

Volume

1

Balranald Mineral Sands Project

NSW Environmental Impact Statement

Prepared for Iluka Resources Limited
May 2015

Main Report



Volume 1

Table of contents

Part A Introduction, site and context, regulatory framework and consultation

Part B Environmental impact assessment

Part C Commitments and justification

References

Acronyms and abbreviations

Volume 2

Appendix A Secretary's Environmental Impact Assessment Requirements

Appendix B Study Team

Appendix C Agricultural Impact Statement

Appendix D Noise Assessment

Appendix E Air Quality and Greenhouse Gas Assessment

Volume 3

Appendix F Biodiversity Assessment

Volume 4

Appendix G Aboriginal Cultural Heritage Assessment

Volume 5

Appendix H Surface Water Management Report

Appendix I Balranald Mineral Sands Project Groundwater Assessment

Appendix J Groundwater Dependant Ecosystems Assessment Report

Volume 6

Appendix K Water Assessment

Appendix L Soil Resource Assessment

Volume 7

Appendix M Rehabilitation and Closure Strategy

Appendix N Transport Assessment

Appendix O Social Assessment

Volume 8

Appendix P Economic Assessment

Appendix Q Geochemistry Assessment

Appendix R Non-Aboriginal Cultural Heritage Assessment

Appendix S Radiation Risk Assessment

CERTIFICATION

For submission of an environmental impact statement (EIS) under Part 4, Division 4.1 of the NSW *Environmental Planning and Assessment Act 1979*

EIS prepared by

Kate Cox	Jarred Kramer	Brett McLennan
BSc (MarSc)	BEng (Env)	BTP (Hons)
EMGA Mitchell McLennan Pty Ltd Ground Floor 20 Chandos Street St Leonards NSW 2065 PO Box 21 St Leonards NSW 1590		

Applicant

Iluka Resources Ltd
Level 23, 140 St Georges Terrace
Perth WA 6000
GPO Box U1988
Perth WA 6845

Proposed development

Balranald Mineral Sands Project
Refer to Chapter 4 of this EIS for a description of the proposed development

Land to be developed

Refer to Table 3.2 of this EIS

Certification

We certify that we have prepared this EIS in accordance with the Secretary's environmental assessment requirements issued for the Balranald Minerals Sands Project on 2 December 2014 and to the best of our knowledge the information contained in this EIS is neither false or misleading



Kate Cox
7 May 2015



Jarred Kramer
7 May 2015



Brett McLennan
7 May 2015

Balranald Mineral Sands Project

Environmental Impact Statement

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Ground Floor, Suite 01, 20 Chandos Street
St Leonards, NSW, 2065




T +61 2 9493 9500
F +61 2 9493 9599
E info@emgamm.com

emgamm.com

Balranald Mineral Sands Project

Final

Report J12011RP1 | Prepared for Iluka Resources Limited | 7 May 2015

Prepared by	Jarred Kramer	Kate Cox	Approved by	Brett McLennan
Position	Environmental Engineer	Associate Environmental Scientist	Position	Director
Signature			Signature	
Date	7 May 2015	7 May 2015	Date	7 May 2015

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T +61 (0)2 9493 9500 | F +61 (0)2 9493 9599

Ground Floor | Suite 01 | 20 Chandos Street | St Leonards | New South Wales | 2065 | Australia

emgamm.com

Table of contents



Table of Contents

PART A Introduction, site and context, regulatory framework and consultation

Chapter 1	Introduction	1
1.1	Overview	1
1.2	Approvals required	1
1.3	State significant development application process	2
1.4	Project location	5
1.5	The proponent	6
1.6	Need for the Balranald Project	6
1.7	EIS study team	7
1.8	EIS structure	7
<hr/>		
Chapter 2	Background	9
2.1	Overview of mineral sands	9
2.2	Iluka’s mining operations in the Murray Basin	9
2.3	Resource exploration	10
2.4	Balranald Project mineral characteristics	10
2.5	Iluka’s mineral processing in the Murray Basin	10
<hr/>		
Chapter 3	Site and surrounds	13
3.1	Project location	13
3.2	Geology of the Murray Basin	13
3.3	Geology of the project area	13
	3.3.1 West Balranald deposit	14
	3.3.2 Nepean deposit	14
3.4	Hydrogeology	16
3.5	Geomorphology	17
3.6	Soils and topography	18
3.7	Climate	20
3.8	Surface water resources	20
3.9	Biodiversity	20
3.10	Land ownership	23
3.11	Surrounding land uses	24
	3.11.1 Agriculture	24
	3.11.2 Natural resources	24
	3.11.3 Conservation areas	24
	3.11.4 Mining	24

Table of Contents *(Cont'd)*

Chapter 4	Project description	33
4.1	Overview	33
4.2	Schedule	33
4.3	Construction phase	39
4.3.1	Site establishment	39
4.3.2	Gravel extraction	39
4.3.3	Construction of access roads	41
4.3.4	Accommodation facility	43
4.3.5	Buildings, workshops and other ancillary facilities	44
4.3.6	Installation of dewatering and injection infrastructure	44
4.3.7	Establishment and commissioning of processing plant	46
4.3.8	Water supply pipeline	46
4.3.9	Construction equipment	47
4.4	Operational phase	47
4.4.1	Mine layout	47
4.4.2	Processing area	48
4.4.3	Groundwater management	54
4.4.4	Mining method, staging and sequence	55
4.4.5	Mining equipment	59
4.5	Processing plant	60
4.5.1	Pre-concentrator plant	60
4.5.2	Wet concentrator plant	61
4.5.3	Wet high intensity magnetic separation plant	61
4.5.4	Ilmenite separation plant	63
4.5.5	Product stockpiles	63
4.6	Tailings and mining by-products management	63
4.6.1	Tailings storage facility	63
4.6.2	Processing mining by-products from Hamilton mineral separation plant	64
4.6.3	Management of potentially acid forming material	64
4.7	Site water management	66
4.7.1	Water sources	66
4.7.2	Water storage infrastructure	67
4.7.3	Water demand	68
4.8	Waste management	68
4.9	Roads and transport	69
4.9.1	Mine access and internal roads	69
4.9.2	Product transport	69
4.9.3	Back-loaded processing by-product transport	69
4.10	Accommodation facility	69

Table of Contents *(Cont'd)*

4.11	Electricity and communications infrastructure	72
4.12	Workforce	72
4.13	Rehabilitation and decommissioning	73

Chapter 5	Consideration of alternatives	77
5.1	Alternatives considered	77
5.2	Mining methods and handling of overburden	77
5.2.1	Dragline	78
5.2.2	Dredging	78
5.2.3	Integrated mining system	79
5.3	Mining sequence	79
5.4	Mine footprint	79
5.5	Processing area location	80
5.6	Power supply	81
5.7	Gravel supply	81
5.8	Materials handling and processing	81
5.8.1	Run of mine pads	81
5.8.2	Mining by-products disposal	82
5.9	Product transport	82
5.9.1	Transport of ore from the Nepean mine	82
5.9.2	Transport of heavy mineral concentrate	82
5.9.3	Transport of ilmenite	83
5.10	Accommodation facility	83
5.11	Water management and supply	84
5.11.1	Groundwater management	84
5.11.2	Fresh water supply	84

Chapter 6	Legislative framework	85
6.1	Introduction	85
6.2	Commonwealth legislation	85
6.2.1	Environment Protection and Biodiversity Conservation Act 1999	85
6.2.2	Native Title Act 1993	86
6.2.3	Water Act 2007	87
6.3	NSW legislation	92
6.3.1	Environmental Planning and Assessment Act 1979	92
6.4	Other NSW legislation	111
6.4.1	Mining Act 1992	111
6.4.2	Protection of the Environment Operations Act 1997	111
6.4.3	Water Act 1912 and Water Management Act 2000	113
6.4.4	National Parks and Wildlife Act 1974	123

Table of Contents *(Cont'd)*

6.4.5	Threatened Species Conservation Act 1995	123
6.4.6	Native Vegetation Act 2003	123
6.4.7	Roads Act 1993	123
6.4.8	Crown Lands Act 1989	124
6.4.9	Western Lands Act 1901	124
6.4.10	Heritage Act 1977	124
6.4.11	Rural Fires Act 1997	124
6.4.12	Dams Safety Act 1978	125
6.4.13	Radiation Control Act 1990	125
6.4.14	Work Health and Safety Act 2011 and Work Health and Safety (Mines) Act 2013	126
6.4.15	Pipelines Act 1967	126
6.5	Strategic policies	127
6.5.1	Draft Murray Regional Strategy	127
6.5.2	NSW 2021	128
6.5.3	Strategic Regional Land Use Policy	129
6.5.4	NSW Aquifer Interference Policy	129
6.5.5	National Water Initiative	130
6.6	Summary of licences approvals and permits	131

Chapter 7	Stakeholder consultation	133
7.1	Overview	133
7.2	Iluka and stakeholder consultation	133
7.3	Consultation objectives	133
7.4	Formal consultation requirements	134
7.5	Stakeholder consultation activities	134
7.5.1	Consultation strategy	134
7.5.2	Stakeholder consultation planning overview	134
7.6	Indigenous stakeholder consultation	145
7.7	Community and service provider consultation	145
7.7.1	Landholder consultation	145
7.7.2	Community service providers	149
7.7.3	Balranald (and surrounds) community consultation	149
7.8	Project design considerations	154
7.9	Ongoing stakeholder engagement	156

PART B	Environmental impact assessment	
---------------	--	--

Chapter 8	Assessment approach	159
8.1	Assessment approach	159
8.2	Assessment structure	160

Table of Contents *(Cont'd)*

8.3	Preliminary risk assessment	160
Chapter 9	Noise and vibration	163
9.1	Introduction	163
9.2	Existing environment	163
9.3	Impact assessment	164
9.3.1	Noise assessment criteria	164
9.3.2	Method	167
9.3.3	Results	169
9.4	Management and mitigation	178
9.4.1	Construction	178
9.4.2	Operations	179
9.5	Conclusion	180
Chapter 10	Air quality	181
10.1	Introduction	181
10.2	Existing environment	181
10.2.1	Meteorology	181
10.2.2	Prevailing wind regime	181
10.2.3	Ambient Temperature	182
10.2.4	Rainfall and evaporation	182
10.2.5	Existing pollutant emission sources	182
10.2.6	Baseline air quality monitoring	182
10.3	Impact assessment	184
10.3.1	Air quality assessment criteria	184
10.3.2	Emissions inventory	187
10.3.3	Assessment locations	187
10.3.4	Air quality modelling	191
10.3.5	Results	191
10.4	Management and mitigation	195
10.4.1	Construction	195
10.4.2	Operation	196
10.5	Conclusion	197
Chapter 11	Greenhouse Gas	199
11.1	Introduction	199
11.2	Existing environment	199
11.3	Impact assessment	200
11.3.1	Methodology	200
11.3.2	Results	201

Table of Contents *(Cont'd)*

11.4	Management and mitigation	201
11.5	Conclusion	202

Chapter 12	Ecology	203
12.1	Introduction	203
12.2	Existing environment	204
12.2.1	Methods	204
12.3	Impact assessment	220
12.3.1	Direct impacts	220
12.3.2	Indirect impacts	221
12.3.3	Impacts to threatened biodiversity	222
12.3.4	Cumulative impacts	224
12.4	Management and mitigation	225
12.4.1	Avoidance	225
12.4.2	Mitigation	225
12.4.3	Biodiversity offset strategy	226
12.5	Conclusion	230

Chapter 13	Aboriginal heritage	233
13.1	Introduction	233
13.2	Assessment method	233
13.3	Existing environment	234
13.3.1	History and landform	234
13.3.2	Archaeological heritage sites	236
13.3.3	Regional archaeological context	237
13.4	Impact Assessment	238
13.4.1	Methodology	238
13.4.2	Survey results	244
13.4.3	Impact assessment	249
13.4.4	Impacts by project area	253
13.4.5	Cumulative impacts	254
13.4.6	Impacts on Willandra Lakes Region World Heritage Area	255
13.5	Management and mitigation	255
13.5.1	Aboriginal cultural heritage management plan	255
13.5.2	Surface salvage collection and management of areas based on risk rating	257
13.5.3	Archaeological research and salvage excavation program	257
13.6	Conclusion	258

Chapter 14	Water resources	261
14.1	Introduction	261

Table of Contents *(Cont'd)*

14.2	Existing environment	262
14.2.1	Surface water	262
14.2.2	Groundwater	264
14.2.3	High priority groundwater dependent ecosystems	268
14.2.4	Water users	269
14.2.5	Hydrogeological numerical model	271
14.3	Impact assessment	271
14.3.1	Assessment criteria	271
14.3.2	Site water management	271
14.3.3	Water demand	273
14.3.4	Site water balance	274
14.3.5	Surface water assessment	274
14.3.6	Groundwater assessment	278
14.3.7	Cumulative impacts	284
14.4	Management and mitigation	284
14.4.1	Water management system	284
14.4.2	Surface water	285
14.4.3	Groundwater	285
14.5	Conclusion	286
<hr/>		
Chapter 15	Soil resources	289
15.1	Introduction	289
15.2	Existing environment	289
15.2.1	Soil landscapes	289
15.2.2	Land systems	290
15.2.3	Soil survey	291
15.2.4	Land and soil capability	293
15.2.5	Biophysical strategic agricultural land	296
15.3	Impact assessment	296
15.3.1	Erosion potential	297
15.3.2	Post-mining land and soil capability	297
15.4	Management and mitigation	298
15.5	Conclusion	300
<hr/>		
Chapter 16	Land use	301
16.1	Introduction	301
16.2	Existing environment	301
16.2.1	Regional agricultural land use	301
16.2.2	Regional agricultural employment and production value	301
16.2.3	Pre-mining potential agricultural production value	302

Table of Contents *(Cont'd)*

16.3	Impact assessment	304
16.3.1	Agricultural production	305
16.3.2	Biophysical strategic agricultural land	306
16.3.3	Southern mallee conservation areas	306
16.3.4	Surface water	306
16.3.5	Groundwater	306
16.3.6	Economic impacts	307
16.4	Management and mitigation	307
16.5	Conclusion	308
<hr/>		
Chapter 17	Rehabilitation	309
17.1	Introduction	309
17.2	Rehabilitation objectives	309
17.3	Operational rehabilitation	310
17.3.1	Seed collection	310
17.3.2	Vegetation clearing	310
17.3.3	Surface soil stripping, stockpiling and management	310
17.3.4	Overburden removal, handling and backfilling	312
17.3.5	Acid mine drainage management implications for rehabilitation	312
17.4	Decommissioning	314
17.4.1	Mine services	314
17.4.2	Infrastructure and buildings	314
17.4.3	Roadways, car parks and hardstands	314
17.4.4	Fuel storages	314
17.4.5	Water storage infrastructure	315
17.4.6	Borrow pits	315
17.5	Post mining land use	315
17.6	Rehabilitation methods for closure	320
17.6.1	Top soil and sub soil reinstatement, compaction and remediation	320
17.6.2	Drainage and erosion control	320
17.6.3	Control of surface water inflow to void	320
17.6.4	Revegetation	320
17.6.5	Brush/timber spreading	321
17.7	Rehabilitation maintenance	321
17.7.1	Weed management	321
17.7.2	Feral species management	321
17.7.3	Infill planting and seeding	322
17.7.4	Fire control	322
17.7.5	Access	322
17.7.6	Public Safety	322

Table of Contents *(Cont'd)*

17.8	Rehabilitation schedule	322
17.9	Rehabilitation criteria	322
17.10	Rehabilitation monitoring	322
17.11	Conclusion	323

Chapter 18	Traffic	325
18.1	Introduction	325
18.2	Existing environment	325
18.2.1	Local road network	325
18.2.2	Key intersections	329
18.2.3	Traffic volumes	330
18.2.4	Traffic capacity standards – level of service	331
18.2.5	Existing pavement condition and width	332
18.2.6	Traffic safety	332
18.2.7	Bus, pedestrian and cycling access	333
18.3	Impact assessment	333
18.3.1	Construction	333
18.3.2	Operations	339
18.4	Management and mitigation	344
18.4.1	Improvements to be implemented by Iluka	344
18.4.2	Improvements to be implemented by road authorities	347
18.4.3	Traffic management plan	347
18.5	Conclusion	347

Chapter 19	Social	349
19.1	Introduction	349
19.2	Existing environment	350
19.2.1	Key socio-economic characteristics	350
19.2.2	Community services and facilities	355
19.2.3	Housing and accommodation	360
19.3	Impact assessment	360
19.3.1	Stakeholder engagement	360
19.3.2	Method	361
19.3.3	Planning feasibility and approvals phase	361
19.3.4	Construction and operational phases	363
19.3.5	Rehabilitation and decommissioning	367
19.3.6	Results	367
19.4	Management and mitigation measures	368
19.4.1	Workforce issues	368
19.4.2	Housing and accommodation	369

Table of Contents *(Cont'd)*

19.4.3 Community services	370
19.4.4 Social amenity	370
19.4.5 Rehabilitation and decommissioning	371
19.5 Conclusion	371

Chapter 20 Economics	373
20.1 Introduction	373
20.2 Existing environment	373
20.2.1 New South Wales	373
20.2.2 Region	377
20.3 Impact assessment	379
20.3.1 Assessment method	379
20.3.2 Benefit cost analysis	380
20.3.3 Economic impacts	386
20.3.4 Government finance	392
20.4 Management and mitigation	393
20.5 Conclusion	393

Chapter 21 Geochemical	395
21.1 Introduction	395
21.2 Method	396
21.2.1 Sampling	396
21.2.2 Test work	397
21.3 Existing environment	397
21.3.1 Hydrogeology	397
21.3.2 Geochemical characterisation	398
21.4 Impact assessment	399
21.4.1 Methodology	399
21.4.2 Results	401
21.4.3 Analysis	418
21.5 Management and mitigation	418
21.6 Conclusion	420

Chapter 22 Hazard and risk	421
22.1 Introduction	421
22.2 Radioactive mine materials	421
22.2.1 Introduction	421
22.2.2 Existing environment	422
22.2.3 Impact assessment	423
22.2.4 Management and mitigation	433

Table of Contents *(Cont'd)*

22.2.5 Conclusion	434
22.3 Storage of dangerous goods	434
22.3.1 Introduction	434
22.3.2 Diesel	434
22.3.3 Petrol	434
22.3.4 Other hydrocarbons	435
22.3.5 Liquid petroleum gas	436
22.3.6 Mitigation and management	436
22.3.7 Conclusion	436
<hr/>	
Chapter 23 Bushfire	437
23.1 Introduction	437
23.2 Existing environment	437
23.2.1 Bushfire prone land	437
23.2.2 Lower Western Zone Bushfire Risk Management Plan	438
23.3 Impact assessment	438
23.3.1 Scope of assessment	438
23.3.2 Assessment method	439
23.3.3 Type of development	441
23.3.4 Asset protection zones	441
23.3.5 Results	445
23.4 Management and mitigation	445
23.4.1 Hazard reduction	445
23.4.2 Water	445
23.4.3 Electricity and gas	446
23.4.4 Access	446
23.4.5 Bushfire construction levels	446
23.4.6 Reducing risk of fire or explosion	446
23.4.7 Bushfire management procedures	447
23.5 Conclusion	447
<hr/>	
Chapter 24 Non-Indigenous heritage	449
24.1 Introduction	449
24.2 Existing environment	449
24.2.1 European settlement history	449
24.2.2 Historical sites and structures	451
24.3 Impact assessment	452
24.3.1 Methodology	452
24.3.2 Survey results	452
24.3.3 Impact assessment	452

Table of Contents *(Cont'd)*

24.4	Management and mitigation	452
24.5	Conclusion	452

Chapter 25	Visual	453
25.1	Introduction	453
25.2	Existing environment	453
25.2.1	Visual character	453
25.2.2	Assessment locations	453
25.2.3	Changes to existing visual character	454
25.3	Impact assessment	455
25.3.1	Method	455
25.3.2	Results	461
25.3.3	Telecommunications towers	467
25.3.4	Cumulative impacts	470
25.4	Management and mitigation	470
25.5	Conclusion	470

PART C	Commitments and justification	
---------------	--------------------------------------	--

Chapter 26	Summary of management and mitigation measures	473
26.1	Introduction	473
26.2	Environmental management strategy	473
26.3	Summary of management and mitigation measures	473

Chapter 27	Justification and conclusion	487
27.1	Introduction	487
27.2	Need for the Balranald Project	487
27.3	Economic justification	487
27.3.1	Benefits and costs	487
27.3.2	Economic stimulus	488
27.4	Social justification	489
27.4.1	Community support	489
27.4.2	Stronger regional economy	489
27.4.3	Arresting population decline	489
27.5	Biophysical justification	490
27.5.1	Rehabilitation	490
27.5.2	Enhanced biodiversity conservation	490
27.6	Objects of the EP&A Act	491
27.6.1	Proper management, development and conservation of resources	491
27.6.2	Orderly development	492
27.6.3	Communication and utility services	492

Table of Contents *(Cont'd)*

27.6.4 Land for public purposes	492
27.6.5 Community services and facilities	493
27.6.6 Protection of the environment	493
27.6.7 Ecologically sustainable development	493
27.6.8 Affordable housing	496
27.6.9 Sharing of responsibility	496
27.6.10 Increased public involvement	496
27.7 Objects of the Environment Protection and Biodiversity Conservation Act 1999	497
27.7.1 Protection of the environment	497
27.7.2 Ecologically sustainable development	498
27.7.3 Conservation of biodiversity	498
27.7.4 Protection and conservation of heritage	498
27.7.5 Co-operative approach	498
27.7.6 Co-operative implementation of responsibilities	498
27.7.7 Recognise role of indigenous people	499
27.8 Conclusions	499

References	501
------------	-----

Acronyms and abbreviations	507
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Appendices

A	Secretary's Environmental Assessment Requirements
B	Study Team
C	Agricultural Impact Statement
D	Noise Assessment
E	Air Quality and Greenhouse Gas Assessment
F	Biodiversity Assessment
G	Aboriginal Cultural Heritage Assessment
H	Surface Water Management Report
I	Groundwater Modelling
J	Groundwater Dependant Ecosystems Assessment Report
K	Water Assessment
L	Soil Resource Assessment
M	Rehabilitation and Closure Strategy
N	Transport Assessment
O	Social Assessment
P	Economic Assessment

Appendices

Q	Geochemistry Assessment
R	Non-Aboriginal Cultural Heritage Assessment
S	Radiation Risk Assessment

Tables

1.1	Project area and disturbance area	6
1.2	Technical study location in EIS	8
3.1	Land systems of the project area	18
3.2	Land details in the project area	23
4.1	Gravel demand	40
4.2	Indicative material volumes over the life of the Balranald Project	59
4.3	Water storage infrastructure	68
6.1	Estimate surface water SDLs	89
6.2	Schedule 2 requirements for an EIS	110
6.3	Requirements for water sharing (Western Murray Porous Rock Groundwater Source)	119
6.4	Average availability of high and general security water from the Murrumbidgee River WSP	122
6.5	Summary of required licenses approvals and permits	131
7.1	Government consultation activities and outcomes	139
7.2	Landholder consultation activities and outcomes	147
7.3	Community consultation activities and outcomes	152
9.1	Summary of existing background and ambient noise levels, dB(A)	164
9.2	Construction noise management level for the project	164
9.3	Operational noise assessment criteria for the Balranald Project	165
9.4	Characterisation of noise impacts and potential treatments	165
9.5	Road traffic noise assessment criteria for residential land use	167
9.6	Relative increase criteria for residential land uses	167
9.7	Relevant site-specific meteorological parameters	169
9.8	Predicted 24 hour construction noise levels, dB(A)	169
9.9	Predicted maximum construction noise levels where criteria are exceeded, dB(A)	171
9.10	Predicted operational noise levels at assessment locations during calm, prevailing and temperature inversion meteorology - dB(A), $L_{eq,(15-min)}$	172
9.11	Characterisation of impacts where predicted noise levels are above PSNL, adverse weather conditions, all years	172
9.12	Predicted operational low frequency noise levels, $L_{eq,(15min)}$	174

Tables

9.13	Maximum noise from intermittent sources at assessment locations, dB(A)	176
9.14	Construction road traffic noise levels (2018), night-time, dB(A)	176
9.15	Operational road traffic noise levels (Year 4), night-time, dB(A)	178
10.1	Impact assessment criteria – particulate matter	185
10.2	Impact assessment criteria – deposited dust	186
10.3	Particulate matter mitigation and acquisition criteria	186
10.4	Year 1 operations – model predictions for the 10 most potentially impacted assessment locations	192
10.5	Year 4 operations – model predictions for the 10 most potentially impacted assessment locations	193
10.6	Year 8 operations – model predictions for the 10 most potentially impacted assessment locations	194
11.1	Calculated annual GHG emissions – Years 1 to Year 8	201
12.1	Summary of fauna survey effort	207
12.2	Vegetation types recorded in the disturbance area	212
12.3	Threatened species recorded or with the potential to be impacted by the project	215
12.4	Conservation significance of remnant native vegetation in the disturbance area	220
12.5	Threatened fauna with the potential for significant impacts	223
12.6	BioBanking ecosystem credit calculations	228
12.7	Biobanking species credit calculations	229
13.1	AHIMS search results by land system	236
13.2	Survey coverage of the land systems	244
13.3	Summary of Aboriginal sites in the BPAHD by site type	244
13.4	Summary of Aboriginal sites within the BPAHD by project element	245
13.5	Summary of archaeological significance and corresponding loss of value	252
13.6	Archaeological risk layer definitions	253
13.7	Recommended management of risk layers with unsurveyed area and known sites	258
14.1	Operation phase water demands	273
14.2	Water balance (average rainfall year)	274
14.3	Overview of predicted groundwater level changes in private landholder bores	280
15.1	Soil landscapes of the Balranald area ¹ and associated land systems in the project area	290
15.2	Land systems and extent in the project area	290
15.3	Great soil groups, land systems, soil types and areas	291
15.4	Land and soil capability classes	293
15.5	Summary LSC classes per soil type	294
15.6	Summary of erosion potential	297
15.7	Changes to land and soil capability	297
16.1	Balranald LGA agricultural production value (2006)	302

Tables

16.2	Pre-mining gross agricultural margin per enterprise for the MDA and ADA	303
16.3	Assessment against the requirements of clause 12 of the Mining SEPP	304
16.4	Summary of gross margins for temporary disturbance	305
17.1	Summary of rehabilitation material volumes	312
17.2	Summary of overburden and ore geochemistry and storage strategies	313
17.3	Primary and secondary domains and final land use	317
18.1	Existing daily traffic and heavy vehicle volumes	331
18.2	Peak construction workforce vehicle movements	334
18.3	Construction heavy vehicle movements	334
18.4	Daily construction traffic volume increase – 2018	336
18.5	Operational workforce vehicle movements	339
18.6	Bulk commodities generated vehicle movements	339
18.7	Daily operational phase traffic increase – 2020	341
18.8	Summary of proposed road and intersection improvements	345
19.1	Key socio-economic characteristics	350
19.2	Summary of potential social impacts during phases of Balranald Project	367
20.1	NSW land use	374
20.2	NSW Water Consumption 2009-2010	375
20.3	Industry gross value added for water using industries 2009–2010 (Australia)	376
20.4	Agricultural land use and value of production in region 2006	377
20.5	Employment by agricultural sectors in the region 2011	378
20.6	Employment by mining and extractive industries in the region 2011	379
20.7	Potential incremental economic benefits and costs of the Balranald Project	381
20.8	Results of BCA (present values @7% discount rate)	384
20.9	Economic impacts of construction on the regional economy	387
20.10	Economic impact of operations on the regional economy	388
20.11	Economic impact of operations on the NSW economy	389
20.12	Regional economic impacts of the Balranald Project and Displaced Agriculture	391
21.1	AMD risk classification	398
21.2	Likelihood definitions	399
21.3	Consequence definition	400
21.4	Impact rating matrix	401
21.5	Summary of geochemical overburden impacts from the Balranald Project	402
21.6	Summary of geochemical ore impacts from the Balranald Project	405
21.7	Summary of geochemical mining by-product impacts from the Balranald Project	408
21.8	Summary of geochemical pit walls, benches and floor impacts from the Balranald Project	414
21.9	Summary of geochemical product impacts from the Balranald Project	416

Tables

22.1	Dose limits for occupational exposed persons and members of the public	423
22.2	Radiation analysis for mine materials	425
22.3	Classification of mine materials	426
22.4	Summary of radiation analysis for West Balranald bores	426
22.5	Summary of radiation analysis for Nepean bores	427
22.6	Summary of radiation analysis for mining by-products	428
22.7	Classification of by-products	429
22.8	Potential dose delivery pathways of handling and stockpiling at Balranald Mine	431
22.9	Potential dose delivery pathways of transportation	432
23.1	Vegetation classifications	442
25.1	Visual impact results	462
26.1	Summary of management and mitigation measures	473

Figures

1.1	Regional context	3
1.2	Location of the project area	4
2.1	Iluka's Murray Basin operations	11
3.1	Conceptual geological cross section	15
3.2	Surrounding land use - natural features	22
3.3	Assessment locations and landownership	25
3.4	Surrounding land use - other features	26
4.1	Indicative project schedule	34
4.2	West Balranald access road, water supply pipeline and gravel extraction areas	35
4.3	West Balranald mine and gravel extraction areas	36
4.4	Nepean access road and injection borefield	37
4.5	Nepean mine	38
4.6	Balranald-Ivanhoe Road and West Balranald access road intersection design	42
4.7	Conceptual mine stage plan for West Balranald mine – Year 1	49
4.8	Conceptual mine stage plan for West Balranald mine – Year 4	50
4.9	Conceptual mine stage plan for West Balranald mine – Year 8	51
4.10	Conceptual mine stage plan for Nepean mine – Year 8	52
4.11	Conceptual site layout for West Balranald processing area	53
4.12	Conceptual long section of mining progression	56
4.13	Conceptual mining progression	57
4.14	Mineral processing plant process flow diagram	62

Figures

4.15	Transport route for HMC (HMC) and ilmenite (NSW)	70
4.16	Accommodation facility location	74
4.17	Accommodation facility conceptual layout	75
6.1	Boundary of surface water SDL resource units	90
6.2	Boundary of groundwater SDL resource units	91
6.3	Planning approval process	96
6.4	Groundwater sharing plan boundaries	115
6.5	Surface water sharing plan boundaries	116
9.1	Noise sensitive receptors and noise monitoring locations	170
9.2	Worst case noise levels (all years), db(A)	173
9.3	Privately owned land assessment - Worst case noise levels, all years, all assessed meteorological conditions, Leq(9-hr) dB(A)	175
10.1	PM ₁₀ and PM _{2.5} - Incremental 24 hour average and incremental annual average - Year 1188	
10.2	PM ₁₀ and PM _{2.5} - Incremental 24 hour average and incremental annual average - Year 4189	
10.3	PM ₁₀ and PM _{2.5} - Incremental 24 hour average and incremental annual average - Year 8190	
12.1	Flora quadrat locations	206
12.2	Fauna survey locations	208
12.3	Mapped vegetation types	214
12.4	Recorded threatened species locations	219
13.1	Aboriginal sites in and around the project area	250
13.2	Aboriginal heritage risk layers in the project area	251
14.1	Iluka's groundwater monitoring installations	265
14.2	Ecosystems that rely on groundwater	270
14.3	Landholder bores and formation	272
14.4	Water balance schematic	276
14.5	Predicted flood extent	279
15.1	Existing land and soil capability	295
15.2	Post-mining land and soil capability	299
17.1	Post-mining land use	319
18.1	Construction traffic routes	326
18.2	Operational traffic routes	327
18.3	Construction daily traffic movements	337
18.4	Operational daily traffic movements	342
19.1	Social assessment study area	352
22.1	SEPP 33 criteria for Class 3 PGII and PGIII flammable liquids (DP&I 2011c)	435
23.1	Bushfire prone land	440
23.2	Bushfire hazard vegetation near the processing area	443
23.3	Slope near the processing area	444

Figures

24.1	The boundary of Paika Station	450
25.1	Viewshed analysis - Year 1, West Balranald mine	457
25.2	Viewshed analysis - Year 4, West Balranald mine	458
25.3	Viewshed analysis - Year 8, West Balranald mine	459
25.4	Viewshed analysis - Year 8, Nepean mine	460

Photographs

25.1	550 kV tower in the US	468
25.2	Telecommunications tower adjacent to Balranald-Ivanhoe Road (photograph taken about 1 km from tower)	469
25.3	Telecommunications tower adjacent to Balranald-Ivanhoe Road (photograph taken about 1.2 km from tower)	469

Part A

Introduction, site and context, regulatory framework and consultation



1 Introduction

1.1 Overview

Iluka Resources Limited (Iluka) proposes to develop a mineral sands mine in south-western New South Wales (NSW), known as the Balranald Mineral Sands Project (the Balranald Project). The Balranald Project 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. The location of the project area is shown in Figure 1.1.

Ore extracted from the Balranald Project would be processed on-site to produce heavy mineral concentrate (HMC) and ilmenite, which will be transported by road to Victoria. Processing of HMC would be undertaken at Iluka's existing mineral separation plant (MSP) at Hamilton (the Hamilton MSP). From the Hamilton MSP, HMC products will continue to be transported by rail to Portland or other ports within Victoria. Ilmenite would be transported by road to a proposed rail loading facility in Manangatang, Victoria. From here, it would be loaded into wagons or containers to be railed to port facilities in Victoria.

By-products from the Hamilton MSP would be managed within Iluka's existing Victorian operations or returned by road to the Balranald Project for management within the mine void. Disturbance associated with mining will be progressively rehabilitated.

The Balranald Project also includes groundwater management infrastructure, a workforce accommodation facility, the extraction of gravel from local sources and a fresh water supply pipeline from the Murrumbidgee River.

The Balranald Project would also generate the need for other infrastructure subject to separate approvals in both NSW and Victoria (refer Section 1.2).

1.2 Approvals required

The Balranald Project requires a number of approvals in NSW and Victoria, as well as approval from the Commonwealth.

In NSW, three key planning approvals are required:

- Development consent under the State significant development (SSD) provisions under Part 4, Division 4.1 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) for:
 - construction, operation and rehabilitation of a mineral sands mining operation, including the extraction of ore from the West Balranald and Nepean deposits, known as the West Balranald and Nepean mines (see Figure 1.2);
 - processing of extracted ore to produce HMC and ilmenite; and
 - transport of HMC and ilmenite by road to Victoria either for further mineral processing or directly to market.

- Approval under Part 5 of the EP&A Act for a transmission line to supply power to the Balranald Project. Approval under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) for the Balranald Project (with the exception of the transmission line which will be subject to a separate EPBC Act referral process).

This environmental impact statement (EIS) has been prepared to accompany a SSD application for the mining of the West Balranald and Nepean deposits, the processing of ore, the transport of the products to Victoria and the return of mining by-products from Victoria. Separate environmental impact assessments (EIAs) will be prepared to accompany applications under Part 5 of the EP&A Act and the EBPC Act.

As previously stated, the Balranald Project includes an accommodation facility at the mine site to cater for the construction and operational workforce required for the life of the project. Approval is sought as part of the SSD application for the accommodation facility to be located in the project area, south east of the West Balranald mine.

Iluka is also investigating lodging a separate development application (DA) under Part 4 of the EP&A Act with Balranald Shire Council (BSC) to locate the accommodation facility within Balranald town, at a location on the Balranald-Ivanhoe Road and adjacent to Mungo and River streets. It is recognised that an accommodation facility within Balranald town may provide increased benefits for Iluka's workforce (through access to recreational and other services), as well as promoting a higher level of integration with and utilisation of services (ie retail, hospitality, health sectors) provided by the Balranald community¹.

For the purposes of this EIS, the accommodation facility has been assessed as being within the project area. In the event that approval is received for both options, Iluka would only construct an accommodation facility at one of the approved locations.

In Victoria, the Balranald Project proposes to use both existing and new rail loading facilities, as well as Iluka's existing Hamilton MSP. Separate approvals will be pursued under the Victorian *Planning and Environment Act 1987* (P&E Act) for the construction and operation of a proposed rail loading facility in Manangatang, approximately 110 km south-west of Balranald, and for the proposed use of port facilities at Geelong.

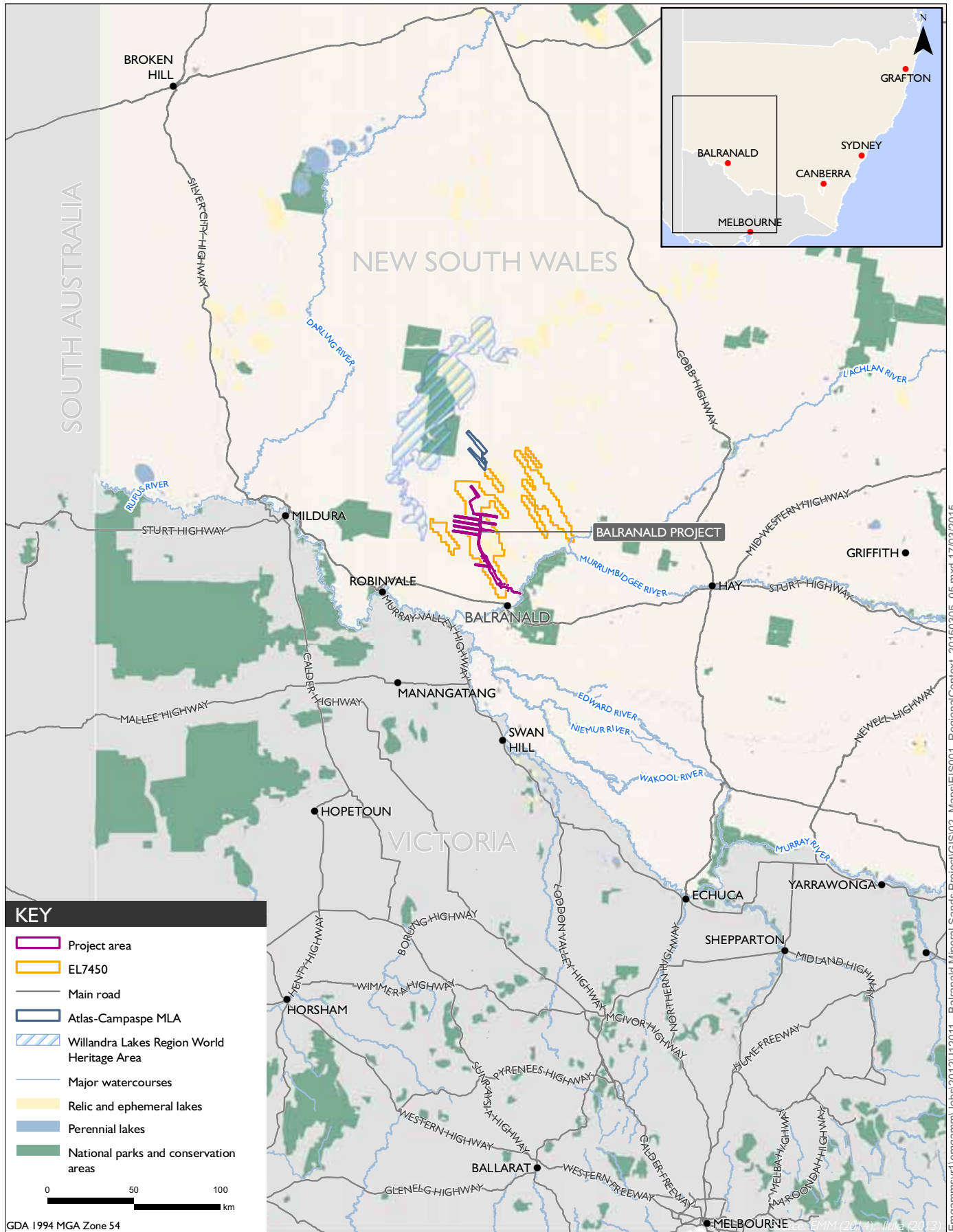
1.3 State significant development application process

The EP&A Act and the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation) provide the framework for environmental planning and assessment in NSW. Part 4 of the EP&A Act relates to development assessment; Division 4.1 specifically relates to the assessment of development deemed to be significant to the state (or SSD).

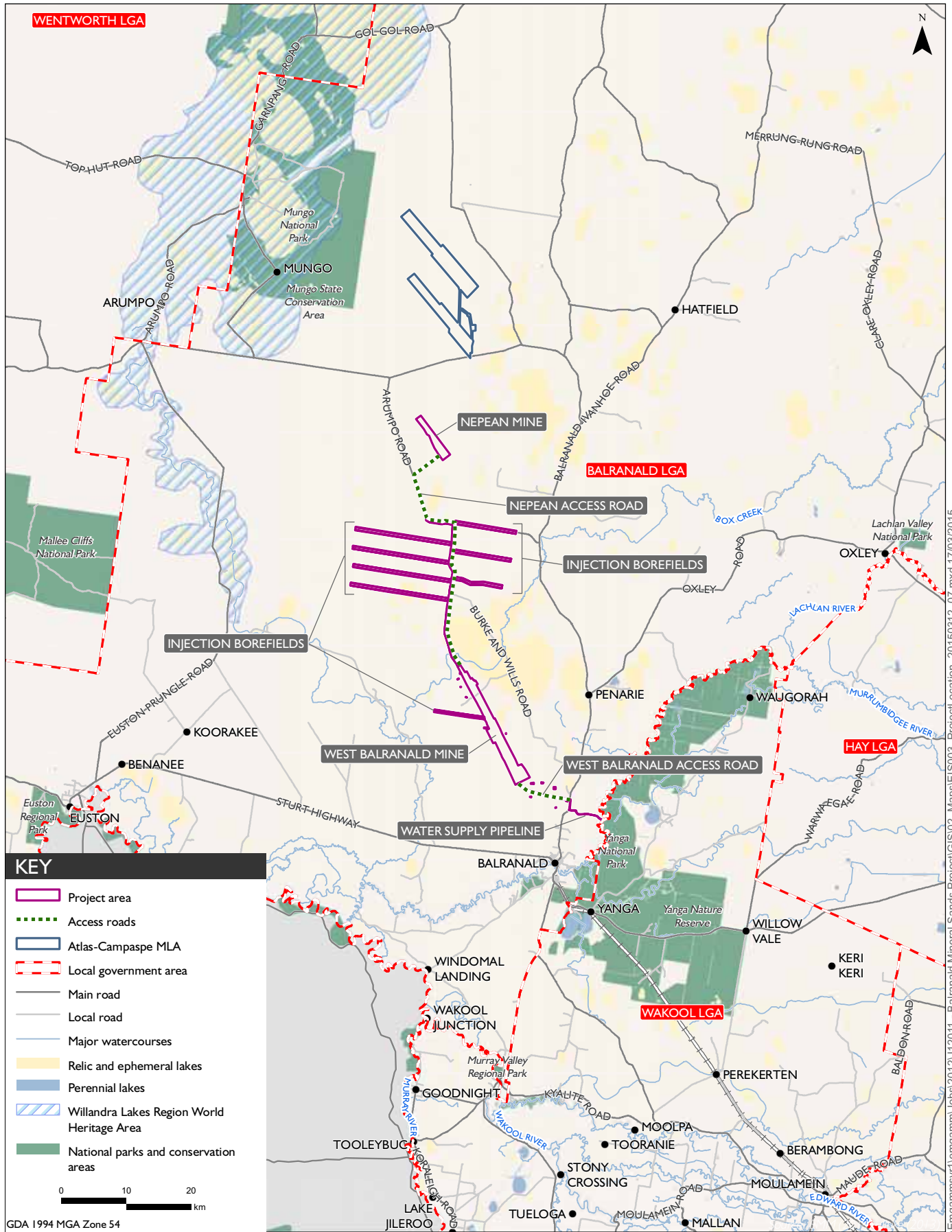
Schedule 1 of *State Environmental Planning Policy (State and Regional Development) 2005* (State and Regional Development SEPP) defines SSD, which includes mineral sands mining. Accordingly, the Balranald Project is of a kind described within Schedule 1 of State and Regional Development SEPP and therefore meets the requirements for SSD.

An EIS is required to accompany an application for SSD. The NSW Minister for Planning is the consent authority, although decisions for Part 4, Division 4.1 projects may be delegated to the NSW Planning Assessment Commission (PAC).

¹ Iluka will progressively develop concepts for an accommodation facility in Balranald town, including consulting with key stakeholders in a constructive manner, and seek approval under a separate DA to be assessed by BSC.



Regional context
 Balranald Mineral Sands Project
 Environmental Impact Statement
 Figure I.1



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Location of the project area
 Balranald Mineral Sands Project
 Environmental Impact Statement
 Figure I.2

This EIS has been prepared to address specific requirements provided in the Secretary's environmental assessment requirements (SEARs) for the SSD application, issued on 2 December 2014. The SEARs are provided in Appendix A, along with a table referencing where each requirement has been addressed in this EIS. It is intended to inform government authorities and other stakeholders about the Balranald Project, and the measures that will be included to mitigate, manage and/or monitor potential impacts and the resultant social, economic and environmental impacts, both positive and negative.

The approval process under Part 4, Division 4.1 of the EP&A Act is described in Chapter 6.

This EIS does not support applications for:

- approval under Part 5 of the EP&A Act for the electricity transmission line;
- approval under the EPBC Act;
- development consent under Part 4, Division 1 of the EP&A Act for an accommodation facility in Balranald town; or

approval under the P&E Act for any infrastructure in Victoria. Applications for these approvals will be supported by separate EIAs as may be required.

1.4 Project location

The Balranald Project is located within the Murray Basin in south-western NSW, near Balranald town, within the Balranald Local Government Area (LGA). The Murray Basin forms part of the larger Murray-Darling Basin in Queensland, NSW, Victoria, South Australia and the Australian Capital Territory. The West Balranald and Nepean deposits are within Exploration Licence (EL) 7450. The regional context of the Balranald Project is presented in Figure 1.1.

The land on which the West Balranald and Nepean mines are proposed to be developed, referred to as the project area (Figure 1.2), is approximately 9,964 hectares (ha). Within the project area are the West Balranald and Nepean mines, access roads, groundwater injection borefields, gravel extraction areas, an accommodation facility, a water supply pipeline and other ancillary infrastructure. Within the project area, the land directly disturbed for the Balranald Project is referred to as the disturbance area. For some project elements in the project area, a larger area has been surveyed than would actually be disturbed. This enables some flexibility to account for changes that may occur during detailed design and operation. The project area and disturbance area for each project element are in Table 1.1.

Table 1.1 Project area and disturbance area

Project element	Project area (ha)	Disturbance area (ha)
West Balranald mine	3,059	3,059
Nepean mine	805	805
West Balranald access road	128	52 ¹
Nepean access road	173	156 ²
Injection borefields	5,721	1,214 ³
Gravel extraction	42	42
Water supply pipeline	29	11 ⁴
Accommodation facility	7	7
Total	9,964	5,346

Notes:

1. 60 m wide corridor within project area.
2. 40-50 m wide corridor within project area.
3. 100 m wide corridors within project area.
4. 15 m wide corridor within project area.

