

Lake Goorly Contracting

MINE CLOSURE PLAN FOR THE LAKE GOORLY GYPSUM OPERATION, FEBRUARY 2022 VERSION 4 REVISION 0



View of natural lakebed LHS versus rehabilitation earthworks RHS

Project Details	
<i>DMIRS Project Name:</i>	<i>J00805 Lake Goorly Gypsum / Bywaters</i>
<i>Environmental Group Site:</i>	<i>S0022435 Lake Goorly Group</i>
<i>Project Name:</i>	<i>Lake Goorly Gypsum Operation</i>
<i>Version Number:</i>	<i>Version 4 Revision 0</i>
<i>Date:</i>	<i>28/02/2022</i>
<i>Tenements:</i>	<i>M70/1079, M70/1114, M70/1115, M70/1118, M70/1191, M70/1255, M70/1256, M70/1257, M70/1258, M70/1259, M70/1272, G70/200, L70/72, L70/84 and L70/141</i>
<i>Document Name:</i>	<i>Mine Closure Plan Lake Goorly Gypsum Operation February 2022 Version 4 Revision 0.docx</i>
<i>Tenement Holders:</i>	<i>Craig Bywaters and Phillip Bywaters</i>
<i>Site Operator:</i>	<i>Lake Goorly Contracting</i>
<i>Authorised company person:</i>	<i>Craig Bywaters - Mobile: 0427 988 650 / Work: 08 9667 1030 / Email: lakegoorly@gmail.com</i>
<i>Address:</i>	<i>Lake Goorly Contracting PO Box 2 Kalannie WA 6468</i>
<i>Technical Details:</i>	<i>Charles Newland – Mobile: 0408 099 891 Email: charles@newlandenviro.com.au</i>

Lake Goorly Contracting

Lake Goorly Contracting
PO Box 2
Kalannie WA 6468

Document Control

<i>Project Title:</i>	<i>Mine Closure Plan for the Lake Goorly Gypsum Operation, February 2022, Version 4 Revision 0</i>		
<i>Project Name:</i>	<i>Lake Goorly Gypsum Operation</i>		
<i>File Name:</i>	<i>Mine Closure Plan Lake Goorly Gypsum Operation February 2022 Version 4 Revision 0.docx</i>		
<i>Tenements:</i>	<i>M70/1079, M70/1114, M70/1115, M70/1118, M70/1191, M70/1255, M70/1256, M70/1257, M70/1258, M70/1259, M70/1272, G70/200, L70/72, L70/84 and L70/141</i>		
<i>Tenement Holders:</i>	<i>Craig Bywaters and Phillip Bywaters</i>		
<i>Prepared By:</i>	<i>Charles Newland / Craig Bywaters</i>		
<i>Company Contact:</i>	<i>Craig Bywaters - Mobile: 0427 988 650 / Work: 08 9667 1030 / Email: lakegoorly@gmail.com</i>		
<i>MCP Contact:</i>	<i>Charles Newland – Mobile 0408 099 891 Email: charles@newlandenviro.com.au</i>		
<i>Address:</i>	<i>Lake Goorly Contracting PO Box 2 Kalannie WA 6468</i>		
<i>Version:</i>	<i>Version 4 Revision 0</i>		
<i>Version Date:</i>	<i>28/02/2022</i>		
<i>Reviewed By:</i>	<i>C Bywaters</i>	<i>Date:</i>	
<i>Approved By:</i>	<i>C Bywaters</i>	<i>Date:</i>	
<i>Distribution:</i>	<i>Electronically to DMIRS 28/02/2022</i>		

© 2022 Lake Goorly Contracting. This report may not be reproduced in part or whole by electronic, mechanical or other means, including photocopying, recording or any information storage system, without the express approval of **Lake Goorly Contracting**.

Permission is hereby given to the Department of Mines, Industry Regulation and Safety to utilise this report as required for their mine closure assessment process.

MINE CLOSURE PLAN CHECKLIST

Q No	Mine Closure Plan (MCP) checklist	Y/N/NA	Page No.	Comments	Changes from previous version (Y/N)	Page No.	Summary
1	Has the Checklist been endorsed by a senior representative within the tenement holder/operating company? (See bottom of checklist.)	Y	viii				
Public Availability							
2	Are you aware that all approved MCPs will be made publicly available?	Y					
3	Is there any information in this MCP that should not be publicly available?	N					
4	If "Yes" to Q3, has confidential information been submitted in a separate document/section?	NA					
Cover Page, Table of Contents							
5	Does the MCP cover page include: <ul style="list-style-type: none"> • Project title • Company name • Contact details (including telephone numbers and email addresses) • Document ID and version number • Date of submission (needs to match the date of this checklist) 	Y					
Scope and Purpose							

Q No	Mine Closure Plan (MCP) checklist	Y/N/NA	Page No.	Comments	Changes from previous version (Y/N)	Page No.	Summary
6	State why the MCP is submitted (e.g. as part of a mining proposal, a reviewed MCP or to fulfil other legal requirements)	NA					MCP update
Project Overview							
7	<p>Does the project summary include:</p> <ul style="list-style-type: none"> • Land ownership details (include any land management agency responsible for the land / reserve and the purpose for which the land / reserve [including surrounding land] is being managed). • Location of the project. • Comprehensive site plan(s). • Background information on the history and status of the project. 	Y	1-43				
Legal Obligations and Commitments							
8	Does the MCP include a consolidated summary or register of closure obligations and commitments?	Y	116-120				
Stakeholder Engagement							
9	Have all stakeholders involved in closure been identified?	y	47-50				
10	Does the MCP include a summary or register of historic stakeholder engagement with details on who	Y	49-50				