Land uses in the project area are primarily agricultural. These include grazing and broad acre cropping. Agricultural land is interspersed with areas of native vegetation, primarily chenopod and mallee scrub, as well as conservations areas in the region (refer Section 3.11.3).

1.5 The proponent

Iluka is an Australian-listed ASX 100 company and a major participant in the global mineral sands industry. It is involved in the exploration, project development, operation (mining and processing) and marketing of mineral sands products.

Iluka's mining and processing operations in Australia produce zircon for ceramics and refractories, and titanium minerals for paint pigments and other protective coatings.

Over recent years, the company has transformed its asset base from its historical reliance on its Western Australian mining operations to new, high quality operations in the Murray Basin (Victoria and NSW) and Eucla Basin (South Australia). Iluka's mining operations in the Murray Basin include the Douglas and Kulwin mines which have ceased production, and the Woornack, Rownack and Pirro (WRP) mine which only recently ceased mining in March 2015. The WRP mine will continue to provide HMC feedstock to the Hamilton MSP for a period of time. This timeframe will depend on market conditions and demand for products.

1.6 Need for the Balranald Project

HMC produced at Iluka's Murray Basin operations is processed at the Hamilton MSP in Victoria. The MSP has a capacity of approximately 0.5 million tonnes (Mt) per annum. Operation of the MSP currently relies largely on HMC feed from the WRP mine, however HMC from Eucla Basin has also been processed and blended with HMC from the Murray Basin.

Unless a new source of HMC feedstock for the Hamilton MSP is provided following exhaustion of HMC feedstock from the WRP mine, the MSP is likely to either be fed from an alternative interstate mine (eg HMC from Eucla Basin), placed into care and maintenance or closed.

The Balranald Project has been identified as the subsequent main source of HMC for the Hamilton MSP (due to its proximity and value) following completion of feedstock from the WRP mine.

1.7 EIS study team

This EIS has been prepared by EMGA Mitchell McLennan Pty Limited (EMM) and a team of technical specialists. The study team is provided in Appendix B.

A pre-feasibility study (PFS) and phase one of a definitive feasibility study (DFS) for the Balranald Project have been completed by Iluka, with input from environmental and engineering specialists. Information from these studies and the specialists involved has been used in the preparation of this EIS.

1.8 EIS structure

This EIS comprises eight volumes.

Volume 1, the main EIS, is structured as follows:

Part A - Introduction, site and context, regulatory framework and consultation - an overview of the Balranald Project, proponent, need for the project and the environmental, social and legislative context in which it would be developed.

Part B - Environmental impact assessment - for each technical study, the assessment objectives, methods and existing environment are described. The management measures that would be implemented are presented followed by the predicted impacts following the implementation of these measures. Finally, environmental monitoring is described to measure impact predictions and allow management/monitoring to be refined.

Part C - Commitments and justification - a statement of commitments that consolidates the key environmental management measures. The Balranald Project is justified on social, economic and environmental grounds, taking into account its consistency with objectives of the EP&A Act, EPBC Act, SEARs and State legislation and policies.

Acronyms and references used in the preparation of this EIS are at the end of this volume.

Volumes 2 to 8 contain all appendices and supporting technical studies as shown in Table 1.2.

Table 1.2 **Technical study location in EIS**

Volume	Appendix	Study
2	A	Secretary's Environmental Assessment Requirements
	B	Study Team
	C	Agricultural Impact Statement
	D	Noise Assessment
	E	Air Quality and Greenhouse Gas Assessment
3	F	Biodiversity Assessment
4	G	Aboriginal Cultural Heritage Assessment
5	H	Surface Water Management Report
	I	Balranald Mineral Sands Project Groundwater Assessment
	J	Groundwater Dependant Ecosystems Assessment Report
6	K	Water Assessment
	L	Soil Resource Assessment
7	M	Rehabilitation and Closure Strategy
	N	Transport Assessment
	O	Social Assessment
8	P	Economic Assessment
	Q	Geochemistry Assessment
	R	Non-Aboriginal Cultural Heritage Assessment
	S	Radiation Risk Assessment

2 Background

2.1 Overview of mineral sands

Mineral sands is a collective term applied to a group of heavy minerals with a high specific gravity. The mineral sands industry consists of two principal product streams; zircon and titanium dioxide minerals, in the form of rutile, ilmenite and leucoxene.

Deposits of mineral sands are formed along ancient coastlines where heavier minerals have been concentrated by wave and wind action. Mineral sand ore bodies are categorised based on the mode of deposition: alluvial (deposited by water/wave action) or aeolian (deposited by wind). The Balranald Project comprises two alluvial deposits, which are further categorised as 'marine beach placer' deposits, or strandlines, which are relatively narrow, linear strandlines of ore.

Most mineral sand deposits are found in unconsolidated fossil shorelines between several hundred metres to hundreds of kilometres inland from the present coastline. Repeated storm erosion and reworking over centuries or millennia may progressively enrich a mineral sands deposit (Iluka 2012).

Over geologically longer periods, subsidence of coastal sediments, changing sea levels caused by ice ages, or isostatic adjustment of continental margins may cause the shorelines to migrate inland (marine transgression), reworking earlier accumulations into larger deposits, or to migrate seaward (marine regression) leaving reworked deposits preserved inland.

Most mineral sands deposits currently mined by Iluka were formed during the Holocene and Pleistocene periods (over the past 1.8 million years) but may date back into the Mid Miocene period (12 million years ago) (Iluka 2012). The West Balranald and Nepean deposits are located some 450 km from the south-eastern Australian coastline, and are approximately 5 million years old.

2.2 Iluka's mining operations in the Murray Basin

Iluka's operations in the Murray Basin (Figure 2.1) produce approximately 0.32 Mt of HMC per annum. The operations have involved mining a series of southern and northern deposits within the Murray Basin since 2004.

Initial mining in the Murray Basin occurred at the southern deposits located near Douglas and a satellite deposit called Echo. The Douglas mine commenced operations in mid-2005 and concluded in early 2012. In 2010 the site commenced processing of ore from Echo mine (now complete). The Douglas site currently receives the non-saleable by-products from the Hamilton MSP operations that are placed in a mined out void created during mining operations. At the time of publication of this EIS, Iluka were seeking separate approval from the Victorian Minister for Planning for the continued disposal of Hamilton MSP by-products at Douglas.

The second stage of operations in the Murray Basin involved mining a series of northern ore bodies known as the Kulwin and WRP group of deposits. The initial northern deposit, Kulwin, was located 28 km east of Ouyen and 30 km west of Manangatang. Kulwin operations were completed in early 2012. Operations commenced in May 2012 at the WRP group of deposits, located 20 km south-east of Ouyen, with mining ceasing during March 2015 and transportation of HMC stockpile anticipated to be completed by 2016.

2.3 Resource exploration

Exploration drilling has been undertaken at the West Balranald and Nepean deposits since 1998, when the West Balranald deposit was first discovered. Initial air core drilling was undertaken along the West Balranald deposit in 1998 and 1999, with further intermittent drilling programmes completed in 2001 and 2003, and an Inferred Resource (quantity and grade/quality estimated on the basis of limited geological evidence and sampling) for West Balranald was reported in 2003. Further drilling was conducted in 2006 and 2007 which defined the extent of the deposit.

A major drilling program over a 17 km length of the deposit was completed in 2009 with an Indicated Resource reported later that year. In 2011 a drilling program was completed to extend the Indicated Resource a further 2.8 km at the north end of the deposit, and from late 2011 to early 2012 infill drilling was conducted to achieve a drill grid of 20 m by 200 m over a 5.6 km strike length near the centre of the deposit.

The Nepean deposit was initially intersected by exploration drilling in 2002. An initial Inferred Resource was reported in 2007. A further two additional drilling programs and a resultant Inferred Resource estimate update was completed in 2008 and 2010. An Indicated Resource was reported for the Nepean deposit in 2011, and updated in 2012 following further drilling.

Iluka was granted EL 7450 on 18 February 2010 covering both deposits. Prior to this, exploration was undertaken in both deposits under a number of ELs, some of which were consolidated to form EL 7450.

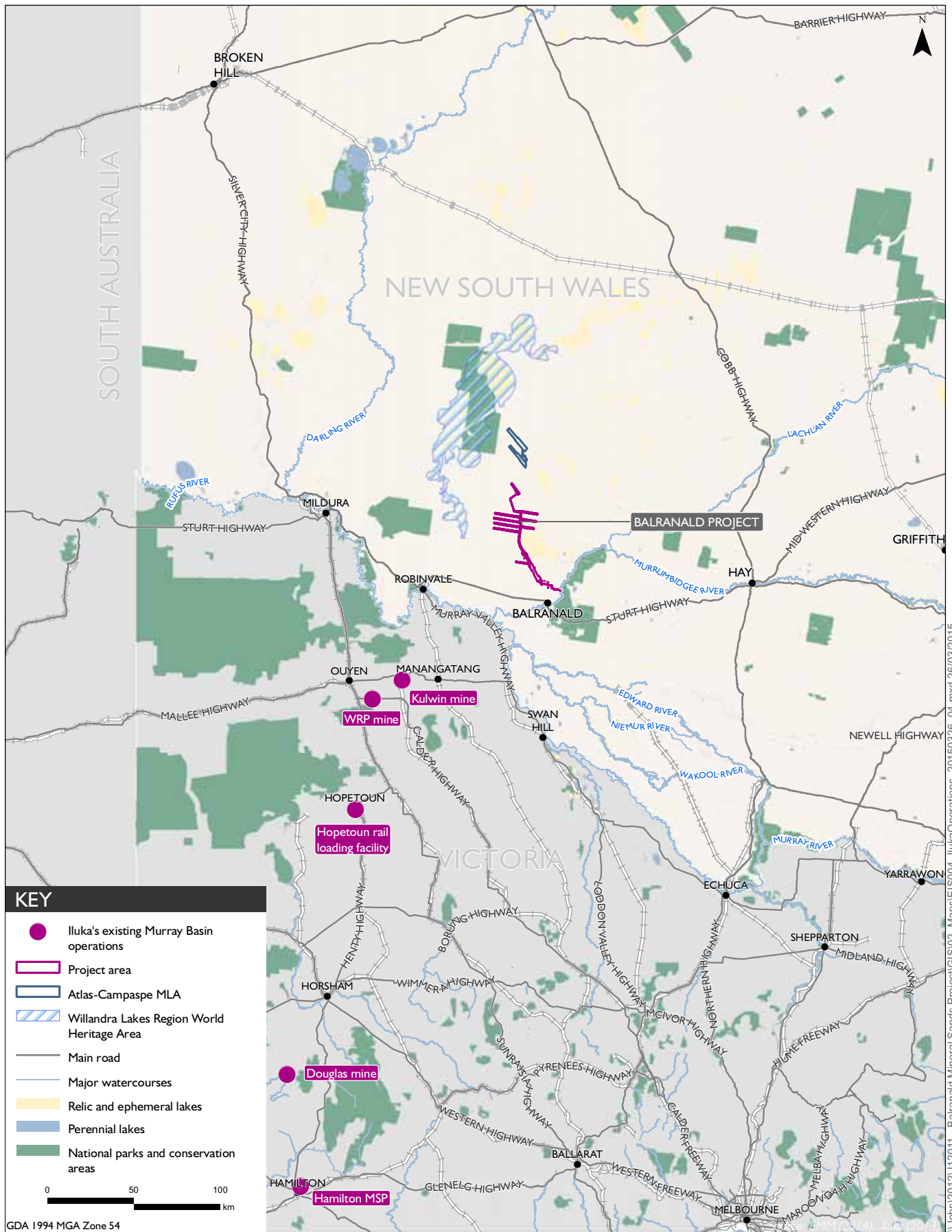
2.4 Balranald Project mineral characteristics

The West Balranald and Nepean deposits have an approximate north-west/south-east alignment and are approximately 20 km and 8 km long respectively. The West Balranald deposit consists of a single high grade linear strand of ore 50 to 80 m below the surface with a variable width along its strike length, from 160 m in the south and north to a maximum of 300 m in the centre. Average thickness also varies along strike from approximately 3 m at the southern and northern extremities to 6 m through the central area of the strand. The Nepean deposit consists of a single high grade linear strand 40 to 60 m below the surface with a variable width along its strike length from 130 m in the south to 160 m in the north with an average thickness of between 4 to 5 m.

The combined Measured, Indicated and Inferred Resource of the West Balranald deposit (excluding Nepean) contains 12.0 Mt of heavy mineral with an average assemblage of 10.8% zircon, 11.9% rutile and 64.1% ilmenite. The Measured Resource makes up 3.8 t of the total Measured, Indicated and Inferred Resource. The combined Indicated and Inferred Resource reported for the Nepean deposit contains 2.4 Mt of heavy mineral with an average assemblage of 14.4% zircon, 14.5% rutile and 59.7% ilmenite.

2.5 Iluka's mineral processing in the Murray Basin

Until March 2015, mineral processing was undertaken at the WRP mine to produce HMC and ilmenite. HMC is transported from the WRP mine by road to Iluka's rail loading facility at Hopetoun, and by rail to the Hamilton MSP. Further downstream mineral processing of HMC is undertaken at the Hamilton MSP. The MSP uses gravimetric, electrostatic and electromagnetic separation to produce final products including zircon, rutile, leucoxene and ilmenite. From the Hamilton MSP, product is transported by road to the Port of Portland for export to customers or to Iluka operations in Western Australia for further processing.



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Iluka's Murray Basin operations
 Balranald Mineral Sands Project
 Environmental Impact Statement
 Figure 2.1

3 Site and surrounds

3.1 Project location

The project area is located in the Murray Basin in south-western NSW, near Balranald town (Figure 1.2). The Balranald-Ivanhoe Road connects the project area to the Sturt Highway, south of the project area, at Balranald town. The Sturt Highway links Balranald to Mildura and Robinvale to the west, and Hay and Wagga Wagga to the east. A compilation of photographs taken of the project area and surrounds is provided at the end of this chapter.

3.2 Geology of the Murray Basin

The Murray Basin consists of series of Late Tertiary transgressive and regressive marine and fluvio-lacustrine formations. The Loxton-Parilla Sands Formation (also known as the Loxton Sand) was formed during the last of these marine incursions and is the main stratigraphic host unit of heavy mineral sand in the Murray Basin. Overlying the Loxton-Parilla Sands in the northern Murray Basin, where the Balranald Project is located, is the Shepparton Formation which consists of mixed lake, fluvial channel and flood-plain sediments (referred to as fluvio-lacustrine), overlain by wind-blown (or aeolian) sands.

The Hatfield Region, which contains the Nepean and West Balranald deposits, is located within the Stacked Sequence Arc (SSA). This is an arc identified by Iluka geologists on the basis of the evidence of the twin regressive sediment packages which host many of the major Murray Basin mineral sands deposits, including the Ginkgo, Snapper, the Prungle group, Campaspe, and West Balranald (Currie 2009).

Detailed geological logging by Iluka field geologists has led to a greater understanding of the Loxton-Parilla Sands stratigraphic sequence in the SSA. The Loxton-Parilla Sands is composed of a stacked sequence of two complete regressive marine sequences (identified as LPS1 and LPS2). The heavy mineral strands in the SSA are all located within the lower (older) regressive sequence, LPS2. Further west and south, the Euston and Ouyen strand plains are located in the foreshore unit of the younger LPS1 unit (Iluka 2013).

The majority of the sand forming the Loxton-Parilla Sands is derived from terrestrial sources and is dominated by quartz. The main source of material for the Loxton-Parilla Sands stacked sequence is therefore assumed to have been derived from rivers from the surrounding hinterlands to the east, north and south with minor marine inputs (Iluka 2013).

Further details on the geology of the Murray Basin can be found in the water assessment contained in Appendix K.

3.3 Geology of the project area

The project area is located in the centre of alluvial sediments in the Murray Basin. Subregions of this Basin are defined by surface geomorphology, and the presence of the Ivanhoe Block and associated structures. Within the project area the basal unit, which directly overlies the basement rocks (comprising Proterozoic and Palaeozoic rocks) is the Olney Formation. The Olney Formation sediments are predominantly continental, but the marginal marine Geera Clay interfingers through the middle sequence at the project area. A conceptual regional geological cross section is shown in Figure 3.1.

At the project area the Olney Formation is overlain by the Loxton-Parilla Sands Formation which is in turn overlain by the Shepparton Formation. The Loxton-Parilla Sands is a thick sequence of marine sands that contains the target mineral deposits, while the Shepparton Formation comprises fluvio-lacustrine unconsolidated clays and silts.

A detailed description of these formations is provided in Chapter 14 and Appendix K. A description of the formations specifically relevant to the West Balranald and Nepean deposits is presented below.

3.3.1 West Balranald deposit

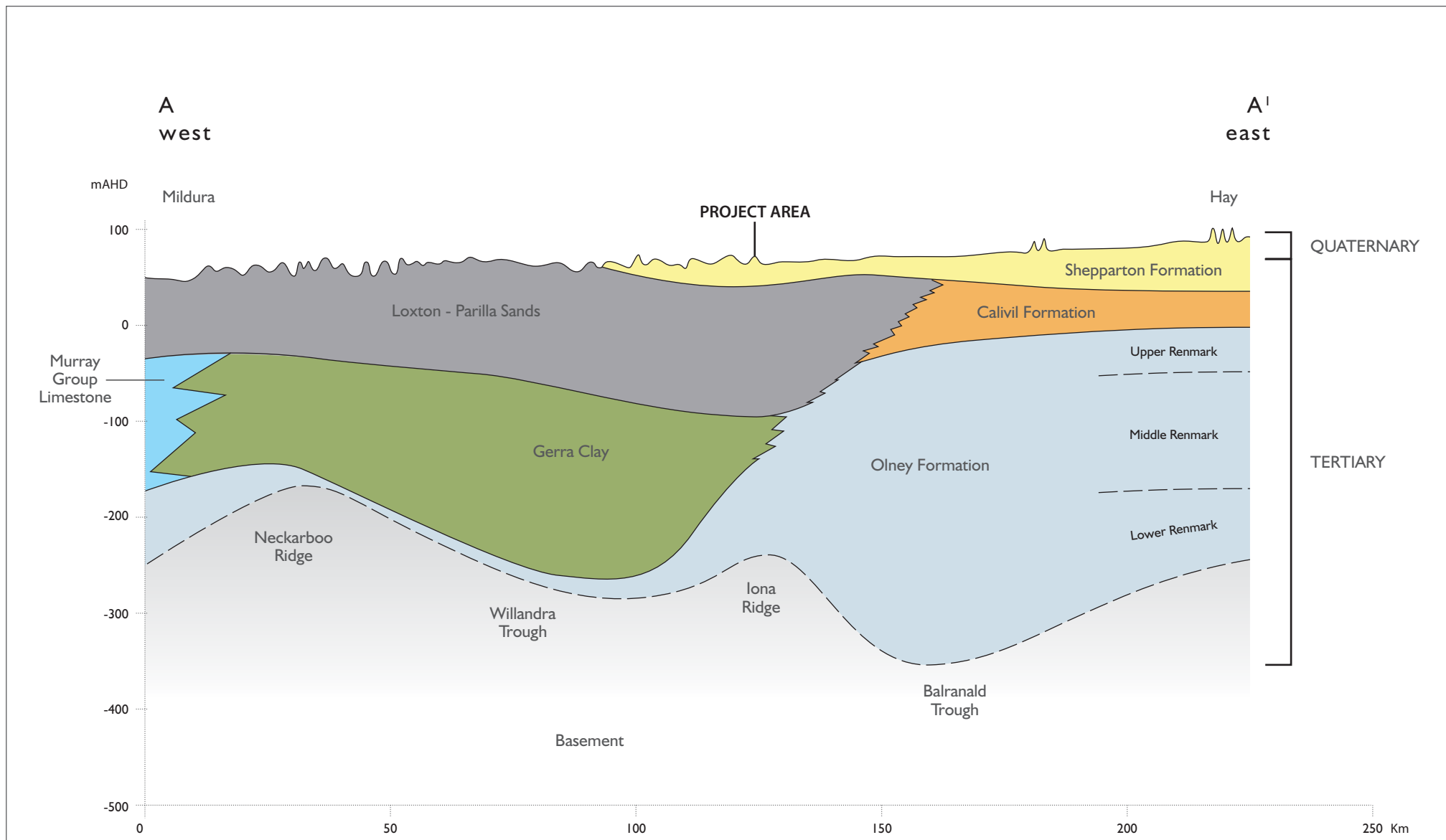
At the West Balranald deposit, the Shepparton Formation consists of a thick layer of unconsolidated to poorly consolidated clays and silty clays with inter-bedded sand lenses. This unit is highly variable across the West Balranald deposit and drilling has defined two dense clay layers (locally up to 4 to 6 m thick). Moderately to strongly indurated iron cemented rock layers are also present within the sand-dominant lenses between the clay layers. The thickness of the unit varies from approximately 19 m at the northern end to more than 36 m through central and southern areas of the deposit. The unit strikes in a north west – south east direction.

The upper Loxton-Parilla Sands marine sequence varies in thickness along the strike of the deposit from 16–20 m in the north to more than 60 m at the southern end. The sequence typically consists of three upper beach facies: foreshore, surf zone and lower shore; the different facies have varying horizontal hydraulic conductivities. A marine transgression marks the boundary between the LPS1 and the lower (older) marine sequence LPS2. The lower marine sequence (LPS2) is host to the West Balranald deposit and consists of three facies (foreshore, surf zone and lower shore), with the mineral sands deposit lying within the foreshore facies of LPS2. Explorative drilling along the length of the West Balranald deposit confirmed the presence of confining Geera Clay along the strike of the West Balranald mine below the LPS2.

3.3.2 Nepean deposit

The Nepean deposit has the same stratigraphic units and strike as the West Balranald deposit (Loxton-Parilla Sands and Shepparton Formation) with differing local features. The Shepparton Formation across the extent of the Nepean deposit consists of an upper layer which contains the consistently high clay contents of the typical Shepparton Formation. Underlying this at the northern and southern ends of the deposit are additional fluvio-lacustrine sediments of the Shepparton Formation, these have more variable clay contents than is typically seen in the region. These sediments are interpreted to be derived from material eroded from the uplifted Iona Ridge and a broad paleo-channel immediately adjacent to the southern edge of the Iona Ridge. In the south, this unit is 80 m thick including up to 60 m of the highly variable sediments beneath the typical Shepparton Formation sediments.

Within the Loxton-Parilla Sands unit, unlike the West Balranald deposit, the contact between the LPS2 and the overlying LPS1 regressive sequence is impossible to delineate as the LPS1 sequence is incomplete. Similar to the West Balranald deposit, the lower marine sequence (LPS2) is host to the Nepean deposit and is also located within the foreshore facies, often immediately above the poorly sorted coarser surf zone sands. Below the LPS2 at the Nepean deposit is the confining Geera Clay unit.



Regional geological cross section

3.4 Hydrogeology

The Murray Basin is a large closed groundwater basin with regional aquifer systems, confining layers and permeability barriers to groundwater flow. Locally in the vicinity of the project area, there is limited recharge from direct rainfall and some limited recharge from surface water systems, with most recharge to the area occurring via through flow from the east.

Consistent with topographic gradients, hydraulic gradients are very gentle in the central and western Murray Basin, and the broad flow direction in all aquifers is from east to west. However, the basement structure influences the groundwater flow direction in the project area causing a slightly north northwest trend in flow. This is most pronounced in the deeper Olney Formation². The horizontal hydraulic conductivity in both the Shepparton Formation and Loxton-Parilla Sands is variable, due to the depositional environments and volume of clay; continual lateral flow through formations is not common.

There is an upwards hydraulic gradient from the Olney Formation and Geera Clay to the Loxton-Parilla Sands and Shepparton Formation based on pressure head differences observed on-site and reported in the literature (Kellet 1989). Heads in the Shepparton Formation and Loxton-Parilla Sands are mostly similar, although results of hydrogeological pumping and injection trials indicate that the two units are poorly connected (Iluka 2015) and therefore vertical flow is limited.

Groundwater quality within the Murray Basin is variable, with fresher water near the basin margins to the east. Quality becomes poorer in a westerly direction (down gradient), and within the project area is typically highly saline. Salts originate from the marine depositional environment and are enhanced by low precipitation and high evaporation rates as well as long groundwater residence times. The water quality of the Shepparton Formation and Loxton-Parilla Sands is comparable, and is characterised by high salinity, neutral pH, low dissolved metals and Na-Cl type dominance.

Site groundwater salinity, represented by electrical conductivity (EC) is variable, and a decreasing trend with depth is observed. The salinity of the Shepparton Formation and Loxton-Parilla Sands are similar, and these formations have the highest EC measurements (averaging 48 and 56 millisiemens per centimetre (mS/cm), respectively) which is equivalent to the EC of sea water (53 to 60 mS/cm). The EC is lower in the Olney Formation with an average EC of 9.3 mS/cm.

Dissolved metal measurements are typically low amongst the formations, although the following dissolved metals results are elevated at the shallower formations (Shepparton and Loxton-Parilla Sands): aluminium, strontium and iron, while manganese was high in the Shepparton Formation only. Aluminium, iron and manganese measurements were an order of magnitude lower in the Olney Formation than the Shepparton Formation.

Further details on the hydrogeology of the project area can be found in the water assessment contained in Appendix K.

² An aquifer is defined as a rock or sediment in a formation, group of formations, or part of a formation that is saturated and sufficiently permeable to transmit economic quantities of water. The groundwater underlying the project area is not considered to be sufficiently permeable to transmit economic quantities of water, nor does it have a widespread suitable quality. Other technical studies refer to the groundwater in the Shepparton Formation, Loxton-Parilla Sands and Olney Formation as being aquifers, this terminology has not been adopted in this EIS.

3.5 Geomorphology

The stratigraphic sequences in the Murray Basin are dominated by consolidated sand, silt, clay and lime-rich sediments, formed by marine, deltaic, fluvial and aeolian depositional environments. Current landforms in the project area may have formed in either the Pleistocene period (approximately 2.5 million to 12,000 years ago) or the Holocene period (approximately 12,000 years to the present day).

Pleistocene relict landforms are found in the northern half of the West Balranald mine, and are associated with the relict lakes (dry clay pans), including Muckee, Tin Tin and Pitarpunga lakes. The development and history of these lake formations is understood from work undertaken on the geomorphic development of the Willandra Lakes system, located approximately 39 km from the northern extent of the West Balranald mine and 23 km from the northern extent of the Nepean mine.

The most dominant Holocene landforms in the project area are the linear dune field systems and ephemeral creeks such as Box Creek. Dating of buried soils has shown that this dune system was last active approximately 15,000 years ago (Bowler and Polach 1971).

Unlike fluvial deposition in Pleistocene landscapes, Holocene stream deposition and activity is comparatively less well understood; it is likely that flood deposition in Box Creek, a tributary of the Lachlan River, has not been active for quite some time. Its flow regime is dependent on major flood events in the Lachlan River, as it is not fed by local run-off because of the area's low gradients, low rainfall and generally permeable soils. Muckee, Tin Tin and Pitarpunga lakes have been dry for at least the last few hundreds to thousands of years. These lakes functioned as overflow lakes being fed through Box Creek.

The development of linear dunes landforms appears to have varied in the Holocene period, with certain dune landforms more active at certain times corresponding to variations in regional climatic conditions.

Although geomorphically stable, parts of the project area have been subject to erosion caused by pastoral activity resulting in eroded pans and scalds where vegetation has been removed and the aeolian sands have deflated. Other areas of exposure and erosion are a result of mechanical disturbance from rural infrastructure such as water storage dams, ground tanks, access tracks and cut lines for fences. This erosion, over time has led to soils on lunette features to be dispersed upon wetting and move down slope. On the back plain landforms sheet erosion has led to the topsoil being stripped and the formation of hard surfaced scalds. Some of these scalds also contain patchy vegetation mounds around their margins. These mounds may preserve an original soil profile beneath a cap of windblown sediment.

In the southern section of the West Balranald mine are longitudinal dune formations, approximately 2-6 m above the swales, which, in some places cover parts of old lake beds. Some of these dunes have also been extensively eroded and now form a series of sand sheets. Sand that has been cemented by calcium carbonate (ie calcrete) can also be found in the dunes.

Further details on the geomorphology of the project area can be found in the Aboriginal cultural heritage assessment in Appendix G.

3.6 Soils and topography

The West Balranald mine is generally flat ranging from 62 to 70 m Australian Height Datum (AHD), while the terrain of the Nepean mine is slightly more undulating with elevations ranging from 64 to 100 m AHD.

The project area contains a variety of soil landscapes resulting in varying depositional sequences and characteristics. Based on land system mapping taken from *Land Systems of Western New South Wales* (NSWSCS 1991), 10 local land systems have been identified within the project area (Table 3.1) (see Chapter 15). Of these, the Arumpo and Rata land systems cover the majority of the project area.

Table 3.1 Land systems of the project area

Land system	Geomorphology	Soils, vegetation and erosion
Arumpo	Long linear, east-west trending dunes of reworked Quaternary aeolian material with narrow swales and flats merging to level sand plains; dune relief to 7 m.	Dunes of deep brownish sands and calcareous sands; swales of highly calcareous solonized brown soils and texture-contrast soils; sand plains of solonized brown soils and calcareous red earths; dunes with dense mallee and variable porcupine grass; swales with belah, rosewood and inedible shrubs; variable speargrass, cannon-ball and forbs. Minor to moderate wind sheeting.
Bulgamurra	Slightly undulating sand plain of Quaternary Aeolian material and areas of east-west trending dunes and rises; relief to 6 m; open calcareous flats and scattered swamps and depressions to 500 m diameter.	Sandplain of solonized brown soils with clumps of belah, rosewood, scattered wilga and nelia; dunes of deep brownish sands with white cypress pine or mallee and porcupine grass; areas of edible and inedible shrubs, variable speargrass, copperburrs and forbs; depressions of grey cracking clays with fringing black box. Minor to moderate wind sheeting and drift.
Condoulpe	Sandplain of Quaternary aeolian material with large areas of east-west trending dunes; relief to 5 m; open flats, terminal drainage basins, locally depressed to 2 m.	Plain and flats of predominantly solonized brown soils and areas of red earths; dunes of deep brownish sands; drainage basins of grey cracking clays; generally dense to scattered belah and mallee; areas of dense edible chenopods; drainage basins of dense black box, nitre goosefoot and dillon bush; variable speargrass, annual saltbushes and forbs. Minor to moderate wind sheeting and scalding.
Gulthul	This land system is characterised as an extensive plain between the Darling and Murrumbidgee Rivers. It consists of an extensive calcareous quaternary sand plain with scattered low dunes with relief of up to 7 m, flats and sinks.	The plains comprise highly calcareous solonized brown soils often with exposed kunkar, travertine or limestone while the dunes comprise dunes of red calcareous sands and brownish sands. Moderately dense mallee, scattered to clumped belah; dense edible saltbushes and bluebushes occur on the plain with areas of dense inedible shrubs and porcupine grass occurring on the dunes. Flats and sinks in the land system comprise red texture contrast soils and grey cracking clays, often fringed by mallee and belah, scattered dillion bush and variable speargrass and forbs. Minor wind sheeting erosion occurs on the plain.
Hatfield	Undulating sand plain of Quaternary aeolian material, east-west trending dunes, relief to 5 m; depressions of fine-textured alluvium to 500 m wide and depressed to 5 m.	Plains of solonized brown soils, red and brown texture-contrast soils and red earths with scattered clumps of rosewood and belah; moderately dense bluebushes and bladder saltbush; dunes of deep brownish sands with clumped white cypress pine, prickly wattle and bluebushes; depressions of grey clays with nitre goosefoot, dillon bush and canegrass. Moderate scalding on plain; slight drift on sandy rises.

Table 3.1 Land systems of the project area

Land system	Geomorphology	Soils, vegetation and erosion
Marma	Severely scalded levees, with associated swamps, pans and lunettes; relief to 5 m; associated floodplain of fine-textured Quaternary alluvium and aeolian sand plains.	Levees of red and yellow texture-contrast soils and grey cracking clays; sand plains and lunettes of solonized brown soils and red texture-contrast soils; floodplains of grey cracking clays; scattered to dense bluebushes, bladder saltbush and old man saltbush; canegrass in swamps; abundant forbs, copperburrs and annual saltbushes. Severe scalding and water sheeting.
Rata	Relict floodplain of grey, fine-textured Quaternary alluvium with small, shallow sub-circular depressions to 500 m wide; relief to 2 m; isolated low rises of coarse-textured aeolian material.	Plains of grey cracking clays and compact clays with dense stands of bladder saltbush; canegrass and nitre goosefoot in depressions; black bluebush, scattered belah and rosewood on sandy rises; abundant annual saltbushes, copperburrs, annual forbs and grasses. Minor scalding on plains; minor wind sheeting on rises.
Riverland	This land system consists of a floodplain of fine textured Quaternary alluvium.	Land units within the system include perennial channels and back channels, billabongs, levees and river side lunettes (source bordering dunes). Vegetation in the Riverland system includes river red gum, black box, river cooba, lignum and abundant grasses and forbs. Scalding levees and lunettes and gullying of riverside banks are the major forms of erosion.
Wilkurra	Sandplain of Quaternary aeolian material with isolated dunes and rises trending east-west, relief to 5 m; small level swales and flats.	Plains and flats with highly calcareous solonized brown soils; dunes with deep brownish sands; uniformly dense stands of belah and rosewood, scattered mulga, wilga and inedible shrubs; white cypress pine on sandy rises; variable speargrass, copperburrs and forbs. Minor wind sheeting and drift.
Youhl	Reniform to sub-circular depressions of fine textured Quaternary alluvium to 10 km in diameter; remnant lunettes on eastern margins; relief to 5 m; associated sandy rises.	Lakebeds of grey cracking clays and red texture-contrast soils; lunettes of saline or compact clays, or calcareous red earths; sandy rises of earthy sands and red earths; lakebeds treeless with dense bladder saltbush and bluebushes, scattered Dillon bush, nitre goosefoot and old man saltbush; lunettes of scattered bluebush; perennial grasses, copperburrs and annual saltbushes. Moderate to severe scalding on lakebeds; gullying and rilling of lunettes.

Source: NSWSCS 1991.

Further details on soils in the project area can be found in the soil resource assessment in Appendix L.

3.7 Climate

The project area is characterised by hot dry summers and cold winters. Climatic data from the Bureau of Meteorology's (BoM) weather station at Balranald town indicates that monthly mean minimum temperature ranges from 3.5°C to 16.4°C and the monthly mean maximum temperature ranges from 15.7°C to 33°C.

The median annual rainfall is 324.8 mm. Rainfall generally occurs throughout the year with the highest median rainfall over spring and the lowest median rainfall over summer.

3.8 Surface water resources

The Lachlan, Murrumbidgee and Murray rivers are the major permanent surface water features in the vicinity of the project area, shown in Figure 3.2. The Lachlan River flows south-west terminating at Great Cumbung Swamp, a 16,000 ha swamp dependent on flows from the Lachlan River, approximately 42 km east of the project area. The Great Cumbung Swamp joins the Murrumbidgee River to the south and becomes part of the Lowbidgee Floodplain (CSIRO 2008).

Flows within these rivers are regulated by major dams in their headwaters, and by local regulating structures such as Balranald Weir and the Paika levee, which divert water for irrigation purposes.

Permanent surface water flows are confined to the major rivers and their associated backwaters and billabongs which are outside of the project area. The catchments within the project area do not contribute to flows of the major permanent surface water features in the vicinity of the project area, except under extreme flood conditions (WRM 2015).

Dry relic lake beds (Pitarpunga, Muckee and Tin Tin lakes) (see Figure 3.2) generally occur to the north east and east of the West Balranald mine and are subject to agricultural activities including grazing and cropping.

Local drainage is poorly defined with the exception of Muckee, Pitarpunga and Tin Tin lakes, and Box Creek downstream of the confluence with Arumpo Creek. Identifying local drainage catchments and flow paths is complicated due to the dunal landforms, which result in numerous small depression storages and small dry lakes. Under existing conditions it is likely that any runoff from the project area would drain via shallow overland sheet flow, before being captured by the dry lakes or depressions evident in the topography (WRM, 2015).

Further details on the surface water resources in and surrounding the project area can be found in the surface water management report in Appendix H.

3.9 Biodiversity

Eleven native vegetation types and one exotic vegetation type were identified within the project area:

- Spinifex Dune Mallee Woodland;
- Chenopod Sandplain/Swale Mallee Woodland;
- Black Bluebush Low Open Shrubland;
- Pearl Bluebush Low Open Shrubland;

- Bladder Saltbush Low Open Shrubland;
- Old Man Saltbush Shrubland;
- Belah - Pearl Bluebush Woodland;
- Belah – Chenopod Woodland;
- Black Box – Chenopod Open Woodland;
- River Red Gum Woodland;
- Flat Open Claypan/Derived Sparse Shrubland/Grassland; and
- Cultivated Grain Crops/Cleared Weedy Fallow/Developed.

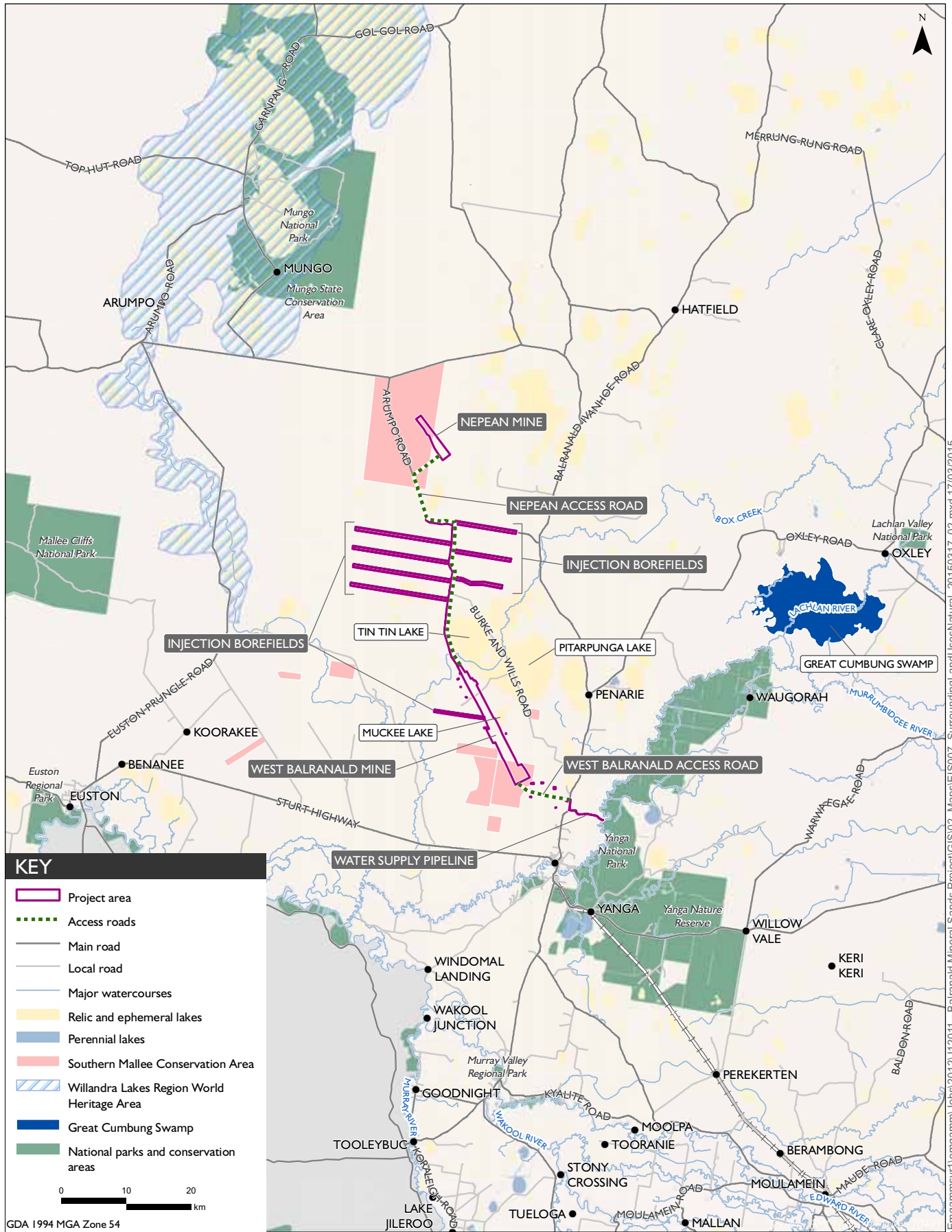
Chenopod Sandplain/Swale Mallee Woodland is the most abundant community in the area.

No threatened flora species were recorded during the surveys within the project area. However seven species are considered to have a low to moderate likelihood of occurrence within the project area, based on the field surveys and literature review.

Most of the project area is subject to grazing by livestock (sheep or cattle), with the exception of the SMCAs, where livestock grazing is not permitted, but grazing by feral herbivores is common. This has resulted in the general absence or reduced diversity of palatable herb and shrub species. The surveys also indicated that foxes, feral cats, rabbits, brown hares, pigs, house mice and goats are common, which negatively impacts on vegetation cover, regeneration and consequently native fauna diversity. Despite this, an array of fauna species were recorded during the surveys, including 171 and 142 vertebrate fauna species in the proposed West Balranald and Nepean mine area.

A total of 20 fauna species recorded during the field surveys are listed as threatened species in the TSC Act, of which three (Malleefowl, Greater Long-eared Bat and Plains Wanderer) are also listed on the EPBC Act.

Further details on the biodiversity of the project area and its surrounds can be found in the biodiversity assessment in Appendix F.



Surrounding land uses - natural features

Balranald Mineral Sands Project
Environmental Impact Statement

Figure 3.2

3.10 Land ownership

Land ownership in and near the project area includes Western Lands Lease (WLL), freehold, Crown and other land tenures. Outside Balranald town, properties are typically large rural land holdings, and homesteads and dwellings are sparsely located. Land holdings within the project area are shown in Figure 3.3. Land details within the project area are listed in Table 3.2.

Homesteads, dwellings and other built structures (eg sheds and other outbuildings) in the vicinity of the project area have been identified based on aerial photography interpretation, with ground-truthing of built structures closer to the project area, as required. For the purposes of the EIS, built structures are identified as assessment locations, shown in Figure 3.3.

The closest homesteads/dwellings to the project area are:

- assessment location R13 located approximately 1 km from the Nepean access road (Arumpo Road) and adjacent injection borefield;
- assessment location R32 located approximately 1.3 km from the Nepean access road (Burke and Wills Road); and
- assessment location R5 located approximately 2.3 km from the West Balranald mine and adjacent an injection borefield.

Table 3.2 Land details in the project area

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

3.11 Surrounding land uses

3.11.1 Agriculture

The project area and surrounding land is zoned for primary production under the *Balranald Local Environment Plan 2010* (Balranald LEP). Land uses in and surrounding the project area are primarily agricultural, and include grazing and cropping. Charcoal farming and gypsum mining is also undertaken on nearby properties. Agricultural land uses are discussed further in Chapter 16.

3.11.2 Natural resources

Natural resources and features in the region are shown in Figure 3.2. The Yanga National Park and Murrumbidgee River are approximately 13 km south-east of the West Balranald mine. The project area adjoins the Murrumbidgee River approximately 10 km north-east of Balranald town.

Mungo National Park and Willandra Lakes Region World Heritage Area (WLRWHA) are approximately 39 km from the northern extent of the West Balranald mine and 23 km north-west of the northern extent of the Nepean mine.

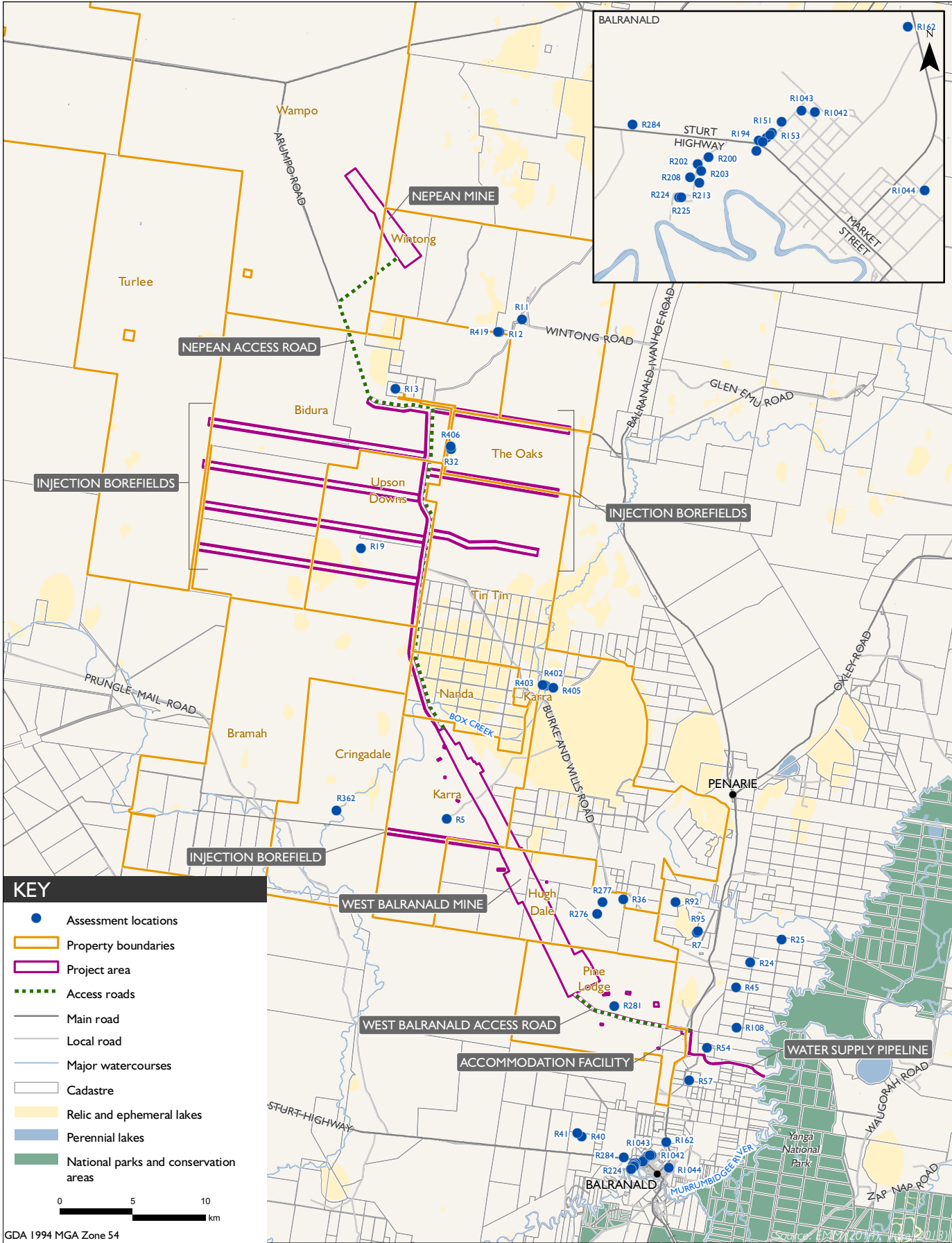
3.11.3 Conservation areas

There are several areas of mallee vegetation in and adjoining the project area which are managed in accordance with WLL conditions under the NSW *Western Lands Act 1901*. These conditions relate to management of certain areas of mallee vegetation, known as 'southern mallee', referred to herein as southern mallee conservation areas (SMCA). SMCA's are managed by lease holders in such a way that conserves vegetation. SMCA's in the project area are shown in Figure 3.2. SMCA's are subject to special conditions under WLLs that were originally established to protect habitat loss associated with agricultural land uses including clearing and grazing.

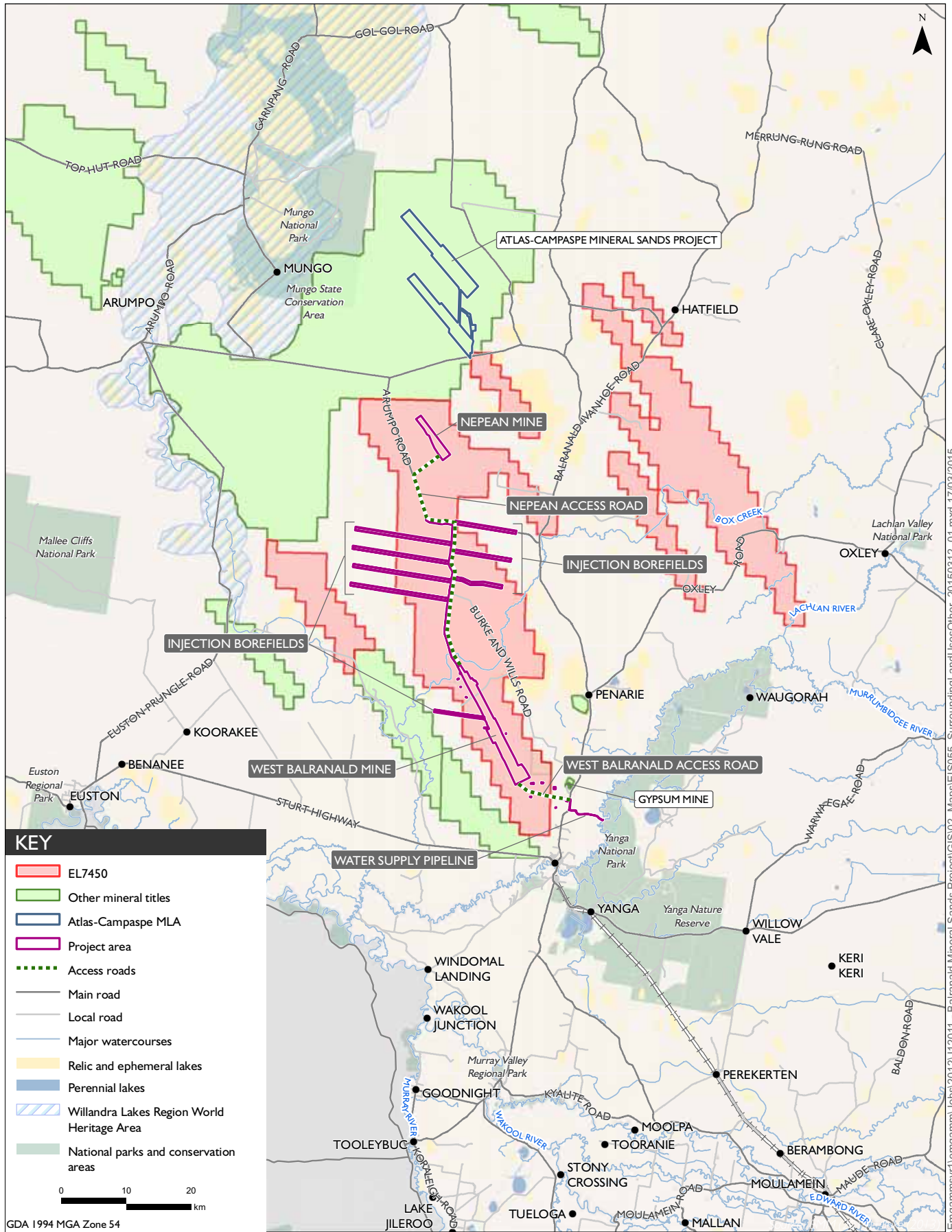
As with much of the project area, SMCA's have been grazed by feral animals, resulting in degradation of the shrub and ground vegetation layers within mallee vegetation.

3.11.4 Mining

Mining and exploration land uses are shown in Figure 3.4. No substantial mining land uses currently exist in the Balranald LGA, although there are a number of mineral titles. A small gypsum mining operation is located to the east of the project area. Approval for a mineral sands mine, known as the Atlas-Campaspe Mineral Sands Project, located approximately 20 km north of the project area, was granted in 2014.



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Surrounding land uses - other features

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Environmental Impact Statement

Figure 3.4



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Photograph taken from general location of northern most injection borefield



Photograph taken next to Nepean access Road half way between West Balranald mine and Nepean mine



Photograph taken from general location of northern most injection borefield



Photograph of Spinifex Dune Mallee Woodland located throughout most of Nepean mine, northern section of the Nepean access road, the southern section of West Balranald mine



Photograph of Black Bluebush Low Open Shrubland located in dry lakes at the southern section of Nepean mine and northern section of West Balranald mine



Photograph of Bladder Saltbush Low Open Shrubland located along the catchment of Box Creek, at the far northern section the West Balranald mine and along the central part of the Nepean access road



Photograph of Belah Woodland located within the Nepean mine



Photograph of Flat Open Claypan/Derived Sparse Shrubland mainly in the central parts of the project area



Photograph of grain crops which occupy large areas in both the northern and southern sections of the West Balranald mine



Photograph of Box Creek
downstream of Tin Tin Lake



Photograph looking west
across Tin Tin Lake



Photograph of Box Creek
culverts at Balranald
Ivanhoe Road



Photograph of Arumpo Road - Balranald-Ivanhoe Road intersection (looking south from Balranald-Ivanhoe Road)



Photograph of Balranald-Ivanhoe Road - McCabe Street intersection (looking south from Balranald-Ivanhoe Road)



Photograph of Balranald-Tooleybuc Road - Swan Hill Road intersection (looking north from Balranald-Tooleybuc Road)



Photograph of McCabe Street at Sturt Highway intersection (looking south from McCabe Street)



Photograph of Balranald-Tooleybuc Road - Murray Street and Lockhart Street intersection (at Tooleybuc looking north from Murray Street)

4 Project description

4.1 Overview

The key components of the Balranald Project include:

- construction, mining and rehabilitation of the West Balranald and Nepean deposits, referred to as the West Balranald and Nepean mines, including progressive rehabilitation;
- processing of extracted ore to produce HMC and ilmenite;
- road transport of HMC and ilmenite to Victoria;
- backfilling of the mine voids with overburden and tailings, including transport of by-products from the processing of HMC in Victoria for backfilling in the mine voids;
- an accommodation facility for the construction and operational workforce;
- gravel extraction from local sources for construction requirements; and
- a water supply pipeline from the Murrumbidgee River to provide fresh water during construction and operation.

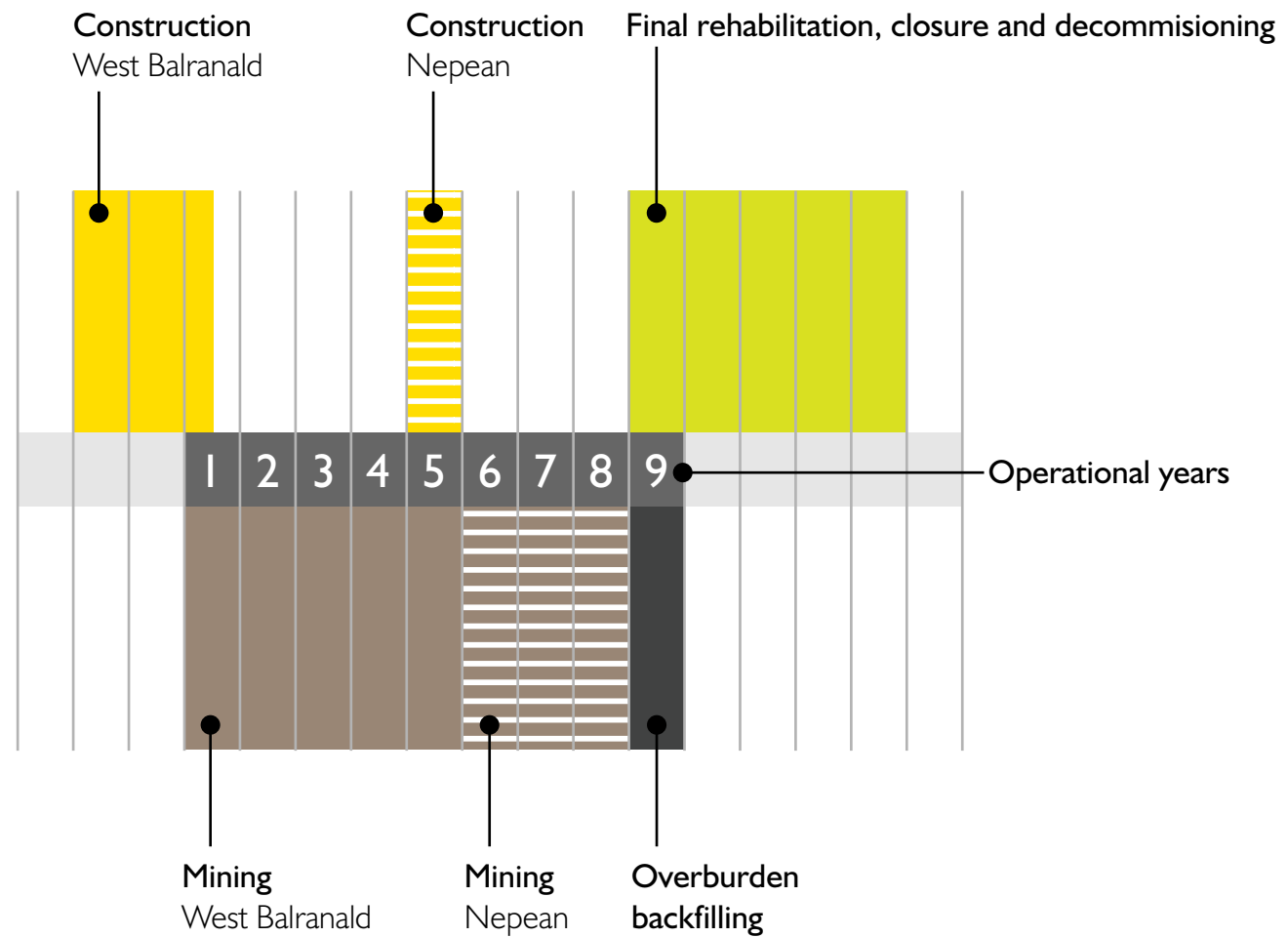
These components are described in more detail in this chapter.

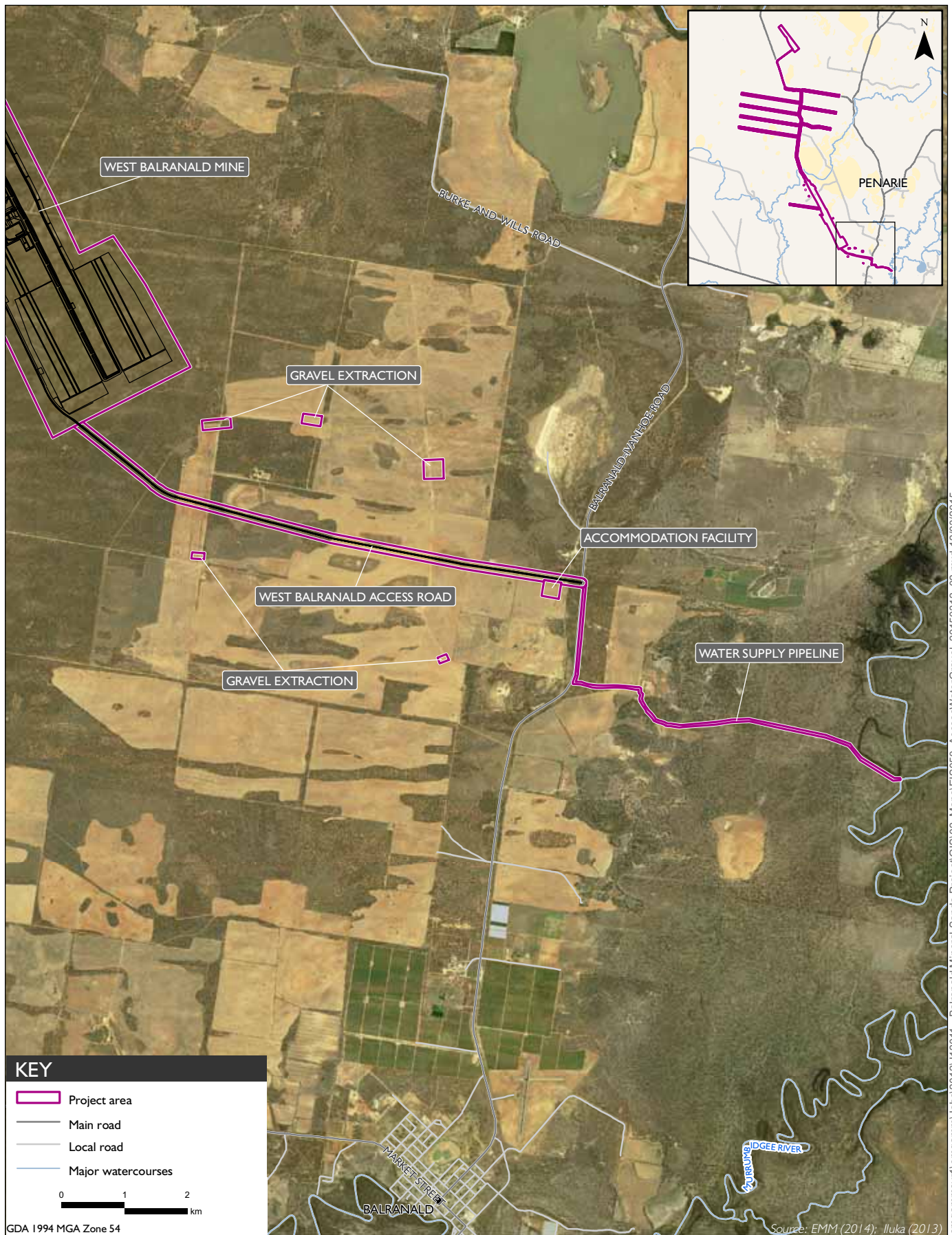
4.2 Schedule

The Balranald Project is projected to have a life of approximately 15 years, including construction, mining, backfilling of overburden material, rehabilitation and decommissioning. An indicative schedule for the Balranald Project is presented in Figure 4.1. The project area and key project elements are shown in Figure 4.2 to 4.5.

Commencement of construction of the Balranald Project would depend on a range of factors including market demand and approval timeframes. Construction would commence at the West Balranald mine and is expected to take about 2.5 years. Operations would commence at the West Balranald mine in Year 1 of the operational phase, which would overlap with approximately the last six months of the construction phase. The operational phase would include mining and associated ore extraction, processing and transport activities and would be approximately nine years in duration. This would include completion of backfilling overburden into the pits at both the West Balranald and Nepean mines. Construction of infrastructure at the Nepean mine would commence from approximately Year 5 of the operational phase, with mining of ore starting in Year 6, and being complete by approximately Year 8.

Decommissioning and ongoing rehabilitation is expected to take a further two to five years following Year 9 of the operational phase.

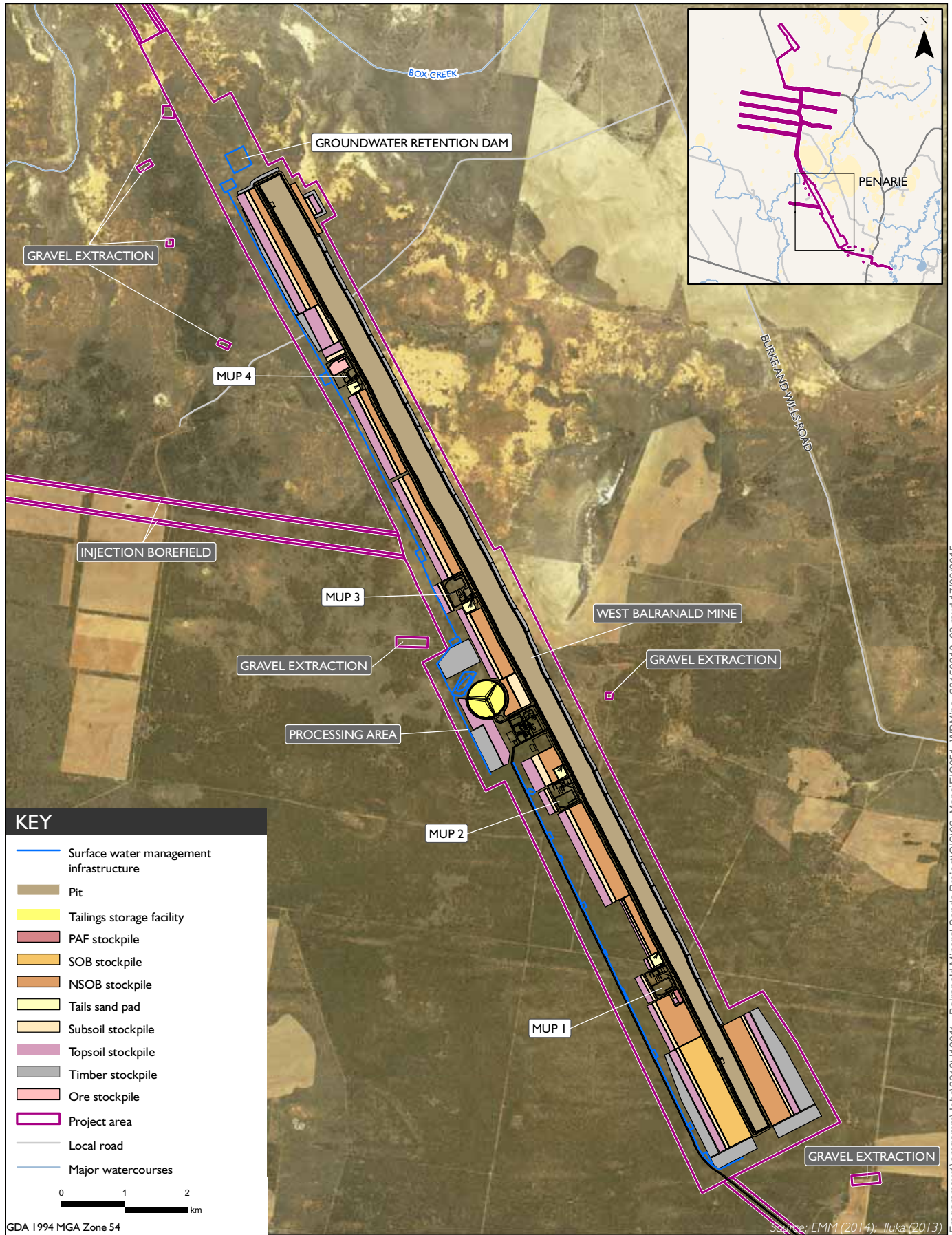




West Balranald access road, water supply pipeline and gravel extraction areas

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Environmental Impact Statement

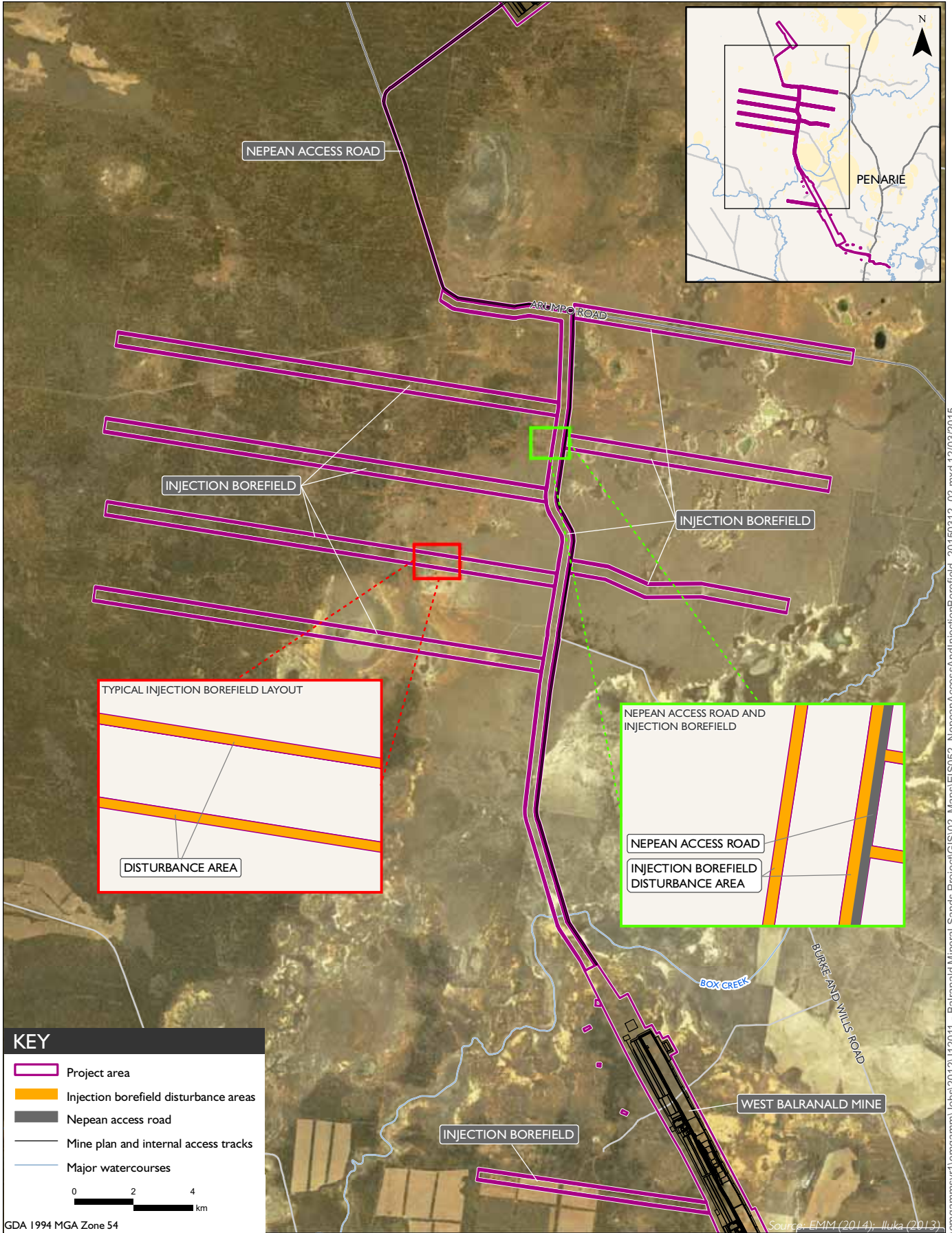
Figure 4.2



West Balranald mine and gravel extraction areas

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Environmental Impact Statement

Figure 4.3



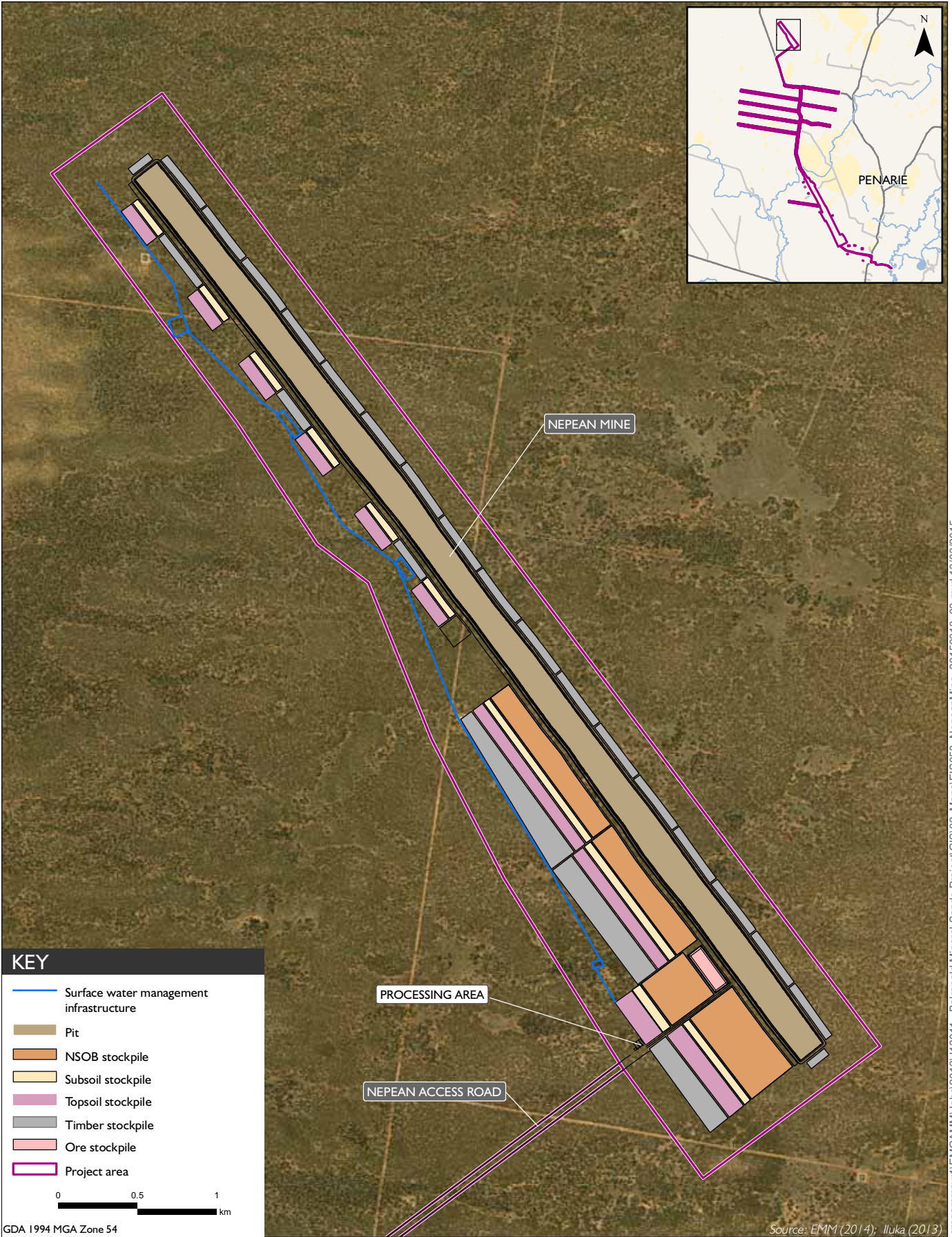
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Nepean access road and injection borefields

Balranald Mineral Sands Project
Environmental Impact Statement

Figure 4.4





4.3 Construction phase

The initial construction phase of the Balranald Project is expected to take approximately 2.5 years from commencement, and is proposed to occur 24 hours per day, seven days per week. The construction phase would commence at the West Balranald mine, and would involve all non-mining related activities including:

- site establishment, including vegetation clearing, topsoil/subsoil stockpiling, establishment of construction compound and bulk earthworks;
- gravel extraction from borrow pits;
- construction of the West Balranald and Nepean access roads and internal roads;
- construction of the accommodation facility; construction of buildings, workshops, security fencing, and other ancillary facilities;
- installation of groundwater management (extraction and injection) infrastructure at the West Balranald mine and injection borefields;
- establishment and commissioning of the processing plant; and
- construction of the water supply pipeline.

Construction of infrastructure at the Nepean mine would commence from approximately Year 5 of operation.

4.3.1 Site establishment

Site establishment at the West Balranald mine would involve the clearing of vegetation and topsoil/subsoil for the West Balranald access road, initial boxcut, internal roads, and hardstand areas for infrastructure. Conventional earth moving equipment would be used including dozers, tractor scoops, scrapers and trucks to clear vegetation and stockpile material. Activities would also include site bulk earthworks, construction of drainage infrastructure, water storage dams, as well as the installation of above ground and below ground services, reticulation of power and water services and concrete foundations.

Site establishment for the Nepean mine would involve similar activities to those described above, but would not occur until approximately Year 5 of the operational phase.

4.3.2 Gravel extraction

During construction, gravel would be required to construct the West Balranald access road, Nepean access road, hardstand areas for infrastructure and internal roads. During operation, gravel would be required for access and haul road maintenance and construction of in-pit benches and ramps that would be progressively installed to reflect mine planning.

The total gravel demand for the life of the Balranald Project is estimated in the order of 3.06 million cubic metres (Mm³) of gravel. The breakdown is summarised in Table 4.1.

Table 4.1 Gravel demand

Project element	Gravel required (Mm³)
West Balranald and Nepean access roads	0.33
Hardstand areas for infrastructure	0.08
Internal haul roads	0.57
In-pit benches and ramps	2.01
Internal roads	0.07
Total	3.06

Source: Tonkin 2014.

Gravel would be sourced both from within the project area and from third party suppliers. Local sources of gravel included in the project area (see Figure 4.2 and 4.3) would primarily provide gravel during the construction phase. The estimated volume of gravel that would be extracted from the project area is 0.16 Mm³. It is possible that additional gravel would be extracted from the disturbance area if identified opportunistically during construction or operation.

The shortfall of gravel (approximately 2.90 Mm³) would be obtained from third party external gravel sources in the region.

Gravel extraction within the project area would involve a series of borrow pits (see Figure 4.2 and 4.3). The process would include:

- removal and screening of topsoil and subsoil which would be stockpiled separately for reinstatement during rehabilitation;
- extraction of gravel to a depth of up to 2-3 m;
- stockpiling the gravel adjacent to the borrow pit;
- processing in a crushing/screening plant (if required); and
- transporting gravel by truck to the required location(s).

Borrow pits would be progressively excavated using an excavator and dozer. If crushing or screening is required, it would occur at the borrow pit. Gravel would be loaded into trucks and transported to locations within the project area.

Approximately 500 to 1,500 tonnes (t) of gravel would be extracted per day, depending on the required rate of extraction.

It is anticipated that the majority of the borrow pits would be constructed and excavated at the commencement of the Balranald Project. Borrow pits would likely be operational for up to 12 months before being progressively rehabilitated. In some cases the borrow pits may remain open for greater than one year to provide gravel for maintenance works.

Once gravel extraction is complete at each borrow pit, rehabilitation activities would typically include:

- removal of all infrastructure from site;
- deep ripping of compacted areas;
- placement of any material that was not suitable for construction purposes back into the excavation;
- battering of pit walls to an appropriate angle to ensure they are safe, stable and suitable for the surrounding land use;
- spreading of previously stockpiled topsoil over the final landform and disturbed areas; and
- revegetation, seeding and/or planting (depending on the final land use).

Details of the rehabilitation activities are provided in the rehabilitation and closure strategy which is contained in Appendix M.

4.3.3 Construction of access roads

There are two primary access roads that would be constructed as part of the Balranald Project; the West Balranald access road and Nepean access road. These are shown in Figure 4.2 and Figure 4.4.

i West Balranald access road

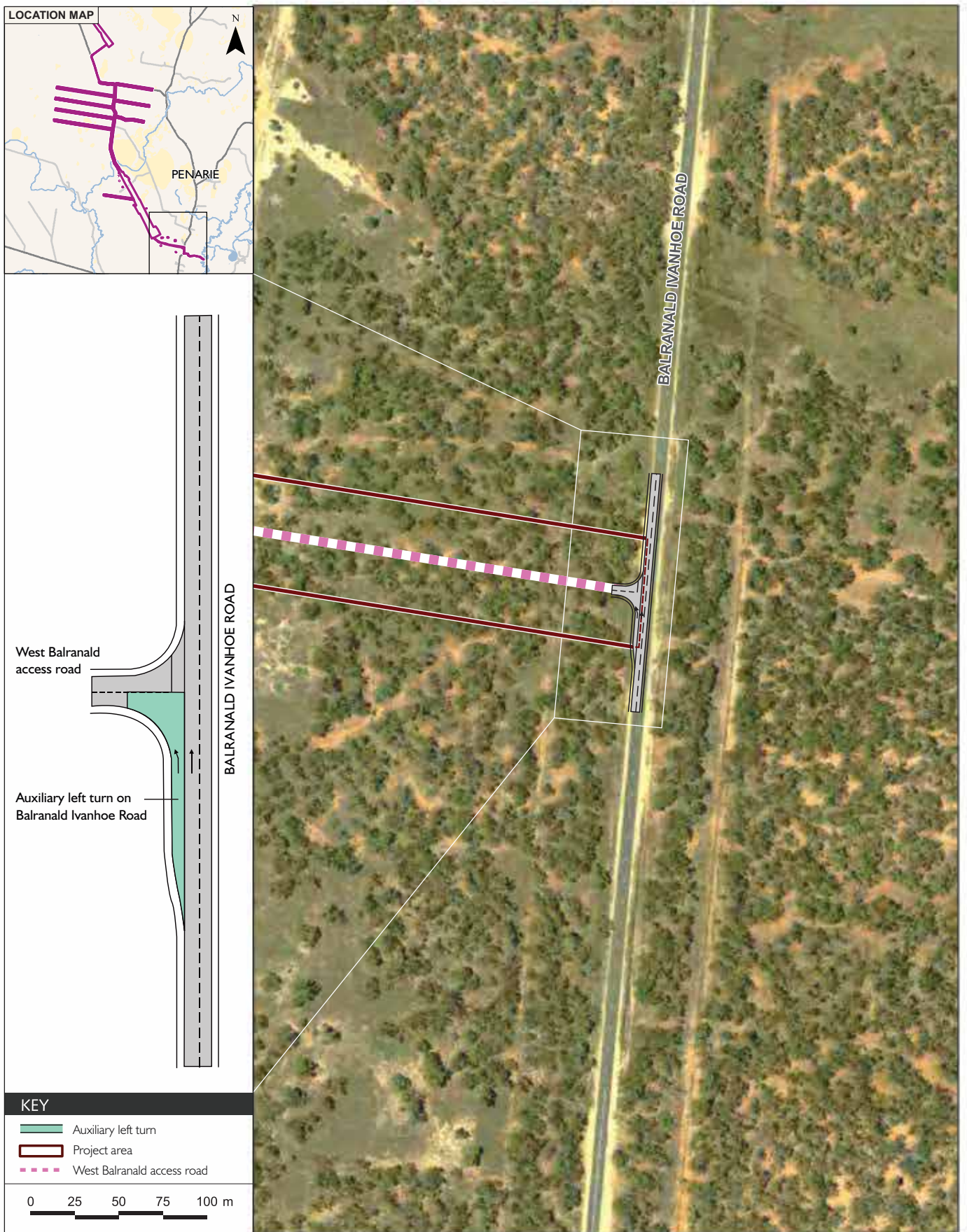
The West Balranald access road would be a new two way access road, approximately 18 km in length, constructed from the Balranald-Ivanhoe Road to the processing area at the West Balranald mine (Figure 4.2). This would be the primary access road to the project area, including the accommodation facility. Its design would include shaped shoulders to allow stormwater runoff to drain from the road surface, culverts in low lying areas and reflective road side markers.

This road would be unsealed with the exception of its intersection with the Balranald-Ivanhoe Road which would be designed and constructed in accordance with guidelines on intersection layouts set out in *Austrroads Guide to Road Design Part 4*. This intersection would include provision of a short auxiliary lane left turn treatment from Balranald-Ivanhoe Road into the access road. The conceptual intersection layout is presented in Figure 4.6.

The West Balranald access road would take approximately 4 to 6 months to construct, including:

- clearing of vegetation and topsoil, which would be stockpiled within the road corridor, retained and utilised for rehabilitation purposes;
- bulk earth works (cut and fill);
- establishment of drainage systems (culverts and swales); and
- construction of the road base and surface, including the placement and compaction of road base materials.

Traffic control management would be implemented during construction of the intersection with Balranald-Ivanhoe Road.



Balranald Ivanhoe Road and West Balranald access road intersection design

During construction of the West Balranald access road, the Burke and Wills Road (public road) and private access tracks through the project area would be used temporarily until access within the project area is established. Iluka will regrade unsealed roads and access tracks to address any induced damage (refer Chapter 18) and consult with affected landholders to ensure ongoing land access is provided.

ii Nepean access road

The Nepean access road would be constructed between the West Balranald and Nepean mines. It would be approximately 39 km long comprising new private access roads and sections of two existing public roads (Burke and Wills Road and Arumpo Road) as shown on Figure 4.4.

The Nepean access road would include:

- approximately 22 km of existing public roads via Burke and Wills Road and Arumpo Road;
- a new 12 km section of road constructed from the West Balranald mine to the Burke and Wills Road; and
- a new 5 km section of road constructed from Arumpo Road to the Nepean mine.

The Nepean access road would provide access between the West Balranald mine and Nepean mine during the life of the Balranald Project. The Nepean access road, from the West Balranald mine to Arumpo Road, is also likely to be used during the initial construction phase to provide access to the injection borefield. Iluka will regrade this unsealed road to address any induced damage (refer Chapter 18).

During the operational phase, the Nepean access road would be the primary route between the West Balranald and Nepean mines, and would be used to transport extracted ore from the Nepean mine to the West Balranald mine from approximately Year 6 to Year 8.

Burke and Wills Road and Arumpo Road are generally unsealed except for short sections. The Nepean access road would also be unsealed. The sections of Burke and Wills and Arumpo roads which would form part of the Nepean access road and would be upgraded in sections to accommodate design traffic (refer Chapter 18).

iii Internal roads

Internal roads within the project area would be constructed to minimise interaction between mining equipment and haul trucks, and general light vehicle traffic on-site. A car park would be established at the processing area at the West Balranald mine.

Internal roads would be constructed using suitable overburden and gravel sourced from within the project area, and external sources.

4.3.4 Accommodation facility

Construction activities would involve vegetation clearance, hardstand construction, installation of underground services, installation of buildings, construction of walkways, car parks and landscaping. A sewage treatment plant (STP) would also be installed.

Modular buildings and portable structures would be transported to the project area, placed in position by cranes (or similar) and assembled on site.

Topsoil cleared during construction would be used for rehabilitation.

4.3.5 Buildings, workshops and other ancillary facilities

Construction of buildings, workshops and other ancillary facilities, primarily located at the processing area, would involve vegetation clearing, removal and stockpiling of topsoil and subsoil and civil works. The majority of buildings would be portable demountable structures that would be transported to the project area and assembled on-site.

4.3.6 Installation of dewatering and injection infrastructure

i Dewatering

Dewatering of aquifers overlying and surrounding the ore body would be required ahead of mining operations at the West Balranald and Nepean mines. This would involve dewatering of underlying aquifers via a series of dewatering bores installed adjacent to, and in advance of, mining operations at the West Balranald mine.

Based on modelling and in-field trials to date, in the order of 350 dewatering bores spaced 100 m apart are expected to be installed for dewatering of the West Balranald and Nepean mines over the course of mining, however this would be optimised based on continued groundwater modelling and project design. Bores are proposed to be located in two parallel lines either side of the mine void. The dewatering system would be installed progressively over the course of operation, typically several kilometres in advance of the mine void as the mine progresses.

Iluka have successfully dewatered and mined the Kulwin and WRP deposits in Victoria using dewatering bores (albeit with the deposits at shallower depths).

Dewatering bores would be screened in the Loxton-Parilla Sands to avoid any risk of contamination. Optimal bore spacing would be refined during detailed design. The bores would be installed using drilling rigs. During installation, a drill rig, water truck, support crane, compressors, light vehicles and excavator would be on-site. Depending on the conditions, each bore would take up to five days to install and would involve:

- confirmation of bore locations –bore locations would be surveyed as part of the site establishment activities;
- vegetation removal –once the locations of each site have been confirmed, appropriate access and a clear works area around each bore location would be established. For the dewatering bores located along the mine void, it is likely that vegetation clearance would occur as part of the larger site preparation works;
- management of drilling fluids – either by:
 - above ground sumps using appropriately sized tanks; or
 - excavation of lined mud pits that would be up to 2.5 m deep by 10 m long and 10 m wide;
- construction of turkeys nests – a series of lined water storage dams will be constructed to provide a disposal locations for water and drill pads associated with bore construction;
- drilling of bores –bores would typically comprise a pre-collar and production casing; and

- bore development –involving the pumping of water into the screens via a jetting tool, and removing drilling mud, mobilised sediment and contained water from the bore.

The dewatering system (including bores and pumps) would be constructed and commissioned along the length of the pit as the mine progresses. Bores would feed water to a transfer main on either side of the mine.

ii Injection

Groundwater abstracted prior to mining would be injected back into the Loxton-Parilla Sands Formation. Two methods of groundwater injection (constructed and developed similar to dewatering bores) will be undertaken:

- on-path injection – involves the injection of groundwater into bores located along the West Balranald mine pit ahead of mining operations; and
- off-path injection – involves the injection of groundwater into bores located some 5 to 30 km away from mining operations in the injection borefields (Figure 4.4).

On-path injection bores will connect to a water transfer main on either side of the mine pit. These injection bores will be fed directly from this transfer main.

Off-path injection bores would be connected to a network of pipeline infrastructure that will extend from the water transfer main at the mine to each of the injection borefields. Each injection borefield would typically comprise:

- a row of injection wells within 50 m wide borefield corridors, with individual wells spaced at a minimum of 100 m intervals. The two 50 m wide corridors would be approximately 350 to 400 m apart (Figure 4.4);
- a network of pipelines laid overland within pipe traces (ie graded windrow on either side);
- service roads for vehicle access during construction and operation; and
- a series of water storage dams to store water during well development.

All bores would be designed and installed to ensure that only the target formation (Loxton-Parilla Sands) is utilised. Bore casing would be fully cement sealed to prevent upward migration of injection water.

The dewatering and injection system would require bore casing, pumps, generators, material for the pipe network, electrical equipment and valves for each site. On top of each of bore would be head works connected to generators and/or a reticulated power supply.

Further detail on the operation of the dewatering and injection infrastructure is provided in Section 4.4.3.

Two groundwater retention dams would also be constructed at the West Balranald mine to allow the precipitation of solids and exposure of groundwater to ultra-violet light to reduce iron bacteria that could potentially foul the injection bore screens. These dams would be 175 ML and approximately 10 ha each in size. One dam would be constructed ahead of mining at West Balranald (in the area to be disturbed by mining). A second dam would be constructed north of the mine void at the West Balranald mine (see Figure 4.3).

4.3.7 Establishment and commissioning of processing plant

The processing plant for the Balranald Project would primarily be relocated from Iluka's WRP mine. The processing plant would be dismantled and transported by truck in various components, and reassembled at the processing area at the West Balranald mine for the duration of the Balranald Project (refer Figure 4.3).

Vegetation and clearing within the processing area would be undertaken prior to the processing plant arriving on-site. Management of vegetation removal and topsoil stockpile management are described in Chapter 15 and 17. The operation of processing plant is described in detail in Section 4.5 of this chapter.

4.3.8 Water supply pipeline

A water supply pipeline would be constructed from the Murrumbidgee River to the accommodation facility and West Balranald processing area (see Figure 4.2). The fresh water pipeline would typically consist of the following components:

- a pumping station with suction pipeline and pump station;
- a 200 to 250 mm pipeline placed in a trench from the river to the Balranald Ivanhoe Road or lay overland within a pipe trace adjacent the mine access road;
- pipeline fittings including air valves at all high points and isolation valves approximately every 5 km;
- pipeline drainage points (ie scour valves at low points);and
- underground road crossings.

The water supply pipeline construction for trenching or pipe trace would be constructed using a trenching or direct plough method.

The water supply pipeline would connect to the non-saline water storage dam within the processing area. For construction purposes the pipeline would require a corridor of approximately 7 to 15 m. A small laydown area within the project area would be required for the construction equipment which would include:

- grader for topsoil stripping and vegetation removal (as required);
- trucks for materials transport (pipe, bedding/backfill material);
- excavator or similar of pipe trenching;
- skid steer or front end loader for sand bedding and back filling;
- backhoe loader or excavator or similar for pipe slinging and trench reinstatement;

- polyethylene butt welding equipment (for HDPE if used);
- trench roller or excavator compaction roller for backfill compaction;
- water cart for dust suppression; and
- light vehicles for personnel access.

4.3.9 Construction equipment

The initial start-up of the Balranald project would require the least amount of plant and equipment. As operations commence more equipment would be necessary to meet the required production rates.

The construction phase would require dozers, tractor scoops, excavators, trucks cranes and graders prior to mining commencing operations.

4.4 Operational phase

Mining operations for the Balranald Project would involve a sequenced dry-mining method. Dewatering of groundwater from aquifers overlying and surrounding the ore body would be required ahead of mining operations. The mine layout, processing area, groundwater management, mining method, staging and sequence and equipment required for mining operations are described in this section. Mining operations would occur 24 hours a day, seven days a week.

4.4.1 Mine layout

The West Balranald and Nepean mines would include:

- open cut mining areas (ie pit/mine void) that would be developed using dry mining methods to remove overburden and extract the ore;
- timber, soil and overburden stockpiles;
- ore stockpiles and mining unit plant (MUP) locations;
- processing area (at the West Balranald mine), including a processing plant, tailings storage facility (TSF), maintenance areas and workshops, product stockpiles, truck load-out area, administration offices and amenities;
- groundwater management infrastructure, including dewatering, injection and monitoring bores and associated pumps and pipelines;
- surface water management infrastructure;
- service infrastructure (eg power);
- haul roads for heavy machinery and service roads for light vehicles; and
- other ancillary equipment and infrastructure.

Conceptual site layout plans for the project are shown in Figure 4.2 to 4.5.

4.4.2 Processing area

The processing area would be located at the West Balranald mine (see Figure 4.3) and would include:

- administration buildings;
- the processing plant, product stockpiles and TSF;
- maintenance areas and workshops;
- car parking; and
- other ancillary infrastructure.