Q No	Mine Closure Plan (MCP) checklist	Y/N/NA	Page No.	Comments	Changes from previous version (Y/N)	Page No.	Summary
	has been consulted and the outcomes?						
11	Does the MCP include a stakeholder consultation strategy to be implemented in the future?	Y	47-50				
Post-mining land use(s) and Closure outcomes							
12	Does the MCP include agreed post-mining land use(s), closure outcomes and conceptual landform design diagram?	Y	50-51				
13	Does the MCP identify all potential (or pre-existing) environmental legacies, which may restrict the post mining land use (including contaminated sites)?	Y	115				
14	Has any soil or groundwater contamination that occurred, or is suspected to have occurred, during the operation of the mine, been reported to DWER as required under the <i>Contaminated Sites Act 2003</i> ?	N	115				
Development of Completion Criteria							
15	Does the MCP include an appropriate set of specific completion criteria and closure performance indicators?	Y	116-119				
Collection and Analysis of Closure Data							
16	Does the MCP include baseline data (including pre-mining studies and environmental data)?	Y	51-98				
17	Has materials characterisation been carried out	Y	115				

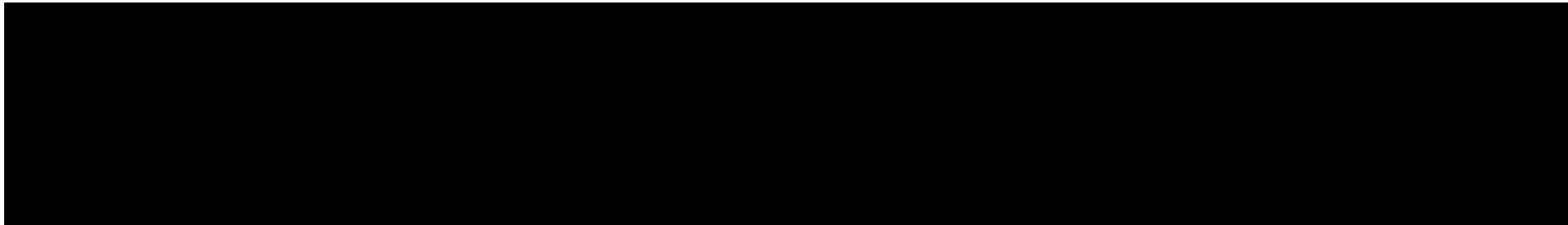
Q No	Mine Closure Plan (MCP) checklist	Y/N/NA	Page No.	Comments	Changes from previous version (Y/N)	Page No.	Summary
	consistent with applicable standards and guidelines (e.g. GARD Guide)?						
18	Does the MCP identify applicable closure learnings from benchmarking against other comparable mine sites?	N					No applicable to a small gypsum operation.
19	Does the MCP identify all key issues impacting mine closure outcomes and outcomes (including potential contamination impacts)?	Y	116-120				
20	Does the MCP include information relevant to mine closure for each domain or feature?	Y	121-124				
Identification and Management of Closure Issues							
21	Does the MCP include a gap analysis/risk assessment to determine if further information is required in relation to closure of each domain or feature?	Y	98				
22	Does the MCP include the process, methodology, and has the rationale been provided to justify identification and management of the issues?	Y	107-103				
Closure Implementation							
23	Does the MCP include a summary of closure implementation strategies and activities for the proposed operations or for the whole site?	Y	121-124				
24	Does the MCP include a closure work program for each domain or feature?	Y	121-124				

Q No	Mine Closure Plan (MCP) checklist	Y/N/NA	Page No.	Comments	Changes from previous version (Y/N)	Page No.	Summary
25	Does the MCP contain site layout plans to clearly show each type of disturbance as defined in Schedule 1 of the MRF Regulations?	Y	40-41				
26	Does the MCP contain a schedule of research and trial activities?	NA					No applicable to a small gypsum operation.
27	Does the MCP contain a schedule of progressive rehabilitation activities?	Y	121-124				
28	Does the MCP include details of how unexpected closure and care and maintenance will be handled?	Y	124				
29	Does the MCP contain a schedule of decommissioning activities?	Y	121-124				
30	Does the MCP contain a schedule of closure performance monitoring and maintenance activities?	Y	125-126				
Closure Monitoring and Maintenance							
31	Does the MCP contain a framework, including methodology, quality control and remedial strategy for closure performance monitoring including post-closure monitoring and maintenance?	Y	125-126				
Financial Provisioning for Closure							
32	Does the MCP include costing methodology, assumptions and financial provision to resource closure implementation and monitoring?	Y	127-129				

Q No	Mine Closure Plan (MCP) checklist	Y/N/NA	Page No.	Comments	Changes from previous version (Y/N)	Page No.	Summary
33	Does the MCP include a process for regular review of the financial provision?	Y	127				
Management of Information and Data							
34	Does the MCP contain a description of management strategies including systems and processes for the retention of mine records?	Y	130				

Corporate Endorsement:

I hereby certify that to the best of my knowledge, the information within this mine closure plan and checklist is true and correct and addresses all the requirements of the Guidelines for Mine Closure Plans approved by the Director General of the Department of Mines, Industry Regulation and Safety.



(NB: The corporate endorsement must be given by tenement holder(s) or a senior representative authorised by the tenement holder(s), such as a Registered Manager or Company Director)

CONTENTS

1	PROJECT SUMMARY	1
1.1	LAND TENURE	27
1.2	AREAS OF DISTURBANCE	30
1.3	MINING OPERATIONS	34
1.4	MINE CLOSURE DOMAINS	36
1.5	PROGRESSIVE REHABILITATION	36
1.6	NATIVE VEGETATION CLEARING PERMIT	37
1.7	SECTION 18 CONSENT	38
2	IDENTIFICATION OF CLOSURE OBLIGATIONS AND COMMITMENTS	44
2.1	MINING PROPOSALS AND NOTICES OF INTENT	44
2.2	TENEMENT CONDITIONS	45
2.3	CLEARING PERMIT CONDITIONS	45
2.4	SECTION 18 CONSENTS UNDER THE <i>ABORIGINAL HERITAGE ACT 1972</i>	45
2.5	SAFETY REQUIREMENTS FOR ABANDONMENT	45
2.6	WORKS APPROVAL AND LICENCE TO OPERATE	45
3	STAKEHOLDER ENGAGEMENT	47
4	BASELINE CLOSURE DATA AND ANALYSIS	51
4.1	BIOGEOGRAPHICAL INFORMATION	51
4.1.1	<i>Climate</i>	51
4.1.2	<i>Regional Setting</i>	53
4.1.3	<i>Local Topography</i>	53
4.1.4	<i>State Level Vegetation Associations</i>	54
4.1.5	<i>Hydrology</i>	58
4.1.6	<i>Surface Geology</i>	60
4.1.7	<i>Waste Rock and Tailings</i>	60
4.1.8	<i>Soils and Topsoil Management</i>	60
4.1.9	<i>Acid Mine Drainage and Acid Sulfate Soils</i>	61
4.1.10	<i>Flora and Vegetation</i>	62
4.1.11	<i>Environment Protection and Biodiversity Conservation Act 1999</i>	67
4.1.12	<i>Conservation Areas</i>	75
4.1.13	<i>Threatened Ecological Communities and Priority Ecological Communities</i>	76
4.1.14	<i>Fauna Assessment</i>	82
4.1.15	<i>Social Environment</i>	98
4.2	OTHER CLOSURE RELATED DATA	98
4.3	DATA ANALYSIS AND IMPLICATIONS FOR MINE CLOSURE	98
5	POST-MINING LAND USES	99
5.1	POST-MINING LAND USES	99
5.2	CLOSURE OBJECTIVES	99