A conceptual layout for the processing area is shown in Figure 4.11. Internal access roads would connect the processing area to the area of active mining and would include haul roads for heavy mine vehicles and service roads for light vehicles.

i Administration buildings

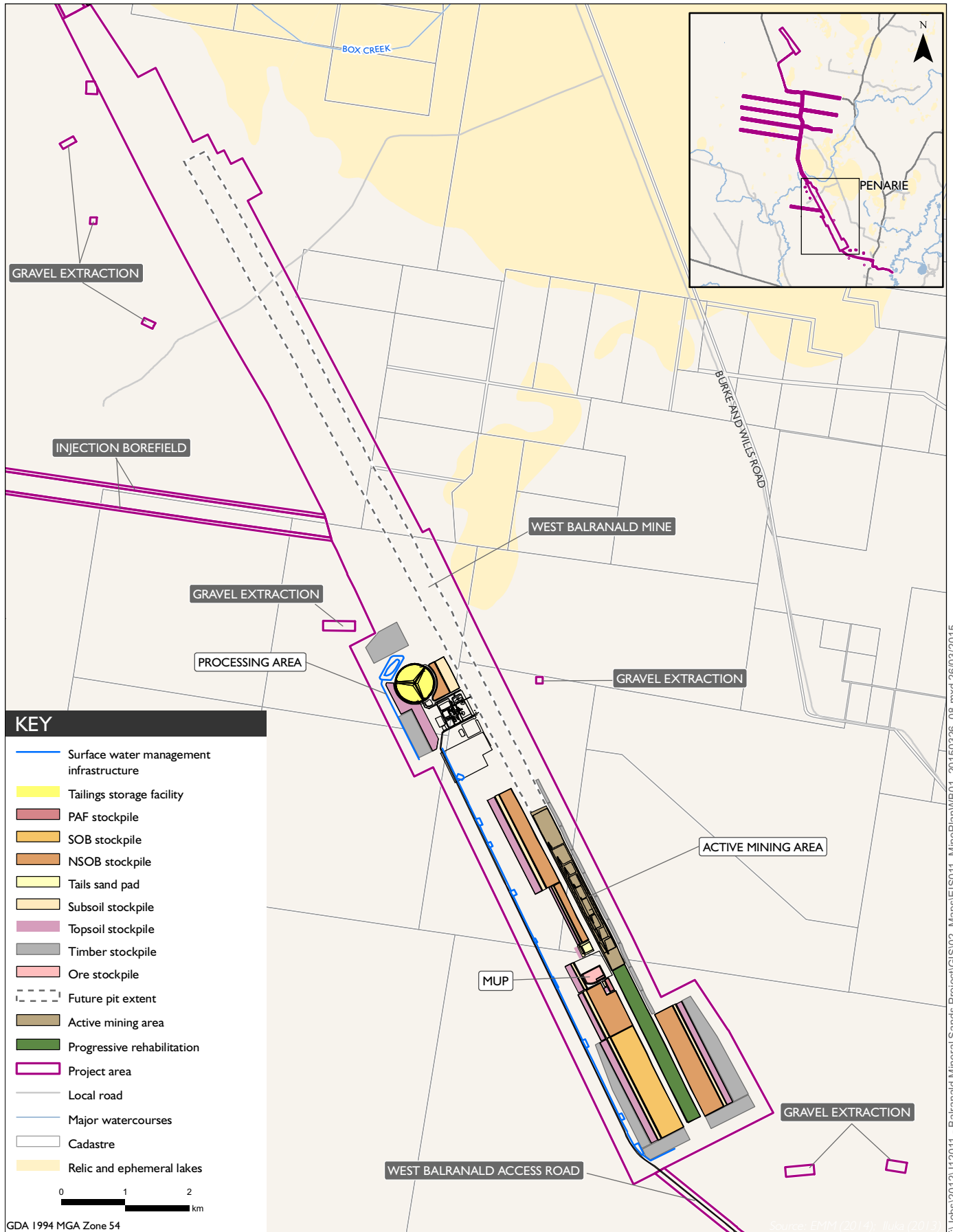
Administration buildings would be located at the processing area. Buildings would include:

- administration and contractor offices;
- site security hut at plant gate;
- laboratories;
- crib rooms; and
- toilets and amenities.

Administration facilities and workshop requirements at the Nepean mine would be similar to West Balranald mine but at a smaller scale.

ii Processing plant, product stockpiles and tailings storage facility

The location of the processing plant, including the pre-concentrator plant (PCP), wet concentrator plant (WCP), wet high-intensity magnetic separator (WHIMS) plant, ilmenite separation plant (ISP), product stockpiles and the TSF is shown in Figure 4.11. Further detail on the processing plant is provided in Section 4.5, and the TSF in Section 4.6.

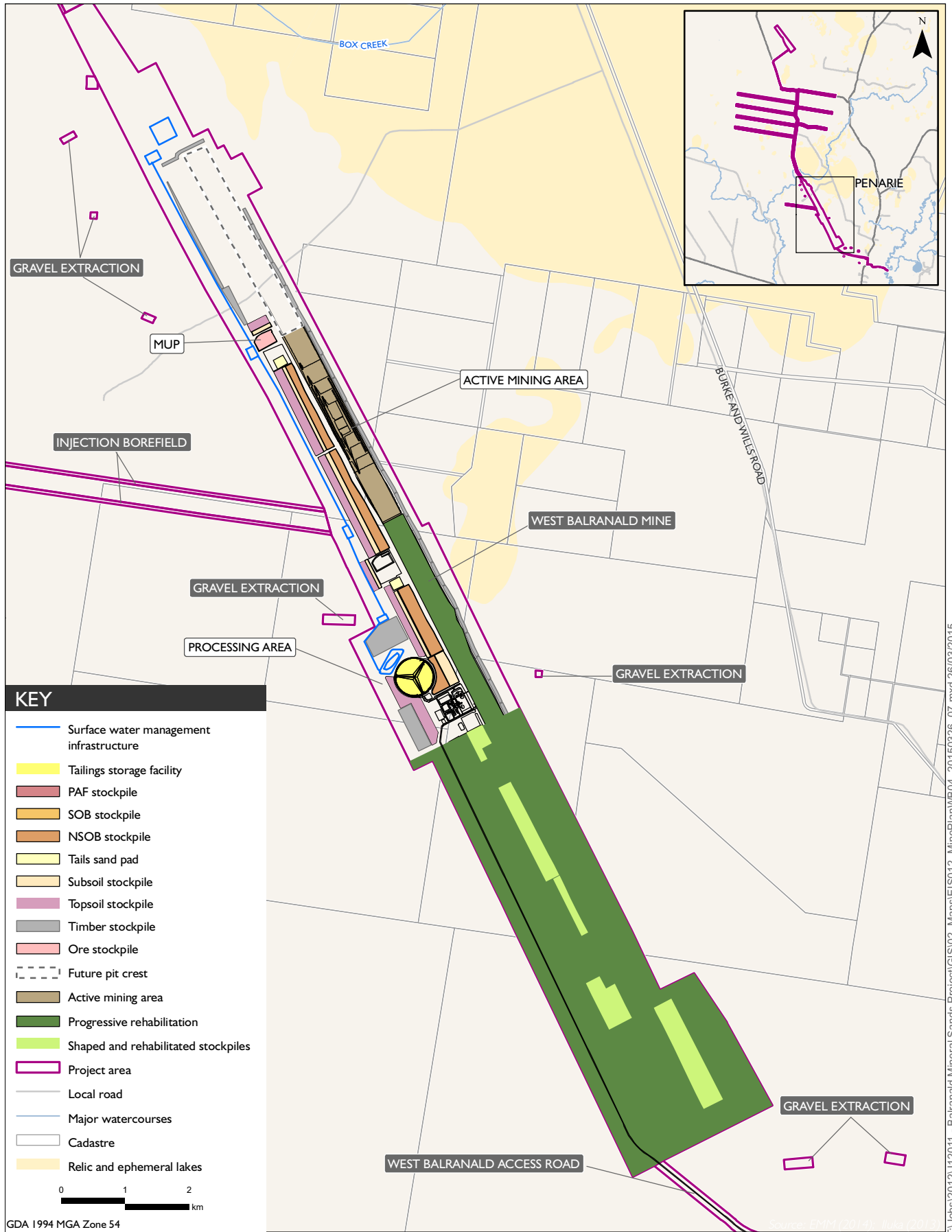


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Conceptual mine stage plan for West Balranald mine - Year 1

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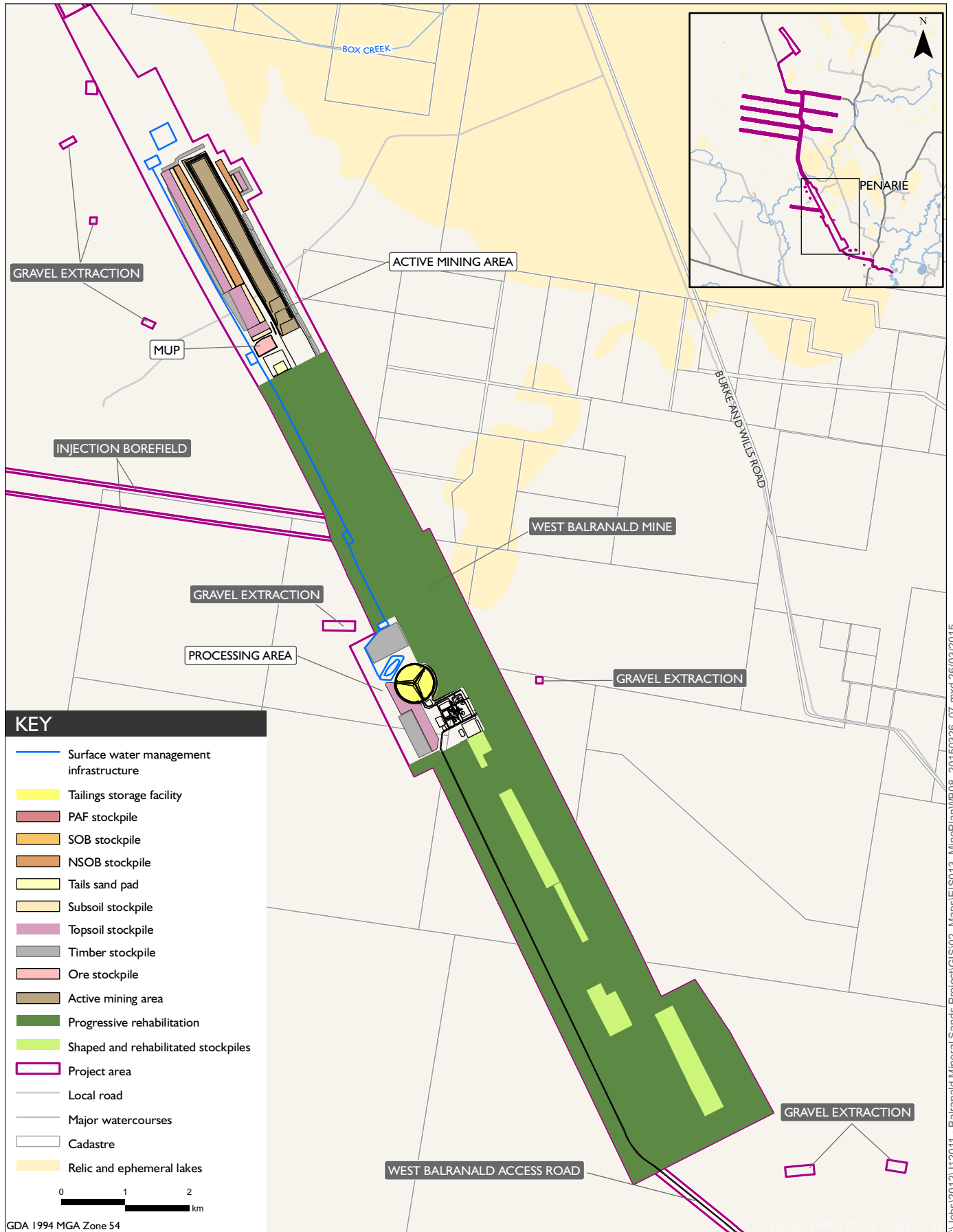
Figure 4.7



Conceptual mine stage plan for West Balranald mine - Year 4

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Figure 4.8

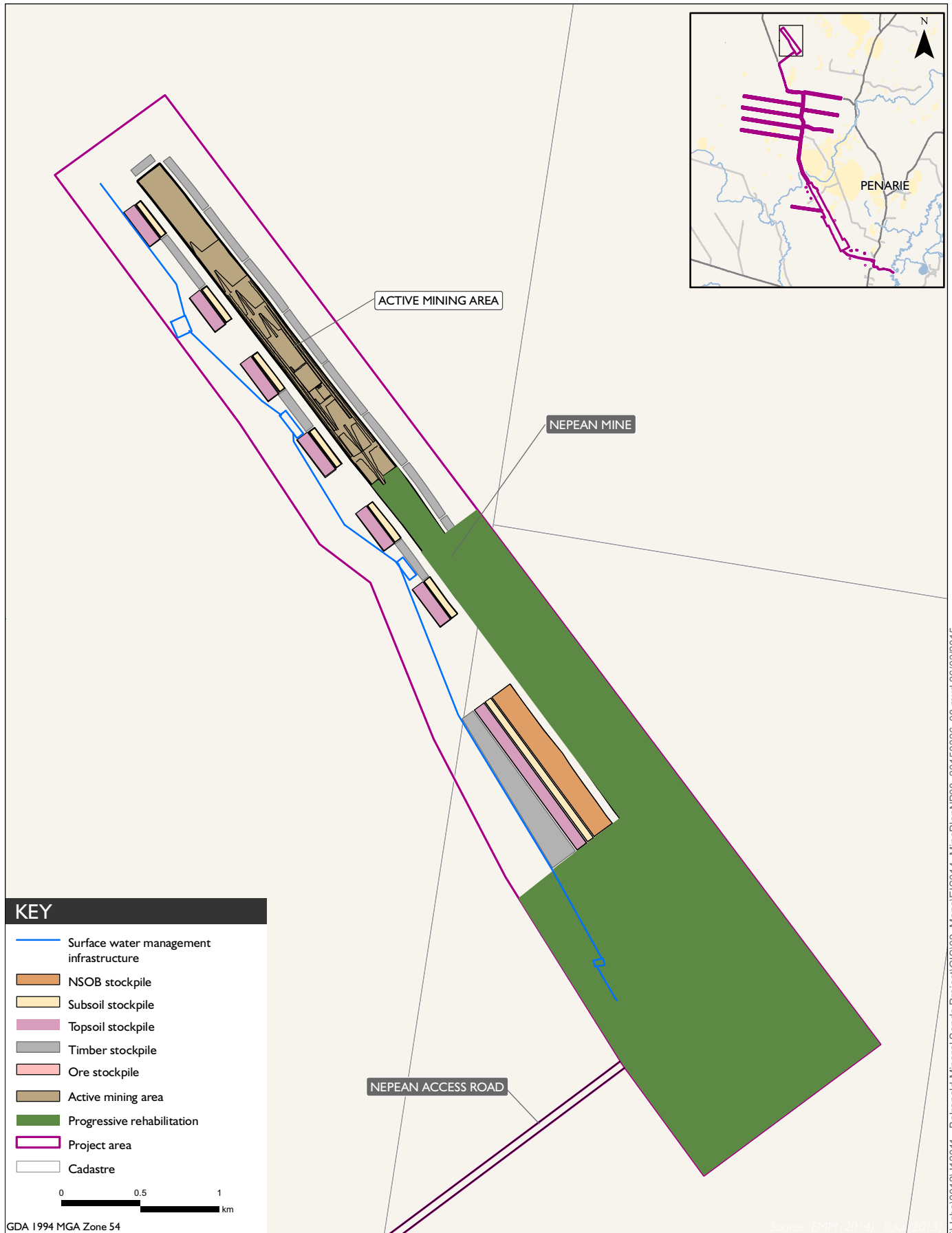


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Conceptual mine stage plan for West Balranald mine - Year 8

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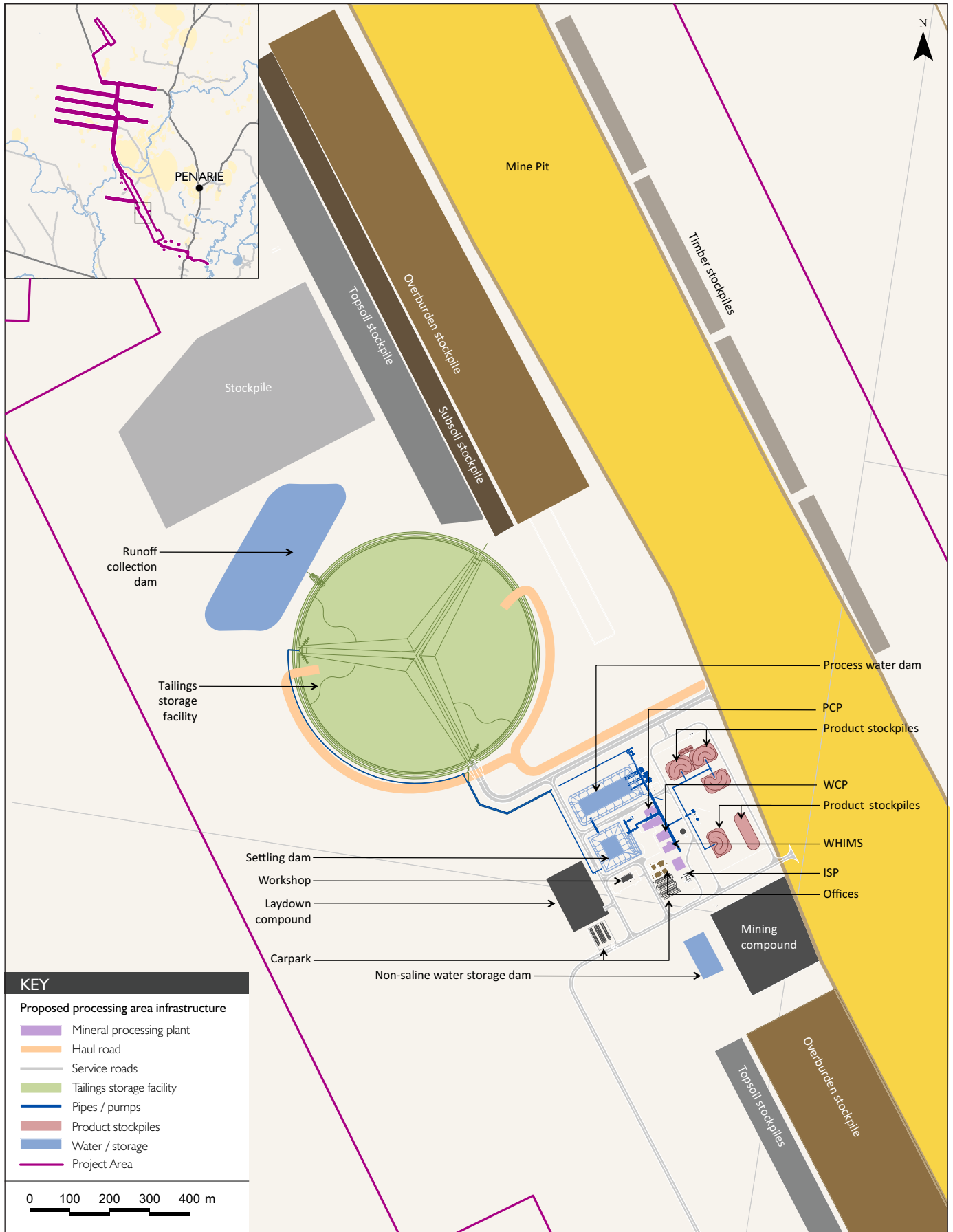
Figure 4.9



Conceptual mine stage plan for Nepean mine - Year 8

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Figure 4.10



Processing area conceptual layout

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Figure 4.11

iii Maintenance areas and workshops

A store warehouse and integrated workshop with washdown bays located within the processing area. This would be a steel framed industrial shed with concrete floors. The store warehouse would provide storage of consumables and spare parts. The workshop would be used for routine maintenance of mine plant and equipment. Vehicle access to both the workshop and warehouse would be provided for forklifts, franna cranes and light vehicles. A hardstand apron would be established to facilitate deliveries from semi-trailers or rigid trucks.

A yard would be provided adjacent to the workshop for a laydown area of large items. The lay down area and workshop shelter would provide storage for materials required for maintenance and fabrication tasks.

iv Other ancillary infrastructure

The West Balranald and Nepean mines would have a combination of stock and security fencing. An employee and visitor car park would be located in the processing area at the West Balranald mine.

A fuel storage and refuelling area would be constructed in the processing area. The facility would provide fuel for the earthmoving fleet, heavy haulage vehicles, light vehicles and mobile equipment.

An on-site gas supply is required to provide fuel for the ISP. The gas supply would be either LPG or LNG and would be delivered to site by tanker, with a dedicated tanker unloading facility and stored in above ground gas tanks.

Separation distances between the fuel and gas storages and other infrastructure (such as buildings) would be provided in accordance with relevant standards and guidelines (refer to Chapter 22 for more details).

4.4.3 Groundwater management

Dewatering of groundwater from aquifers overlying and surrounding the ore body would be required ahead of mining operations. This would involve dewatering via a series of bores installed adjacent to, and in advance of, mining. Extracted water would be injected back into the same formation. The dewatering and injection infrastructure is described in the following sections.

i Dewatering system

It is estimated that dewatering would commence around six months in advance of mining operations. Each dewatering bore would have a nominal flow rate of approximately 25 L/s and be connected to a skid-mounted head works arrangement. In the order of 350 dewatering bores spaced about 100 m apart would be required along the West Balranald mine over the life of the mine.

The dewatering bores would be powered by a combination of a 22 kilovolt (kV) power and diesel generators. Power would be provided with the use of skid mounted pump control panels (or similar) with multiple dewatering bores likely to be connected to each panel.

ii Injection system

As described in Section 4.3.6, groundwater would be injected back into the Loxton-Parilla Sands Formation. Two methods of groundwater injection will be undertaken:

- on-path injection – involves the injection of groundwater into bores located along the West Balranald mine pit ahead of mining operations. The injection bores will be connected to a water transfer main on either side of the mine pit; and
- off-path injection – involves the injection of groundwater into bores located some 5 to 30 km away from mining operations in the injection borefields. The injection bores would be connected to a network of pipeline infrastructure that will extend from the water transfer main at the mine to each of the injection borefields (Figure 4.4).

The two constructed groundwater retention dams at the West Balranald mine would allow for the precipitation of solids and exposure of groundwater to ultra-violet light to reduce iron bacteria that would potentially foul the injection bore screens.

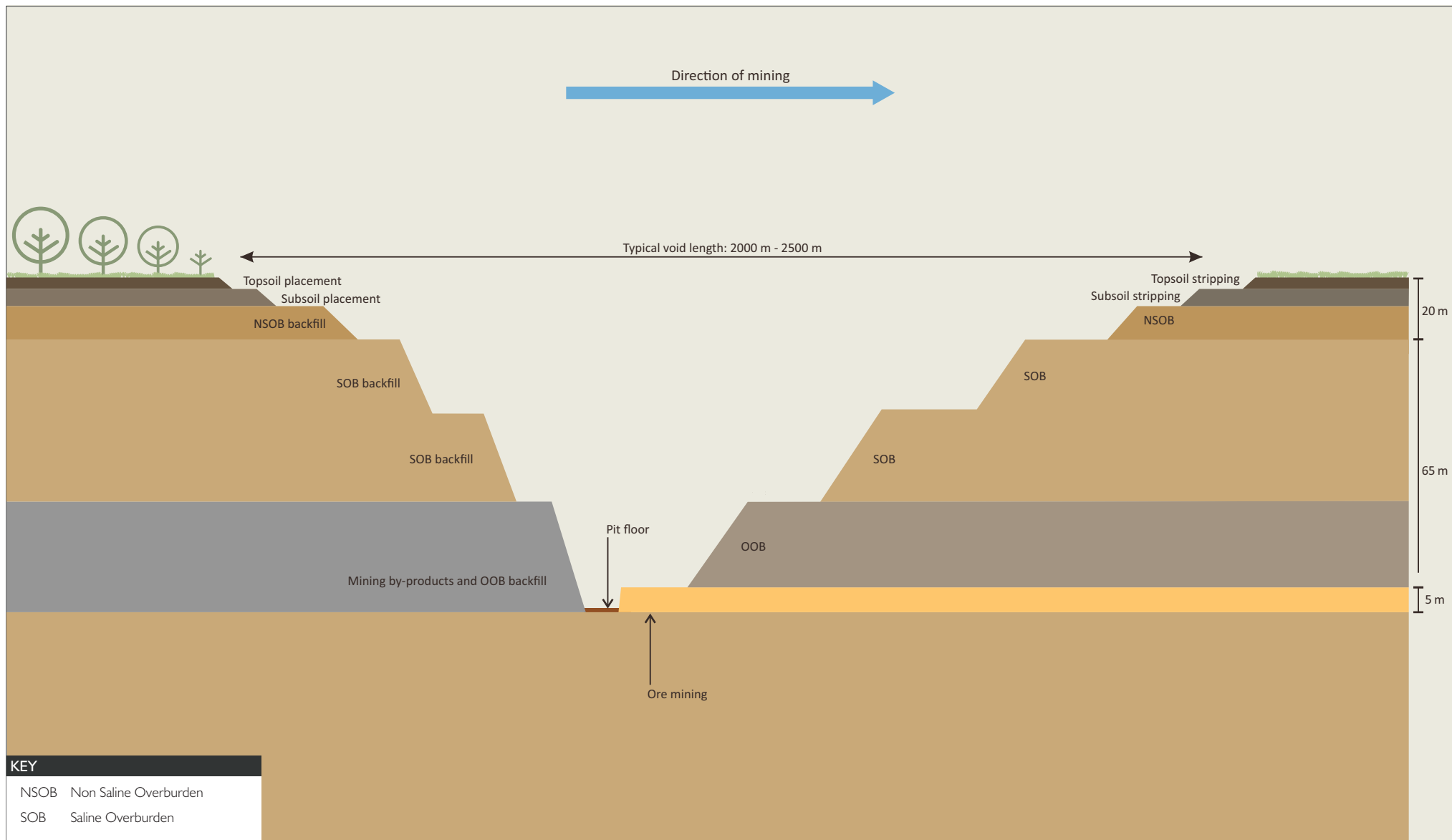
4.4.4 Mining method, staging and sequence

Mining of the West Balranald and Nepean mines would be by dry-mining methods using trucks and shovels and associated equipment fleets. A conceptual long section and plan view of mining progression are shown in Figure 4.12 and 4.13. A range of alternative mining methods were considered during Iluka's pre-feasibility study for the Balranald Project; these are discussed in Chapter 5.

The typical process for mining of West Balranald and Nepean mines would include:

- vegetation removal, soil stripping and stockpiling;
- overburden removal and management, which would include overburden stockpiles outside of the mine pit and direct backfilling of the mining void;
- ore recovery, including stockpiling and initial processing of run of mine (ROM) ore at the MUP;
- management of tailings and mining by-products, which would include progressive backfill of the mining void with fines and sand tailings from the processing plant, TSF and Hamilton MSP; and
- rehabilitation of mined areas.

Mining would commence with the establishment of an initial boxcut at the southern end of the West Balranald mine to enable ramps to be installed in the pit floor. Stripping of topsoil followed by removal of dry overburden would begin in Year 1. Soil stripping and overburden removal occurring several hundred metres ahead of the initial boxcut.

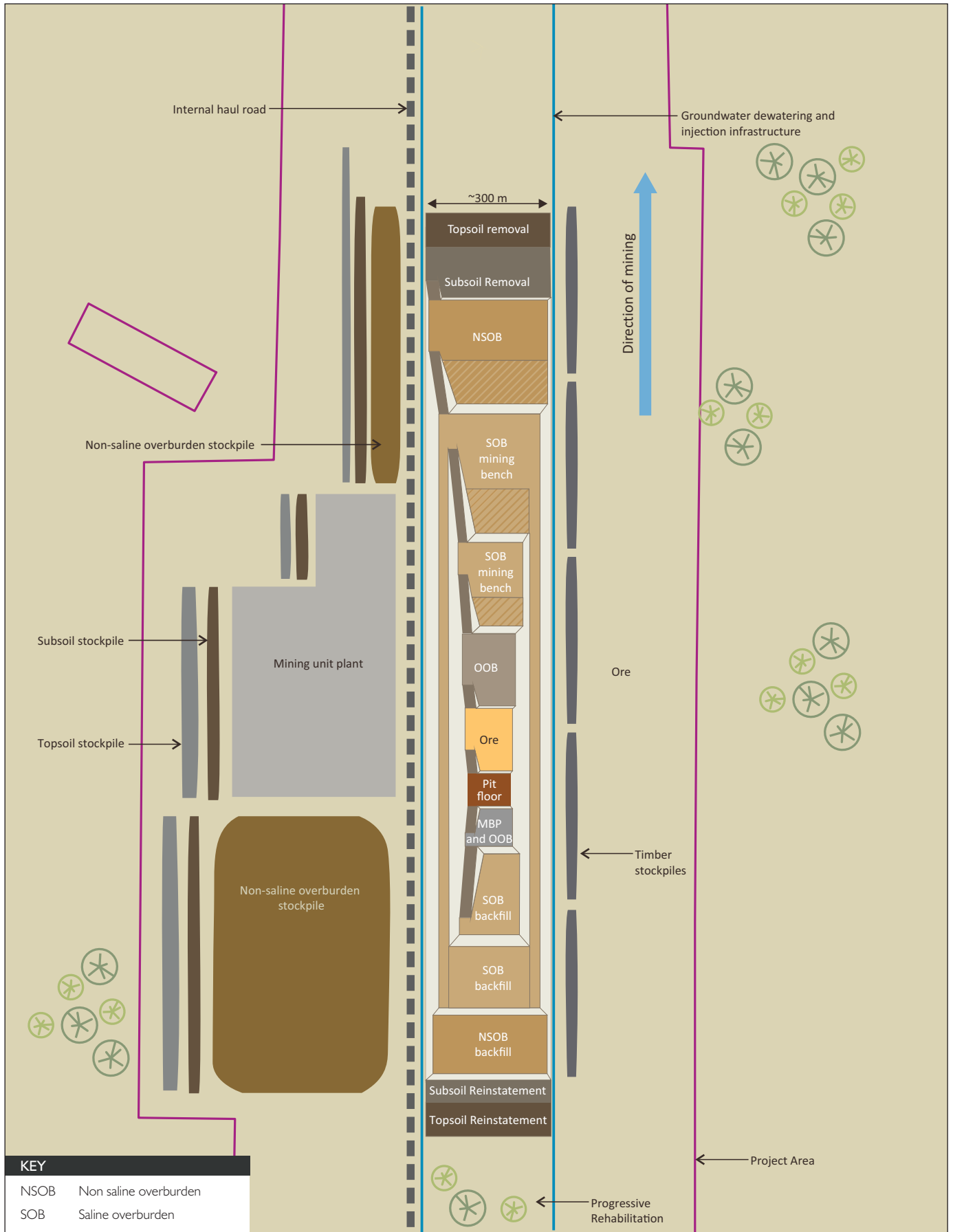


Note: Not to Scale

Conceptual mining progression - long section

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Figure 4.12



Conceptual mining progression - plan view

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Figure 4.13

Once the initial boxcut at the West Balranald mine is established, mining would commence northwards. Initially, all overburden would be stockpiled adjacent to the boxcut. Mining would advance north at a rate of approximately 8 to 10 m per day. The active mining area at any given time would typically be in the order of 2 to 2.5 km long, 300 m wide and up to 80 m deep, as illustrated in Figures 4.12 and 4.13.

The conceptual mine layout plans for Years 1, 4 and 8 of the mine life, provided in Figures 4.7 to 4.10 show the progression of the active area of mining, commencing at the south of West Balranald mine in Year 1 and progressing north. Mining operations at Nepean mine commence at approximately Year 6 and would progress from south to north. As the mine advances, the mine void would be backfilled with the overburden, and subsoil and topsoil reinstated (see Figure 4.13). A similar process would be undertaken at the Nepean mine, over a shorter mine path and at shallower depths.

Once mining commences at the Nepean mine, run of mine (ROM) ore from the Nepean mine would be transported by truck to the processing area at the West Balranald mine.

i Vegetation removal, topsoil stripping and stockpiling

In order to remove the volume of overburden to facilitate mine advancement, vegetation would be cleared in advance of mining. Timber, vegetation, topsoil and subsoil would be stripped separately using conventional earth moving machinery including tractor scoops, dozers, excavators and scrapers. It would then be stockpiled separately along the length of the disturbed area. Timber, vegetation, topsoil and subsoil removal rates would be dictated by the requirement to remove soils and overburden in advance of the mine face. Timber would be stockpiled, topsoil would be stockpiled to a height of about 2 m and subsoil would be stockpiled to a height of about 10 m. In the order of 5.2 Mbcm on-path, and 10.6 Mbcm total (including off-path), topsoil and subsoil would be removed.

Vegetation clearing management measures are described in Section 12.4 and soil management measures are described in Section 15.4.

ii Overburden removal and management

Overburden extracted during mining would be either stockpiled adjacent to the pit or backfilled directly in the mine void. This would depend on the stage of mining operations and material type. At commencement of mining operations with the initial boxcut in Year 1, all extracted material would be stockpiled outside of the mine pit. As mining progresses, overburden would be placed directly into the void behind the advancing pit which would reduce disturbance outside of the pit along the length of the mine.

Overburden has been characterised as non saline overburden (NSOB), saline overburden (SOB) and material that is potentially acid forming (PAF) on exposure to atmospheric conditions. NSOB is overburden material that is generally above the water table and therefore has relatively low salinity and is not PAF. SOB is overburden situated below the water table is therefore saline, but is not PAF. These materials are considered to have low reactivity from an acid generation perspective. Overburden which is PAF is located directly above the ore and is more reactive and has the potential to generate acid on exposure to atmospheric conditions.

Table 4.2 shows the indicative tonnages of overburden and ore to be excavated. Tonnages include the material moved as part of mining but exclude rehandled overburden from stockpiles back into the pit.

Table 4.2 Indicative material volumes over the life of the Balranald Project

Mine	Volume of material (Mm ³) ¹				
	SOB	NSOB	PAF	Ore	Tailings/mining by-products
West Balranald	133.6	53.6	32.2	10.2	8.4
Nepean	n/a	35.2	n/a	2.7	2.3

Notes: 1. Excludes rehandled material volumes.

Overburden stockpiles would have a height of up to 15 m and would be formed using earthmoving equipment. Runoff from overburden stockpiles would be captured and transferred to collection drains and dams (NSOB) and the MUP dams (SOB).

PAF material within the overburden would be extracted using earthmoving machinery and would be returned, via in-pit access ramps, as backfill and covered as soon as practicable. Some PAF material would need to be stockpiled during the establishment of the initial boxcut. Runoff from overburden stockpiles containing PAF materials would be captured and transferred to the MUP dam. Further details on the management of PAF material is discussed in Section 4.6.3.

Most overburden would ultimately be returned to the mine void, although five NSOB stockpiles in the southern half of the West Balranald mine (refer Figure 4.9) would remain in-situ and would be shaped and contoured as part of the final landform. Topsoil and subsoil would be reinstated above the overburden, and the area would be rehabilitated.

iii Ore recovery, stockpiling and processing at the mining unit plant

Extracted ore would initially be stockpiled on ROM pads adjacent to the MUP. At any time, the quantity of ore stockpiled at the MUP is estimated at up to around 1.2 Mt. This is equivalent to approximately four months supply of ore feed at any time, based on an ore processing rate of 475 tonnes per hour (tph) and a rougher head feed of 440 tph.

The MUP is the first stage in processing of extracted ore, which screens the ore to remove oversize material (greater than 2.5 mm in diameter). The ore is then slurried with water from the MUP dam and pumped via pipeline to the processing plant. Oversize material greater than 2.5 mm is returned directly into the mine pit. Ore from stockpiles would be processed in the MUP at a nominal rate of approximately 500 tph dry.

The MUP would consist of an apron feeder with a vibrating dry grizzly, scrubber and trommel unit and would be track-mounted to enable relocation as mining progresses. The MUP is expected to be relocated approximately four times over the life of the mine. Approximate locations of the MUP over the life of the West Balranald mine are shown in Figure 4.3.

4.4.5 Mining equipment

Typical equipment that would be used during mining includes:

- shovels;
- excavators;
- haul trucks;

- dozers (tracked and wheel dozers);
- graders;
- tractor scoops;
- water trucks;
- loaders;
- scrapers;
- conveyors;
- lighting plants; and
- service and maintenance vehicles.

A typical fleet of equipment has been assumed for the purposes noise and air quality assessments, as discussed in Chapters 9 and 10. Iluka is investigating optimised earth moving techniques for overburden, including in-pit conveyor and a dozer push or bucket wheel excavator. If adopted, these optimised methods would reduce the numbers of earthmoving equipment required to mine the Balranald Project (ie shovels, excavators and haul trucks).

Final mining equipment (including type, number and size), would be determined during detailed design.

4.5 Processing plant

Mineral processing would be undertaken at the processing plant, shown in Figure 4.11. The processing plant would concentrate the ore to generate two primary product streams; HMC and ilmenite. Annual average production rates of HMC and ilmenite are 500,000 tpa and 600,000 tpa respectively. The processing plant would have a processing rate of 475 tonnes per hour (tph) and a rougher head feed of 440 tph. Once processed, HMC and ilmenite would be stockpiled at the processing area prior to off-site transport (see Figure 4.11).

The processing plant has a number of components including the PCP, WCP, WHIMS plant and ISP. Water requirements for the processing plant would be fed from the process water dam, except for the ISP, which requires fresh water. The site water management system including process water and water storage infrastructure is described in Section 4.7.2.

The processing plant is described below and a process flow diagram is shown in Figure 4.14.

4.5.1 Pre-concentrator plant

The PCP utilises desliming cyclones for fines removal and gravity spirals to concentrate the heavy mineral within the ore. Wet gravity processing methods would separate light minerals (such as quartz) from heavy minerals (such as rutile and zircon), and remove mining by-products such as slimes and sand.

The PCP comprises thickeners, a spirals building, flocculent units, a cyclone stacker, pump stations and a mining by-product handling plant. The PCP requires water, which would be supplied by the process water dam.

The PCP would receive slurried ore via pipeline from the MUP, and would process ore at a nominal rate of 440 tph. The slurried ore is initially pumped to the PCP vibrating screen which would remove material 2.5 mm or larger. The PCP then separates the fines (-53 micrometres (μm)) fraction from the coarser sand fraction, and concentrates the heavy mineral in the sand to a grade suitable to feed into the WCP.

The fines fraction (-53 μm) is separated from the coarser sand fraction by desliming cyclones. The fines report to the cyclone overflow and are gravity fed to a thickener unit, where flocculent is added to create a thickened fines by-product stream (thickener underflow (or slimes)). The coarse sand fraction reports to the cyclone underflow and is pumped to the PCP gravity spirals which separate the heavy mineral fraction from the lighter sand material.

The PCP circuit produces a concentrated heavy mineral stream and a sand by-product stream. The concentrated heavy mineral either goes directly to the WCP as a slurry, or to the decoupling stacker. The sand by-product stream is diverted to a sand tails stacker and stockpiled. Once the sand by-product stockpile has reached capacity it is trucked to the mine void for disposal.

4.5.2 Wet concentrator plant

The WCP further upgrades the heavy mineral content of the concentrate stream (from the PCP) to between 95% and 98% heavy mineral. Wet gravity processing methods further separate light and heavy minerals.

The WCP produces an upgrade HMC product at a rate of 150 tph. The WCP comprises a decoupling plant with a PCP heavy mineral stockpile, a constant density tank and structure, a spirals building consisting of five or six spiral stages, screens and associated stockpiles and pipelines, pump stations and water storage dams. The WCP is typically divided into a primary and secondary concentrating circuit where the primary circuit contains gravity spirals which upgrades the PCP concentrate. The secondary WCP consists of the WHIMS circuit and the up-current classifier circuit. The upgraded ore is fed through the WHIMS plant.

4.5.3 Wet high intensity magnetic separation plant

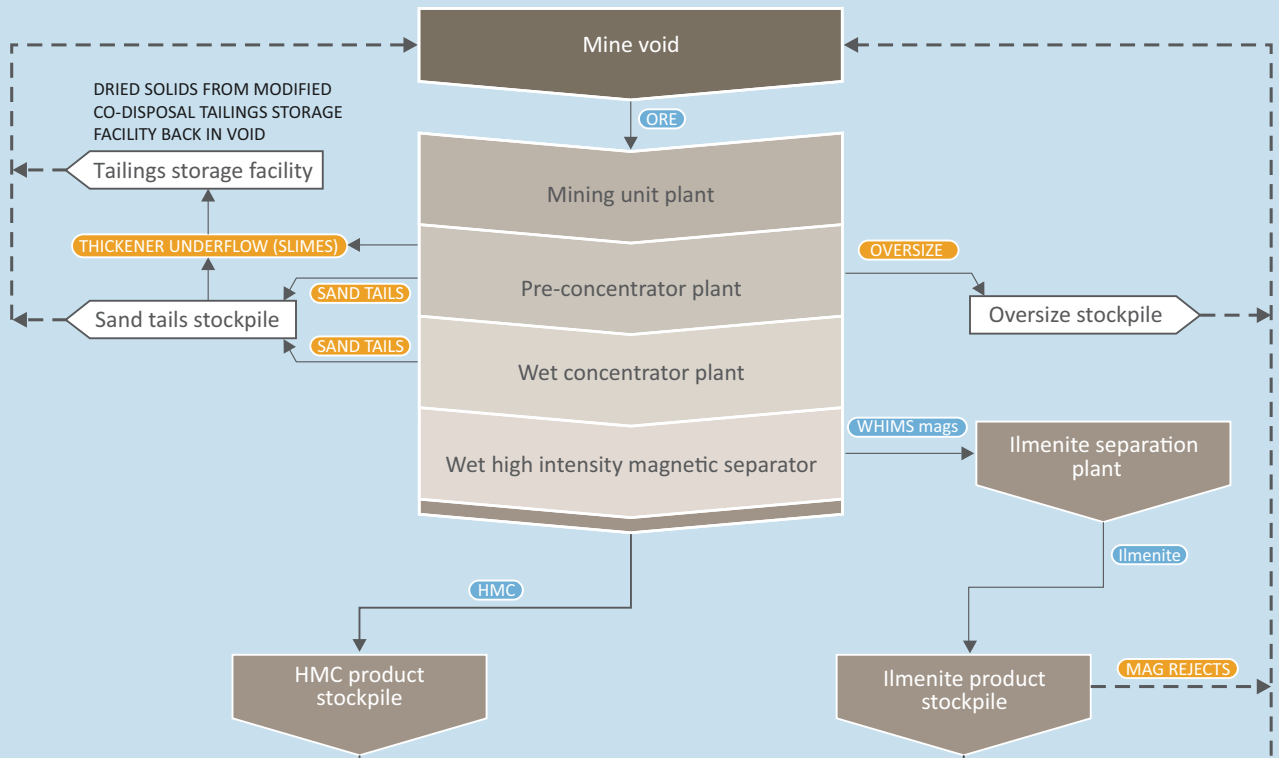
The WHIMS plant is a series of high strength magnets which separate magnetic material (magnetic or primary ilmenite) from non-magnetic material (HMC). The WHIMS plant is a wet process that splits the product into two streams (HMC product stream and magnetic ilmenite stream) with different destinations and beneficiation process routes.

The WHIMS plant includes five primary and two secondary processing units with the primary unit feed rate approximately 150 tph. Each of the five units would process approximately 30 tph.

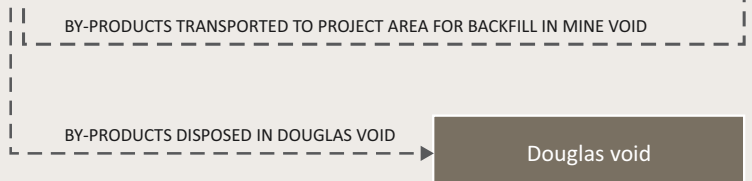
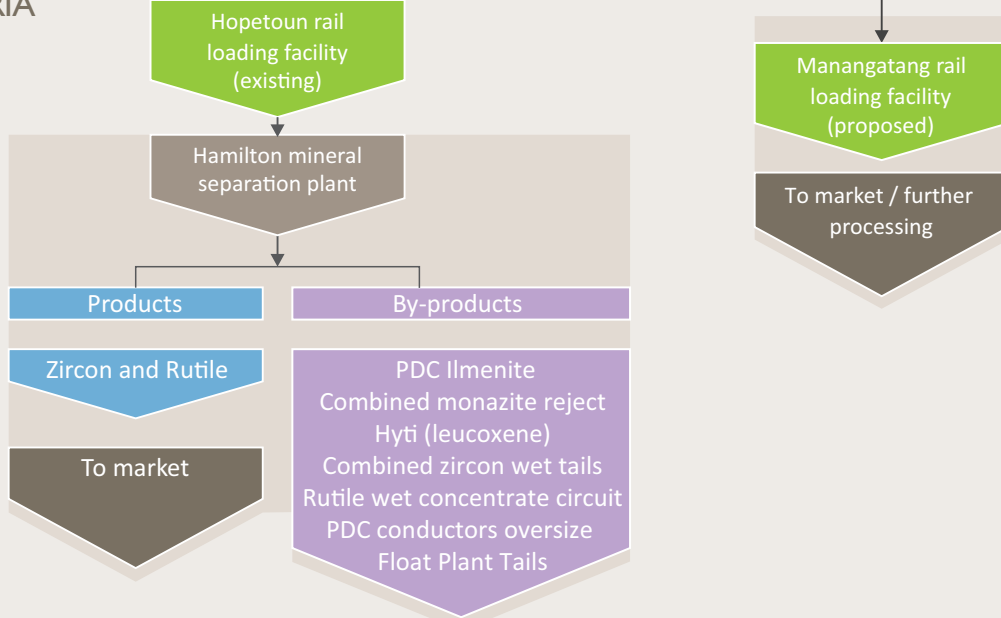
The secondary WHIMS units would receive approximately 34 tph dry solids. These units would further recover entrained ilmenite from the non-magnetic WHIMS stream. The secondary WHIMS magnetic stream is combined with the primary magnetic stream and fed to the ISP.

The non-magnetic stream is HMC, which is stockpiled in the processing area (Figure 4.11).