5.2.1 Stable..... 100

5.2.2 Erosion Resistant..... 100

5.2.3 Non-polluting..... 100

5.2.4 Consistent with Local Landscape Aesthetics 101

5.2.5 Revegetated with a Functioning Native Vegetation Ecosystem 101

5.2.6 Safe..... 101

6 CLOSURE RISK ASSESSMENT 103

6.1 IDENTIFICATION OF CLOSURE RISKS..... 103

6.2 RISK MANAGEMENT PROCESS 103

6.3 RISK ASSESSMENTS WHERE MCP PLAN IS INCLUDED IN A MINING PROPOSAL 114

6.4 RISK ASSESSMENT INFORMATION 114

6.5 FURTHER GUIDANCE MATERIAL 114

6.6 SITE SPECIFIC ASSESSMENT 115

6.7 MATERIALS CHARACTERISATION 115

6.8 CONTAMINATED SITES 115

7 CLOSURE OUTCOMES AND COMPLETION CRITERIA 116

7.1 CLOSURE OUTCOMES 116

7.2 COMPLETION CRITERIA 116

7.3 REHABILITATION REVEGETATION ENDPOINTS 116

8 CLOSURE IMPLEMENTATION 121

8.1 CLOSURE TASK REGISTER 121

8.2 RESEARCH, INVESTIGATION AND TRIALS..... 124

8.3 PROGRESSIVE REHABILITATION 124

8.4 EARLY CLOSURE - PERMANENT CLOSURE OR SUSPENDED OPERATIONS UNDER CARE AND MAINTENANCE..... 124

8.5 DECOMMISSIONING 124

9 CLOSURE MONITORING AND MAINTENANCE 125

9.1 REHABILITATION MONITORING 125

9.2 GENERAL SITE ASSESSMENT..... 126

10 FINANCIAL PROVISION FOR CLOSURE 127

11 MANAGEMENT OF INFORMATION AND DATA 130

12 REFERENCES 131

13 APPENDICES 137

TABLES

Table 1: Comments from DMIRS from the 2017 MCP and the response from LGC.....	23
Table 2: Mining tenement and land tenure information for the LGC Tenements	28
Table 3: Areas of disturbance for the Operation	31
Table 4: Areas of disturbances in relation to mining approval	37
Table 5: Stakeholder engagement register	49
Table 6: Climatic information for Dalwallinu BOM 8297	52
Table 7: Information on the Statewide vegetation associations occurring within the LGC Tenements.....	54
Table 8: Water quality recorded in Lake Goorly by DEC (Table 2 from DEC 2008a).....	59
Table 9: Conservation taxa listed by NatureMap and likelihood of occurrence in the Project area	68
Table 10: Threatened Flora taxa listed under the <i>EPBC Act 1999</i> and likelihood of occurrence in the Project area	70
Table 11: Information on the areas of lunette dunes in Western Australia and their extent within the Wheatbelt	78
Table 12: Aquatic invertebrate species identified from Lake Goorly in 1991 and 2008 (taken from Table 7 in DEC 2008a)	82
Table 13: Waterbirds recorded at Lake Goorly by DEC (2008a)	84
Table 14: Assessment of conservation significant fauna that could potentially occur at Lake Goorly the potential impact from mining operations	87
Table 15: Definitions of risk from AS/NZS ISO 31000:2009	104
Table 16: Likelihood definitions.....	105
Table 17: Consequence definitions.....	105
Table 18: Risk rating matrix	106
Table 19: Risk assessment table for mine closure	107
Table 20: Completion criteria for the MCP domains.....	118
Table 21: Estimated costs for mine closure	127

FIGURES

Figure 1: Regional location of the Lake Goorly mining tenements	2
Figure 2: Locality map for the Lake Goorly mining tenements	3
Figure 3: Land tenure at the Lake Goorly Gypsum Operation	39
Figure 4: Location of mining activities at the Lake Goorly Gypsum Operation.....	40
Figure 5: Location of rehabilitation areas at the Lake Goorly Gypsum Operation.....	41
Figure 6: Location of clearing permit CPS 5955/3 at the Lake Goorly Gypsum Operation ..	42
Figure 7: Location of Mongers Lake Waterway Site 24380 in relation to the Lake Goorly mining tenements	43
Figure 8: Mean monthly rainfall and temperature data for Dalwallinu BOM Station 8297	51
Figure 9: Contour map for the Lake Goorly Gypsum Operation	56
Figure 10: Statewide vegetation associations at the Lake Goorly Gypsum Operation.....	57
Figure 11: Vegetation communities for the Lake Margin (from Fordyce 2011)	72
Figure 12: Vegetation Associations for M70/1312 (from Newland Environmental 2013)	73
Figure 13: Location of Priority Flora at the Lake Goorly Gypsum Operation.....	74
Figure 14: Location of Threatened and Priority Ecological Communities in relation to the Lake Goorly Gypsum Operation.....	79
Figure 15: Location GSWA mapped gypsum dune lunettes.....	80
Figure 16: The “ <i>Lunette dunes 72955</i> ” shapefile loaded into Google Earth Pro (Lake Goorly locality)	81

PLATES

Plate 1: Typical vegetated lakebed surface with simple samphire communities	4
Plate 2: Typical barren lakebed surface with no vegetation (subject to ponding)	4
Plate 3: Typical gypsum dune fringing the lakebed with low open shrublands	5
Plate 4: Entrance to the Lake Goorly Gypsum Operation on L70/72.....	5
Plate 5: Entry signage on L70/72.....	6
Plate 6: Access road on L70/72, looking towards the stockpiling area on M70/1118.....	6
Plate 7: Stockpiling area on M70/1118	7
Plate 8: Load-out at the stockpiling area on M70/1118	7
Plate 9: Gypsum product for agricultural use	8
Plate 10: Gypsum product for cement manufacture	8
Plate 11: Site office and ablution block on M70/1255.....	9
Plate 12: Mining operations at M70/1191.....	9

Plate 13: Mining area on M70/1118 showing resource depth.....	10
Plate 14: Strip mining sequence showing of quarry excavation (RHS), gypsum windrow (middle) and topsoil material as outer windrow (LHS)	10
Plate 15: Rehabilitation photo taken 11/06/2015 at M70/1191	11
Plate 16: Ground surface immediately after rehabilitation earthworks at M70/1191	11
Plate 17: Monitoring Site 5 in 2015 (immediately after rehabilitation earthworks).....	12
Plate 18: Monitoring Site 5 in 2021 (six years after rehabilitation earthworks).....	12
Plate 19: Monitoring Site 7 in 2015 (immediately after rehabilitation earthworks).....	13
Plate 20: Monitoring Site 7 in 2021 (six years after rehabilitation earthworks).....	13
Plate 21: Monitoring Site 5 Control (analogue) in 2021 (refer to Plate 18)	14
Plate 22: Monitoring Site 7 Control (analogue) in 2021 (refer to Plate 20)	14
Plate 23: Monitoring Site 1 in 2021 (12 years after rehabilitation)	15
Plate 24: Monitoring Site 1 Control (analogue) in 2021	15
Plate 25: Monitoring Site 2 in 2021 (17 years after rehabilitation)	16
Plate 26: Monitoring Site 2 Control (analogue) in 2021	16
Plate 27: Monitoring Site 3 in 2021 (six years after rehabilitation earthworks).....	17
Plate 28: Monitoring Site 3 Control (analogue) in 2021	17
Plate 29: View of Monitoring Site 3 LHS after rehabilitation earthworks in 2015 and natural lakebed RHS	18
Plate 30: Panoramas showing integration of rehabilitated landform RHS into the natural lakebed surface LHS.....	19
Plate 31: Rehabilitated area at the dune mining area on M70/1079 in 2021	20
Plate 32: Close-up of regrowth from the above area (rehabilitation 2 years old)	20
Plate 33: Rehabilitated area at the dune mining area on M70/1079 in 2017	21
Plate 34: Same area as Plate 33 with photo taken in 2021	21
Plate 35: Typical dune vegetation in M70/1079 middle and RHS, excavation on LHS	22
Plate 36: Typical view of the Lake Floor Sapphire Community (from Fordyce 2011).....	65
Plate 37: She oak (<i>Casuarina obesa</i>) open woodland (from Fordyce 2011)	65
Plate 38: Shrubland/woodland and occasional thicket of mixed <i>Acacias</i> and <i>Eremophilas</i> (from Fordyce 2011)	66
Plate 39: <i>Acacia inceana</i> subsp. <i>latifolia</i> (Priority 1) near M70/1079 (from Fordyce 2011) ..	66

APPENDICES

Appendix A	DMIRS approval letter for Mine Closure Plan Registration ID 69523
Appendix B	Clearing Permit CPS 5955/3
Appendix C	Section 18 Notices for the Lake Goorly Gypsum Operation
Appendix D	Obligations and Commitments Register
Appendix E	Licence to Operate for the Lake Goorly Gypsum Operation
Appendix F	Copy of correspondence to the Shire of Dalwallinu
Appendix G	NatureMap search for conservation listed flora at Lake Goorly
Appendix H	<i>EPBC Act 1999</i> Protected Matters Report for Lake Goorly
Appendix I	NatureMap search for conservation listed fauna at Lake Goorly
Appendix J	Typical analysis of the gypsum material

ABBREVIATIONS

AER	Annual Environmental Report
AMD	Acid mine drainage
APARP	As Low as Reasonably Practicable
ASS	Acid sulfate soils
<i>BC Act 2016</i>	<i>Biodiversity Conservation Act 2016</i>
BOM	Bureau of Meteorology
CAR	Comprehensive, Adequate and Representative
CPS 5955/3	Clearing Permit CPS 5955/3
DAWE	Department of the Agriculture, Water and the Environment
DBCA	Department of Biodiversity, Conservation and Attractions
DEC	Department of Environment and Conservation (now DBCA)
DEC (2008a)	Resource Condition Report for a Significant Western Australian Wetland: Lake Goorly
DMIRS	Department of Mines, Industry Regulation and Safety
DPAW	Department of Parks and Wildlife (now DBCA)
DPIRD	Department of Primary Industry and Regional Development