PROJECT AREA - NSW



VICTORIA



KEY

- Backfilled in mine void
- Loading facility
- Product streams
- Mining by-products
- Mineral separation plant by-products

Mineral processing flow diagram
 Balranald Mineral Sands Project
 Environmental Impact Statement
 Figure 4.14



4.5.4 Ilmenite separation plant

The ISP separates the WHIMS magnetic stream into two ilmenite products; sulphate and chloride ilmenite. The ISP would have a feed rate of approximately 90 tph (dry) and include a stockpile reclaim system to feed the ISP, a wash plant to remove dissolved salts from the mineral surfaces and a dry separation plant comprising rare earth drum roll magnetic separators to magnetically fractionate the mineral.

The ISP non-magnetic stream would be directed to the non-magnetic tank bin, while the magnetic streams of sulphate ilmenite and chloride ilmenite reports to the sulphate and chloride bins respectively (Figure 4.11).

4.5.5 Product stockpiles

HMC and ilmenite product stockpiles would be located at the processing area, as shown in Figure 4.11.

4.6 Tailings and mining by-products management

Tailings and mining by-products would be generated by the MUP and processing plant. Tailings generated at the MUP would include oversize material, which would be temporarily stockpiled at the MUP before being returned to the pit. Tailings generated at the processing plant would include sand and slimes. A portion of sand tailings would be stockpiled before being returned to the pit, while the remainder would be disposed using a process known as modified co-disposal. Modified co-disposal would involve slurring sand tails with slimes from the processing plant, and placement in the TSF.

Non-saleable by-products associated with the processing of Balranald Project HMC from the Hamilton MSP would be managed as part of Iluka's existing Victorian operations or returned to the West Balranald mine void (refer Figure 4.14). At the time of publication of this EIS, Iluka were seeking separate approval from the Victorian Minister for Planning for the continuing disposal of Hamilton MSP by-products at Douglas.

Further details on mining by-products and management are provided in the geochemistry assessment in Appendix Q.

4.6.1 Tailings storage facility

Management of tailings and mining by-products would be by modified co-disposal. Modified co-disposal would involve slurring sand tails from the WCP with slimes (thickener underflow) from the PCP, and placement in the TSF. The sand and thickener underflow mixture is referred to as ModCod.

The TSF would be located within the processing area (Figure 4.11). The TSF would be approximately 30 ha in area with a tailings volume in the order of 1 Mm³, lined and divided into a number of individual cells. The ModCod would be pumped into a single cell of the TSF. Once a cell is at capacity, the ModCod would be directed to the next empty cell while the first cell dries and consolidates. Once the ModCod has dried sufficiently, the cell would be excavated and the dried material transported by truck back to the mine pit for backfilling into the mine void. Cells that have been excavated would then become available to refill. The cycle from slurry to consolidation to recovery is estimated to take 12 months per cell.

Water would be recovered from the TSF via decant or an in cell pontoon pump and either gravity fed or pumped to the settling dam.

Sand tailings not required for the ModCod would be pumped to a sand stacking pad located adjacent to the ROM stockpile at the MUP. Once the sand tails are dried they would be backfilled into the mine void.

4.6.2 Processing mining by-products from Hamilton mineral separation plant

The Hamilton MSP would generate by-products during processing of HMC from the Balranald Project. This would include the following streams:

- sand and slimes tailings;
- sand tails containing monazite; and
- float plant tails.

Hamilton MSP by-products generated would be required to be managed as part of Iluka's existing Victorian operations or returned to be placed in the West Balranald pit as part of backfilling activities.

4.6.3 Management of potentially acid forming material

The Balranald Project would produce multiple sources of PAF material:

- organic overburden and ore from the West Balranald mine;
- tailings underflow from the PCP thickener;
- sand tails;
- ModCod;
- ilmenite and HMC product streams; and
- mining by-products from the Hamilton MSP.

i Organic overburden

Organic overburden would be generated over the life of mining at the West Balranald mine. Initially, organic overburden created by the initial boxcut would be managed by:

- routine geological/geochemical assessment of overburden extracted to enable segregation of organic overburden and selective handling/reuse according to potential acid generation risk;
- stockpiling PAF overburden on a low permeability pad with a limestone liner (eg ultra-fine grained limestone) with surface water drainage control (upstream cut-off drains), within the designated stockpile area at the MUP, with runoff or seepage directed to the MUP dam;
- blending or applying thin layers of a sufficient quantity of limestone into the temporary organic overburden stockpile from the initial boxcut;
- develop operating protocols to maintain/create sufficient storage and conduct regular monitoring of water level and chemistry in the MUP dam;
- monitoring of the integrity of the surface water and drainage management around the PAF pad, and any limestone blending equipment; and

- placing PAF at the base of the backfill face and covering with overburden as soon as possible during mining.

Once the initial boxcut is complete, there would be no above-ground organic overburden stockpiled during the operational phase, due to the ongoing placement of newly disturbed organic overburden directly within the pit. Limestone may be blended with, or applied to the organic overburden (as required) as it is progressively mined. Operating protocols would be developed prior to operation.

ii Ore

Ore would be removed from the pit and stored on a ROM stockpile pad adjacent to the MUP. The ROM stockpile pad would be constructed on a low permeability pad with a limestone liner (eg ultra-fine grained limestone) with surface water drainage control (upstream cut off drains), within the stockpile area at the MUP, with runoff/seepage directed to the MUP dam.

iii Tailings underflow

Tailings underflow from the PCP thickener would be mixed with sand tails from the WCP to form ModCod and sent to the TSF.

iv Sand tails

Sand tails from the WCP process that are not mixed with tailings underflow would be stored on a sand stacking pad. The sand stacking pad would be constructed with a low permeability base and runoff capture system. Runoff would be directed to the MUP dam. Once the sand tails are dry they would be trucked back to the mine void and covered with overburden as part of backfilling operations.

v ModCod

The TSF would be designed with a low permeability lining. Each cell of the multi-cell TSF would be sequentially filled. Once each cell is full, the next cell would commence use. When the material in each cell is dry the cell would be excavated with the dry material trucked back to the pit void and covered with overburden as part of the backfilling process. The decant water reclaimed from TSF would be recirculated through the processing plant.

vi Product streams

Ilmenite and HMC product streams would be stockpiled separately on ore pads with low permeability and runoff capture. Runoff from the stockpiles would be directed to the settling dam. The magnetic rejects from the ISP would be blended with sand tails from the WCP and placed back into the pit void and covered with overburden as part of backfilling operations.

vii Mineral separation plant by-products

Any mining by-products associated with the processing of Balranald HMC at the Hamilton MSP, if transported back to the West Balranald mine, would be stockpiled on a pad with low permeability and runoff capture. The runoff would be directed to the settling dam. The by-product material from the MSP would be blended with sand tails and placed back into the pit void and covered with overburden as part of backfilling operations.

4.7 Site water management

The water management system for the Balranald Project includes both the management of surface water on-site, and management of extracted groundwater. The surface water management system would be designed to manage surface water flows on-site according to catchment area and associated water quality, and is described in the following sections.

The groundwater management system forms part of the overall site water balance and is an input into the surface water management system. The groundwater management system has been described in Section 4.4.3.

The location of surface water management infrastructure in the project area is shown in Figure 4.3 and 4.5.

4.7.1 Water sources

During construction, water would be abstracted from the Olney Formation (ie lower salinity/brackish water) in the project area. The rate of abstracted water would be up to 150 ML/yr.

During operation, water sources would include:

- surface runoff – generated by direct rainfall within the surface water catchment areas in the project area. This would be separated into mine affected water (elevated salinity, low pH, elevated concentrations of heavy metals and elevated concentrations of oil and grease) and sediment laden water;
- groundwater:
 - inflow to the pit – although the dewatering system is designed to completely dewater the pit ahead of mining, it is expected that there would be a small volume of groundwater inflow into the pit during the life of the mine;
 - groundwater extracted from the Loxton-Parilla Sands – to dewater the pit prior to mining as described in Section 4.4.3; and
- fresh water – supplied from the Murrumbidgee River by the water supply pipeline (Figure 4.2) (extraction of water from the Murrumbidgee River may commence during the construction phase if construction of the pipeline is completed).

Site water management is necessary during all phases of project operations. Water has been divided into five streams. The proposed strategy for the management of water is based on the separation of water from different sources based on anticipated water quality, as follows:

- groundwater dewatered from the Loxton-Parilla Sands. Some groundwater would be used to satisfy mine water demands (see Section 4.7.3), however the majority would be treated with ultra-violet (UV) light and injected back into the Loxton-Parilla Sands.

- Mine affected water, comprising runoff and groundwater inflow to the pit collecting in the active mining area at the West Balranald mine, runoff from SOB and PAF stockpiles and runoff from the MUP area and processing area (including ROM pads, and tailings and mining by-product stockpiles). Management would include:
 - seepage, groundwater and surface runoff inflows to the active mining area would be collected in on-site storages and used preferentially to satisfy mine water demands; and
 - runoff from the MUP area and processing area, and the SOB and PAF stockpiles would also be collected in on-site storages and used to satisfy mine water demands.
- Sediment laden water, comprises runoff from the active mining area at the West Balranald mine and the Nepean mine, and runoff from NSOB, topsoil and subsoil stockpiles. Surface runoff from NSOB stockpiles and the active mining areas would be captured and treated in sediment dams and used for dust suppression.
- Surface water runoff from undisturbed areas would be diverted, wherever possible, around areas disturbed by mining and released from the site, minimising the capture of clean surface runoff.
- Raw water for use in the ISP, dust suppression on NSOB stockpiles, soil stockpiles and rehabilitated areas, and to supply filtered water demands would be pumped from the Murrumbidgee River via the water supply pipeline. Potable water would be trucked to the project area and stored.

Sewage at the project area would be managed in two ways:

- for areas with high density of personnel (ie processing area and accommodation facility), a package waste treatment system (ie STP) would be used, which would require occasional pumping out of sludge. Wastes would be collected from site by licensed contractor and disposed of at a licensed facility; and
- for ablutions located in areas with low or infrequent use, untreated waste would be collected in septic tanks which would be emptied by tanker as required.

4.7.2 Water storage infrastructure

Water used in processing operations would be managed by various dams and structures. Water storage infrastructure that would be constructed as part of the water management system are shown in Table 4.3. All dams would be lined to prevent leakage.

Table 4.3 Water storage infrastructure

Dam	Description
Settling dam	The settling dam would collect runoff water from the processing area. It allows for settling of solids before transfer to the process water dam and recycling within the processing area.
Process water dam	The process water dam would be the primary water supply for the processing plant. It would receive water from the settling dam and groundwater from the dewatering system. The process water pumps are supplied from this dam. Receives overflows from settling dam via gravity.
MUP dam	The MUP dam would receive dewatering flows from West Balranald mine and transfers of excess water from process water dam. It would supply water to the MUP. The MUP dam would also collect runoff from the ROM pad, stockpile pads containing PAF materials, sand tails stacking pad, which are potentially acid forming. The pH of the MUP dam would be continuously monitored and lime tipping would be done on occasion to maintain a pH > 4.5.
Processing area runoff dam	Captures runoff from the processing area. Water is transferred to the settling dam.
TSF	Receives modified co-disposal (ModCod) slurry consisting of sand and thickener underflow mixture (or slimes). It would contain all direct rainfall and resulting runoff that occurs within the TSF area. Water is decanted from the TSF and returned to the settling dam for reuse in the processing plant.
Groundwater retention dams	Two groundwater retention dams would store groundwater extracted from the Loxton-Parilla Sands by the dewatering bores. Groundwater would be exposed to UV light prior to being reinjected.
Non-saline water dam	Constructed to hold imported raw water from the water supply pipeline.
Runoff collection drains and dams	Constructed to capture runoff from the NSOB, topsoil and subsoil stockpiles. Would function as sediment basins.

4.7.3 Water demand

Demands for water would be primarily generated by the processing plant (including MUP, PCP, WCP and ISP), dust suppression and potable requirements for amenities. The ISP also requires potable water which would be sourced from the water supply pipeline from the Murrumbidgee River.

4.8 Waste management

The mine would generate various non-hazardous recyclable and non-recyclable wastes, as well as waste hydrocarbons. Bins would be positioned where food is consumed so the mine is kept free of litter. All non-hazardous waste (including putrescibles and inert) would be securely stored. All waste would be removed from site and disposed of by licensed contractors. Recyclable materials would be sent to a licensed recycler. Sewerage waste would be generated by on-site amenities. Sewage wastes would be collected from site by licensed contractor and disposed of at a licensed facility.

Operation and maintenance of plant and equipment would generate waste hydrocarbons such as greases, oils and hydraulic fluids. These waste hydrocarbons would be placed in suitable containers and placed in a bunded area to await disposal at either an EPA-approved hydrocarbon waste site or a recycling depot.

4.9 Roads and transport

4.9.1 Mine access and internal roads

The primary access road for the Balranald Project would be a private access road from the Balranald-Ivanhoe Road to the West Balranald mine. Access to the Nepean mine would be via the Nepean access road, constructed from the West Balranald mine to the Nepean mine that would include portions of the Burke and Wills and Arumpo roads (ie public roads). The access roads are shown in Figure 4.2 and 4.4.

Internal roads would be constructed along the length of the mine disturbance area generally parallel to the mine void.

4.9.2 Product transport

HMC and ilmenite would be transported by B-double trucks from West Balranald mine.

Trucks transporting HMC (in bulk) would travel along the Balranald-Ivanhoe Road, McCabe Street, the Sturt Highway south of Balranald, Balranald-Tooleybuc Road, through Tooleybuc and then west into Victoria to Iluka's existing rail facility at Hopetoun in Victoria. Transport of ilmenite would be by either B-double (in bulk) or containerised on flat-bed trucks. Ilmenite would be transported along the same product haulage route as HMC within NSW to a proposed rail loading facility in Manangatang, Victoria. The transport route for HMC and ilmenite in NSW is shown in Figure 4.15.

Transport of HMC would generate approximately 35 trucks per day to transport product to Hopetoun, Victoria, and 40 trucks per day for the transport of ilmenite to Manangatang, Victoria.

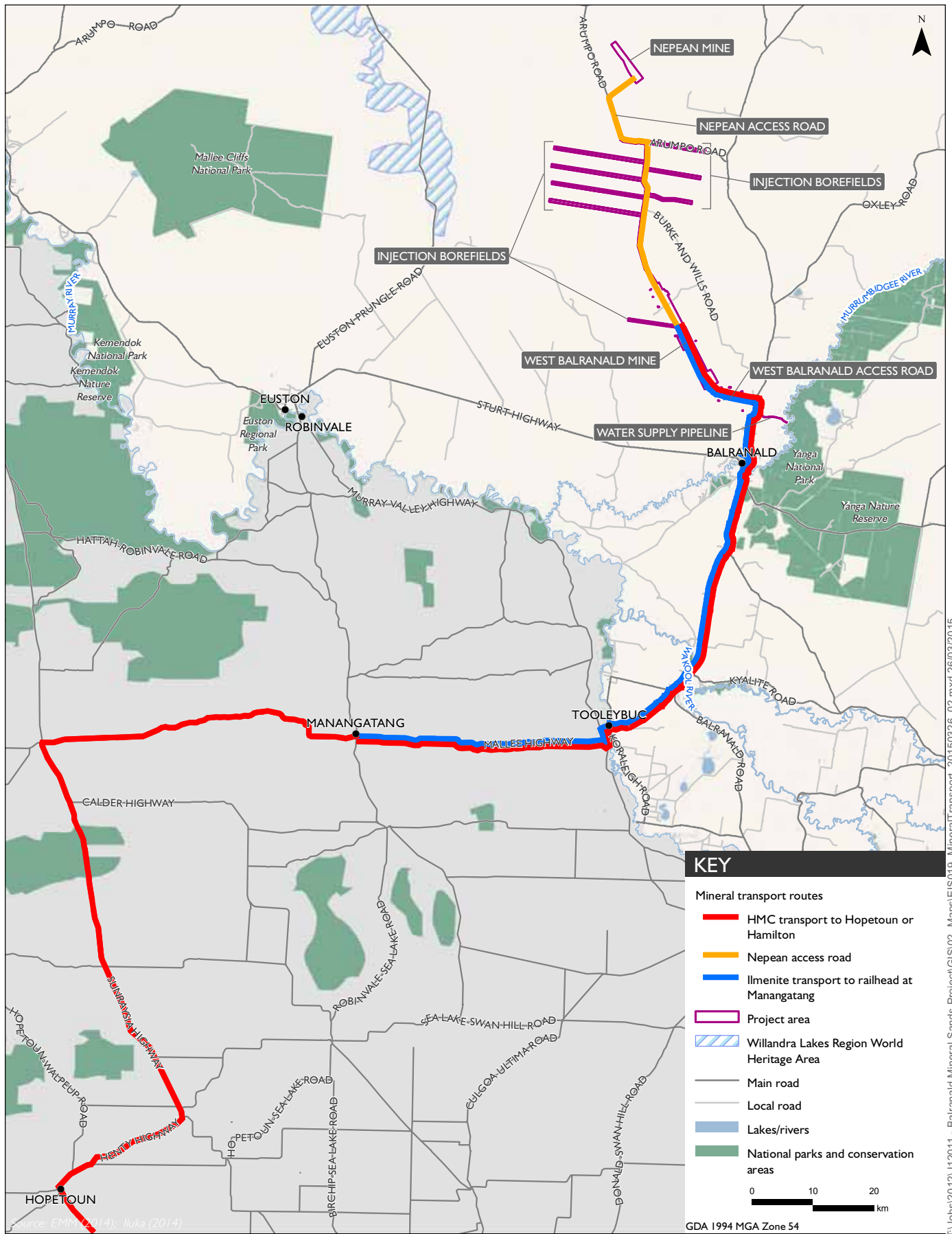
4.9.3 Back-loaded processing by-product transport

Non-saleable by-products associated with the processing of HMC at the Hamilton MSP would continue to be managed as part of Iluka's Murray Basin operations in Victoria, which includes placement of by-products from the Hamilton MSP in the mine void of Iluka's Douglas mine. However, where this is not possible, the non-saleable by-products would be transported back to the project area by road for placement in the mine void.

4.10 Accommodation facility

The accommodation facility would provide accommodation for all workers who choose not to commute to the project area on a daily basis, or who cannot commute within Iluka's enforced maximum daily commute time of 60 minutes one way. It would provide up to approximately 550 single rooms/quarters to accommodate peak construction and operational workforces of approximately 225 and 550 people, respectively. The facility itself would be operated by a staff of about 10 to 20, including administration, cleaning, food preparation, maintenance and security staff.

It is expected that the majority (95%) of the construction and operational workforce would stay at the accommodation facility. That is, it has been assumed that only 5% of the construction and operational workforce would commute on a daily basis while on-shift.



Transport route for HMC and ilmenite

Balranald Mineral Sands Project
Environmental Impact Statement

Figure 4.15

It is expected that approximately 70% of both the construction and operational workforce would be on site at any point in time with 30% on periods of rostered or other leave periods expected that the peak construction and operational workforce on-site at anyone point in time would be approximately 158 and 385 people, respectively. During the overlap of the construction and operational phases, it is expected that the combined construction and operational workforce on-site at any one point in time would be about 315 people. Based on the assumption that 95% of this workforce would use the accommodation facility, it is expected that the facility would cater for approximately:

- 150 construction employees during the construction phase;
- 366 operational employees during the operational phase; and
- 299 construction and operational employees during the overlap of the construction and operation phases.

The facility would principally accommodate employees and long stay contractors. Visitors and short stay contractors may also be accommodated.

The facility would be located adjacent to the West Balranald mine near the intersection of the primary access road with the Balranald-Ivanhoe Road (see Figure 4.16). Vehicle access would be provided off the West Balranald access road.

The facility would include:

- modular and relocatable single rooms/quarters;
- office building;
- wet mess area (including stores, kitchen and dining area);
- laundry facilities;
- toilet and shower facilities;
- car and bus parking area; and
- recreation areas.

A design using modular and relocatable single rooms/quarters would enable the accommodation facility to be 'scaled up' and then 'scaled down' in order to accommodate the requisite number of commuting workers. A conceptual layout is shown in Figure 4.17.

The recreation areas would contain facilities such as BBQs, gym/recreational room, hard ball sport area and swimming pool.

The accommodation facility site is cleared and currently used for grazing. It is well screened from the Balranald-Ivanhoe Road by a thick stand of vegetation along the road corridor which would be maintained as part of the design of the facility.

The accommodation facility would be supplied with potable water either via the proposed water pipeline from the Murrumbidgee River or a potable system supplied by truck. Power and telecommunications would be via existing services immediately to the east within the Balranald-Ivanhoe Road corridor.

A package waste treatment system (ie STP) would be used to service the accommodation facility for the life of the project. The system would be designed, installed and operated in accordance with the requirements of relevant government agencies and BSC. Waste from the system would be pumped out and disposed at Balranald townships wastewater treatment plant.

As outlined in Section 1.2, Iluka is also investigating lodging a separate DA under Part 4 of the EP&A Act with BSC to locate the accommodation facility within Balranald town, at a location on the Balranald-Ivanhoe Road and adjacent to Mungo and River streets. It is recognised that an accommodation facility within Balranald may provide increased benefits for Iluka's workforce (through access to recreational and other services), as well as promoting a higher level of integration with and utilisation of services (ie retail, hospitality, health sectors) provided in Balranald town.

Iluka will progressively develop concepts for a Balranald accommodation facility, including consulting with key stakeholders in a constructive manner, and seek approval under a separate DA to be assessed by BSC. In the event that approval is received for both options, In the event that approval is received for both options, Iluka would only construct an accommodation facility at one of the approved locations.

4.11 Electricity and communications infrastructure

The Balranald Project would have a power demand in the order of 15 million volt amps (MVA), mostly for the WCP, PCP, WHIMS, ISP, MUP and injection system. Electricity would be supplied to the mine by connection to the existing electricity supply network. The construction and operation of a transmission line from this network to the project area would form part of a separate approval process.

A standard suite of communication systems would be installed in the project area, including two telecommunications towers. The towers include a 70 m self-supporting lattice tower located 500 m from the processing area at West Balranald mine, and a 50 m lattice mast supported by guy wires located at Nepean mine. The 70 m tower would be erected during the initial construction phase and the 50 m mast would be erected before the commencement of mining at Nepean mine. Both would be decommissioned following completion of mining.

A telecommunication system would be installed to the site offices located in the mine infrastructure area at the West Balranald mine.

4.12 Workforce

During the construction phase, the Balranald Project would employ a peak construction workforce of approximately 225 people. During the operational phase, a peak workforce of approximately 550 people is anticipated. There would be a short period when there would be an overlap of these workforces as construction is finalised and mining operations commence. During this overlap, it is expected there would be a combined construction and operational workforce of about 450 people.

It is expected that approximately 70% of both the construction and operational workforce would be on-site at any point in time with 30% on scheduled leave periods. Accordingly, the peak construction and operational workforce on-site at anyone point in time is expected to be about 158 people and 385 people respectively. During the overlap of the construction and operational phases, it is expected that there would be approximately 315 people on-site at any one point in time.

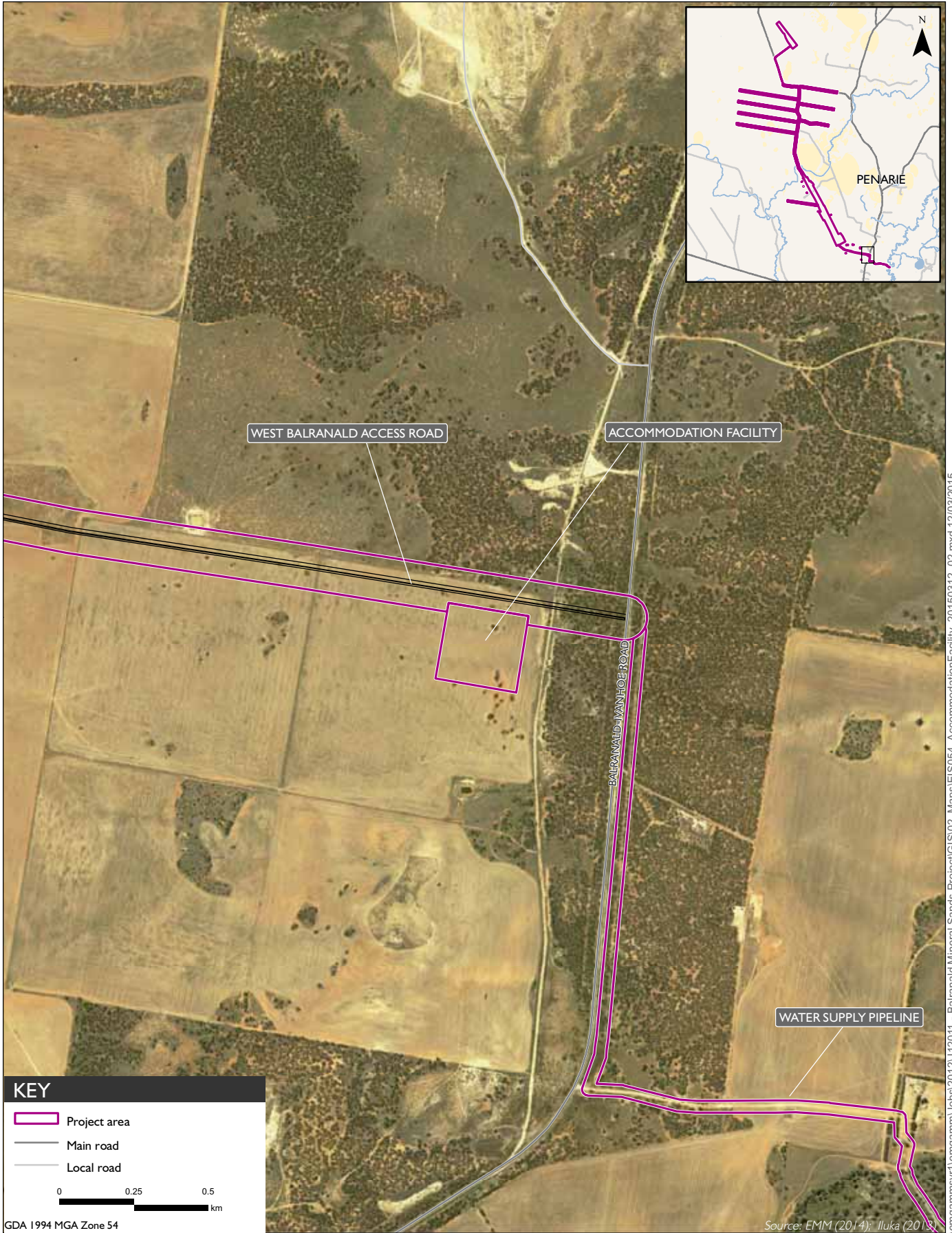
The possible roster for construction workers would be 14:7 (14 days on then 7 days off) or 21:7. The possible roster for operational workers would be 8:6 or 4:3.

4.13 Rehabilitation and decommissioning

The rehabilitation of the Balranald Project would include the progressive re-establishment of native Chenopod Shrub lands, mallee and areas designated for agricultural production.

Rehabilitation of the final landform would be undertaken on a domain basis, which represent land management or rehabilitation areas and post mine landforms areas. Rehabilitation would be undertaken using different techniques suited to the type of disturbance incurred and the proposed post-mine land use. Each are further detailed in Appendix M and summarised in Chapter 17.

Closure and decommissioning would involve removing site services, buildings and infrastructure, roadways, car parks and hardstand areas.








GDA 1994 MGA Zone 54

Source: EMM (2014); Iluka (2013)

Accommodation facility location
 Balranald Mineral Sands Project
 Environmental Impact Statement
 Figure 4.16

West Balranald access road



KEY	
	Recreation areas
	Laundry facilities
	Self-contained accommodation
	Existing vegetation
	Bushfire setback

Accommodation facility conceptual layout

Balranald Mineral Sands Project
Environmental Impact Statement

Figure 4.17

5 Consideration of alternatives

5.1 Alternatives considered

This chapter describes the alternatives that were considered as part of the development of the Balranald Project described in Chapter 4. The justification for the preferred option is discussed briefly.

The key elements of the project where alternatives were considered included:

- mining methods and handling of overburden;
- mining sequence;
- mine footprint;
- processing area location;
- power supply;
- gravel supply;
- materials handling and processing;
- product transport;
- accommodation facility; and
- water management and supply.

Each of these are discussed in the following sections.

5.2 Mining methods and handling of overburden

A number of different mining methods were considered for the Balranald Project to provide an economically efficient option for extraction of the mineral sands resource. Initially a qualitative assessment was undertaken on all known mining methods, both conventional and unconventional, to assess which mining alternatives had potential application to mineral sand deposits with similar characteristics to the West Balranald and Nepean deposits.

Qualitative consideration was given to all known conventional open cut and underground mining methods, including highwall, board and pillar, longwall, shortwall, and block caving mining methods, however most were discounted early in the process due to being unsuitable for a range of economic, safety and geotechnical characteristics.

In addition to the proposed method of mining using conventional truck and shovel equipment as described in Chapter 4, three other mining methods were shortlisted for more detailed investigation and are described in further detail below:

- dragline;
- dredging; and
- integrated mining systems, including a range of technologies for overburden materials handling.

5.2.1 Dragline

Due to the geometry of the West Balranald pit, the dragline application was considered unconventional and would involve regular relocations of the dragline between two or more active mining areas. An assessment concluded that while dragline operations had some potential to result in an operating cost saving, this potential benefit was negated by an additional capital requirement to relocate mining equipment.

Risks were also identified including:

- productivity risks associated with the interaction between dragline operations and other site activities (dewatering, mining, tails disposal, management of PAF); and
- geotechnical risks where the poor cohesion of overburden materials at the West Balranald mine and the associated flat batter angles limit the material within reach of the dragline.

The above risks were considered to further impact the viability of dragline mining. It was concluded that the use of draglines was not a viable mining solution for the Balranald Project.

5.2.2 Dredging

Given the mineral sand deposit at the West Balranald mine is beneath the water table and the overburden largely consists of unconsolidated sands, the application of dredge mining was investigated.

An evaluation concluded that dredge mining was not a viable solution due to:

- high capital and rehabilitation costs associated with dredge mining and slimes handling;
- risks when compared to conventional mining, such as:
 - slimes management and associated infrastructure;
 - geotechnical issues impacting total material volumes and water impoundment structures within the pit;
 - heavy mineral recovery issues associated with dredge mining process and slimes build up within ponds; and
 - operability of multiple dredges within a narrow pit.

Based on this, dredging and all other forms of wet mining (such as sluicing) were eliminated as viable mining options.

5.2.3 Integrated mining system

A range of integrated mining methods that could replace the truck and shovel method were evaluated, including:

- bucket wheel excavators;
- dozer trap/conveyor systems;
- cross-pit stacking systems;
- loader and hopper mining options;
- continuous miner based mining systems; and
- associated conveyor systems.

It was concluded that integrated mining methods were not viable due to:

- high capital expenditure costs;
- operational inflexibility – once the equipment has been designed and constructed, there is limited opportunity to vary the operation to meet market demands and/or operational variability, which is not suited to the characteristics to the Balranald Project;
- technologies having not been applied to mining resources with similar pit characteristics to the Balranald Project; and
- production-critical nature of equipment, with equipment typically arranged on-site in a series where disruption to any part of the production equipment could disrupt production schedules.

Notwithstanding the above, further consideration has been given to the use of cross-pit stacking systems in combination with the truck and shovel mining method. Such technology could replace a portion of the truck and shovel equipment fleet for handling overburden materials.

5.3 Mining sequence

Various mining sequences were investigated. The optimum mining direction for West Balranald and Nepean was identified as being from south to north due to a range of factors including deposit geometry, grade and assemblage distribution and ability to meet required production rates using this mining sequence.

5.4 Mine footprint

Iluka has undertaken a process throughout the preparation of this EIS to avoid and minimise environmental impacts, as far as practicable. Generally, this process has involved:

- undertake baseline surveys to identify constraints within the project area and surrounds;
- overlay of preliminary project footprint information on aerial photography together with mapping of environmental constraints, particularly for biodiversity and Aboriginal cultural heritage;

- refine location of project infrastructure to avoid known constraints where possible;
- avoidance of direct impacts to identified constraints during detailed design, for example through relocating infrastructure (such as roads, stockpiles, ancillary infrastructure) where reasonable and feasible; and
- where significant features could not be avoided, identification of mitigation measures to minimise impacts, or compensation (eg offsets) if impacts were not able to be sufficiently mitigated or avoided.

The Balranald Project mine footprint has been reduced and refined based on mine plan optimisation during pre-feasibility and detailed feasibility studies. The area directly disturbed by mining is primarily defined by the location of the mineral sands resource. There were limited opportunities to reduce the footprint of the actual mine pit that would not affect the economic viability and safe extraction of the resource, which is highly influenced by geotechnical considerations. Therefore, there was limited scope to avoid impacts that would occur in the direct path of the mine.

However, significant re-design of the mine plan was completed to maximise the direct placement of overburden materials within mine void, thereby reducing the volume of material that requires stockpiling at the surface. This resulted in significantly less surface disturbance for placement of stockpiles outside the pit. Key drivers for the re-design of the mine plan were economics and management of potentially acid forming materials; however, the locations in which stockpile areas were reduced were guided by the presence of environmental constraints at the surface. These were primarily areas identified as having potential Aboriginal cultural heritage significance. This also resulted in a reduction in impacts to native vegetation associated with an overall reduction in the disturbance area as a result.

5.5 Processing area location

The location of the processing area and associated infrastructure was investigated using a range of strategic drivers that included alignment with the West Balranald and Nepean access roads, proximity to homesteads/dwellings on surrounding properties, extent of vegetation clearing required, topography, electricity infrastructure alignments, mine operations, environmental, cultural heritage, land tenure and view shed analysis (ie visibility).

The optimum location was determined to be within 3 km of the centre of the West Balranald deposit. Further analysis was undertaken to determine if the processing area should be located on the east or west side of the pit. The outcome was that the processing area was to be located on the west side of the West Balranald mine in its proposed location (refer Figure 4.11).

Consideration was given to the relocation of the mineral processing plant from the WRP mine (comprising PCP, WCP and WHIMS) to the Balranald Project, versus the plant remaining at the WRP mine. Relocating the plant to the Balranald Project would enable heavy minerals to be processed at the project area, with HMC transported by road from Balranald to the existing rail facility at Hopetoun (Victoria), and railed to the Hamilton MSP. For the plant to remain at the WRP mine, ore would need to be transported by road to the WRP mine for processing, and then transported again by road to the Hopetoun rail loading facility.

A financial, risk and sensitivity analysis was completed for each option, with the conclusion that the mineral processing plant should be located in the project area.

The processing plant identified for reuse at the Balranald Project is the PCP coupled with the WCP located at the WRP mine. As the pieces of plant are separate, modular buildings, it is possible to locate the PCP closer to the ROM pad and relocate it periodically. The optimisation model considered relocating the PCP periodically compared to pumping lower volumes of material to the WCP.

A single PCP co-located with the WCP at the processing area for the life of the Balranald Project was identified as the optimum scenario.

5.6 Power supply

Multiple power supply options were considered to provide power to the Balranald Project over the mine life. Options assessed included an islanded power station running on diesel or gas, a hybrid wind/diesel option and a network supply option. All options were examined with respect to capital and operating costs, carbon emissions and time to implement. Sensitivities around mine life and mine load were also considered in the analysis.

Based on the outcome of the options analysis it was recommended that a connection to the existing electricity network be adopted as the power supply option for the Balranald Project. This option provides the lowest cost over the mine life and represented the best value.

The power supply for the Balranald Project will be considered in a separate approval process under Part 5 of the EP&A Act.

5.7 Gravel supply

Two options were considered to supply gravel for the Balranald Project principally for the provision of road base material for internal roads and in pit ramps, comprising local resource extraction and importation of gravel from external suppliers.

Site investigations were completed within the area proximate to the West Balranald and Nepean mines to identify resources of gravel and if local supply was feasible. Sampling and testing of the areas confirmed that suitable material yet limited volumes is available for the construction of roads. Due to the shortfall of suitable local viable material, additional gravel from external sources would need to be purchased to meet the demand for the life of the Balranald Project.

5.8 Materials handling and processing

A range of options were evaluated for handling of ore and tailings. These included:

- ROM pads; and
- mining by-products disposal method.

5.8.1 Run of mine pads

Multiple ROM pads and MUP locations and configurations were considered as a means of reducing trucking costs. The MUP is typically located alongside a ROM stockpile. There are environmental and cost benefits to minimising trucking distances by relocating the ROM pad and MUP periodically as the mining operation advances. The environmental impacts (eg ground disturbance) and cost associated with the construction of multiple ROM pads was compared against the cost of trucking and pumping over various distances. Scenarios operating between one and eight ROM locations were assessed, with total of four locations over the life of the mine being assessed as optimal.

5.8.2 Mining by-products disposal

The Balranald Project would produce tailings over the mine life as a result of on-site mineral processing activities. Early project development work considered the construction TSF (ModCoD) versus solar drying dams for the management of tailings.

ModCoD requires a smaller area for the TSF while all other parameters remained similar. An outcome of this was that the solar drying option was approximately 20% greater net present cost (NPC) than the ModCoD scenario across the varying ROM and PCP scenarios, due largely to the increased construction and rehabilitation costs associated with a larger facility. ModCoD was determined to be the best option for mining by-product disposal.

5.9 Product transport

5.9.1 Transport of ore from the Nepean mine

A number of alternative scenarios were considered for the transport of ore mined at the Nepean mine, including quad trucks, B-doubles, heavy off-road haul trucks and long distance pumping. Variations of these options also included considering both pre-concentration at Nepean and concurrent mining of Nepean at a lower rate. Economic modelling, coupled with a qualitative risk assessment identified the use of B-doubles as the preferred method of transporting ore from the Nepean mine to the MUP at the West Balranald mine. An access road between the Nepean and West Balranald mines (using portions of the Burke and Wills and Arumpo roads) is proposed to be constructed as part of the Balranald Project.

By the time mining is due to commence at the Nepean mine (approximately Year 6), the MUP would be located on a ROM pad at the northern end of the West Balranald mine, and it would remain in this location for the duration of mining at Nepean. Ore would be mined and loaded into trucks at Nepean and transported to the MUP at the northern end of the West Balranald mine.

5.9.2 Transport of heavy mineral concentrate

A number of different transport options were analysed for the transport of HMC from the Balranald project area. A comparative traffic impact analysis considered:

- road classifications;
- network capacity if development proceeded;
- number of dwellings and other sensitive areas;
- road and intersections upgrade requirements; and
- journey time.

As a result of the analysis, transport by road by B-double trucks to Iluka's Hopetoun rail loading facility in Victoria and thereafter by rail to Hamilton MSP was selected as the preferred transport option for HMC.

5.9.3 Transport of ilmenite

Iluka investigated different options for the transport of ilmenite from the Balranald project area to the nearest port facility in Victoria. A comparative assessment considered:

- port options, including Portland, Geelong and Melbourne;
- rail sidings and network capacity in NSW and Victoria; and
- directly trucking, or the combined use of road and rail to port facilities.

The preferred option was for material to be loaded into B-Double trucks (bulk or containerised) at West Balranald mine and trucked to a proposed rail facility at Manangatang, Victoria. From here, it would be loaded into wagons or containers to be railed to port facilities in Victoria.

5.10 Accommodation facility

As part of the Balranald Project, Iluka has considered two primary options for accommodating the workforce, including a purpose built accommodation facility located close to the mine site or located in or adjacent to Balranald town.

Factors considered included:

- area of land available;
- proximity to other dwellings and land uses;
- proximity to the project area and required travel distances;
- environmental considerations (such as ecology, cultural heritage, noise, air quality);
- site access and traffic impacts;
- proximity to electricity and water services; and
- proximity to services and facilities.

Approval is sought as part of the Balranald Project for an accommodation facility to be located in the project area, south east of the West Balranald mine, to cater for the construction and operational workforce required for the life of the project.

Iluka is also investigating lodging a separate DA under Part 4 of the EP&A Act with BSC to locate the accommodation facility within Balranald town, at a location on the Balranald-Ivanhoe Road and adjacent to Mungo and River streets. It is recognised that an accommodation facility within Balranald may provide increased benefits for Iluka's workforce (through access to recreational and other services), as well as promoting a higher level of integration with and utilisation of services (ie retail, hospitality, health sectors) provided in Balranald town.

Iluka will progressively develop concepts for a Balranald accommodation facility, including consulting with key stakeholders in a constructive manner, and seek approval under a separate DA to be assessed by BSC.

In the event that approval is received for both options, Iluka would only construct an accommodation facility at one of the approved locations.

5.11 Water management and supply

5.11.1 Groundwater management

Iluka investigated a number of options for the injection of extracted groundwater to allow dry mining of the Balranald deposit. Numerical modelling of the injection process influenced the design of the injection borefields to ensure the system could be operated within acceptable parameters and. The design of the injection borefields included extensive consideration of hydrogeological properties, bore spacing and other infrastructure configurations through detailed modelling, as well as consideration of environmental parameters such as groundwater quality, groundwater dependent ecosystems and other water users.

The proposed location of injection borefields in the project area (Chapter 4) was identified as a result of the extensive modelling process.

5.11.2 Fresh water supply

Iluka investigated different fresh water supply options for the Balranald Project. Options considered included:

- treatment of saline groundwater by desalination;
- direct connection to surface water supply (extraction from a river); and
- third party supply (Balranald township municipal supply or bottled water).

Direct connection to a surface water supply was considered the most feasible and best option. Five different pipeline locations and four different pumping station options were considered for connection to the Murrumbidgee River. The pipeline and pumping station outlined in Section 4.3.8 was selected as the preferred option based on factors including reducing total pipeline distance, land access, availability of disturbed area for pump station infrastructure and minimising potential environmental impacts.

6 Legislative framework

6.1 Introduction

This chapter describes the relevant Commonwealth and NSW legislative and regulatory framework under which the Balranald Project will be assessed and determined.

6.2 Commonwealth legislation

6.2.1 Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places which are defined as matters of national environmental significance (MNES).

MNES, as defined under the EPBC Act, include:

- world heritage properties;
- national heritage places;
- wetlands of international significance;
- listed threatened species and ecological communities;
- migratory species;
- Commonwealth marine areas;
- the Great Barrier Reef Marine Park;
- nuclear actions (including uranium mining); and
- a water resource in relation to coal seam gas development and large coal mining development.

Under the EPBC Act, actions (or developments) that may have a significant impact on a MNES are deemed to be 'controlled actions' and can only proceed with the approval of the Commonwealth Minister for the Environment. An action that potentially has an impact on a MNES is required to be referred to the Department of the Environment (DoE) for determination as to whether or not the action is a controlled action.

The Balranald Project was referred to DoE on 20 August 2012 for consideration as a controlled action (reference EPBC 2012/6509), based on potential impacts to listed threatened species. The referral excluded the transmission line which will be subject to a separate referral.

On 25 October 2012, the Balranald Project was confirmed as a controlled action by DoE as it may potentially impact the following MNES:

- world heritage properties;
- places listed on the National Heritage Register;
- listed threatened species and ecological communities; and
- listed migratory species.

These MNES are deemed to be the controlling provisions for the Balranald.

The determination by DoE also declared that the Balranald Project required, in addition to an approval under Part 4 of the EP&A Act, an approval under Part 8 of the EPBC Act. In this instance a bilateral assessment was not considered appropriate since the Balranald Project would be undertaken across two states. As stated in Chapter 1, the approval under the EPBC Act is required for both the NSW and Victoria elements of the Balranald Project (with the exception of the transmission line, which will be subject to a separate referral process).

On 25 September 2014 an application was lodged with DoE to vary the proposed action in accordance with sections 156A(1) and 156A(3) of EPBC Act. The proposed variation to the action sought to remove the following components from the proposed action such that they are not considered further as part of the proposed action:

- traffic movements generated by the Balranald Project in Victoria; and
- development of a rail loading facility at Manangatang (Victoria), and transport of ilmenite by rail to ports in Victoria.

The proposed variation was supported by documentation demonstrating that the above components would not have any significant impacts on the controlling provisions.

On 5 December 2014, DoE accepted the proposed variation as requested. As such, for the purposes of the EPBC Act, the controlled action excludes traffic movements generated by the Balranald Project in Victoria, development of a rail loading facility at Manangatang (Victoria) and transport of ilmenite by rail to ports in Victoria.

A separate EIS will be prepared and lodged with DoE to support an application for the Balranald Project under Part 8 of the EPBC Act.

6.2.2 Native Title Act 1993

The Commonwealth *Native Title Act 1993* (NT Act) allows a native title determination application (native title claim) to be made in respect of land or waters where native title has not been validly extinguished (eg extinguished by the grant of freehold land).

A register of native title claims is maintained by the National Native Title Tribunal. Applications for compensation for extinguishment or impairment of native title rights can also be made. All native title claims are subjected to a registration test and claims will only be registered if claimants satisfy a number of conditions.

Proposed activities or development that may affect native title are called 'future acts'. Claimants whose native title claims have been registered have the right to negotiate about some future acts, including mining and the granting of a mining lease, over the land the subject of their native title claim. Where a native title claim is not registered a development can proceed through the mediation and determination processes, though claimants will not be able to participate in future act negotiations.

A future act includes the granting of a mining lease over Crown land or reserves. While there are Crown reserves proximate to the project area, the proposed mining lease area will not cover these reserves and the Native Title Act therefore does not apply to the Balranald Project.

6.2.3 Water Act 2007

The Commonwealth *Water Act 2007* commenced on 3 March 2008 and implemented key reforms for water management in Australia, including:

- establishing the Murray-Darling Basin Authority (MDBA) with the functions and powers needed to ensure that water resources in the Murray-Darling Basin (MDB) are managed in an integrated and sustainable way;
- requiring the MDBA to prepare a strategic plan (the Basin Plan) for the integrated and sustainable management of water resources in the MDB; and
- establishing a Commonwealth Environmental Water Holder to manage the Commonwealth's environmental water to protect and restore the environmental assets of the Basin and outside the Basin where the Commonwealth owns water.

i Murray-Darling Basin Authority

The MDBA oversees water planning considering the MDB as a whole, rather than state by state. Key functions of the MDBA under the *Water Act 2007* include:

- preparing a Basin Plan for adoption by the Minister, including setting sustainable limits on water that can be taken from surface and groundwater systems across the Basin (known as sustainable diversion limits or SDLs);
- advising the Minister on the accreditation of state water resource plans;
- developing a water rights information service which facilitates water trading across the MDB;
- measuring and monitoring water resources in the MDB;
- gathering information and undertaking research; and
- engaging the community in the management of the MDB's resources.

ii The Basin Plan

The *Water Act 2007* requires the MDBA to prepare the Basin Plan and establishes mandatory content for the plan, including:

- limits on the amount of water (both surface and ground water) that can be taken from MDB water resources on a sustainable basis;

- identification of risks to MDB water resources, such as climate change, and strategies to manage those risks;
- requirements that a state water resource plan will need to comply with if it is to be accredited under the Act;
- an environmental watering plan to optimise environmental outcomes for the MDB by specifying environmental objectives, watering priorities and targets for Basin water resources;
- a water quality and salinity management plan which may include targets; and
- rules about trading of water rights in relation to Basin water resources.

A draft Basin Plan was released on 28 May 2012 following consultation with various stakeholders. Following amendments, the Basin Plan was adopted by the Federal Water Minister on 22 November 2012.

The Basin Plan provides a coordinated approach to water use across the Basin's four states and the Australian Capital Territory (ACT). It limits water use at environmentally sustainable levels by determining long-term average SDLs for both surface water and groundwater resources. SDLs are the maximum long-term annual average quantities of water that can be taken on a sustainable basis from MDB water resources as a whole, and from each SDL resource unit, from 2019.

The MDBA has determined 10,873 gigalitres (GL) per year to be the volume of surface water that reflects an environmentally sustainable level of take as a long term average with different limits for every river valley in the MDB. This would provide an additional 2,750 GL per year of water returned to the MDB's rivers. For groundwater, this volume is 3,324 GL per year.

The MDBA estimates that, as of 30 June 2012, 1,547 GL per year had been recovered for the environment. As of December 2013, 1,894 GL of the 2,750 GL SDL reduction target set out in the Basin Plan had been secured.

The MDB has been divided into 29 surface water SDL resource units and 66 groundwater SDL resource units. Surface water SDL resource units SS15 Murrumbidgee and SS18 Lower Darling, and groundwater SDL resource units GS50 Western Porous Rock and GS28 Lower Murrumbidgee Alluvium cover the project area.

The location of the surface water and groundwater SDL resource units can be seen in Figure 6.1 and 6.2.

Schedule 2 of the Basin Plan sets the SDLs for each surface water SDL resource unit as a formula: it is the baseline diversion limit (BDL) minus the local reduction amount and, where applicable, the shared reduction amount. The schedule includes notes of the MDBA's estimates, in GL per year, of the quantity of water represented by BDLs, SDLs, the amount of environmental water already recovered and the remaining gap. For SS15 Murrumbidgee the following SDL has been prescribed:

The limit is the BDL minus 320 GL per year (local reduction amount) minus the SDL resource unit shared reduction amount.

Note 1: The Authority estimates the BDL to be 2501 GL per year and therefore this limit is estimated to be 2181 GL per year minus the SDL resource unit shared reduction amount.

Note 2: As of 30 June 2012, the reduction achieved is estimated to be 173 GL per year and thus the gap remaining is estimated to be 147 GL per year in relation to the local reduction amount for this SDL resource unit.

For SS15 Lower Darling, the following SDL has been prescribed:

The limit is the BDL minus 8 GL per year (local reduction amount) minus the SDL resource unit shared reduction amount.

Note 1: The Authority estimates the BDL to be 60.5 GL per year and therefore this limit is estimated to be 52.5 GL per year minus the SDL resource unit shared reduction amount.

Note 2: As of 30 June 2012, the reduction achieved is estimated to be 2.8 GL per year and thus the gap remaining is estimated to be 5.2 GL per year in relation to the local reduction amount for this SDL resource unit.

These estimates are summarised in Table 6.1.

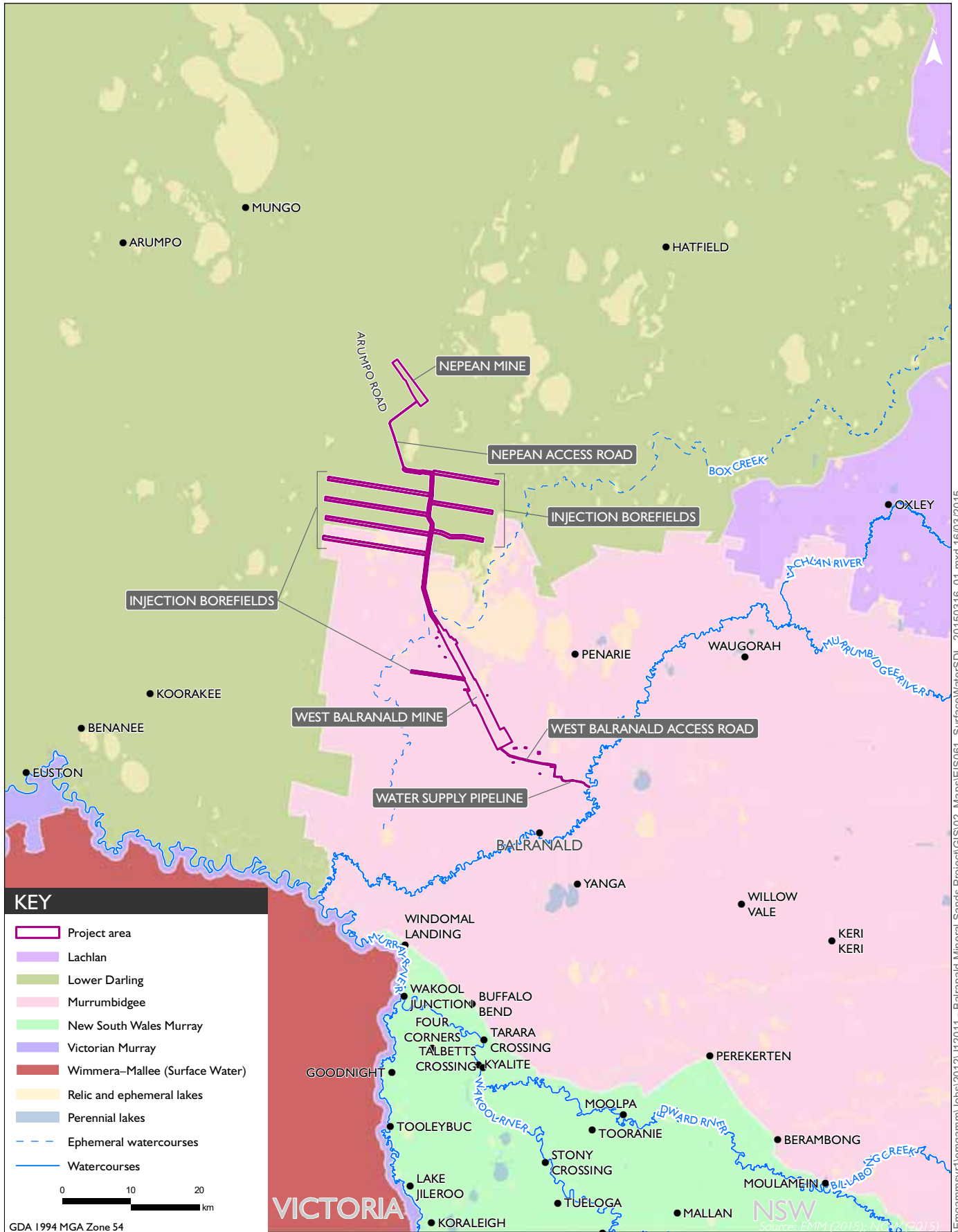
Table 6.1 Estimate surface water SDLs

Surface-water SDL resource unit	Estimated BDL (GL/y)	Local reduction amount (GL/y)	Shared reduction amount (GL/y)	Estimated long-term average SDL (GL/y)	Local reduction achieved from BDL	Local gap remaining
	A	B	C	D = A – B – C	As of 30 Sept 2011 (GL/y)	
Murrumbidgee (SS15)	2,501	320	X9	2,181 – X9	137	183
Lower Darling (SS18)	60.5	8	X11	52.5 – X11	0.4	7.6

Schedule 4 of the Basin Plan sets the SDLs for each groundwater SDL resource unit. For GS50 Western Porous Rock, the prescribed SDL is 116.6 GL per year. For GS28 Lower Murrumbidgee Alluvium the prescribed SDL is 26.9 GL per year for the shallow Shepparton Formation and 273.6 GL per year for the deep Calivil Formation and Renmark Group.

The long-term average SDLs set out in schedules 2 and 4 of the Basin Plan take effect on 1 July 2019, by which point they will be incorporated in state water resource plans which are required to be accredited under the *Water Act 2007*. Accredited water resource plans will be an important means for the states and the ACT to align their water management with elements of the Basin Plan.

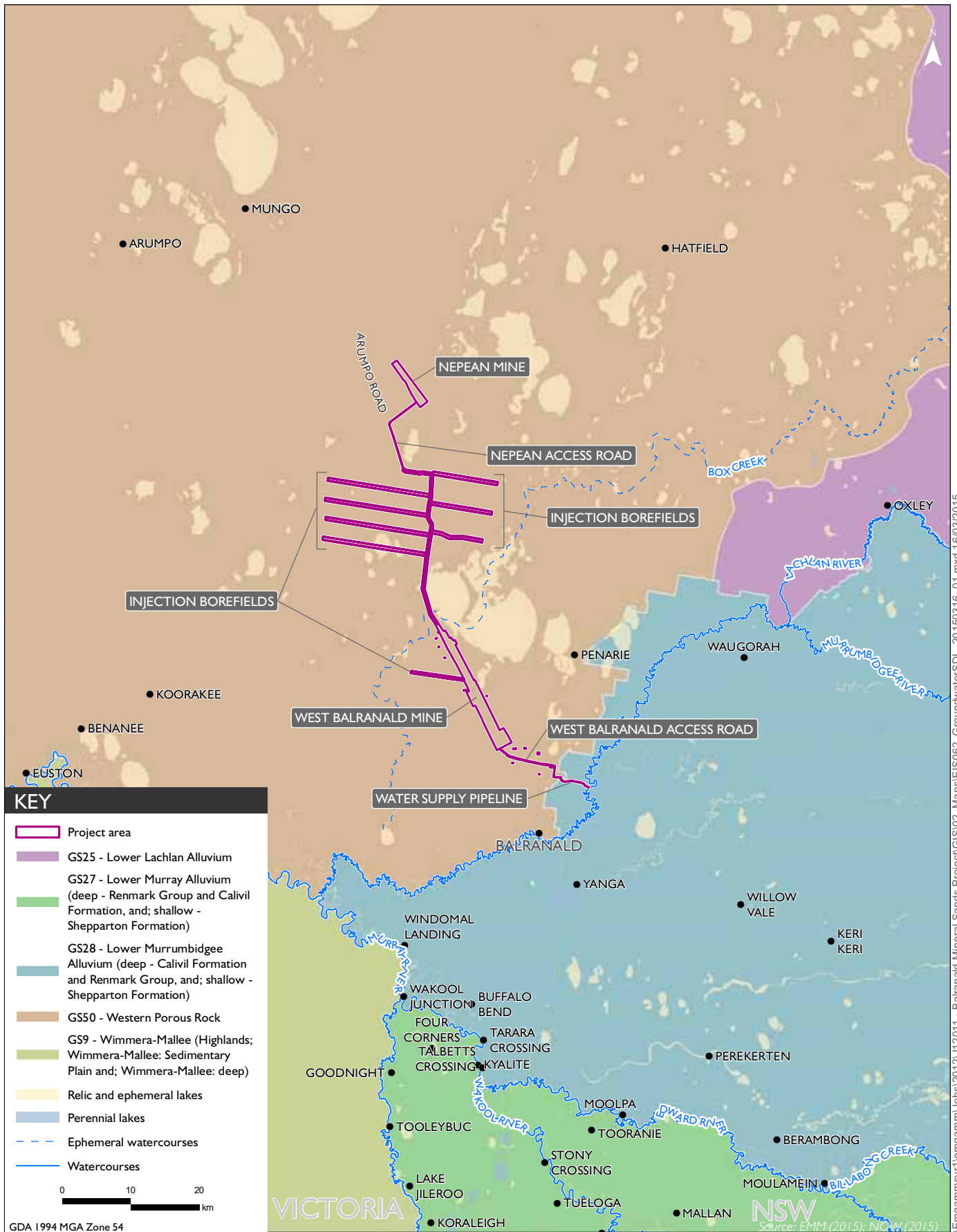
As of March 2015, NSW had not produced any state water resource plans to address the SDLs required for surface water SDL resource units SS15 Murrumbidgee and SS18 Lower Darling, and groundwater SDL resource unit GS50 Western Porous Rock which cover the project area.



Boundary of surface water SDL resource units

Balranald Mineral Sands Project
Environmental Impact Statement

Figure 6.1



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Boundary of groundwater SDL resource units

Balranald Mineral Sands Project
Environmental Impact Statement

Figure 6.2

6.3 NSW legislation

- This section of the chapter deals with all elements of the Balranald Project being undertaken in NSW, with the exception of the transmission line which will be subject to a separate approval process under Part 5 of the EP&A Act; and
- an accommodation facility in Balranald town which would be subject to a separate DA under Part 4 of the EP&A Act.

6.3.1 Environmental Planning and Assessment Act 1979

i Planning approval requirements

The EP&A Act and the EP&A Regulation form the statutory framework for planning approval and environmental assessment in NSW. Implementation of the EP&A Act is the responsibility of the Minister for Planning, statutory authorities and local councils. It contains three parts that impose requirements for planning approvals:

- Part 4 which provides for control of 'development' that requires development consent from the relevant consent authority. A division of Part 4 (Division 4.1) provides for control of SSD where the Minister for Planning (or delegate) is the consent authority;
- Part 5 which provides for control of 'activities' that do not require approval or development consent under or Part 4; and
- Part 5A which provides for control of State significant infrastructure that do not require approval or development consent under Part 4.

The requirement for development consent is set out in environmental planning instruments (EPs); state environmental planning policies (SEPPs), regional environmental plans (REPs) or local environmental plans (LEPs).

ii State significant development approval process

Section 89C(2) of the EP&A Act states that:

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

Schedule 1 of the State and Regional Development SEPP identifies what constitutes SSD, with one form being development for the purpose of mineral sands mining. As the Balranald Project is of a kind described within Schedule 1 of the State and Regional Development SEPP (ie mineral sands mining), it meets the requirements for SSD (see below for further information).

Under section 89D of the EP&A Act, the NSW Minister for Planning is the consent authority for SSD. However, pursuant to section 23 of the Act, the Minister may delegate the consent authority function to the Planning Assessment Commission (PAC), the Director-General or to any other public authority.

A DA for SSD must be accompanied by an EIS, prepared in accordance with the EP&A Regulation. Before preparing an EIS, an applicant must request SEARs (which are essentially terms of reference and were previously known as Director-General's requirements) which specify what must be addressed in an EIS. The SEARs for the Balranald Project, which were first issued on 25 May 2012 and then revised on 2 December 2014, are included with this EIS in Appendix A. The sections of this EIS where the SEARs have been addressed are also identified in Appendix A.

Clarification on the SEARs issued on 25 May 2012 was sought from DoE on a number of points on 13 June 2012 regarding description of the proposal, water supply and rail transport. A response on these matters was provided on 23 July 2012. The relevant correspondence is provided with the SEARs in Appendix A.

Upon finalisation, the EIS will be lodged with the DA and supporting documentation with the Department of Planning and Environment (DP&E) for public exhibition. The EIS will be placed on public exhibition for a minimum of 30 days by DP&E and submissions will be sought from BSC, government agencies and the community. Any submissions received by DP&E will be reviewed and forwarded to Iluka to consider and respond to (via a response to submissions (RTS) report).

Following receipt of the RTS report, DP&E will prepare its assessment report considering this EIS, all submissions received during the exhibition process and the RTS report. This report is forwarded to the consent authority (Minister or PAC) for consideration before determining the DA.

The planning approval process for SSD (under Division 4.1 of Part 4 of the EP&A Act) can be seen in Figure 6.3.

iii Matters for consideration

When assessing a DA for SSD, the consent authority (ie Minister for Planning or PAC) is required to take into consideration the matters outlined in section 79C of the EP&A Act. This states:

(1) Matters for consideration – general

In determining a development application, a consent authority is to take into consideration such of the following matters as are of relevance to the development the subject of the development application:

(a) the provisions of:

- (i) any environmental planning instrument, and
- (ii) any proposed instrument that is or has been the subject of public consultation under this Act and that has been notified to the consent authority (unless the Director-General has notified the consent authority that the making of the proposed instrument has been deferred indefinitely or has not been approved), and
- (iii) any development control plan, and
- (iiia) any planning agreement that has been entered into under section 93F, or any draft planning agreement that a developer has offered to enter into under section 93F, and
- (iv) the regulations (to the extent that they prescribe matters for the purposes of this paragraph), and

- (v) any coastal zone management plan (within the meaning of the *Coastal Protection Act 1979*),

that apply to the land to which the development application relates,

- (b) the likely impacts of that development, including environmental impacts on both the natural and built environments, and social and economic impacts in the locality,
- (c) the suitability of the site for the development,
- (d) any submissions made in accordance with this Act or the regulations,
- (e) the public interest.

Despite the above, clause 11 of the State and Regional Development SEPP states that development control plans do not apply to SSD.

The matters for consideration that apply to the Balranald Project are discussed below in Sections 6.3.1v to 6.3.1xi.

iv Approvals not required or which cannot be refused

Under section 89J of the EP&A Act, the following authorisations are not required for SSD:

- (a) the concurrence under Part 3 of the *Coastal Protection Act 1979* of the Minister administering that Part of that Act;
- (b) a permit under Section 201, 205 or 219 of the *Fisheries Management Act 1994*;
- (c) an approval under Part 4, or an excavation permit under Section 139, of the *Heritage Act 1977*;
- (d) an Aboriginal heritage impact permit under Section 90 of the *National Parks and Wildlife Act 1974*;
- (e) an authorisation referred to in Section 12 of the *Native Vegetation Act 2003* (or under any Act repealed by that Act) to clear native vegetation or State protected land;
- (f) a bush fire safety authority under Section 100B of the *Rural Fires Act 1997*; and
- (g) a water use approval under Section 89, a water management work approval under Section 90 or an activity approval (other than an aquifer interference approval) under Section 91 of the *Water Management Act 2000*.

Further, under section 89K of the EP&A Act, the following authorisations cannot be refused and are to be substantially consistent with a development consent for SSD:

- (a) an aquaculture permit under Section 144 of the *Fisheries Management Act 1994*,
- (b) an approval under Section 15 of the *Mine Subsidence Compensation Act 1961*,
- (c) a mining lease under the *Mining Act 1992*,
- (d) a production lease under the *Petroleum (Onshore) Act 1991*,

- (e) an environment protection licence under Chapter 3 of the *Protection of the Environment Operations Act 1997* (for any of the purposes referred to in Section 43 of that Act),
- (f) a consent under Section 138 of the *Roads Act 1993*,
- (g) a licence under the *Pipelines Act 1967*.

v Environmental planning instruments

The following environmental planning instruments are relevant to the Balranald Project:

- State and Regional Development SEPP;
- *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) 2007* (the Mining SEPP);
- *State Environmental Planning Policy No. 33 – Hazardous and Offensive Development* (SEPP 33);
- *State Environmental Planning Policy No. 44 – Koala Habitat Protection* (SEPP 44);
- *State Environmental Planning Policy No 55 – Remediation of Land* (SEPP 55); and
- *Balranald Local Environmental Plan 2010* (Balranald LEP).

The relevant provisions of the above instruments to the Balranald Project are discussed in the following sections.

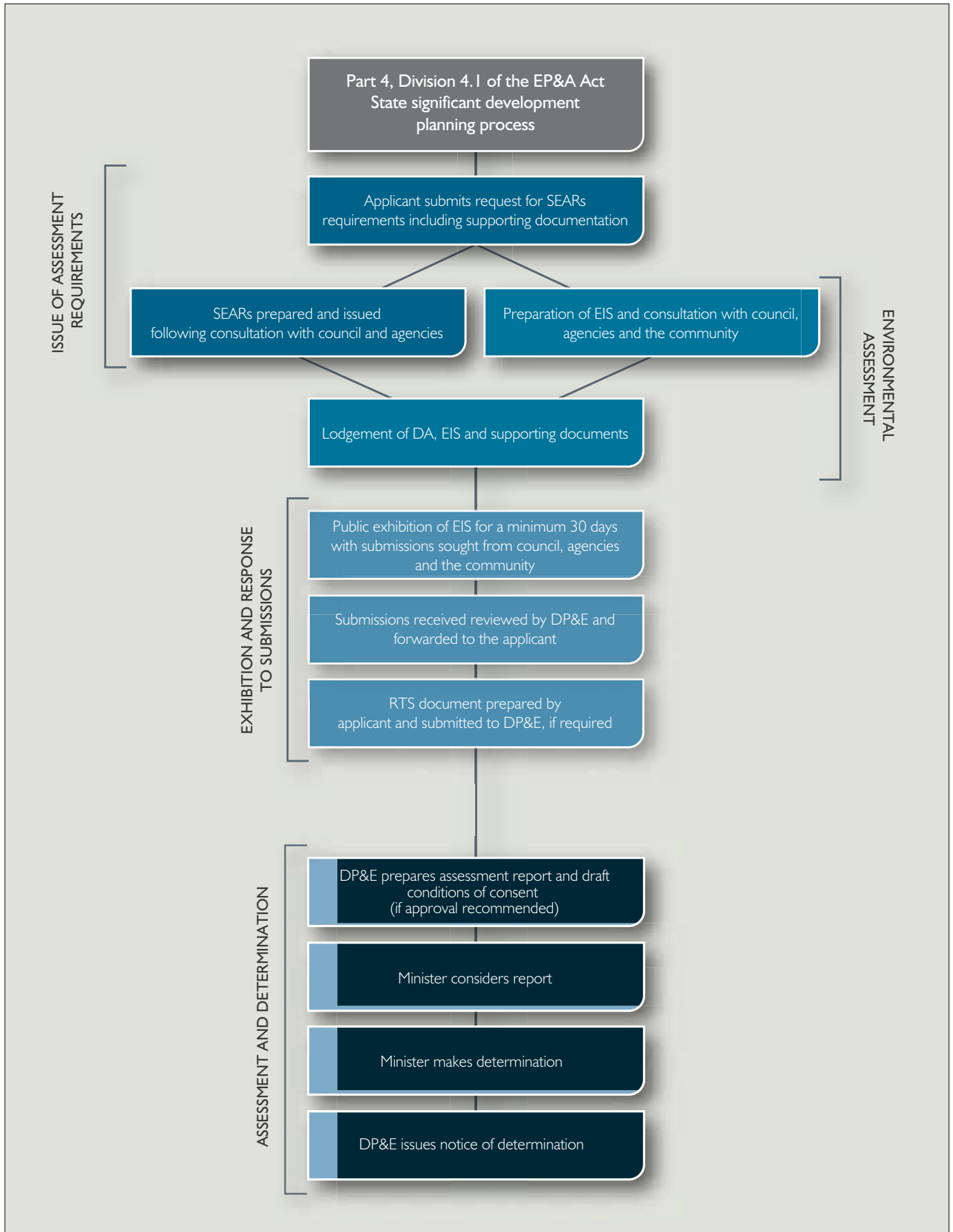
a. State Environmental Planning Policy (State and Regional Development) 2005

The State and Regional Development SEPP, among other matters, defines certain development that is SSD. Clause 8 of the SEPP states:

- (1) Development is declared to be State significant development for the purposes of the Act if:
 - (a) the development on the land concerned is, by the operation of an environmental planning instrument, not permissible without development consent under Part 4 of the Act, and
 - (b) the development is specified in Schedule 1 or 2.

Schedule 1 of the State and Regional Development SEPP defines a range of general SSDs, including mining. Clause 5 of Schedule 1 states:

- (1) Development for the purpose of mining that:
 - (a) is coal or mineral sands mining, or
 - (b) is in an environmentally sensitive area of State significance, or
 - (c) has a capital investment value of more than \$30 million.



The Balranald Project is a development for the purposes of mineral sands mining and will have a capital investment value exceeding \$30 M. It will not, however, be developed in an environmentally sensitive area of State significance.

The Balranald Project is not permissible without development consent (ie is permissible with development consent) under the Mining SEPP and the Balranald LEP.

The Balranald Project meets both the requirements of clause 8 of the State and Regional Development SEPP as it is not permissible without development consent and is development specified in Schedule 1. Therefore, the Balranald Project is SSD for the purposes of the EP&A Act.

b. [State Environmental Planning Policy \(Mining, Petroleum Production and Extractive Industries\) 2007](#)

The Mining SEPP provides for the proper management and development of mineral, petroleum and extractive material resources for the social and economic welfare of NSW. The Mining SEPP establishes appropriate planning controls to encourage ecologically sustainable development.

Aims

Clause 2 of the Mining SEPP sets out its aims. It states:

The aims of this Policy are, in recognition of the importance to New South Wales of mining, petroleum production and extractive industries:

- (a) to provide for the proper management and development of mineral, petroleum and extractive material resources for the purpose of promoting the social and economic welfare of the State, and
- (b) to facilitate the orderly and economic use and development of land containing mineral, petroleum and extractive material resources, and
- (b1) to promote the development of significant mineral resources, and
- (c) to establish appropriate planning controls to encourage ecologically sustainable development through the environmental assessment, and sustainable management, of development of mineral, petroleum and extractive material resources, and
- (d) to establish a gateway assessment process for certain mining and petroleum (oil and gas) development:
 - (i) to recognise the importance of agricultural resources, and
 - (ii) to ensure protection of strategic agricultural land and water resources, and
 - (iii) to ensure a balanced use of land by potentially competing industries, and
 - (iv) to provide for the sustainable growth of mining, petroleum and agricultural industries.

For the reasons set out in the chapter, the Balranald Project is considered to be consistent with these aims.

Permissibility

Clause 7 of the Mining SEPP defines what mining development can be undertaken with development consent. It states:

- (1) Mining

Development for any of the following purposes may be carried out only with development consent:

...
 - (b) mining carried out:
 - (i) on land where development for the purposes of agriculture or industry may be carried out (with or without development consent), or...

Under the Balranald LEP, the project area is zoned RU1 Primary Production within which agriculture is permissible with consent. Accordingly, the Balranald Project is permissible with development consent under the Mining SEPP.

Matters for consideration

Part 3 of the Mining SEPP outlines matters for consideration in DAs. The clauses relevant to the Balranald Project are detailed below.

Significance of the resource

Clause 12AA of the Mining SEPP states:

- (1) In determining an application for consent for development for the purposes of mining, the consent authority must consider the significance of the resource that is the subject of the application, having regard to:
 - (a) the economic benefits, both to the State and the region in which the development is proposed to be carried out, of developing the resource, and
 - (b) any advice by the Director-General of the Department of Trade and Investment, Regional Infrastructure and Services as to the relative significance of the resource in comparison with other mineral resources across the State.
- (2) The following matters are (without limitation) taken to be relevant for the purposes of subclause (1)(a):
 - (a) employment generation,
 - (b) expenditure, including capital investment,
 - (c) the payment of royalties to the State.

- (3) The Director-General of the Department of Trade and Investment, Regional Infrastructure and Services is, in providing advice under subclause (1)(b), to have regard to such matters as that Director-General considers relevant, including (without limitation):
 - (a) the size, quality and availability of the resource that is the subject of the application, and
 - (b) the proximity and access of the land to which the application relates to existing or proposed infrastructure, and
 - (c) the relationship of the resource to any existing mine, and
 - (d) whether other industries or projects are dependent on the development of the resource.
- (4) In determining whether to grant consent to the proposed development, the significance of the resource is to be the consent authority's principal consideration under this Part.
- (5) Accordingly, the weight to be given by the consent authority to any other matter for consideration under this Part is to be proportionate to the importance of that other matter in comparison with the significance of the resource.

Clause 12AA of the Mining SEPP operates to make the 'significance of the resource' the principal consideration of the matters the Minister or PAC is to consider under Part 3 of the Mining SEPP. The operation of clause 12AA is therefore limited to considerations under Part 3 of the Mining SEPP. Clause 12AA does not operate to make the 'significance of the resource' the principal consideration of the matters contained within section 79C of the EP&A Act.

Matters relating to the economic benefits, both to NSW and the region, of developing the mineral sands resource are detailed in Chapter 20. This chapter provides a summary of an economic assessment that has been prepared which describes the direct and flow-on economic benefits of the Balranald Project to NSW and the region.

The economic study has two components, a benefit cost analysis (BCA) and a regional economic impact assessment using input-output (IO) analysis. BCA considers the direct costs and benefits accruing in NSW from the Balranald Project, for instance, from additional value added in the form of wages and salaries paid to employees and contractors. Flow-on effects of the Balranald Project, such as the effects on regional income, employment or value added, are detailed in the economic assessment.

As clause 12AA(2) states the matters relevant in considering economic benefits, both to NSW and the region, of developing the resource are employment generation, expenditure, including capital investment, and the payment of royalties to the state. These matters are addressed below.

- **Employment generation:** As stated in Chapter 4, the Balranald Project would employ a construction workforce of approximately 225 people. During the operational phase, a peak workforce of approximately 550 people is anticipated. There would be a short period when there would be an overlap of these workforces as construction is finalised and mining operations commence. During this overlap, it is expected there would be a combined construction and operational workforce of about 450 people.

The economic assessment demonstrates that the Balranald Project is expected to have significant production benefits. It states that the project is estimated to have total net production benefits of \$148 M. Assuming 55% foreign ownership, \$132 M of these net production benefits would accrue to Australia. It also demonstrates that the Balranald Project would have positive flow-on effects on the NSW, regional and local economies based on the significant projected expenditures on wages and salaries, as well as other mining inputs. The flow-on effects are estimated to generate additional regional employment of around:

- 420 direct and indirect jobs during the construction phase; and
 - 1,289 direct and indirect jobs during the operation phase.
- **Expenditure, including capital investment:** The capital investment associated with the Balranald Project was estimated to be in the order of some hundreds of millions of dollars. This is the level of capital investment included in the BCA. The regional economic activity arising from capital expenditure in the regional economy was estimated using input-output analysis at in the order of up to:
 - \$136 M in annual direct and indirect regional output or business turnover;
 - \$51 M in annual direct and indirect regional value added; and
 - \$24 M in annual direct and indirect household income.

In addition, the Balranald Project would result in ongoing annual expenditure in the regional economy of approximately \$206 M. The economic activity in the regional economy from operational expenditure was estimated using IO analysis in the order of up to:

- \$965 M in annual direct and indirect regional output or business turnover;
 - \$300 M in annual direct and indirect regional value added; and
 - \$82 M in annual direct and indirect household income.
- **The payment of royalties to the State:** The economic assessment estimated royalties of \$96 M present value using a 7% discount rate. The estimates also include an allowance for deductions.

Matters relating to the significance of the resource are summarised below.

Size, quality and availability of the resource: The size and quality of the mineral sand resource of the Balranald Project is significant and high grade.

- The combined Measured, Indicated and Inferred Resource of the West Balranald deposit (excluding Nepean) contains 12.0 Mt of heavy mineral with an average assemblage of 10.8% zircon, 11.9% rutile and 64.1% ilmenite. The Measured Resource makes up 3.8 t of the total Measured, Indicated and Inferred Resource. The combined Indicated and Inferred Resource reported for the Nepean deposit contains 2.4 Mt of heavy mineral with an average assemblage of 14.4% zircon, 14.5% rutile and 59.7% ilmenite.

The resource is able to be mined by Iluka in a financially viable and environmentally sound manner as detailed in this EIS.

- **Proximity and access to existing or proposed infrastructure:** Iluka's has existing operations in the Murray Basin with mining activities at WRP mine, located about 20 km south-east of Ouyen in Victoria, producing approximately 0.32 Mt of HMC per annum. HMC is transported from WRP mine by road to Iluka's rail loading facility at Hopetoun, and then by rail to the Hamilton MSP in Victoria. Further mineral processing of HMC is undertaken at the Hamilton MSP.

Mining at the WRP mine ceased during March 2015 with stockpiled HMC to continue to be transported until it is exhausted. After this the existing Hamilton MSP would be reliant on feedstock from other operations in the Eucla Basin (SA) and/or the commencement of mining at West Balranald mine as part of the Balranald Project. Otherwise, it could be placed into care and maintenance or closed.

From the Hamilton MSP, product is transported by rail to the port of Portland, or to Melbourne Port for export or to Iluka operations in Western Australia for further processing.

All existing processing infrastructure in Victoria and Western Australia is expected to be used by the Balranald Project.

- **Relationship of the resource to any existing mine:** There is no direct relationship between the resource of the Balranald Project to an existing mine. However, as previously stated, some labour and capital resources would be able to be relocated from WRP mine to the Balranald Project following the cessation of mining at WRP mine.
- **Other industries or projects are dependent on the development of the resource:** Mining projects provide linkages to regional economies via the expenditure associated with the projects themselves and the expenditure of employees and contractors. Ex-post surveys of business and households in relation to mining in other regions confirm the existence of flow-on economic activity to regional economies. In a survey of businesses and households in the Central West region of NSW, Gillespie Economics (2009) found that:
 - 71% of businesses surveyed considered that their business directly or indirectly benefits from mining;
 - 93% of businesses surveyed considered that the local economy benefits from mining; and
 - 93% of household respondents agreed or strongly agreed that the local economy benefits from the mining.

The Balranald Project would similarly provide linkages to other existing, expanded or newly established businesses in the region and NSW. The greater the levels of expenditure in the regional economy, the greater the extent of these linkages. Businesses providing the goods and services required by the Balranald Project, and its employees and contractors, would benefit.

Non-discretionary development standards

Clause 12AB of the Mining SEPP sets out a number of non-discretionary development standards for the purposes of section 79C(2) and (3) of the EP&A Act in relation to the carrying out of development for the purposes of mining. These standards relate to cumulative noise level, cumulative air quality level and aquifer interference. These standards are addressed in Chapters 9, 10 and 14 respectively for noise and vibration, air quality and water resources.

Compatibility of the mine with other land uses

Clause 12 of the Mining SEPP requires the consent authority to consider the compatibility of the development with other land uses, and states:

Before determining an application for consent for development for the purposes of mining, petroleum production or extractive industry, the consent authority must:

- (a) consider:
 - (i) the existing uses and approved uses of land in the vicinity of the development, and
 - (ii) whether or not the development is likely to have a significant impact on the uses that, in the opinion of the consent authority having regard to land use trends, are likely to be the preferred uses of land in the vicinity of the development, and
 - (iii) any ways in which the development may be incompatible with any of those existing, approved or likely preferred uses, and
- (b) evaluate and compare the respective public benefits of the development and the land uses referred to in paragraph (a) (i) and (ii), and
- (c) evaluate any measures proposed by the applicant to avoid or minimise any incompatibility, as referred to in paragraph (a)(iii).

Existing land uses and potential impacts are discussed throughout this EIS. The discussion demonstrate that the Balranald Project would not have a significant impact on existing and approved land uses in the vicinity of the project area.

Consideration of voluntary land acquisition and mitigation policy

Clause 12A of the Mining SEPP requires consent authorities to consider any applicable provisions of the voluntary land acquisition and mitigation policy before determining an application for consent for SSD for the purposes of mining, petroleum production or extractive industry. It states:

- (2) Before determining an application for consent for State significant development for the purposes of mining, petroleum production or extractive industry, the consent authority must consider any applicable provisions of the voluntary land acquisition and mitigation policy and, in particular:
 - (a) any applicable provisions of the policy for the mitigation or avoidance of noise or particulate matter impacts outside the land on which the development is to be carried out, and
 - (b) any applicable provisions of the policy relating to the developer making an offer to acquire land affected by those impacts.
- (3) To avoid doubt, the obligations of a consent authority under this clause extend to any application to modify a development consent for State significant development for the purposes of mining, petroleum production or extractive industry.

The reference to the voluntary land acquisition and mitigation policy is the *Voluntary Land Acquisition and Mitigation Policy* which was published by the Minister for Planning in the Government Gazette on 19 December 2014. The *Voluntary Land Acquisition and Mitigation Policy* describes how consent authority's are to deal with predicted noise and dust impacts from State significant mining, petroleum production and extractive industry proposals when determining DAs for those proposals.

The *Voluntary Land Acquisition and Mitigation Policy* establishes a framework for ensuring that when noise or dust impacts from a proposal exceeds the relevant assessment criteria, land owners are provided with:

- a negotiated agreement between the land owner and the proponent; or
- obligations on the proponent to offer mitigation of impacts on the land, or acquisition of the land, in accordance with conditions of a project approval.

The *Voluntary Land Acquisition and Mitigation Policy* expresses a preference for negotiated agreements, but specifies some minimum requirements for those agreements if they are to justify the grant of a planning approval. It also specifies the kinds of mitigation commitments, and the terms of land acquisition offers, which would be required in any approval conditions imposed under the policy.

The provisions of the *Voluntary Land Acquisition and Mitigation Policy* have been considered in the noise and air quality assessments (refer to Chapters 9 and 10).

Compatibility of proposal with mining

Clause 13 of the Mining SEPP relates to matters a consent authority must take into consideration when determining applications for development that is:

- in the vicinity of an existing mine, petroleum production facility or extractive industry;
- identified on a map as being the location of State or regionally significant resources of minerals, petroleum or extractive materials; or
- identified by an environmental planning instrument as being the location of significant resources of minerals, petroleum or extractive materials.

Clause 13(2) states:

Before determining an application to which this clause applies, the consent authority must:

- (a) consider:
 - (i) the existing uses and approved uses of land in the vicinity of the development, and
 - (ii) whether or not the development is likely to have a significant impact on current or future extraction or recovery of minerals, petroleum or extractive materials (including by limiting access to, or impeding assessment of, those resources), and
 - (iii) any ways in which the development may be incompatible with any of those existing or approved uses or that current or future extraction or recovery, and
- (b) evaluate and compare the respective public benefits of the development and the uses, extraction and recovery referred to in paragraph (a) (i) and (ii), and

- (c) evaluate any measures proposed by the applicant to avoid or minimise any incompatibility, as referred to in paragraph (a) (iii).

Therefore, this clause requires the consent authority to consider the proposal's potential impact on other mining, petroleum production and extractive industries within the local area.

The Balranald Project is located proximate to an existing small gypsum mine. It is also located approximately 20 km from Cristal's Atlas-Campaspe Minerals Sands Project being the northern extent of the Nepean mine, which has yet to commence construction. The Balranald Project would not directly, or indirectly, impact on these mines.

There are also a number of other lineal mineral sand deposits located proximate to the West Balranald and Nepean deposits. Some of these deposits are covered by existing exploration licences (ELs) issued under the NSW *Mining Act 1992* (Mining Act), held by Iluka and others. The Balranald Project has been designed to ensure that it does not impact on the ability to extract or recover those deposits in the future (including by limiting access to, or impeding assessment of, those resources).

Figure 3.4 shows the Balranald Project in relation to the gypsum mine, the Atlas-Campaspe Minerals Sands Project and other ELs.

Natural resource and environmental management

Clause 14 of the Mining SEPP requires the consent authority to consider natural resources management, and states:

- (1) Before granting consent for development for the purposes of mining, petroleum production or extractive industry, the consent authority must consider whether or not the consent should be issued subject to conditions aimed at ensuring that the development is undertaken in an environmentally responsible manner, including conditions to ensure the following:
 - (a) that impacts on significant water resources, including surface and groundwater resources, are avoided, or are minimised to the greatest extent practicable,
 - (b) that impacts on threatened species and biodiversity, are avoided, or are minimised to the greatest extent practicable,
 - (c) that greenhouse gas emissions are minimised to the greatest extent practicable.
- (2) Without limiting subclause (1), in determining a development application for development for the purposes of mining, petroleum production or extractive industry, the consent authority must consider an assessment of the greenhouse gas emissions (including downstream emissions) of the development, and must do so having regard to any applicable State or national policies, programs or guidelines concerning greenhouse gas emissions.

An assessment of greenhouse gas emissions (GHG), biodiversity and water resources are addressed in Chapters 11, 12 and 14 respectively.

Resource recovery

Clause 15 of the Mining SEPP requires the consent authority to consider the efficiency of resource recovery, and states:

- (1) Before granting consent for development for the purposes of mining, petroleum production or extractive industry, the consent authority must consider the efficiency or otherwise of the development in terms of resource recovery.
- (2) Before granting consent for the development, the consent authority must consider whether or not the consent should be issued subject to conditions aimed at optimising the efficiency of resource recovery and the reuse or recycling of material.
- (3) The consent authority may refuse to grant consent to development if it is not satisfied that the development will be carried out in such a way as to optimise the efficiency of recovery of minerals, petroleum or extractive materials and to minimise the creation of waste in association with the extraction, recovery or processing of minerals, petroleum or extractive materials.

The Balranald Project has been designed to maximise the efficiency of resource recovery. A range of alternatives have been considered for the Balranald Project. Evaluation of the alternatives has, among other things, considered resource recovery efficiency including mining method, material handling strategies, tailings and mining by-product management and product transport options. A description of the alternatives considered is provided in Chapter 5.

Transport

Clause 16 of the Mining SEPP requires the consent authority to consider the implications of transport of materials in connection of the development on public roads, and states:

- (1) Before granting consent for development for the purposes of mining or extractive industry that involves the transport of materials, the consent authority must consider whether or not the consent should be issued subject to conditions that do any one or more of the following:
 - (a) require that some or all of the transport of materials in connection with the development is not to be by public road,
 - (b) limit or preclude truck movements, in connection with the development, that occur on roads in residential areas or on roads near to schools,
 - (c) require the preparation and implementation, in relation to the development, of a code of conduct relating to the transport of materials on public roads.

The Balranald Project would transport materials (including HMC, ilmenite and may transport Hamilton MSP by-products) on public roads in NSW. Traffic impacts are addressed in Chapter 18, and demonstrate that the Balranald Project would not have a significant impact on the road network.

Rehabilitation

Clause 17 of the Mining SEPP requires the consent authority to consider rehabilitation. It states:

- (1) Before granting consent for development for the purposes of mining, petroleum production or extractive industry, the consent authority must consider whether or not the consent should be issued subject to conditions aimed at ensuring the rehabilitation of land that will be affected by the development.
- (2) In particular, the consent authority must consider whether conditions of the consent should:
 - (a) require the preparation of a plan that identifies the proposed end use and landform of the land once rehabilitated, or
 - (b) require waste generated by the development or the rehabilitation to be dealt with appropriately, or
 - (c) require any soil contaminated as a result of the development to be remediated in accordance with relevant guidelines (including guidelines under section 145C of the Act and the *Contaminated Land Management Act 1997*), or
 - (d) require steps to be taken to ensure that the state of the land, while being rehabilitated and at the completion of the rehabilitation, does not jeopardize public safety.

The above aspects of Clause 17 are considered in detail in Chapter 17.

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

SEPP 33 requires the consent authority to consider hazard potential of proposed activities including the location of the development, the way in which it is to be carried out, and the storage of dangerous goods. Mining of mineral sands is not identified as a potentially hazardous or offensive industry. However, the Balranald Project may be determined to be a potentially hazardous development if the storage of dangerous goods exceeds the requirements of *Hazardous and Offensive Development Application Guidelines: Applying SEPP 33* (DP&I 2011) (Applying SEPP 33).

An assessment of hazard potential of the Balranald Project against Applying SEPP 33 is provided in Chapter 22.

d. State Environmental Planning Policy No. 44 – Koala Habitat Protection

SEPP 44 encourages the conservation and management of koala habitats, to ensure permanent free-living koala populations will be maintained over their present range. SEPP 44 requires the consent authority to consider if the land in the development application is 'potential koala habitat' or 'core koala habitat'.

An assessment of potential and core koala habitat has been undertaken for the Balranald Project (refer to Chapter 12) and has determined the project area does not contain any potential or core koala habitat.

e. [State Environmental Planning Policy No 55 – Remediation of Land](#)

SEPP 55 was enacted to provide a state-wide approach to the remediation of contaminated land for the purpose of minimising the risk to human health and the environment. No contaminated lands have been identified within the project area that would be disturbed by mining or for mining associated purposes. Should contaminated sites be encountered during construction and operation of the Balranald Project, these sites would be assessed and treated as required.

f. [Balranald Local Environmental Plan 2010](#)

As stated above, under the Balranald LEP, the project area is zoned RU1 Primary Production. Within this zone, open cut mining is permissible with development consent. Open cut mining is defined as “mining carried out on, and by excavating, the earth’s surface, but does not include underground mining.”

The objectives of zone RU1 include:

- to encourage sustainable primary industry production by maintaining and enhancing the natural resource base.
- to encourage diversity in primary industry enterprises and systems appropriate for the area.
- to minimise the fragmentation and alienation of resource lands.
- to minimise conflict between land uses within this zone and land uses within adjoining zones.
- to encourage development that is in accordance with sound management and land capability practices, and that takes into account the environmental sensitivity and biodiversity of the locality.
- to support rural communities.
- to ensure the provision of accommodation for itinerant workers.

The Balranald Project’s compatibility with zone objectives relating to primary industry production and agriculture are addressed in Chapter 16.

vi [Planning agreements](#)

One of the matters of consideration under section 79C of the EP&A Act is the relevant provisions of any planning agreements. Section 93F of the EP&A Act relates to planning agreements, which:

- ... is a voluntary agreement or other arrangement under this Division between a planning authority (or 2 or more planning authorities) and a person (the developer):
- (a) who has sought a change to an environmental planning instrument, or
 - (b) who has made, or proposes to make, a development application, or
 - (c) who has entered into an agreement with, or is otherwise associated with, a person to whom paragraph (a) or (b) applies, under which the developer is required to dedicate land free of cost, pay a monetary contribution, or provide any other material public benefit, or any combination of them, to be used for or applied towards a public purpose.

Section 93F enables the applicant (or proponent) of a development to enter into a voluntary planning agreement (VPA) or another arrangement with planning authorities in lieu of a section 94 contribution. Iluka propose to progress discussions with BSC on potential Iluka involvement in or support towards relevant community programs that provide material public benefits.

vii Environmental Planning and Assessment Regulation 2000

As previously stated, a DA for SSD must be accompanied by an EIS, prepared in accordance with the EP&A Regulation. Schedule 2 of the EP&A Regulation stipulates:

- requirements of the Director-General and approval bodies in relation to EISs (ie the SEARs); and
- general provisions relating to EISs.

The general provisions specify the form (clause 6) and the content (clause 7) of an EIS. Clause 6 states:

An environmental impact statement must contain the following information:

- (a) the name, address and professional qualifications of the person by whom the statement is prepared,
- (b) the name and address of the responsible person,
- (c) the address of the land:
 - (i) in respect of which the development application is to be made, or
 - (ii) on which the activity or infrastructure to which the statement relates is to be carried out,
- (d) a description of the development, activity or infrastructure to which the statement relates,
- (e) an assessment by the person by whom the statement is prepared of the environmental impact of the development, activity or infrastructure to which the statement relates, dealing with the matters referred to in this Schedule,
- (f) a declaration by the person by whom the statement is prepared to the effect that:
 - (i) the statement has been prepared in accordance with this Schedule, and
 - (ii) the statement contains all available information that is relevant to the environmental assessment of the development, activity or infrastructure to which the statement relates, and
 - (iii) that the information contained in the statement is neither false nor misleading.