DPLH	Department of Planning, Lands and Heritage
DWER	Department of Water and Environmental Regulation
EPA	Environmental Protection Authority
<i>EPBC Act 1999</i>	<i>Environmental Protection and Biodiversity Conservation Act 1999</i>
ESA	Environmentally Sensitive Area
LGC	Lake Goorly Contracting
GSWA	Geological Survey of Western Australia
IBRA	Interim Biogeographic Regionalisation of Australia
ISO	International Organisation for Standardization
IUCN	International Union of Conservation
JORC	Joint Ore Reserves Committee
LGC	Lake Goorly Contracting
LGC Tenements	M70/1079, M70/1114, M70/1115, M70/1118, M70/1191, M70/1255, M70/1256, M70/1257, M70/1258, M70/1259, M70/1272, M70/1312, G70/200, L70/72, L70/84 and L70/141
MCP	Mine Closure Plan
MP	Mining Proposal
Mongers Lake Waterway	Mongers Lake Waterway Registered Site ID 24380
Newland Environmental	Newland Environmental Pty Ltd
MP 47944	Mining Proposal Registered ID 47944
MRF	Mining Rehabilitation Fund
NVCP	Native Vegetation Clearing Permit
PDWSA	Public Drinking Water Source Area
PEC	Priority Ecological Community
TEC	Threatened Ecological Community
the Operation	Lake Goorly Gypsum Operation
the Bywaters	Craig Bywaters and Phil Bywaters
Section 18	Section 18(3) Ministerial consent issued under the <i>Aboriginal Heritage Act 1972</i>
S18 Consent 34-13313	Section 18 Consent Ministerial Reference No: 34-13313
S18 Consent 69-13337	Section 18 Consent Ministerial Reference No: 69-13337
UCL	Unallocated crown land
Units	
AHD	Australian Height Datum
m	metres
m ³	cubic metres

km	kilometres
t	tonnes
t/m ³	tonnes per cubic metres
tpa	tonnes per annum
LHS	Left hand side
RHS	Right hand side
RL	Relative level

1 PROJECT SUMMARY

Lake Goorly Contracting ('LGC') has been mining gypsum at Lake Goorly since 2003. The Lake Goorly Gypsum Operation ('the Operation') is located in the northern wheatbelt on Lake Goorly, approximately 245km northeast from Perth and 31km east-northeast from Wubin. The regional location of the Operation is displayed in Figure 1. Site photographs of the Operation and Lake Goorly area are provided in Plates 1 to 35.

Lake Goorly is a large salt lake that is dry for extended periods and then partially inundates on a very occasional basis. The Lake Goorly environment consists of a flat lakebed with simple samphire open shrubland communities (Plate 1) or barren ponded areas devoid of vegetation (Plate 2). The edge of the lakebed is fringed with low gypsum dunes containing open shrublands and woodlands (Plate 3). Both the lakebed and fringing dunes contain mineable gypsum resources.

LGC is owned and operated by Craig and Phil Bywaters (the 'Bywaters') who are also the landholders of the farmland surrounding the Operation. The Operation is conducted under the following approvals from the Department of Mines, Industry Regulation and Safety ('DMIRS'):

- Mining Proposal ('MP') ID 47944 ('MP 47944') that was approved on 04 June 2014.
- Mine Closure Plan ('MCP') ID 69523 ('MCP 69523') that was approved on 16 October 2017.
- Native Vegetation Clearing Permit ('NVCP') CPS 5955/3 ('CPS 5955/3') that was re-issued as an extension of term on 04 April 2019 (CPS 5955/1 was first issued on 27 March 2014).
- Project Management Plan PM-187-167959 that was approved 05 November 2014.

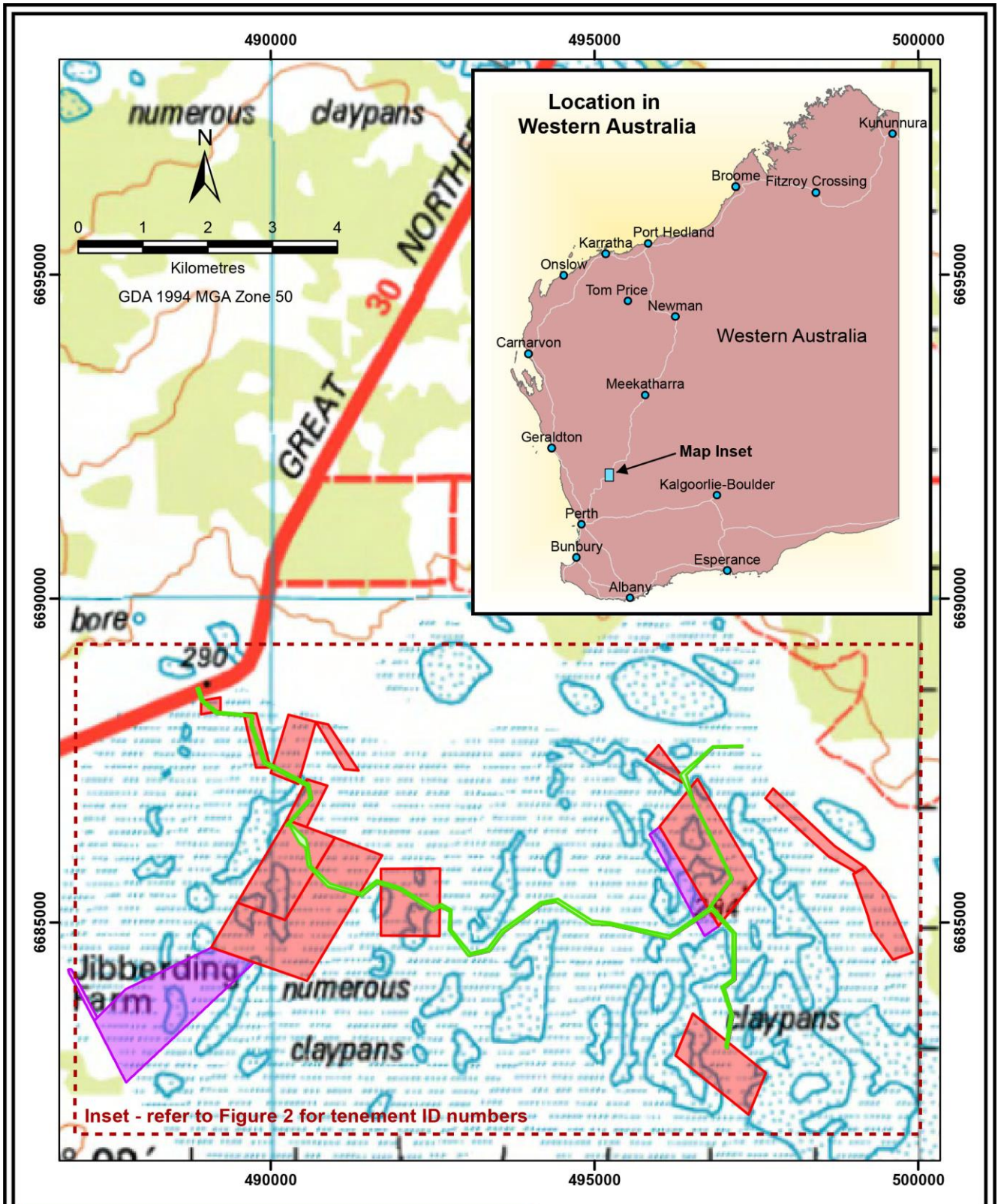
Mining initially occurred under a number of smaller mining proposals and clearing permits that were superseded by overall mining proposal MP 47944 and overall clearing permit CPS 5955/1 that were both approved in 2014. The approval for MP 47944 extends to 15 mining tenements: M70/1079, M70/1114, M70/1115, M70/1118, M70/1191, M70/1255, M70/1256, M70/1257, M70/1258, M70/1259, M70/1272, G70/200, L70/72, L70/84 and L70/141 (known as the 'LGC Tenements' in this MCP). The location of the LGC Tenements at Lake Goorly is displayed in Figure 2. The LGC Tenements form the basis of the DMIRS Environmental Group Site "S0022435 Lake Goorly Group.