Clause 7 states that an EIS must also include each of the following:

- (a) a summary of the environmental impact statement,
- (b) a statement of the objectives of the development, activity or infrastructure,
- (c) an analysis of any feasible alternatives to the carrying out of the development, activity or infrastructure, having regard to its objectives, including the consequences of not carrying out the development, activity or infrastructure,
- (d) an analysis of the development, activity or infrastructure, including:
 - (i) a full description of the development, activity or infrastructure, and
 - (ii) a general description of the environment likely to be affected by the development, activity or infrastructure, together with a detailed description of those aspects of the environment that are likely to be significantly affected, and
 - (iii) the likely impact on the environment of the development, activity or infrastructure, and
 - (iv) a full description of the measures proposed to mitigate any adverse effects of the development, activity or infrastructure on the environment, and
 - (v) a list of any approvals that must be obtained under any other Act or law before the development, activity or infrastructure may lawfully be carried out,
- (e) a compilation (in a single section of the environmental impact statement) of the measures referred to in item (d) (iv),
- (f) the reasons justifying the carrying out of the development, activity or infrastructure in the manner proposed, having regard to biophysical, economic and social considerations, including the principles of ecologically sustainable development set out in subclause (4).

Note. A cost benefit analysis may be submitted or referred to in the reasons justifying the carrying out of the development, activity or infrastructure.

The above requirements and where they are addressed in the EIS are set out in Table 6.2 below.

Table 6.2 **Schedule 2 requirements for an EIS**

Requirement	Where contained in the EIS
Name, address and professional qualifications of the person(s) who prepared the EIS	Certification page at the front of this EIS
Name and address of the responsible person (the applicant)	Certification page at the front of this EIS
Address of land	Section 1.4
Description of development	Chapter 4
Assessment of the environmental impact	Chapters 9-25
Declaration that the EIS has been prepared in accordance with this Schedule, contains all available information that is relevant to the environmental assessment of the development and that the information contained in the statement is neither false nor misleading	Certification page at the front of this EIS
Summary of the EIS	Executive summary
A statement of the objectives of the development	
An analysis of feasible alternatives, having regard to its objectives, including the consequences of not carrying out the development	Chapter 5
A full description of the development	Chapter 4
A general description of the environment likely to be affected by the development	Chapter 3 and Chapters 9-25
The likely impact on the environment of the development	Chapters 9-25
A full description of the measures proposed to mitigate any adverse effects of the development	Chapters 9-25
A list of any approvals that must be obtained under any other Act or law before the development, activity or infrastructure may lawfully be carried out	Chapter 6
A compilation of the measures referred to in item (d) (iv)	Chapter 26
The reasons justifying the carrying out of the development, activity or infrastructure in the manner proposed, having regard to biophysical, economic and social considerations, including the principles of ecologically sustainable development	Chapter 27

viii **Likely impacts of the development**

This EIS comprehensively describes the likely impacts of Balranald Project, including environmental impacts on both the natural and built environments, and social and economic impacts in the local area, region and State. It also describes commitments proposed by Iluka to mitigate and manage these impacts. These descriptions are based on technical studies prepared by specialists, which are appended to this EIS. The technical studies were prepared using the most recent and accurate scientific data relevant to the Balranald Project in consideration of current policies and legislation. In addition, the technical studies adopted conservative assumptions to enable the upper limit of likely impacts to be assessed.

ix Suitability of the site for the development

It is considered that the site of the Balranald Project (the project area) is suitable for a mineral sands mine for a number of reasons which are detailed in Chapter 27.

Principally, the Balranald Project would facilitate the recovery of mineral sand reserves within the footprint of an EL granted under the Mining Act. It would also be undertaken on privately-owned land where open cut mining is permissible. It is considered to be broadly compatible with surrounding land uses, particularly considering the proposed rehabilitation and closure strategy which would result in no long term net loss of agriculture land. A range of commitments have been made by Iluka to mitigate potential impacts of the Balranald Project on surrounding land uses. Subject to the application of the commitments, the Balranald Project is unlikely to have a significant impact on these land uses.

x Submissions

As previously stated, this EIS will be placed on public exhibition for a minimum of 30 days by DP&E and submissions will be sought from BSC, government agencies and the community. Any submissions received by DP&E will be reviewed and forwarded to Iluka to consider and respond to (via a RTS report).

Following receipt of the RTS report, DP&E will prepare its assessment report considering this EIS, all submissions received during the exhibition process and the RTS report.

xi Public interest

To assist the consent authority in determining whether the Balranald Project is in the public interest, this EIS provides a justification for the project (refer to Chapter 27), taking into consideration its potential environmental impacts, and the suitability of the site. It also considers the proposal against the principles of ecologically sustainable development (ESD). The consent authority will also be required to consider all submissions received during the public exhibition of the EIS.

6.4 Other NSW legislation

6.4.1 Mining Act 1992

The Mining Act makes provision for granting mining authorities, leases and licences for the exploration and mining of minerals and coal. The Mining Act places controls on methods of exploration and mining, the disposal of mining waste, land rehabilitation, and environmental management activities.

The Balranald Project would require the granting of a mining lease under the Mining Act. As discussed in Section 6.3.1iv, under section 89K of the EP&A Act a mining lease is to be issued in terms that are substantially consistent with a development consent for SSD.

6.4.2 Protection of the Environment Operations Act 1997

The NSW *Protection of the Environment Operations 1997* (POEO Act) is the principal NSW environmental protection legislation which is administered by the EPA. Schedule 1 of the POEO Act lists the 'scheduled activities' which are to be regulated by an environment protection licence (EPL) which includes criteria and monitoring requirements for environmental pollution. Schedule 1 includes:

- mineral processing;
- mining for minerals;

- waste disposal (application to land); and
- waste storage.

Each of these activities are described below.

Clause 26 of Schedule 1 of the POEO Act relates to 'mineral processing', including mineral waste generation. It states that activities which process more than 150 tonnes per day (tpd) of ores (using methods including chemical, electrical, magnetic, gravity or physical-chemical) and/or involves having on site at any time more than 5 t of prescribed waste, not including excluded material, are scheduled activities. Prescribed waste is defined as hazardous waste, restricted solid waste or liquid waste, or any combination of them. Excluded material is defined as contaminated soil, grease trap waste, waste stored prior to its lawful discharge to a sewer or waters, septic tank waste, stormwater or recoverable oil or oil and water mixture.

The Balranald Project would process more than 150 tpd of mineral sand. It is also likely to have more than 5 t of prescribed waste on site at any time. As stated in the radiation risk assessment in Appendix S, test work indicates that the mining by-products have been characterised as either restricted solid waste or hazardous waste. Therefore, the Balranald Project is scheduled activity under the POEO Act, for the purposes of a mineral processing activity.

Clause 29 of Schedule 1 of the POEO Act relates to 'mining for minerals', meaning the mining, processing or handling of minerals, that is to disturb a total surface area of more than 4 ha of land. The Balranald Project involves the mining, processing and handling of minerals and would disturb a total surface area exceeding 4 ha. The Balranald Project is, therefore, a scheduled activity for the purposes of mining for minerals.

Clause 39 of Schedule 1 of the POEO Act relates to 'waste disposal (application to land)'. It applies to the application to land of waste received from off site, including (but not limited to) application by ploughing, injecting or mixing into the land. The Balranald Project would dispose of mining by-products generated on and off-site. As stated above, the radiation risk assessment (Appendix S) states that these mining by-products have been characterised as either restricted solid waste or hazardous waste. Therefore, the Balranald Project is a scheduled activity under the POEO Act, for the purposes of waste disposal (application to land).

Clause 42 of Schedule 1 of the POEO Act relates to 'waste storage'. It states that activities which store more than 5 t of hazardous waste, restricted solid waste, liquid waste or special waste (other than waste tyres) on the premises at any time are scheduled activities. The Balranald Project would likely store more than 5 t of mining by-products which have been characterised as either restricted solid waste or hazardous waste at any one point in time, and is therefore defined as a scheduled activity under the POEO Act for the purposes of waste storage.

Accordingly, the Balranald Project is deemed to be a scheduled activity under the POEO Act for the purposes of mineral processing, mining for minerals, waste disposal (application to land) and waste storage and would require an EPL. If development consent is granted, the EPL for the Balranald Project is to be issued in terms that are substantially consistent with the development consent, in accordance with section 89K of the EP&A Act.

6.4.3 Water Act 1912 and Water Management Act 2000

The NSW *Water Act 1912* (Water Act) has historically been the main legislation for the management of NSW water resources. However the Water Act is progressively being repealed and replaced by the NSW *Water Management Act 2000* (WM Act) on a water source by water source basis as water sharing plans (WSPs) commence. The water sources in the vicinity of the Balranald Project have WSPs that have commenced and therefore most aspects of water management come under the WM Act.

However, some aspects of the Water Act are still operational across all of NSW, such as licenses for monitoring bores, and licensing of groundwater injection activities. Licensing of monitoring bores continues under the Water Act until a regulation surrounding aquifer interference activities provides a mechanism for an approval for these activities. Licensing of injection into groundwater systems is also still currently still managed under the Water Act.

As stated, the WM Act applies to those areas where a WSP has commenced. WSPs are statutory plans under the WM Act that apply to individual water source areas and which contain the rules for sharing and managing the water resources of NSW. The WM Act outlines the requirements for the taking and trading of water through water access licences (WALs), water supply works and water use approvals.

Groundwater and surface water within the project area is governed under the WM Act within the relevant WSPs which are discussed below.

WSPs aim to ensure sustainable and integrated management of NSW water by providing clear arrangements for activities that affect water quality and quantity. The plans sets management rules for WALs, water allocation accounts, dealings in licences and water allocations, water supply works approvals, and the extraction of water.

There are provisions in the surface water WSPs to provide water to support the ecological processes and environmental needs of the rivers, and direct how the surface water available for extraction is to be shared. The provisions in the groundwater WSPs provide water to support the ecological processes and environmental needs of high priority groundwater dependent ecosystems (GDEs) and rivers, and direct how the water available for extraction is to be shared.

There are a number of surface and groundwater WSPs that relate to water sources in and surrounding the project area, including:

Groundwater

- *Water Sharing Plan for the NSW Murray-Darling Basin Porous Rock Groundwater Sources 2011;*
- *Water Sharing Plan for the Lower Lachlan Groundwater Source 2003;* and
- *Water Sharing Plan for the Lower Murrumbidgee Groundwater Sources 2003.*

Surface water

- *Water Sharing Plan for the Murrumbidgee Regulated River Water Source 2003;*
- *Water Sharing Plan for the Lachlan Regulated River Water Source 2003;*
- *Water Sharing Plan for the New South Wales Murray and Lower Darling Regulated Rivers Water Sources 2003;*

- *Water Sharing Plan for the Lachlan Unregulated and Alluvial Water Sources 2012*; and
- *Water Sharing Plan for the Murrumbidgee Unregulated and Alluvial Water Sources 2012*.

Combined

- *Water Sharing Plan for the Lower Murray-Darling Unregulated and Alluvial Water Sources 2011*.

Of these, the Balranald Project would be required to be licensed to take (or extract) water in relation to two WSPs, namely:

- *Water Sharing Plan for the NSW Murray-Darling Basin Porous Rock Groundwater Sources 2011* (herein referenced as the MDB Porous Rock WSP); and
- *Water Sharing Plan for the Murrumbidgee Regulated River Water Source 2003* (herein referenced as the Murrumbidgee River WSP).

The location of the Balranald Project in relation to the MDB Porous Rock WSP and Murrumbidgee River WSP can be seen in Figures 6.4 and 6.5 with further details on each plan are provided below.

Under section 89J of the EP&A Act, water use and management approvals (under sections 89, 90 and 91 of the Water Act) are not required for SSD. However, SSD is not exempt from the obligation to secure an aquifer interference approval under section 91(3) of the WM Act and WALs under section 56 of the WM Act. However, it should be noted that section 91(3) of the WM Act has not yet commenced and aquifer interference approvals do not actually exist. The Balranald Project would need to comply with the *NSW Aquifer Interference Policy (AIP)* which requires licences for all water taken and intercepted from each relevant water source. This would be required for the Balranald Project under the relevant WSPs. Further details on the AIP are provided in Section 6.5.4.

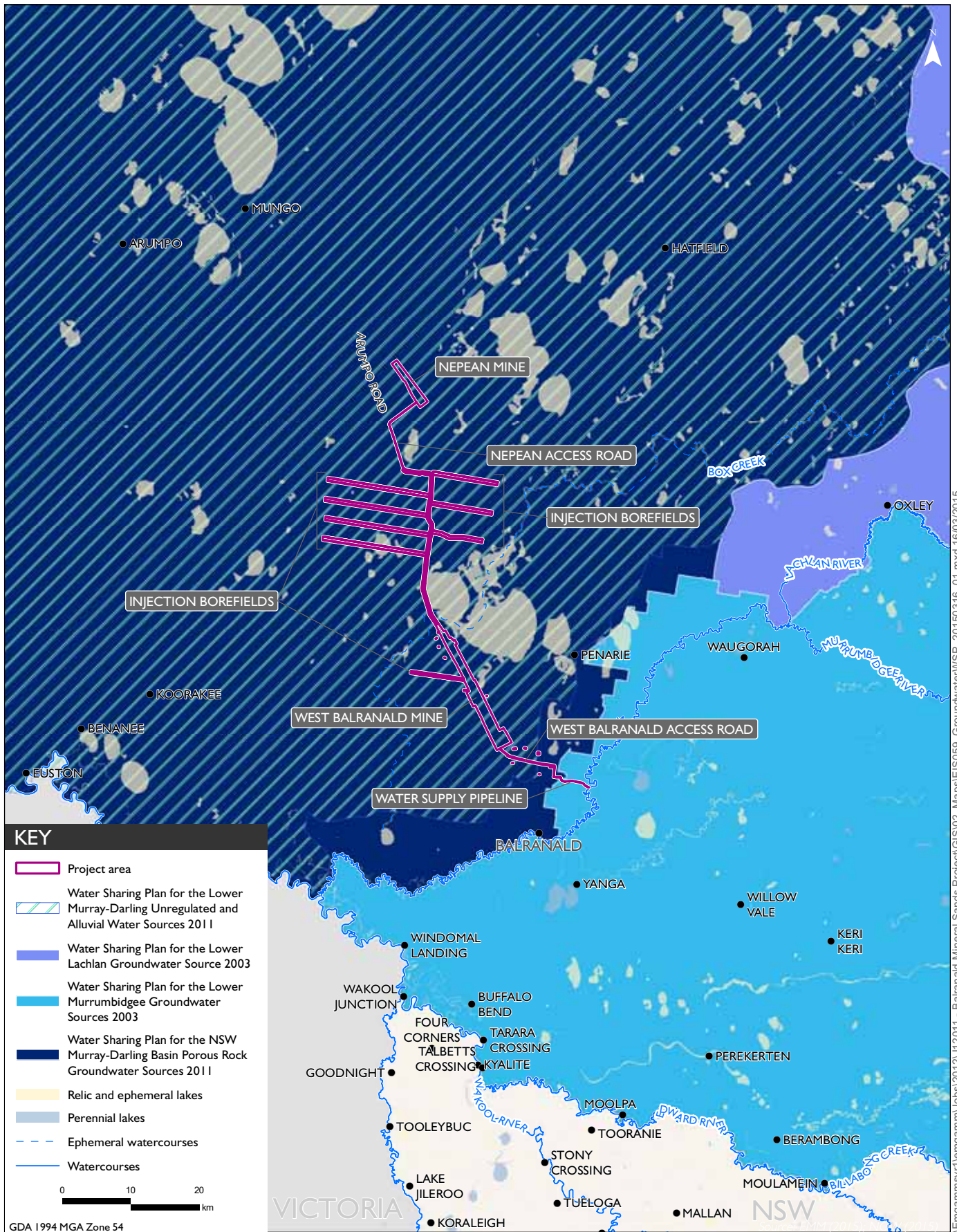
An access licence may also be granted where the right to apply for the licence has been acquired in accordance with a controlled allocation order made under section 65 of the WM Act. Section 65 provides that:

The Minister may, by order published in the Gazette, declare that the right to apply for an access licence for a specified water management area or water source is to be acquired by auction, tender or other means specified in the order.

The Balranald Project would require:

- WALs under section 56 of the WM Act) for the extraction of water (groundwater and surface water) from the relevant WSPs; and
- compliance with the AIP.

Further discussion on the water impacts of the Balranald Project is provided in Chapter 14.

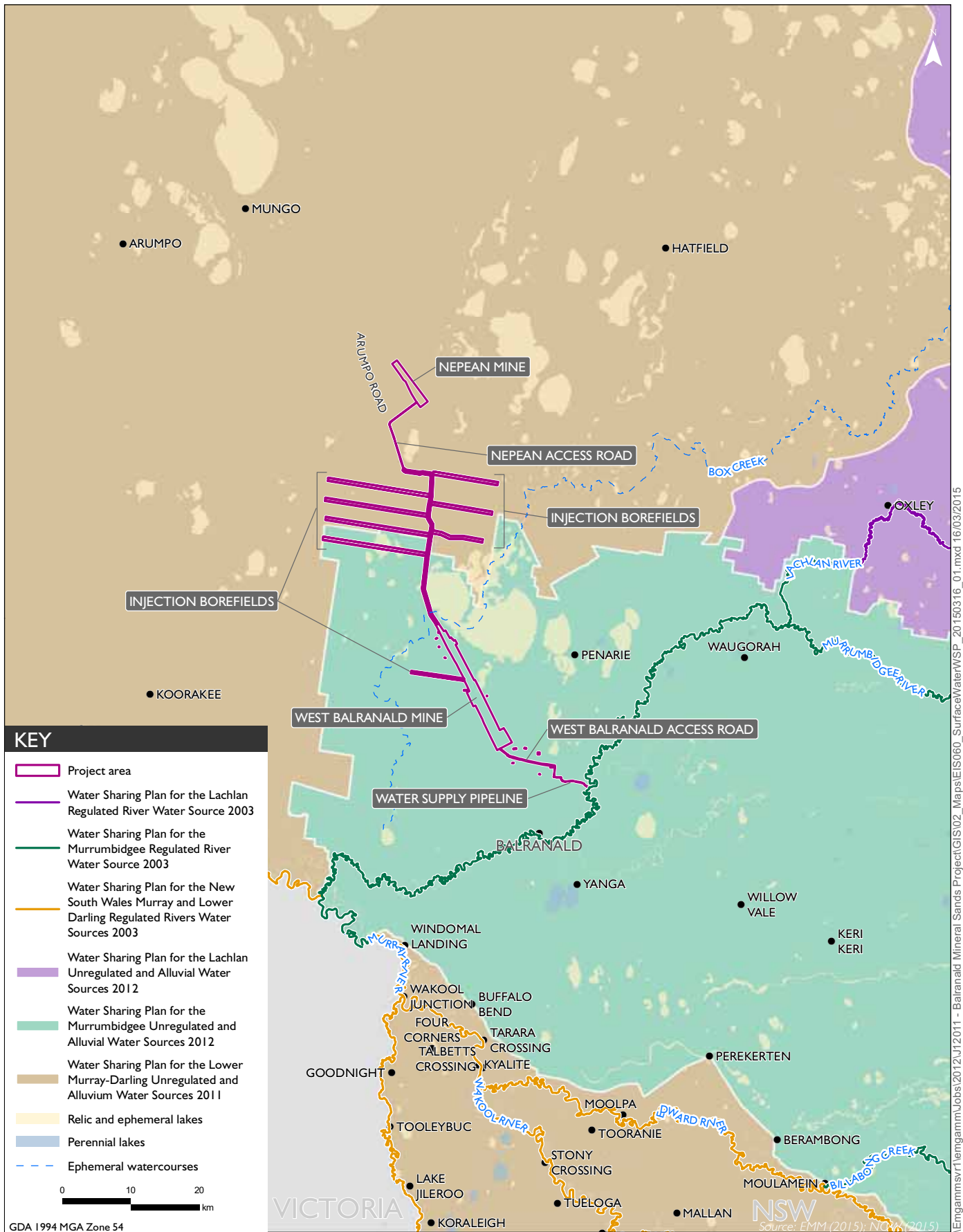


Boundary of groundwater sharing plans

Balranald Mineral Sands Project
Environmental Impact Statement

Figure 6.4





Boundary of surface water sharing plans

Balranald Mineral Sands Project
Environmental Impact Statement

Figure 6.5

The MBD Porous Rock WSP commenced on 16 January 2012 and is due for extension or replacement in July 2022.

In general, the MBD Porous Rock WSP area includes all porous rock groundwater sources within the MDB and that are not included in other WSPs, such as porous rock groundwater sources in the *Water Sharing Plan for the Great Artesian Basin Groundwater Sources 2008*. The plan also includes minor miscellaneous, unmapped alluvial sediments that overly outcropping porous rock groundwater sources as well as fractured rocks that occur within groundwater sources that are predominantly porous rock.

The groundwater sources within the MBD Porous Rock WSP cover an area of:

- approximately 8,642,000 ha, which includes only the outcropped portions (ie that portion of the groundwater source with a surface expression); and
- approximately 3,436,000 ha, which includes only the buried portions (ie that portion of the groundwater source that is buried under another groundwater source and, therefore, has no surface expression).

There are four groundwater sources within the MBD Porous Rock WSP:

- the Gunnedah-Oxley Basin MDB Groundwater Source (a portion on the north eastern side of the MDB between Narrabri, Gunnedah and Dubbo eastward to the MDB border);
- the Oaklands Basin Groundwater Source (a portion in the south-central area of NSW that is completely buried by the Murray Basin alluvial sediments near Jerilderie);
- the Sydney Basin MDB Groundwater Source (a small portion of the Sydney Basin that occurs west of the dividing range on the eastern side of the MDB extending southward along the basin border to nearly Bathurst); and
- the Western Murray Porous Rock Groundwater Source (a portion in the far west of NSW from south of Broken Hill southward to the state border and to the west of the Lower Lachlan, Lower Murrumbidgee, and Lower Murray Groundwater Sources westward to the NSW border).

The project area lies within Western Murray Porous Rock Groundwater Source.

Section 4(6) of this WSP states that:

- (6) Subject to subclause (8), the Western Murray Porous Rock Groundwater Source includes all water contained in:
 - (a) all rocks of Tertiary and Quaternary age within the outcropped and buried areas, and
 - (b) all alluvial sediments within the outcropped areas,within the boundary of the Western Murray Porous Rock Groundwater Source as shown on the Plan Map.

The Western Murray Porous Rock Groundwater Source covers an outcrop area of 7,302,000 ha. It extends from the boundary with the Adelaide and Kanmantoo Fold Belts in the north to the Murray River in the south. To the east the water source is bound by the boundary between the Kanmantoo and Lachlan Fold Belts. The water source incorporates the alluvial Renmark Group and Calivil Formation in the east which grade into the Murray Group Limestone and Loxton-Parilla Sands to the southwest.

Section 8 of the Basin Groundwater WSP states that:

The vision for this Plan is to provide for healthy and enhanced groundwater sources and water dependent ecosystems and for equitable water sharing among users in these groundwater sources.

The objectives of this Basin Groundwater WSP are to:

- (a) protect, preserve, maintain and enhance the high priority groundwater dependent ecosystems and important river flow dependent ecosystems of these groundwater sources,
- (b) protect, preserve, maintain and enhance the Aboriginal, cultural and heritage values of these groundwater sources,
- (c) protect basic landholder rights,
- (d) manage these groundwater sources to ensure equitable sharing between users,
- (e) provide opportunities for enhanced market based trading of access licences and water allocations within environmental and system constraints,
- (f) provide water allocation account management rules which allow sufficient flexibility in water use,
- (g) contribute to the maintenance of water quality,
- (h) provide recognition of the connectivity between surface water and groundwater,
- (i) adaptively manage these groundwater sources, and
- (j) contribute to the environmental and other public benefit outcomes identified under the Water Access Entitlements and Planning Framework in the Intergovernmental Agreement on a National Water Initiative (2004) (hereafter the NWI).

There are approximately 40,746 unit shares of entitlement (under licence) in the area covered by the MDB Porous Rock WSP. The majority of these licences are for industrial and mining purposes. Of these shares, 21,782 unit shares are licenced for the Western Murray Porous Rock Groundwater Source. In addition, a number of salt interception schemes operate in the Western Murray Porous Rock Groundwater Source; these are expected to be issued entitlements in the order of 14,582 unit shares. Basic landholder rights within the Western Murray Porous Rock Groundwater Source are estimated at 26,747 ML/year, and represent a significant volume of the total rights within this water source. There is also a significant amount of unassigned water within the source estimated to be 467,377ML/yr (refer Table 6.3).

The MDB Porous Rock WSP sets the annual groundwater recharge volumes for each identified groundwater source and the volumes of water available for sharing (the long-term average annual extraction limit). Provisions are made for environmental water allocations, basic landholder rights, domestic and stock rights and native title rights. The statistics for the Western Murray Porous Rock Groundwater Source availability are presented in Table 6.3.

Table 6.3 Requirements for water sharing (Western Murray Porous Rock Groundwater Source)

Use	Share component
Recharge	1,060,971 ML/yr (not high environmental value) 42,994 ML/yr (high environmental value)
Environmental water	530,485 (50% of recharge for not high environmental value) 42,994 ML/yr (100% of recharge for high environmental value) Plus all groundwater in storage
Long-term average annual extraction limit (LTAAEL)	530,486 ML/yr
Town water supply	0 ML/year
Basic rights (domestic and stock)	26,747 ML/yr
Native title	0 ML/yr
Aquifer access licences	21,780 unit shares ³
Salinity and water table management	14,582 ML/yr
Total water requirements ¹	63,109 ML/yr
Unallocated water ²	467,377 ML/yr

1. This number is not listed in the MDB Porous Rock WSP, but is calculated by summing all requirements for water under Part 5 of the plan for the Western Murray Porous Rock Groundwater Source and assuming 1 unit share is equal to 1 ML.
2. This number is not listed in the MDB Porous Rock WSP, but is calculated as the difference between the long-term average annual extraction limit minus the total water requirements.
3. A unit share is defined in section 29(2)(b) of the MDB Porous Rock WSP as being a maximum of 1 ML per unit share, or a lower amount if the volume of water extraction from the water source is deemed to be in excess of the LTAAEL over a three year rolling period by 5% or more.

As Table 6.3 shows, there is a significant amount of unallocated water within the Western Murray Porous Rock Groundwater Source of the MDB Porous Rock WSP.

The WSP does not however distinguish between aquifers containing highly saline water (ie requiring dewatering and injection into the same aquifer as part of the Balranald Project) and those aquifers containing water that has beneficial use.

The Balranald Project would abstract groundwater over a 10 year period, with a peak abstraction period spanning six years. Over this six year peak, Iluka would seek to abstract a 'gross' volume of groundwater in the order of between 20,000 and 30,000 ML/year, of which, approximately 90%, would be injected back into the same aquifer (refer Section 4.4.3 and the water assessment in Appendix K for more details). These gross abstraction volumes (notwithstanding injection) are well within the sustainable limits of the Western Murray Porous Rock Groundwater Source and constitute only 6% of the current level of unallocated water within this source.

In accordance with the WM Act a WAL may be granted where the right to apply for the licence has been acquired in accordance with an order made under section 65 of the Act.

Iluka currently have two WALs (WAL 31101 and 31102) that are, and have been, used to assign groundwater allocations for relevant trade periods with water supply works approval extraction locations nominated. As part of the Balranald Project, Iluka will continue to use one or both of these WALs to assign future groundwater allocations, while additional WALs may be applied for in accordance with the WM Act.

During 2013/14, Iluka negotiated third party water trades under the WM Act in the order of 1,100 ML (2013/14) and 900 ML (2014/15) to support field program activities. The groundwater allocation was secured from the Western Murray Porous Rock Groundwater Source and assigned to nominated water supply works approvals to facilitate Iluka's hydrogeological programs and a mining trial.

Iluka would obtain further allocations to support the Balranald Project from the Western Murray Porous Rock Groundwater Source through third party water trades and/or through controlled allocation orders under section 65 of the WM Act. These allocations would be obtained with consideration to return flow regulations which the NSW government proposes to introduce in 2015. As part of a controlled allocation order made on 9 September 2014, the NSW government stated that:

Return flow rules are likely to be made for aquifer access licences in the second half of 2014. Once these rules are put in place, licence holders will receive a credit to their water allocation account for water returned to the same groundwater source from which it was taken, providing specific conditions are met. Licence holders will only need to hold enough licence shares to account for the net amount of water extracted, ie the amount of water initially extracted minus the amount of water returned. Water usage fees will only be applied to the net amount of water extracted.

Iluka would seek credits for all injected water under the return flow regulation once it is enacted. As stated above, this regulation was set to commence in late 2014, but is yet to commence. Under this regulation Iluka would only be required to hold the licence volume for the difference between the 'net' and 'gross' take of groundwater.

Iluka will continue to engage with the NSW Government regarding when the return flow rules are enacted and on the timing of a future controlled allocation order to secure a WAL for the Balranald Project.

ii [Water Sharing Plan for the Murrumbidgee Regulated River Water Source 2003](#)

The Murrumbidgee River WSP lies within the Murrumbidgee Water Management Area and the Murray Water Management Area. The water source is defined as the water between the banks of all rivers, from the upper limit of Burrinjuck Dam water storage (being the Taemas Bridge crossing) and Blowering Dam water storage (being the dam wall and spillway for Jounama Pondage), downstream to the junction of the Murrumbidgee and Murray rivers. This includes the Murrumbidgee River at Balranald where fresh water is proposed to be extracted to supply the project (see Figure 6.5).

The Murrumbidgee River WSP commenced on 1 July 2004 and applied for a period of 10 years to 30 June 2014. In May 2014, the Minister for Natural Resources, Lands and Water approved an extension to the plan until its date of replacement (by 1 July 2015 or sooner).

Section 9 of the Murrumbidgee River WSP states that:

The vision for this Plan is to provide for equitable sharing of limited water resources to sustain a healthy and productive river and the welfare and well being of Murrumbidgee regional communities.

The objectives of this Murrumbidgee River WSP are to:

- (a) protect and restore in-river and riparian habitats and ecological processes,
- (b) provide for appropriate watering regimes for wetlands,
- (c) sustain and enhance population numbers and diversity of indigenous species,
- (d) protect basic landholder rights, as specified in the Water Management Act 2000, including native title rights,
- (e) maximise early season general security allocations,
- (f) protect town water supply,
- (g) protect end-of-system flows,
- (h) provide for commercial consumptive use,
- (i) provide for identified recreational water needs,
- (j) protect identified indigenous and traditional uses of water, and
- (k) within the ability of this Plan promote the recovery of known threatened species.

The provisions in the WSP provide water to support the ecological processes and environmental needs of the Murrumbidgee River and direct how the water available for extraction is to be shared. The plan also sets rules that effect the management of water access licences, water allocation accounts, the trading of or dealings in licences and water allocations, the extraction of water, the operation of dams and the management of water flows.

At the commencement of the Murrumbidgee River WSP, the following unit shares were available from the Murrumbidgee River:

- general security - 2,043,432 unit shares;
- high security - 298,021 unit shares;
- domestic and stock - 35,572 ML/year;
- local water utility - 23,403 ML/year;
- Murrumbidgee irrigation (conveyance) - 243,000 unit shares;
- Coleambally irrigation (conveyance) - 130,000 unit shares; and
- supplementary water - 220,000 unit shares.

The share components of licences such as local water utility and domestic and stock are expressed as a number of megalitres per year. The share components of high security and general security, conveyance and supplementary water access licences are expressed as a number of unit shares.

The unit share equivalent in megalitres would vary year to year depending on water availability in the river system. An Available Water Determination (AWD), as a percentage, would be made and this would determine what each unit share is equal to in megalitres. The mechanism for this is outlined in Part 8 Division 2 of the Murrumbidgee River WSP.

An AWD for regulated river (high security) access licences would generally be between 0.95 ML/unit share and 1 ML/unit share. There are some exceptions to this for extreme drought conditions. An AWD for regulated river (general security) access licences would not be made until the AWD for high security licences is greater than 0.95 ML/unit share.

The reliability of supply history for both general security and high security surface water licences in the Murrumbidgee River WSP is presented in Table 6.4. It tabulates average availability over the last five years, over the last 10 years (since commencement of the Murrumbidgee River WSP) and since 1983/84 when records of availability commenced.

Table 6.4 Average availability of high and general security water from the Murrumbidgee River WSP

Average availability	General security	High security
Average last 5 years	78%	98%
Average last 10 years (since commencement of the Murrumbidgee River WSP)	53%	96%
Average since 1983/84 (period of record)	86%	98%

An embargo on applications for new commercial (or industrial) water access licences has been in place for the since 1985. Under the WM Act, the only applications that can be made are for those categories or sub-categories specified in either the NSW *Water Management (General) Regulation 2011* or in the Murrumbidgee River WSP. This includes replacement access licences as a result of access licence dealings (or water dealings) which include:

- sale or transfer of the ownership of an access licence (called a transfer);
- change in the location where a water access licence can be used;
- sale of the share component of an access licence (called assigning share component);
- subdivision of an access licence or consolidation of access licences;
- sale of allocation water (called an assignment of water allocation);
- change in the category of an access licence (called a conversion); and/or
- rental of a water access licence (called a term transfer).

Iluka would obtain a 450 ML of high security water from the Murrumbidgee River WSP through access licence dealings to secure a fresh water supply for the Balranald Project.

6.4.4 National Parks and Wildlife Act 1974

The NSW *National Parks and Wildlife Act 1974* (NPW Act) provides for nature conservation in NSW including the conservation of places, objects and features of significance to Aboriginal people and protection of native flora and fauna. A person must not harm or desecrate an Aboriginal object or place without an Aboriginal heritage impact under section 90 of the NPW Act. However, a section 90 permit is not required for SSD approvals by virtue of section 89J of the EP&A Act.

Potential impacts to Aboriginal heritage objects resulting from the Balranald Project are detailed in Chapter 13.

6.4.5 Threatened Species Conservation Act 1995

The TSC Act aims to conserve biological diversity in NSW through the protection of threatened flora and fauna species and endangered ecological communities (EECs).

The potential impacts of the Balranald Project on threatened species and EECs listed under the TSC Act are discussed in Chapter 12.

6.4.6 Native Vegetation Act 2003

The NSW *Native Vegetation Act 2003* (NV Act) provides for the promotion, improvement and protection of native vegetation in NSW. Approval to clear native vegetation in NSW is required under the NV Act. Under section 89J of the EP&A Act, SSD is exempt from an authorisation to clear native vegetation under section 12 of the NV Act.

Potential impacts to native vegetation resulting from the Balranald Project are detailed in Chapter 12.

6.4.7 Roads Act 1993

The NSW *Roads Act 1993* (Roads Act) regulates activities that may impact on public roads in NSW. Section 138 of the Roads Act states that

A person must not:

- (a) erect a structure or carry out a work in, on or over a public road, or
- (b) dig up or disturb the surface of a public road, or
- (c) remove or interfere with a structure, work or tree on a public road, or
- (d) pump water into a public road from any land adjoining the road, or
- (e) connect a road (whether public or private) to a classified road,

other than with the consent of the appropriate roads authority.

The potential impacts of the Balranald Project on the existing road network and proposed road safety improvement works to accommodate design traffic are discussed in Chapter 18. Any road works would require approvals under section 138 of the Roads Act from BSC and RMS. Under section 89K of the EP&A Act, an approval under section 138 of the Roads Act is to be issued in terms that are substantially consistent with a development consent for SSD.

6.4.8 Crown Lands Act 1989

The NSW *Crown Land Act 1989* (CL Act) sets out how Crown land is to be managed. In particular, specific use of Crown land generally needs to be authorised by a lease, licence or permit. The approval of the NSW Crown Land Division would be required under the CL Act for any works or mining in Crown land.

While there is Crown land proximate to the project area, no infrastructure works or mining associated with the Balranald Project would be undertaken within that land.

6.4.9 Western Lands Act 1901

The NSW *Western Lands Act 1901* (WL Act) establishes an appropriate system for land administration and effective integration with natural resource management of land in the Western Division of NSW. The project area is within the Western Division and most land is held under Western Land Leases (WLL) granted under the WL Act.

WLLs in the project area have been granted mostly for grazing purposes as well as for grazing and cultivation. The WLLs can include conditions which are tailored to the individual property. Many of the WLLs applicable to the project area include a condition that allows mining to be carried out on land within a WLL, subject to securing the required approvals under environmental, planning and mining legislation.

As discussed in Chapter 3, there are two WLLs within the project area (Hughdale and Pine Lodge) which include conditions relating to management of areas known as SMCAs. These areas are subject to special conditions which require the areas to be managed by current lease holders in such a way that conserve vegetation in certain areas of the lease holding. Changes to these WLLs will be required for the project to proceed.

The biodiversity offset strategy for the Balranald Project has considered impacts to the SCMAs and suitable offsets have been provided to compensate for impacts.

6.4.10 Heritage Act 1977

The NSW *Heritage Act 1977* (Heritage Act) aims to protect and conserve the natural and cultural history of NSW, including scheduled heritage items, sites and relics. Approvals under Part 4 or an excavation permit under section 139 of the Heritage Act are not required for SSD by virtue of section 89J of the EP&A Act.

The potential heritage impacts of the Balranald Project and the related mitigation measures proposed are discussed in Chapter 24.

6.4.11 Rural Fires Act 1997

The NSW *Rural Fires Act 1997* (RF Act) aims to among other things, to prevent, mitigate and suppress bush and other fires in LGAs (or parts of areas) and other parts of NSW constituted as rural fire districts, including Balranald.

On 1 August 2002, the EP&A Act and the RF Act were both amended to enhance bush fire protection through the development assessment process. The EP&A Act establishes a system for requiring bush fire protection measures on bush fire prone land at the DA stage. Generally DAs on bush fire prone land must be accompanied by a bush fire assessment report demonstrating compliance with the aim and objectives of *Planning for Bush fire Protection 2006* (PBFPP guidelines) and the specific objectives and performance criteria for the land use proposed.

A bushfire assessment of the Balranald Project has been undertaken in accordance with the PBFP guidelines and is provided in Chapter 23.

6.4.12 Dams Safety Act 1978

The NSW *Dams Safety Act 1978* (DS Act) established the Dams Safety Committee to approve and maintain records of 'prescribed dams' in NSW. Prescribed dams are defined in Schedule 1 of the DS Act. Consultation with the Dams Safety Committee would be undertaken by Iluka to determine if any dams proposed under the Balranald Project, such as the TSF and groundwater retention dams, would be deemed to be prescribed dams and require inclusion within Schedule 1 of the DS Act.

6.4.13 Radiation Control Act 1990

The NSW *Radiation Control Act 1990* (RC Act) includes provisions regulating the use, sale, giving away, disposal, storage, possession, transport, installation, maintenance or repair, remediation or clean-up of regulated material in NSW.

Regulated material include radioactive substances, ionising radiation apparatus, non-ionising radiation apparatus and sealed source devices. A radioactive substance is defined as:

... any natural or artificial substance whether in solid or liquid form or in the form of a gas or vapour (including any article or compound whether it has or has not been subjected to any artificial treatment or process) which emits ionising radiation spontaneously with a specific activity greater than the prescribed amount and which consists of or contains more than the prescribed activity of any radioactive element whether natural or artificial.

The prescribed activity of radioactive substances are contained in Schedule 1 of the NSW *Radiation Control Regulation 2013* (RC Regulation).

Under Section 6 of the RC Act, a person responsible for regulated material must hold a radiation management licence in respect of the regulated material and must comply with any conditions to which the licence is subject.

Section 6(1) of the RC Act states that:

For the purposes of this Act each of the following persons is a person responsible for regulated material:

- (a) the owner of the regulated material,
- (b) any person who is storing, selling or giving away the regulated material,
- (c) any person who has possession of the regulated material, other than:
 - (i) a person who is the holder of a radiation user licence in respect of the regulated material and who has possession of the regulated material only for the purposes of using the regulated material, or
 - (ii) a person who has possession of the regulated material only for the purposes of transporting the regulated material.

Section 7 of the RC Act states that a person who uses regulated material must hold a radiation user licence and must comply with any conditions to which the licence is subject.

Notwithstanding the above, under Part 2 of the RC Regulation, persons are exempt from radiation management and radiation user licences for managing and using radioactive ores that are at any place to which the NSW Mine Health and Safety Act 2004. This legislation has been repealed and replaced with the NSW *Work Health and Safety (Mines) Act 2013* (WH&S Mines Act). No exemptions are provided in the RC Act, RC Regulation or WH&S Mines Act for holding radiation management and radiation user licences.

A radiation risk assessment prepared by Iluka (refer to Appendix S) indicates that no mining materials, including the overburden, ore, HMC, mineral concentrates and mining by-products are classified as regulated material. As such, Iluka are not required to obtain licences under sections 6 and 7 of the RC Act for the handling and use of regulated material. Further details are provided in the radiation risk assessment in Appendix S.

6.4.14 Work Health and Safety Act 2011 and Work Health and Safety (Mines) Act 2013

The aim of the NSW *Work Health and Safety Act 2011* (WH&S Act) is to ensure a consistent approach to ensuring health and safety of workers in NSW. One of the key aims of the WH&S Mines Act is to assist in securing the objects of the WH&S Act at mines, including the object of securing and promoting the health and safety of persons at work at mines or related places.

The Balranald Project would implement the necessary policies and training required under the WH&S Act and WH&S Mines Act, including obtaining licenses for storage and handling of dangerous goods. Further information on safety and hazards is provided in Chapter 22.

6.4.15 Pipelines Act 1967

The NSW *Pipelines Act 1967* aims to:

- implement a timely and efficient approvals system to facilitate the construction of cross-country transmission pipelines in New South Wales;
- ensure the effect of a pipeline project commenced under the Act on the environment, landowners and native titleholders is properly considered and managed; and
- ensure pipeline licensees protect the environment, pipeline employees and the public from dangers arising from both pipeline construction and the transmission of potentially hazardous substances.

Not all pipelines are required to be licenced under the *Pipelines Act 1967*. Predominantly licenced pipelines convey oil, gas and petroleum.

Pipelines constructed as part of the Balranald Project, particularly the water supply pipeline do not need to be licenced under the *Pipelines Act 1967*.

6.5 Strategic policies

6.5.1 Draft Murray Regional Strategy

The *Draft Murray Regional Strategy* (the Strategy) was prepared in 2009 by the then Department of Planning (now DP&E) and identified key priorities for the Murray Region. The region is composed of ten LGA's including Balranald and, therefore, applies to the project area. The Strategy recognises the challenges of the region and aims to:

- protect and manage the sensitive riverine environment of the Region's major waterway, such as the Murray River;
- cater for the Region's housing demand over the next 25 years;
- prepare for and manage the significantly ageing population;
- reinforce the role of Albury as the region's major regional centre;
- ensure an adequate supply of employment land;
- protect the rural landscape and natural environment;
- consideration of additional development sites outside of agreed local strategies;
- ensure that the land use planning systems can respond to changing circumstances for settlement and agricultural activity arising from water trading; and
- recognise, value and protect the cultural and archaeological heritage values of the Region for both Aboriginal and European cultures.

Mining is recognised by the Strategy as one of the key drivers of rural and regional economies in the Murray Region. In particular, the Strategy notes that mining of mineral sands in the Balranald LGA is a potentially significant contributor to the subregional economy. The Murray Region has valuable resources with mineral sands being recognised as the most valuable of these commodities.

The Strategy identifies a key action as being the protection of land uses for primary production, including mining, and to facilitate related industries with appropriate zones and planning provisions.

The Balranald Project is consistent with the aims and objectives of the Strategy, as it would allow the region to realise the economic potential and benefits of the mineral sand resources that would be mined as part of the Balranald Project.

6.5.2 NSW 2021

The *NSW 2021: A Plan to Make NSW Number One* (NSW Government 2011) aims to guide policy and budget decisions over the ten year period to 2021. The plan is based around the following strategies:

- rebuild the economy;
- return quality services;
- renovate infrastructure; and
- strengthen the local environment and communities.

Work has been undertaken to localise NSW 2021 through consultation with local communities to identify local priorities for action at the regional level. A regional action plan for the Murray-Lower Darling, in which Balranald LGA and town is located, was prepared in December 2012 (the Murray-Lower Darling Regional Action Plan).

The Regional Action Plan was underpinned by community consultation which included holding regional forums to hear directly from communities. These forums were aimed at identifying regional issues and priorities how the State Government could assist in delivering those priorities. The key priorities identified by communities within the Murray-Lower Darling Regional Action Plan include:

Prosperous and economically diverse – The Murray-Lower Darling will use its competitive advantages in location, workforce availability, climate, education and training opportunities, agribusiness and infrastructure to grow and diversify the economy. The region will be recognised as a place for new and innovative business concepts, products and services and for nurturing new high-value export-orientated industries in agriculture, manufacturing, mining, transport, arts and culture.

Providing quality education and training opportunities – The Murray-Lower Darling region will continue to be home to quality education and research institutions. Industry and educational institutions will partner to promote lifelong learning and provide people with more education, training and employment options.

Recognised for its strong communities – The Murray-Lower Darling will be recognised for its resilient communities and effective regional leadership to adapt to the challenges of water management, climate change and the ever changing nature of agriculture production in inland NSW.

Well-connected – The Murray-Lower Darling will be well-connected with increased access to transport services within our region and to other regions and major airports. Roads will be upgraded to continue to support the critical transport and logistics industry. Improvements and increased access to new technologies will link the Murray-Lower Darling region to high quality reliable mobile and internet services.

Specifically in relation to growth and diversification of the economy, the Murray-Lower Darling Regional Action Plan states:

The Murray-Lower Darling region has a strong economy based on agriculture, forestry, the services sector, tourism and the training sector. There are further opportunities to grow the economy and increase regional business investment through the expansion of manufacturing, food processing, logistics industries and the new mineral sand mining industry in the west of the region.

Expansion of these industries will increase local employment opportunities, including for young people. Delivery of education and training services to support these industries will be required to ensure local people have the skills required to take advantage of new employment opportunities.

Accordingly, part of the Murray-Lower Darling Regional Action Plan is to grow the regional economy through the development of mineral sands mines within the Murray Basin. These NSW government expects these mines, such as the Balranald Project, to increase employment opportunities.

6.5.3 Strategic Regional Land Use Policy

The NSW government has recently prepared the *Strategic Regional Land Use Policy* which aims to protect strategic agricultural land and valuable water resources in areas of regional NSW where mining and coal seam gas resources are prevalent.

Seven regions in NSW have been identified as applying under this Policy with each region having a Strategic Regional Land Use Plan (SRLUP). These regions include Upper Hunter, New England North West, Central West, Southern Highlands, Western, Murrumbidgee, and Alpine. As of November 2012, two SRLUP's (Upper Hunter and New England North West) had been completed with the remainder to be completed or commenced in 2013.