Since MP 4794 was approved, another four mining tenements have been granted: M70/1312, M70/1403, M70/1404 and L70/226. No mining has occurred as yet on these new tenements. Revised mining proposals will be submitted in 2022 to include these new tenements into the approval envelope for the Lake Goorly Environmental Group Site. An amendment will also be made to incorporate these new tenements into the NVCP.

This MCP has been prepared in accordance with the 2020 guidelines '*Mine Closure Plan Guidance - How to prepare in accordance with Part 1 of the Statutory Guidelines for Mine Closure Plans*' (DMIRS 2020). This is the fourth MCP update for the Operation and is termed:

- **MCP Version 4 Revision 0.**

This MCP replaced MCP MCP 69523 from 2017. A copy of the approval letter for MCP 69523 is provided in Appendix A. In the approval letter, DMIRS provided a series of additional points that should be addressed for the next MCP submission. These points are reproduced in Table 1 and include the response and/or actions from LGC.



Lake Goorly Contracting

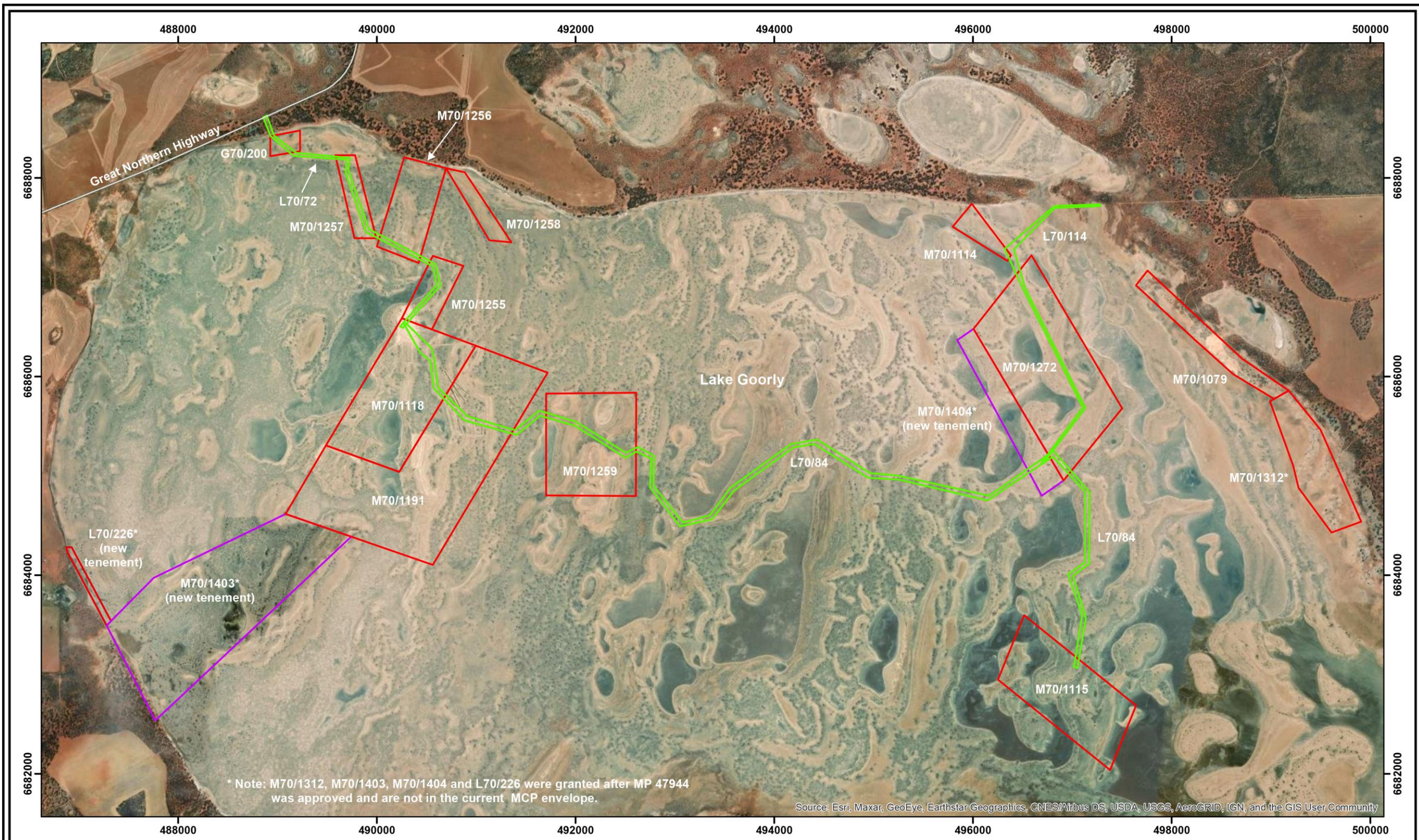
Figure 1: Regional location of the Lake Goorly mining tenements

Drawn: C Newland	Date: 08/08/2021
Authored: C Bywaters	Print Size: A4
Map Name: Figure 1 Regional Location Lake Goorly Mining Tenements	
Base Map: Base Map: Geoscience Australia Natmap Digital 2008 Edition 'zone50_mga.ecw'	

Legend

- Mining and general purpose leases
- Miscellaneous licences
- New tenements (granted 2021)

Figure 1: Regional location of the Lake Goorly mining tenements



Lake Goorly Contracting			
Figure 2: Locality map for the Lake Goorly mining tenements			
Drawn: C Newland	Authored: C Bywaters	Print Size: A3	Date: 08/08/2021
Map Name: Figure 2 Locality Map Lake Goorly Mining Tenements.mxd			
Base Map: ESRI Basemap "World Imagery" (date 12/11/2020)			

Legend

- Mining and general purpose leases
- Miscellaneous licences
- New tenements

Figure 2: Locality map for the Lake Goorly mining tenements



Plate 1: Typical vegetated lakebed surface with simple samphire communities



Plate 2: Typical barren lakebed surface with no vegetation (subject to ponding)



Plate 3: Typical gypsum dune fringing the lakebed with low open shrublands



Plate 4: Entrance to the Lake Goorly Gypsum Operation on L70/72



Plate 5: Entry signage on L70/72



Plate 6: Access road on L70/72, looking towards the stockpiling area on M70/1118



Plate 7: Stockpiling area on M70/1118



Plate 8: Load-out at the stockpiling area on M70/1118



Plate 9: Gypsum product for agricultural use



Plate 10: Gypsum product for cement manufacture



Plate 11: Site office and ablution block on M70/1255



Plate 12: Mining operations at M70/1191



Plate 13: Mining area on M70/1118 showing resource depth



Plate 14: Strip mining sequence showing of quarry excavation (RHS), gypsum windrow (middle) and topsoil material as outer windrow (LHS)



Plate 15: Rehabilitation photo taken 11/06/2015 at M70/1191



Plate 16: Ground surface immediately after rehabilitation earthworks at M70/1191



Plate 17: Monitoring Site 5 in 2015 (immediately after rehabilitation earthworks)



Plate 18: Monitoring Site 5 in 2021 (six years after rehabilitation earthworks)



Plate 19: Monitoring Site 7 in 2015 (immediately after rehabilitation earthworks)



Plate 20: Monitoring Site 7 in 2021 (six years after rehabilitation earthworks)



Plate 21: Monitoring Site 5 Control (analogue) in 2021 (refer to Plate 18)



Plate 22: Monitoring Site 7 Control (analogue) in 2021 (refer to Plate 20)



Plate 23: Monitoring Site 1 in 2021 (12 years after rehabilitation)



Plate 24: Monitoring Site 1 Control (analogue) in 2021



Plate 25: Monitoring Site 2 in 2021 (17 years after rehabilitation)



Plate 26: Monitoring Site 2 Control (analogue) in 2021



Plate 27: Monitoring Site 3 in 2021 (six years after rehabilitation earthworks)



Plate 28: Monitoring Site 3 Control (analogue) in 2021



Plate 29: View of Monitoring Site 3 LHS after rehabilitation earthworks in 2015 and natural lakebed RHS

With reference to Plates 27 to 29, some mined areas had no vegetation prior to mining and are thus rehabilitated to the original landscape of barren lakebed. It should be noted that the barren areas of lakebed are no longer mined due to poor gypsum availability.



Plate 30: Panoramas showing integration of rehabilitated landform RHS into the natural lakebed surface LHS



Plate 31: Rehabilitated area at the dune mining area on M70/1079 in 2021



Plate 32: Close-up of regrowth from the above area (rehabilitation 2 years old)



Plate 33: Rehabilitated area at the dune mining area on M70/1079 in 2017



Plate 34: Same area as Plate 33 with photo taken in 2021



Plate 35: Typical dune vegetation in M70/1079 middle and RHS, excavation on LHS

Table 1: Comments from DMIRS from the 2017 MCP and the response from LGC

No	Section of MCP	Comment from DMIRS	LGC Response	Updated Section
1	Closure Obligations & Commitments	This section did not identify and discuss all of the relevant legislation that must be considered for the project. An example is the Wildlife Conservation Act (1950) that was mentioned in section 7.1.10.	The relevant legislation has been identified, listed and discussed in Section 2. The <i>Wildlife Conservation Act 1950</i> as mentioned in the DMIRS comment (superseded by the <i>Biodiversity Conservation Act 2016</i>) was not considered as having relevance to mine closure for this particular operation.	Section 2
2	Stakeholder Engagement	The Department notes that the proposed mining areas are most likely within some areas of the Mongers Lake Waterway Aboriginal heritage sites. Information relating to the Section 18 approval contained within the mining proposal must be repeated in the MCP as it is a stand-alone document. The Department would expect this to be addressed as part of the next MCP submission.	Specific information on the Mongers Lake Waterway Aboriginal heritage site has been provided as new Section 1.7. Information on the Mongers Lake Waterway Aboriginal heritage that was provided in the previous MCP and is now consolidated into Section 1.7.	Section 1.7
3	Completion Criteria	The project aims to reinstate the natural surface water flow on the lake surface. The completion criteria should capture this objective.	Lake Goorly does not appear to have specific surface flow lines, rather lower lying ponding loci following significant rainfall. This is shown in Plates 1 and 2 with a distinctive lack of drainage line definition. This situation is mentioned in the Department of Environment and Conservation ('DEC') publication 'Resource Condition Report for a Significant Western Australian Wetland: Lake Goorly' (DEC 2008a) that states: " <i>However, in most years surface water does not flow through the system. Instead, it ponds in waterlogged depressions or poorly defined drainage lines, and eventually infiltrates to the groundwater.</i> " (DEC 2008a). As shown in Plates 15 and 30, the lakebed is restored to a flat contour similar to the original surface, thus likely to reinstate the previous surface hydrology. Closure Objective 4 in Table 20 has been updated to reflect this; " <i>The lakebed is to be restored to a flat contour similar to the</i>	Section 7, Table 20