The *Strategic Regional Land Use Policy* also includes provisions to review and update existing regional strategies for a number of regions including the Strategy discussed above.

Although the project area is not located on mapped strategic agricultural land, under the *Strategic Regional Land Use Policy* all SSD and coal seam gas projects that may impact agricultural resources, whether or not they are located on land mapped as strategic agricultural land under a SRLUP, require an agricultural impact statement (AIS) to accompany a DA. An AIS for the Balranald Project is provided in Appendix C and summarised in Chapter 16.

The *Strategic Regional Land Use Policy* also references the AIP which is discussed in the following section.

6.5.4 NSW Aquifer Interference Policy

The AIP was released by the NSW government in September 2012 to address water licensing and the potential impacts of aquifer interference activities within NSW. The AIP defines the regime for protecting and managing the impacts of aquifer interference activities on NSW's water resources and assist proponents to prepare necessary information for activities that have will have an interference on aquifers.

The AIP aims to:

- clarify water licence and impact assessment requirements for aquifer interference activities;
- ensure equitable water sharing among different types of water users;
- ensure that water taken by aquifer interference activities is properly licensed and accounted for in the water budget and water sharing arrangements; and
- enhance existing regulation, resulting in a comprehensive framework to protect the rights of all water users and the environment.

The AIP states that the activity must address minimal impact consideration for impacts on water table, water pressure and water quality. It requires that planning for measures in the event that the actual impacts are greater than predicted, including making sure there is sufficient monitoring in place.

The AIP focuses on high risk activities such as mining, coal seam gas, sand and gravel extraction, construction dewatering, aquifer injection activities, and other activities that have the potential to contaminate groundwater or decrease aquifer storage and yields. Impacts on connected alluvial aquifers and surface water systems, as well as impacts to other water dependent assets, such as water supply bores and groundwater dependent ecosystems are also considered.

All water taken from a water source by an aquifer interference activity, regardless of its quality, is required to be accounted for within the long term average extraction limit specified for that water source. The AIP states that separate approval is required (under section 91(3) of the WM Act) for aquifer interference activities to ensure that the amount of water taken from each water source does not exceed the extraction limit set in the WSP. However, as stated in Section 6.4.3, section 91(3) of the WM Act has not yet commenced and aquifer interference approvals do not actually exist. Where an aquifer interference activity results in the movement of adjacent, overlying or underlying water into the groundwater source separate aquifer licenses are required for each of these sources for the predicted volume of impact.

The AIP requires that two years of baseline groundwater data be collected and incorporated into the impact assessment prior to lodging a DA. For the Balranald Project, groundwater will be taken incidentally via dewatering to allow effective and safe operation of dry mining activities. All water taken by aquifer interference activities, regardless of its quality, needs to be accounted for within the extraction limits for the respective water source, in this case the Western Murray Porous Rock Groundwater Source within the MBD Porous Rock WSP and other connected water source if required.

The Balranald Project has been assessed in accordance with the AIP with further detail provided in Chapter 14.

Aquifer interference activities located within strategic agricultural land are subject to a gateway process prior to submission of a DA in accordance with the *Strategic Regional Land Use Policy*. The gateway process includes consideration of impacts to agriculture as well as aquifers. The Balranald Project is not located within strategic agricultural land and therefore is not subject to the gateway process.

6.5.5 National Water Initiative

The NSW government is a partner to an intergovernmental agreement, the National Water Initiative (NWI), which was signed by the Council of Australian Governments (CoAG) in June 2004. The NWI recognises the continuing imperative to increase the productivity and efficiency of Australia's water use, the need to service rural and urban communities, and to ensure the health of river and groundwater systems by establishing clear pathways to return all systems to environmentally sustainable levels of extraction.

The NWI has a number of relevant requirements for water planning, including:

- settling the trade-offs between the competing uses must be based on the best available;
- science and socio-economic analysis, as well as consultation with the community;

- ensuring that environmental and other public-benefit outcomes are provided for through planned and adaptive environmental water on a statutory basis and achieved, including actions to sustain high-conservation value rivers, reaches, and groundwater areas;
- providing for water trading to enhance water markets;
- recognising and addressing surface and groundwater connectivity;
- managing local impacts in groundwater areas as well as protecting GDEs;
- providing for indigenous consultation and aboriginal cultural and commercial entitlements;
- assessing and addressing interception; and
- monitoring and reporting on implementation.

The NWI sets outcomes, guidelines and timelines for water plans and planning processes. The National Water Commission (NWC) is an independent statutory body responsible for providing advice to CoAG on the implementation of the NWI and national water issues and undertakes a biennial assessment of each state's progress on implementing the NWI.

NSW's primary vehicles for implementation of the NWI are through the preparation and implementation of the various WSPs and AIP.

6.6 Summary of licences approvals and permits

Table 6.5 contains a summary of the licences, approvals and permits that are likely to be required for the Balranald Project.

Table 6.5 Summary of required licenses approvals and permits

Legislation	Authorisation	Consent or approval authority
EP&A Act	Development consent	Minister for Planning or delegate
	Construction certificate required prior to construction of certain structures in the processing area	BSC or private certifier
	Occupation certificate required prior to use of certain buildings in the infrastructure and facilities areas	BSC or private certifier
Mining Act	Mining lease for project area	DRE
	MOP or REMP for mining operations	DRE
POEO Act	EPL for mining and processing operations	EPA
Roads Act	Section 138 permit for road and intersection improvements including construction of intersections with Balranald-Ivanhoe Road, Burke and Wills Road and Arumpo Road	BSC
WL Act	Changes to conditions on WLLs	Crown Lands

Table 6.5 Summary of required licenses approvals and permits

Legislation	Authorisation	Consent or approval authority
Water Act	Licencing of monitoring bores Licencing of injection into groundwater	NOW
WM Act	Water access licence/sto access water from MDB Porous Rock WSP and Murrumbidgee River WSP	NOW
<i>Dams Safety Act 1978</i>	Listing of water storage dams	Dams Safety Committee
<i>Work Health and Safety Act 2011</i>	Licensing of dangerous goods (eg diesel and ANFO magazine storage)	NSW WorkCover Authority
EPBC Act	Approval to undertake controlled action	DoE

7 Stakeholder consultation

7.1 Overview

This chapter provides an overview of stakeholder consultation and engagement activities undertaken for the Balranald Project and a summary of the consultation results that have been incorporated into the project design, environmental assessments and mitigation measures in this EIS.

7.2 Iluka and stakeholder consultation

The development of strong relationships with stakeholders is an important aspect of Iluka's business. Throughout the development of a project, Iluka strives to build and maintain these relationships by demonstrating the values of commitment, integrity and responsibility.

Iluka's approach to stakeholder consultation is established in the company's Stakeholder Relations Policy (Iluka 2013). This document demonstrates the manner in which Iluka will engage, consult and support the stakeholders and communities relevant to its activities.

Of the commitments established in the Stakeholder Relations Policy, the following were the most critical in developing a stakeholder consultation strategy for the Balranald Project:

- engage in open and meaningful communication with our stakeholders; and
- acknowledge, respect and incorporate stakeholder rights, values, beliefs and culture in our decision-making processes.

7.3 Consultation objectives

The aim of Iluka's stakeholder consultation activities for the Balranald Project has been to facilitate structured stakeholder input to inform relevant environmental assessments and demonstrate open, transparent engagement through EIS development and publication.

To achieve this aim, Iluka has established a number of objectives, being to:

- consult early to establish points of contact, develop Iluka's profile within government agencies and ensure all government requirements are identified;
- identify other relevant stakeholders who have a known or potential future interest in the Balranald Project;
- establish relationships with the community;
- provide stakeholders with accurate and regular information on the Balranald Project;
- identify and understand the aspects of the Balranald Project which are of most interest to stakeholders; and
- continually seek feedback on relevant areas of Balranald Project and the strategies proposed to minimise impacts, and identify opportunities to accommodate feedback into the project design.

Stakeholder engagement and consultation has been led by Iluka with support from EMM and technical specialists, as required.

7.4 Formal consultation requirements

Among the objectives of the EP&A Act, one objective is 'to provide increased opportunity for public involvement and participation in environmental planning and assessment'. Accordingly, stakeholder engagement and consultation forms a key information input in the preparation of large environmental impact assessments.

The SEARs for the Balranald Project state that stakeholders must be consulted during the preparation of the EIS. Specifically, the SEARs state:

During the preparation of the EIS, Iluka must consult with relevant local, State and Commonwealth Government authorities, service providers, community groups and affected landowners.

The EIS must describe the consultation process and the issues raised, and identify where the design of the development has been amended in response to these issues. Where amendments have not been made to address an issue, a short explanation should be provided.

Once the initial DGRs and subsequent SEARs were received, Iluka reviewed the scope and efficacy of the early stakeholder consultation activities to ensure they met the EIS requirements. The review indicated that the initial approach to stakeholder consultation undertaken prior to the issuing of the DGRs and SEARs and preparation of this EIS more than adequately addressed the requirements. Iluka's ongoing consultation activities continued in this manner.

7.5 Stakeholder consultation activities

7.5.1 Consultation strategy

To assist in the development of consultation activities, Iluka has developed two strategies in support of:

- community consultation, including for EIS requirements and community relations exercises; and
- government consultation and relations.

The consultation strategy is inclusive of Balranald project field activities required to support environmental assessments that have been conducted from late 2011 to 2015. These strategies were developed following a detailed stakeholder and issues identification process, risk assessment and management planning.

7.5.2 Stakeholder consultation planning overview

Stakeholder consultation requires detailed planning, execution and documenting of engagement and other relevant events, incorporating a process of continual improvement and refinement to reflect changes within the stakeholder groups, issues or local, regional and national sensitivities.

The basis of planning for Iluka's preliminary (before preparation of this EIS) and formal consultation activities incorporated the following key tasks:

- stakeholder identification and assessment;
- early stakeholder consultation and scoping; issues identification and analysis;
- tool/event identification and evaluation;
- development of consultation plans/strategies; and
- implementation, monitoring, documenting and review of consultation activities.

i Stakeholder identification and assessment

The objective of the stakeholder identification process was to identify, as far as reasonably practicable, those stakeholders deemed to hold a direct or indirect interest in the development of the Balranald Project. In identifying stakeholders and developing a stakeholder register, Iluka considered the range of government stakeholders, relevant local communities including their varied occupations, interests, community infrastructure or services that could be potentially impacted by the development of the Balranald Project, as well as any regional interests such as media outlets or special interest groups. Iluka's stakeholder register was regularly updated as changes in community were identified or project configuration and design evolved.

Three stakeholder categories were identified, community, government and Indigenous, each with a number of sub-groups as follows:

- community - property owners, local businesses, schools and training centres, the local community, special interest groups, service providers and the media;
- government - BSC, neighbouring local councils and State and Commonwealth government agencies, local members and Ministers; and
- Indigenous - registered Aboriginal parties (refer to Chapter 13), the local indigenous community and those organisations servicing their interests or representation.

Once stakeholders were identified, an assessment of each stakeholder, their relationships and areas of interest or concern were established and assessed, as they pertain to the Balranald Project and its perceived/potential impacts or benefits, to allow Iluka to define stakeholder engagement strategies tailored to individual or group needs and at the most relevant time given the project schedule.

ii Early stakeholder consultation

Iluka places a high level of importance on early engagement both with the local community and government stakeholders. Before late 2010, Iluka undertook initial consultation with government stakeholders, engaged with the local community, Aboriginal stakeholders, organisations and local businesses. This high level of engagement sought to introduce Iluka and the proposed Balranald Project to new stakeholders and has continued through the environmental impact assessment process, up to publication of this EIS.

This early engagement provided Iluka with the opportunity to commence building relationships with the key stakeholder groups that would form the basis for detailed consultation planning and ongoing activities through the development of this EIS.

iii Issues identification and assessment

To identify issues that may be raised by one or more stakeholders, Iluka implemented an issues identification and analysis process to establish a register of potential matters of concern or interest. Using records of early engagement activities, interviewing Iluka project personnel and online/media research, a list of potential matters was consolidated and categorised into the following groups:

- political;
- regulatory approvals;
- land access;
- land use and logistics;
- land management;
- water (surface and groundwater);
- emissions, nuisance and sustainability;
- social impact;
- economic development, business and employment; and
- Iluka's social licence to operate.

iv Tool/event identification

A range of stakeholder engagement tools and methods were considered and used, including:

- face-to-face meetings;
- workshops;
- newsletters and targeted updates (ie resident's update);
- fact sheets and other guidance material;
- drop-in sessions;
- Iluka participation in community events;
- information available on the Iluka website;
- media articles and advertising; and
- meetings with BSC and government agencies.

v Development of consultation plans and strategies

Following the completion of the stakeholder and issues identification and assessment process, project action plans and consultation strategies were developed to guide stakeholder engagement.

vi Consultation activities and events

As outlined above, to achieve Iluka's own stakeholder relations objectives and demonstrate appropriate consultation with community, government and Indigenous groups, a range of formal and informal stakeholder engagement methods (ie tools, events) have been employed in accordance with project action plans and consultation strategies.

Following a review of all consultation activities, it is evident that consultation processes have evolved with time, both in the content delivered and the responses provided by stakeholders. Consultation completed as part of Balranald Project Scoping Report (EMM 2012) and PFS activities (up to mid-2013) was characterised by high-level project briefings and limited or no stakeholder responses (ie effectively an awareness and educative process). As a result, records have been collated and summarised to reflect the briefing content and those limited issues raised.

Upon commencement of the DFS (mid-2013 onwards), Iluka began providing detailed concept and impact information to stakeholders who were subsequently able to raise specific issues for Iluka to consider and address as part of the environmental assessment process. Those consultation activities completed since 2013 have been targeted towards specific issues or outcomes and promoted significantly more discussion and response from stakeholders than PFS-stage consultation.

Table 7.1 lists the consultation activities undertaken in support of the Balranald Project and details the purpose, key issues and are detailed by stakeholder category. Where a consultation activity has resulted in a change to project design, level of impact or to a mitigation strategy, such a change has been demarcated.

vii Government consultation

Local councils, State and Commonwealth government agencies were principally consulted to identify key issues for this EIS, to seek guidance on assessment approaches and to investigate government policies that apply to the Balranald Project. The primary consultation tool was to hold targeted meetings with agency representatives, either face-to-face or by phone. Table 7.1 provides an overview of those meetings and briefing sessions held with government agencies to date and the key issues discussed.

Iluka will continue to engage with councils and relevant government agencies on a regular basis throughout the EIS approval and project development processes associated with the Balranald Project.

It should be noted that the State government agencies listed in Table 7.1 contain a number of separate divisions, offices or agencies that were consulted during preparation of the EIS. Details on these separate divisions, offices or agencies are provided below:

- DITIRIS (also known as NSW Trade and Investment) has a number of operational divisions, including NSW Department of Primary Industries (DPI) and Resources and Energy (DRE):
 - DRE was engaged a number of times during the preparation of this EIS.

- DPI itself has a number of divisions, including Land and Natural Resources and NSW Office of Water (NOW). Of these divisions, Land and Natural Resources and NOW were regularly engaged during the preparation of this EIS.
- The Land and Natural Resources division of DPI contains a number business units and agencies, including Crown Lands. Crown Lands administers all crown land in NSW, including all land within the Western Division of NSW (including the Balranald LGA) held under Western Lands Leases, granted under the *NSW Western Lands Act 1901*. Crown Lands was engaged during the preparation of this EIS.
- DP&E includes a number of affiliated agencies, including the Office of Environment and Heritage (OEH). In addition, NSW National Parks and Wildlife Service (NPWS) forms part of OEH. DP&E, OEH and NPWS were regularly engaged during the preparation of this EIS.
- Transport for NSW also contains a number of agencies, including Roads and Maritime Services (RMS) which was regularly engaged during the preparation of this EIS.

In addition to the meetings listed above, a planning focus meeting (PFM) was held in Balranald with a number of government agencies and BSC on 10 May 2012 prior to the issue of the initial DGRs. Attendees included representatives from DP&E, DRE, NOW, Crown Lands, EPA, OEH, NPWS and BSC. The PFM included a presentation on:

- the background and need for the Balranald Project;
- project description, as it was known at the time;
- statutory and approval requirements;
- planned stakeholder engagement; and
- an initial assessment of potential environmental issues and how these issues would be addressed in this EIS.

The presentation was followed by a tour of the project area.

Table 7.1 Government consultation activities and outcomes

Agency	Date	Purpose and key issues	Relevant to project design?	Applied changes
Local government				
BSC	15 February 2011	Meeting to provide an initial project briefing to Council.	No	-
(Senior staff or Council, as identified)	27 June 2011	Meeting to provide a project update.	No	-
	20 September 2011	Meeting to provide a project update.	No	-
	10 November 2011	Project briefing including discussion of power supply options, road options from West Balranald mine to Sturt Highway, road/rail options to Victoria, construction/civil works, accommodation facility options, airport capability and potable water supply options for project.	No	-
	21 February 2012	Meeting to provide a project update.	No	-
	17 July 2012	Meeting to provide a project update.	No	-
	3 October 2013	Transport briefing including discussion on options study and preferred product haulage route.	Yes	Informed preferred product haulage route
	18 February 2014	Presentation to Council to provide a project update, including discussion on accommodation facility and community involvement/support program process.	No	-
	2 April 2014	Transport briefing including discussion on traffic and transport assessments on preferred product haulage route. Road Safety Audit, preliminary pavement condition assessment on preferred product haulage route and proposed over dimensional transport route.	Yes	Informed scope and assumptions applied to supporting technical studies
	24 June 2014	Presentation to Council to provide a project update.	No	-
	10 September 2014	Presentation to Council workshop on Iluka's design and consultation activities for the proposed Town accommodation facility. Background and rationale for site selection; overview of residential consultation completed/proposed and accommodation facility concept layout options.	Yes	Informed town accommodation facility site selection process
	9 October 2014	Transport briefing including discussion on pavement condition assessment on preferred product haulage route and rehabilitation treatment options. Pavement condition assessment, predicted design traffic and rehabilitation treatment (road safety / maintenance).	Yes	Informed development of traffic mitigation measures
	26 November 2014	Transport briefing including discussion on road safety/maintenance Road safety/maintenance objectives and framework.	Yes	Informed parameters for developing any future framework (if required)
	10 March 2015	Presentation to Council to provide a project update.	No	-

Table 7.1 Government consultation activities and outcomes

Agency	Date	Purpose and key issues	Relevant to project design?	Applied changes
Wakool Shire Council (Senior staff or Council, as identified)	18 July 2012	Presentation to Council to provide a briefing on the project. Iluka business, Balranald Project and schedule overview.	No	-
	12 November 2014	Meeting to provide project update. Balranald Project update, traffic and transport assessments and consultation.	No	-
	19 March 2015	Meeting to provide project update. Balranald Project update, traffic and transport assessments and consultation.	No	-
Swan Hill Rural City Council (Senior staff or Council, as identified)	20 September 2011	Presentation to Council to provide a briefing on the project. Iluka business, Balranald Project, transport options study, community engagement and schedule overview.	No	-
	15 November 2011	Briefing on transport and logistics options for HMC to Hamilton.	No	-
	21 February 2012	Meeting to provide a project update.	No	-
	18 July 2012	Meeting to provide a project update. Balranald Project, transport options study and project schedule.	No	-
	11 September 2014	Meeting to provide project update. Balranald Project overview, traffic and transport assessments, social / economic benefits overview & project schedule.	No	-
	13 November 2014	Meeting to provide project update. Balranald Project update, traffic and transport assessments and consultation.	No	-
Mildura Rural City Council (Senior staff only)	11 November 2011	Meeting to provide a briefing on the project. Iluka business, Balranald Project, transport options study, community engagement & schedule overview.	No	-

Table 7.1 Government consultation activities and outcomes

Agency	Date	Purpose and key issues	Relevant to project design?	Applied changes
State government agencies				
DPI – Mineral Resources	10 March 2011	Initial presentation of conceptual development plan of the project.	No	-
	13 April 2011	Briefing session to provide update on the project.	No	-
	27 July 2011	Briefing session to provide update on the project.	No	-
	7 November 2011	Briefing session to provide update on the project and discuss proposed exploration activities in 2012.	No	-
	9 December 2011	Meeting to discuss mining lease application process.	No	-
	7 March 2012	Meeting where final conceptual project development plan was presented.	No	-
	27 September 2012	Meeting to provide update on the project and confirm certain aspects of the mining lease application process.	No	-
	27 March 2013	Meeting to provide update on project, status of studies and discuss proposed borehole mining trial (separate to Balranald Project).	No	-
	19 November 2013	Workshop to provided update on the project and discuss preliminary results of groundwater and geochemistry modelling and assessments.	No	-
11 September 2014	Meeting to provide an update on the project, including outcomes of rehabilitation strategy.	No	-	
NOW	14 April 2011	Meeting to provide a briefing on the project and seek advice on water related approvals and licences.	No	-
	8 November 2011	Meeting to provide a briefing on hydrogeological test work and progress on groundwater flow model development.	No	-
	5 July 2012	Project briefing.	No	-
	23 July 2012	Update on hydro-geological investigations and groundwater flow modelling results to date.	No	-
	20 June 2013	Meeting to provide update on project and discuss controlled allocation order.	No	-
	19 November 2013	Workshop to provided update on the project and discuss preliminary results of groundwater and geochemistry modelling and assessments.	Yes	Revised hydrogeological modelling and injection bore field design
	18 November 2014	Briefing session to provide update on the project and discuss results of groundwater and geochemistry modelling and assessments and proposed mitigation and management measures.	Yes	Finalised materials handling strategies and hydrogeological modelling approach

Table 7.1 Government consultation activities and outcomes

Agency	Date	Purpose and key issues	Relevant to project design?	Applied changes
Crown Lands	4 April 2011	Project briefing.	No	-
	7 June 2012	Meeting to provide briefing on project and obtain advice on assessment procedures and policies on Western Lands.	No	-
DP&E	14 December 2010	Meeting to provide initial project briefing.	No	-
	10 March 2011	Meeting where initial conceptual development plan of the project was presented.	No	-
	4 November 2011	Meeting to provide update on project design and baseline investigations.	No	-
	7 March 2012	Meeting where final conceptual project development plan was presented.	No	-
	20 June 2013	Meeting to provide update on project and seek advice on assessment timeframes.	No	-
	12 September 2013	Meeting to provide update on the project.	No	-
	18 June 2014	Meeting to provide update project, progress of technical studies, consultation with other agencies and timeframe for finalisation of EIS.	No	-
OEH and NPWS	15 April 2011	Project briefing and discussed key environmental approvals processes and OEH involvement.	No	-
	5 June 2012	Project briefing discussion regarding biodiversity offset requirements.	No	-
	5 June 2014	Meeting to present results of ecology and Aboriginal heritage investigations and discuss approach to offsets.	No	-
	2 September 2014	Project briefing and update. Update on the results of the Aboriginal heritage assessment and results of investigations on proposed biodiversity offset options.	No	-
	6 February 2015	Project briefing and update. Discussion on results of further field surveys and status of the biodiversity offset strategy.	Yes	Informed biodiversity offset strategy and mitigation measures
EPA	17 July 2012	Project briefing. Baseline radiation survey requirements.	No	-
	19 November 2013	Project briefing and update. Preliminary results of groundwater and geochemistry modelling and assessments.	No	-
	13 January 2014	Project briefing and update. Regulations and requirements for assessment of the transport of waste.	No	-
	12 August 2014	Project briefing and update. Air quality modelling approach and baseline monitoring results, and provide update on groundwater and geochemistry assessments.	Yes	Informed environmental assessment and development of mitigation measures for air quality and geochemistry

Table 7.1 Government consultation activities and outcomes

Agency	Date	Purpose and key issues	Relevant to project design?	Applied changes
	18 November 2014	Project briefing and update. Results of groundwater and geochemistry modelling and assessments and proposed mitigation and management measures.	Yes	Informed finalisation of materials handling strategies and hydrogeological modelling approach
RMS	27 May 2011	Project briefing. Road and transport options being considered for project.	No	-
	10 November 2011	Project briefing. Power supply options, road options from project area to Sturt Highway, road/rail options to Hamilton, construction/civil works, accommodation village options, aerodrome capability, potable water supply options for project area (joint meeting with BSC).	No	-
	3 October 2013	Transport briefing including discussion on options study and preferred product haulage route. Preferred product haulage route selection and rationale.	Yes	Informed preferred product haulage route
	2 April 2014	Transport briefing including discussion on traffic and transport assessments on preferred product haulage route. Road Safety Audit, preliminary pavement condition assessment on preferred product haulage route and proposed over dimensional transport route.	Yes	Informed scope and assumptions applied to supporting technical studies
	9 October 2014	Transport briefing including discussion on pavement condition assessment on preferred product haulage route and rehabilitation treatment options. Pavement condition assessment, predicted design traffic and rehabilitation treatment (road safety/maintenance).	Yes	Informed development of traffic mitigation measures
	25 November 2014	Transport briefing including discussion on road safety / maintenance. Road safety/maintenance objectives and framework.	Yes	Informed parameters for developing any future framework (if required)
Crown LandsS	7 June 2012	Define Western Land Lease conditions, transfer processes and gravel extraction/royalty requirements.	No	-

Table 7.1 Government consultation activities and outcomes

Agency	Date	Purpose and key issues	Relevant to project design?	Applied changes
Commonwealth government				
DoE	6 July 2012	Meeting to discuss aspects of EPBC Act referral – in particular, nuclear action, endangered species, Ramsar wetlands, bilateral process.	No	-
	9 October 2012	Meeting to discuss splitting the transmission line works and Balranald Project into two separate referrals.	No	-
	18 December 2012	Meeting to discuss commonwealth EIS guidelines and requirements for technical studies.	No	-
	1 July 2013	Meeting to discuss status of project, planned work program for 2013/2014, advice on secondary approvals, air and noise assessments, outcomes of preliminary BioBanking assessment and offsetting strategy and upcoming government consultation.	No	-
	18 September 2013	Meeting to provide update on project and discuss process for varying the controlled action.	No	-
	17 June 2014	Meeting to provide update on project, including ecological studies, transmission line referral and request to submit application to amend action.	Yes	Informed environmental impact assessment and mitigation measures for ecology
	6 February 2015	Meeting to provide update on project and brief new DoE personnel.	No	-
Government forums and boards				
Lower Murray Darling Catchment Management Authority Board	7 December 2011	Project briefing to the board.	No	-
Central Murray Transport Forum	15 May 2012	Provided briefing to representativeness of forum including representatives from BSC, Swan Hill, Mildura, Buloke, Gannawarra, Wakool councils, RMS, VicRoads, and DTPLI.	No	-
	3 December 2014	Provided briefing to representativeness of forum including representatives from BSC, Swan Hill, Mildura, Buloke, Gannawarra, Wakool councils, RMS, VicRoads, and DTPLI.	No	-

7.6 Indigenous stakeholder consultation

Aboriginal stakeholders were engaged in accordance with OEH's *Aboriginal cultural heritage consultation requirements for proponents (DECCW, 2010)* and DEC's *Draft Guidelines for Aboriginal cultural heritage impact assessment and community consultation (DEC, 2005c)* as part of the cultural heritage assessment for the Balranald Project.

The Aboriginal cultural heritage consultation requirements provide detailed guidance on the implementation of a four stage consultation process. The four stages are:

- Stage 1 – notification of the Balranald Project and registration of interest;
- Stage 2 – presentation of information about the Balranald Project;
- Stage 3 – gathering information about the cultural significance; and
- Stage 4 – review draft cultural heritage assessment report.

Engagement with Indigenous stakeholders is detailed in Chapter 13 and Appendix G, including key issues raised and proposed mitigation measures.

7.7 Community and service provider consultation

Consultation within the local communities in which Iluka proposes to operate is crucial in identifying potential issues and benefits with the relevant stakeholder groups. Given the often varied demographic base of community stakeholders, it is important for Iluka to implement a number of strategies to provide the greatest reach possible to all sectors of the community. As such, Iluka has sought to implement strategies to reach the following key groups:

- landholders with a direct relationship to the Balranald Project;
- other regional landholders (eg within the Homebush district);
- community and other service providers within Balranald;
- Balranald community members; and
- residents adjacent to the land being considered for the accommodation facility in Balranald town.

The following sections detail the processes and outcomes of a range of consultation activities undertaken to achieve Iluka's community consultation objectives.

7.7.1 Landholder consultation

Landholders directly affected by the Balranald Project (ie landholders directly within the project area) have been consulted on an ongoing basis regarding Iluka's activities (including the operation of a number of field trials and regional environmental, cultural and geology investigations and studies) and development of the Balranald Project. The majority of this consultation has been conducted via individual meetings to provide a private setting to discuss details specific to their property.

Consultation with landholders who are indirectly affected by the Balranald Project (such as landholders adjacent to the West Balranald and Nepean mines, access roads, transmission line, water supply pipeline and accommodation facility) has also been by face-to-face meetings to discuss specific matters.

Table 7.2 provides an overview of the key issues raised by landholders during the consultation process which generally relate to the project design or potential impacts of the project.

Complementing the direct consultation of landholders, in 2014 Iluka commenced a program of providing quarterly briefings to the Homebush Landcare Group (HLG), a member-based organisation that holds an interest in land management activities of the area. Many of the landholders engaged directly by Iluka also attend the HLG briefing sessions. This forum provided Iluka with the means to garner a broader response to its proposed activities, especially from those who do not incur part of the project footprint or who live within closer proximity to the Balranald township.

It should also be noted that those community consultation activities, as described in Section 7.5, were also available or provided to landholders as members of the Balranald community.

In addition to face-to-face meetings in Table 7.2, interviews were completed with 11 landholders directly affected by the Balranald Project as part of the social assessment (refer to Chapter 19 and Appendix O), while 16 landholders were directly consulted in the development of the groundwater use study (refer to Chapter 14 and Appendix K).

Table 7.2 Landholder consultation activities and outcomes

Stakeholder	Date	Consultation details	Key issues discussed	Relevant to project design?	Applied changes
Individual landholder meetings	Various (2011 to 2015)	Individual (one-on-one) meetings with landholders, including those with direct and indirect interface with the Balranald Project	Mine disturbance footprint – query on establishing the extent of the mine in relation to properties required for development	No	-
			Mine disturbance footprint – query on general land management (i.e. dust suppression activities) and accessibility issues (i.e. exclusions) with West Balranald mine development	No	-
			Mine disturbance footprint – issue raised that landholder prefers the area to be left to farming practices, rather than mining	No	-
			Mining program – query on Nepean mine development program	No	-
			Mining program – query on scheduled commencement and stage progress	No	-
			Haul road – query on preferred route and discussion on proximity to grazing and cropping	No	-
			Injection borefield – issue raised twice on the suitability of proposed groundwater injection borefields given lower topographic elevation of some areas, with concern over potential surface expression and overall sustainability/land management/impact considerations	Yes	Review of injection borefield locations
			Water supply – issue raised many times over Iluka’s potential use of fresh/brackish groundwater as a large source of water for project development and operations	Yes	Non-saline water supply option consideration
			Water supply – issue raised many times that the Murrumbidgee should be considered the preferred and simplest source of water for Iluka	Yes	Non-saline water supply option consideration
			Water supply – recommendations provided for potential pipeline routes and river pumping locations	Yes	Non-saline water supply option consideration
Electricity transmission line – issue raised that proposed transmission line route options have a disproportionate productivity impact on small river-fronting properties	Yes	Transmission line route – contingent options			
Electricity transmission line – issue raised that proposed transmission line causes efficiency declines in seeding, crop management and harvesting by adding extra barriers (in the form of poles)	Yes	Transmission line route – contingent options and infrastructure design			

Table 7.2 Landholder consultation activities and outcomes

Stakeholder	Date	Consultation details	Key issues discussed	Relevant to project design?	Applied changes
Homebush Landcare Group	12 July 2013	Meeting to provide briefing on the Balranald project and hydrogeological field program planned for late-2013/14	Iluka provided an update on the Balranald Project and hydrogeological field program planned to inform groundwater modelling & project design	No	-
	25 March 2014	Meeting to provide a briefing on the project, with key focus on 2014 field trial activities and short-term water sourcing.	Water supply – consensus of group demonstrating concern over Iluka’s potential use of fresh/brackish groundwater as a large source of water for project development and operations	Yes	Non-saline water supply option consideration
	12 September 2014	Meeting to provide a briefing on the project, with key focus on hydrogeology study results and long-term water supply needs	Iluka provided feedback on its water supply assessment process – highlighting a change in preference to river water for project supply requirements with some potential for minor, discreet brackish groundwater extraction	Yes	Non-saline water supply option consideration
	27 November 2014	Site visit (long-term pump test site) and to provide a briefing on the project	Iluka demonstrated the infrastructure requirements and operational processes for groundwater dewatering and injection systems that would be proposed to be deployed as part of the Balranald Project. A general project update was provided, with specific focus on Iluka’s proposal for an injection borefield north of the West Balranald mine	No	-

7.7.2 Community service providers

Iluka consulted with community and service providers within Balranald to identify and assess the availability of the providers to meet foreseeable demand or other impacts as a result of the Balranald Project and the introduction of a new workforce to the area.

As part of the social assessment, a total of 65 interviews were also undertaken with community and service providers in and around the town of Balranald by Environmental Affairs Pty Limited on behalf of Iluka. While most interviews were held in-person, some were also undertaken by telephone. The interviews were completed across the following periods:

- 24 to 26 July 2012;
- 12 and 13 September 2012;
- 30 October and 1 November 2012; and
- 21 to 23 January 2013.

Results of this interview program are included in the social assessment in Chapter 19 and Appendix O.

7.7.3 Balranald (and surrounds) community consultation

Iluka has sought to inform the Balranald community through a number of strategies as outlined below.

i Community information sessions

Community information sessions provided an opportunity for a community to engage directly with representatives of Iluka. Iluka has held annual community information sessions, in conjunction with the Balranald 5 Rivers Outback Festival, an annual community festival held at the township of Balranald since 2010. Sessions have been held in Balranald on:

- 31 October 2012;
- 11 and 12 October 2013; and
- 10 and 11 October 2014.

The provision of information has increased each year, reflecting the rate of project and approvals development and the community's understanding of the Balranald Project. The format of the most-recent (2014) event aimed to provide information on the Balranald Project to a broad range of the community, including the regional community which is attracted to the festival.

The information sessions were advertised in the local newspaper and on radio with attendees able to read the project display boards and talk to representatives from Iluka about the Balranald Project. Information provided included:

- details on Iluka and its operations in the Murray Basin;
- mineral sands and how they are used;
- the Balranald Project and the approvals required for the project to commence; and

- methods for obtaining more information about the Balranald Project.

Copies of the information displays provided at the community information sessions on 10 and 11 October 2014 are provided in Appendix B of the social assessment in Appendix O and remain available to the community through Iluka.

ii Community newsletters and fact sheets

As part of Iluka's community engagement and project consultation activities, newsletters have been periodically distributed within the Balranald locality. The most recent newsletters were distributed in November 2013 and October 2014, with further newsletters proposed generally on a quarterly basis starting with the EIS public display period. Newsletters are posted to all households within the Balranald local region via Australia Post and are made available at community information sessions and in Iluka's Balranald operations office.

These newsletters provide information relating to Iluka's field activities, community consultation and general project updates. The newsletters also advertise opportunities for community members to engage with Iluka representatives and discuss the Balranald Project.

Copies of the community newsletters are provided in Appendix C of the social assessment in Appendix O.

Balranald Project fact sheets have been developed to ensure information provided at the October 2014 community information sessions are available to those that were unable to attend. Replicating the display board information, these fact sheets are available at Iluka's Balranald operations office.

iii Town accommodation facility consultation activities

As outlined in Section 1.2, Iluka has identified that establishing an accommodation facility within Balranald town may provide increased benefits for its workforce (through access to recreational and other services), as well as promoting a higher level of integration with and utilisation of services (ie retail, hospitality, health sectors) provided by the Balranald community.

On this basis, Iluka implemented a consultation strategy targeted at those residents adjacent to the site being investigated for the accommodation facility in Balranald town. Residents of Mungo Street (eight properties in total), occupiers of one property on River Street and one on Balranald-Ivanhoe Road were identified as being immediately proximate to the proposed development.

Iluka conducted three door-knock campaigns, each with individual objectives, being:

- January 2014 – introduce the possibility of an accommodation facility being located on the adjacent site and solicit feedback on potential design concepts;
- April/May 2014 – present four site layout options for review and discussion, demonstrating inclusion of those design concepts suggested by residents in January 2014; and
- March 2015 – provide an update on ongoing design and engineering works for the Balranald town accommodation facility, ensure an understanding of Iluka's dual accommodation facility proposals (ie mine site and town) and forecast further engagement on final design considerations in 2015.

Iluka will continue to seek approval for the development of the accommodation facility in Balranald town concurrent to the approval being sought as part of the EIS for the accommodation facility to be located within the project area.

iv Other engagement activities

Iluka has incorporated a number of other activities into its overall consultation strategy. The following briefly summarises those activities:

- Emergency response providers site visit - as part of the 2014 field activities, Iluka hosted representatives of all Balranald emergency response providers to increase their awareness of the Balranald Project and discuss potential capability requirements in the event of full project development. Representatives of NSW Police, NSW Fire and Rescue, Rural Fire Service, Volunteer Rescue Association, Ambulance NSW and Balranald Shire Council attended.
- Landholder and local government mine tour – Iluka invited project area landholders and BSC representatives to attend a tour of Iluka’s WRP mine in Victoria. The tour was held on 11 March 2015 and was attended by numerous landholders and two representatives of BSC, in addition to representatives of the HLG and Balranald Inc. The key objective of this activity was to provide attendees a greater understanding of the operations and management of a mineral sands mine and discuss aspects of the Balranald (scale, operational capacity, groundwater dewatering and injection system) within the context of an existing, visible operation.
- Community relations officer - Iluka has provided a dedicated community relations resource to provide a one-stop interface with the Balranald community and other stakeholders. The community relations advisor is generally in the community on a fortnightly basis and responds to enquires for project information, requests for meetings and discussions with landholders, local businesses and the community.
- Local business engagement - Iluka has welcomed interest from local businesses and service providers about opportunities to support Iluka’s development and maintains a register of all enquiries. Periodic, informal discussions with local business representation agency Balranald Inc also occur.
- Iluka website - Iluka maintains general project information on its website (www.iluka.com), as well as advice on how to make contact with the company to discuss the Balranald Project further.
- Media engagement - Iluka provides local media outlets with copies of any material it distributes within the community, such as periodic newsletters.

For results and outcomes of all community consultation activities completed to date, refer to Table 7.3.

Table 7.3 Community consultation activities and outcomes

Stakeholder	Date	Consultation details	Key issues discussed	Relevant to project design?	Applied changes
Mungo St, River St, Balranald-Ivanhoe Rd residents	January 2014	Door-knocking campaign to introduce town accommodation facility proposal and seek design ideas	Hesitation in the location of a Town accommodation facility adjacent their property.	No	-
			Concern on behavioural aspects of facility residents, particularly alcohol consumption and noise.	No	-
			Preference to locate car parking and common areas further away from existing residential areas to minimise potential noise.	Yes	Balranald town accommodation facility design parameters
			Locate accommodation closer to residents, in preference to car parking and common areas.	Yes	Balranald town accommodation facility design parameters
			Fencing and landscaping are important for aesthetic and security purposes.	Yes	Balranald town accommodation facility design parameters
			Access and egress should be located away from residences.	Yes	Balranald town accommodation facility design parameters
			Incorporation of a buffer zone (setback, landscaping) into the facility design is desirable.	Yes	Balranald town accommodation facility design parameters
	April/May 2014	Door knocking campaign to present site layout options and seek feedback	Questioning of the site selection process.	No	-
			Reinforced initial comments on-site layout (car parking and recreational areas further away from existing residences, accommodation units closer).	Yes	Balranald town accommodation facility design parameters
	March 2015	Door knocking campaign to update residents on progress	General consensus on a site layout option preference for temporary accommodation closer to residential areas to provide longer-term buffer zones and to minimise Iluka accommodation units fronting towards existing houses.	Yes	Balranald town accommodation facility design parameters
Acknowledge Iluka’s ongoing concept development and site planning activities for town accommodation facility and establish upcoming consultation activities ensure understanding of dual accommodation facility proposals (ie mine site and town) and forecast further engagement on final design considerations in 2015.			No	-	

Table 7.3 Community consultation activities and outcomes

Stakeholder	Date	Consultation details	Key issues discussed	Relevant to project design?	Applied changes
Attendees at the 2014 community information sessions	10 October 2014	Community information stall at the Balranald community centre on Market Street, Balranald	A stall was held at the Balranald community centre. Information provided included details on Iluka and its operations in the Murray Basin, mineral sands and how they are used, the Balranald Project and the approvals required for the project to commence, and methods for obtaining more information about the project. The stall was advertised in local media and was open for people to drop in throughout the day. Iluka personnel were available to answer questions about the Balranald Project.	No	-
	11 October 2014	Community information stall at the Balranald 5 Rivers Outback Festival	A stall was held at the Balranald 5 Rivers Outback Festival. Information provided included details on Iluka and its operations in the Murray Basin, mineral sands and how they are used, the Balranald Project and the approvals required for the project to commence, and methods for obtaining more information about the project. The stall was advertised in local media and was open for people to drop in throughout the day. Iluka personnel were available to answer questions about the Balranald Project.	No	-
Emergency response providers site visit attendees	11 September 2014	Introduce all providers to field trials and future project development; discuss capabilities	Some capabilities are limited within Balranald, particularly on Hazmat response or rescue squad equipment capabilities and capacities.	No	-
Balranald business owners		Discussion on general procurement processes	Outlined procurement processes and timeframes for potential development.	No	-
Balranald business owners Lessee		Discussion on the development of the Town accommodation facility option	Discussed potential temporary use of one business premises for overflow car parking; business operator indicated a workable position.	Yes	Balranald town accommodation facility design parameters

7.8 Project design considerations

In completing its detailed consultation activities, Iluka has engaged with a broad range of the Balranald community, landholders, service providers, businesses, indigenous groups and representatives of local, State and Commonwealth government agencies and offices. Iluka has endeavoured to provide information on the development and relevant potential impacts of the Balranald Project to these stakeholders.

Subsequently, at multiple stages throughout the consultation process, Iluka has engaged with relevant stakeholders on various aspects of the Balranald Project and has provided ongoing opportunities to the broader community to provide general feedback on the development of the Balranald Project.

As outlined in Sections 7.6 to 7.8, Iluka has recorded information on key issues discussed with stakeholders (particularly through the DFS consultation phase) and has identified issues that subsequently informed project design principles, concepts, scope or outcomes. Key stakeholder issues raised that are relevant to project design are listed below:

- Project accommodation facility options – feedback regarding the location of the accommodation facility was sought from a number of local stakeholders and BSC. As a result, and taking into consideration the feedback received, Iluka undertook a detailed analysis of a number of options for locating the accommodation facility in or adjacent to Balranald town and of sites closer to the project area. There was a strong desire from many within the community and BSC to locate the accommodation facility within Balranald town to maximise integration and potential service utilisation. However, those residents adjacent to the preferred Balranald town accommodation facility site demonstrated some specific concerns relating to the proposed development.

Although not relevant to this EIS, Iluka has undertaken detailed consultation with residents adjacent to the preferred Balranald town accommodation facility site to establish preliminary site design objectives. Such advice has included:

- optimised layout preferences for on-site positioning of car parking, communal/recreational areas and accommodation zones;
- the provision of buffer zones, fencing and landscaping;
- designated access/egress locations; and
- accommodation unit alignment.

As outlined in Section 1.2, Iluka is progressing with two accommodation facility applications – one adjacent to the West Balranald mine (included in the EIS) and the Balranald town option (to be included in a separate DA). This process will allow Iluka to develop the optimum accommodation facility site following consideration of each option.

- Fresh water supply during construction and operation of the Balranald Project – consultation with stakeholders identified a preference against the use and treatment (ie desalinisation) of groundwater abstracted from the Olney Formation (Lower Renmark Group) as the principal fresh water supply for the Balranald Project. This is due to the level of existing beneficial use (as a stock and domestic supply) and its status as a water supply of ‘last-resort’ during droughts. Even if potential Iluka use was not deleterious to the aquifer, it was seen by some stakeholders as a resource that should only be utilised for agricultural productivity Iluka considered various factors (including stakeholder concerns) and determined that a secure, tenable, economic and low risk/impact water supply for mine development could be obtained (subject to licensing) from the Murrumbidgee River. However, groundwater is still proposed to be abstracted from the Olney Formation at reduced volumes (150 ML/yr) during the construction phase.

Additionally, prior to commencing the proposed scoping of pipeline routes for fresh water supply from the Murrumbidgee River, Iluka sought input from adjacent landholders on land access, existing pipeline routes and infrastructure.

- Injection borefield – landholders identified a topographic low in an early concept for the injection borefield. Concern for how groundwater reinjection may impact through surface expression in naturally low-lying areas was raised. Through Iluka’s groundwater assessments, it was determined that an injection borefield in this area was not suitable, reflecting the concerns of the landholders.
- Transmission line – although not within the scope of this EIS, feedback was received from a landholder in regards to the potential productivity and logistics challenges that may be imposed when a power line is placed through small, high intensity irrigation plots. Additionally, a further landholder identified potentially productivity losses as a result of power line infrastructure placement. In this regard, Iluka will continue to consider the potential impacts of the transmission line alignment as it defines a preferred route and construction methods.
- Transport routes and methods for product haulage – consultation was completed with both NSW and Victorian transport regulators, as well as BSC, to inform the preferred transport route from the project area to destinations in Victoria and proposed mitigation measures to accommodate design traffic. This influenced the transport assessment and a range of other technical studies prepared in support of the Balranald Project.
- Hydrogeological modelling approach - consultation with NOW regarding the approach to the hydrogeological modelling for the project and use of the model in predicting the hydrogeological impact associated with the project. The consultation confirmed the approach and suitability of model for impact assessment purposes.
- Assessment of acid generation associated with materials handling – extensive consultation was undertaken with key NSW government agencies including EPA and NOW regarding the assessment approach and sampling and test work to characterise acid-generating overburden materials. This verified the approach taken by Iluka and provided suitable outcomes for management of overburden characterised as potentially acid forming.

7.9 Ongoing stakeholder engagement

Stakeholder engagement undertaken by Iluka on the Balranald Project has been comprehensive and reflects the requirements of the SEARs. Iluka will continue to work closely with councils, particularly BSC, State and Commonwealth agencies, directly and indirectly affected landholders, service providers, and the Balranald community to help inform the Balranald Project's final design and management and ensure the project meets the reasonable expectations of stakeholders.

Iluka will seek to undertake further consultation activities to complement the approvals process.