No	Section of MCP	Comment from DMIRS	LGC Response	Updated Section
			<i>original surface, thus reinstating the previous surface hydrology (ponding)."</i>	
4	Risk Assessment Matrix	<p>It would be beneficial to present a description of the Consequence ratings (insignificant – catastrophic) and the Likelihood ratings (rare – almost certain).</p> <p>The risk assessment has grouped risk pathways that have inherently different risk ratings. There can be multiple risk pathways for environmental factors and objectives. It may be beneficial to list the different reasons (pathways) that can lead to inadequate topsoil management and a loss in viability of the seedbank.</p>	<p>The risk assessment has been updated to include definitions of “likelihood” (Table 16), “consequence” (Table 17) and the calculated scores for the “risk rating matrix” (Table 18).</p> <p>The risk assessment table for mine closure has been expanded to include descriptors for:</p> <ul style="list-style-type: none"> • Potential risk; • Description of Risk (Hazard); • Inherent Risk; • Management Measures (Mitigation); and • Residual Risk <p>Pathways (potential causatives) for each risk are also included. The revised risk assessment for mine closure is presented as Table 19.</p>	Section 6, Tables 15 to 19.
5	Closure Implementation	The post rehabilitation section should include monitoring of water flow/ponding and if surface drainage on the lake is not adequate remedial actions should be undertaken to reinstate the natural surface water flows.	Refer to the response at Comment 3. No ponding has been observed by LGC in rehabilitation areas over the past 20 years of operational site presence. Ponding is intermittent and short duration in the lower and barren areas of the lakebed that are no longer mined due to poor gypsum availability.	Section 7, Table 20.
6	Closure Monitoring & Maintenance	Trigger levels should be stated for when remedial tasks will be undertaken for soil erosion, weeds or disruptions to surface water.	From examination of previously rehabilitated areas that go back 20 years, there is no evidence of soil erosion, weeds or disruptions to surface water. If any of these issues are observed at any level they will be reported in the Annual Environmental Report (‘AER’) and next MCP, and immediate remedial action undertaken by LGC.	Section 9.
7	Closure Monitoring & Maintenance	Timeframes for monitoring and remedial tasks should be more specific.	Monitoring timeframes have been provided in Section 9. Remedial action will be decided upon on a case by case basis. Post-closure, monitoring of rehabilitation sites will continue until sign-off relinquishment by DMIRS, estimated at 5 to 10 years.	Section 9.1

No	Section of MCP	Comment from DMIRS	LGC Response	Updated Section
			At least three monitoring cycles are planned over this post-closure timeframe. To date, no remedial action has been required.	
8	Closure Monitoring & Maintenance	The methodology should be stated for the vegetation and fauna assessments that will determine if completion criteria have been attained.	The results of the statistical analysis will determine when the rehabilitation communities are similar to the control sites. A 75% community similarity is the end point objective. In regards to Monitoring Site 3 (no vegetation), the assessment will be subjective, based on visual appearance (i.e. a flat barren lakebed with no vegetation). No fauna monitoring is proposed at this point in time due to the paucity of species occurrence and lack of impact on conservation listed species.	Section 9.1
9	Closure Monitoring & Maintenance	The site has completed a large amount of rehabilitation and may wish to seek sign-off on rehabilitation areas that have attained completion criteria prior to closure of the site. This could be discussed in this section of the MCP.	LGC will approach DMIRS in the next few years in regards to areas that could potentially be subject to relinquished or sign-off. The establishment of monitoring quadrats is the first part of this process. Drone imagery will be provided to DMIRS as part of the relinquishment request along with an updated monitoring report including statistical analysis.	Section 9.
10	Financial Provisioning	This section should state the assumptions made during financial provisioning. An example of this is that specific costs were given for remedial actions after closure. This would assume an assumption was made on the total area that may require remedial activities.	Section 10 has been updated to include assumptions in support of the estimated costs for financial provisioning. The main financial assumption is that 75% of rehabilitation earthworks will have been completed at the time of closure. This assumption is based on area measurements of progressive rehabilitation mapped over many years.	Section 10
11	Financial Provisioning	The cost provisioning for vegetation and fauna monitoring were low given the commitments in completion criteria that these assessments will be undertaken.	As part of this MCP review, the financial provisions required for mine closure have been updated (including revised monitoring costs). Vegetation monitoring using 10 rehabilitation sites and 10 paired analogue sites has been implemented. Fauna monitoring is not proposed at this stage due to the paucity of species on site and general lack of suitable protective habitat.	Section 10, Table 21

No	Section of MCP	Comment from DMIRS	LGC Response	Updated Section
12	Management of Information & Data	All records relevant to mining activities should be retained and made available if required by the department; not just the information required for Annual Environmental Reporting, the Mining Rehabilitation Fund and/or Mine Closure Plans.	Section 12 has been updated to read: “All mining related environmental data in relation to the Operation will be provided to DMIRS electronically, including: <ul style="list-style-type: none"> • Mining proposals; • Baseline reports accompanying mining proposals; • MCPs; • NVCPs; • AERs; • MRF data; and • Any other relevant reports or information.” 	Section 11

1.1 Land Tenure

All of the LGC Tenements are held by Phillip Bywaters and/or Craig Bywaters. The Bywaters own much of the farming land that surrounds Lake Goorly. Information of each of the LGC Tenements is provided in Table 2. Land tenures for the Lake Goorly area are displayed in Figure 3. With reference to Table 2 and Figure 3, all LGC Tenements are contained 100% within unallocated crown land ('UCL') except for M70/1079 and a small portion of L70/72.

M70/1079 is contained 100% within the Freehold Lot 502 that is part of the Bywaters' farming land.

The majority of L70/72 is UCL (92.79%). The western section of L70/72 extends to the Great Northern Highway passing through Freehold Lot 413 (5.82%) and Road Reserve (1.39%). The site access road in L70/72 terminates in a parking bay along the side of the Great Northern Highway.

The region is generally sparsely inhabited with the residential loci being widely spaced farm houses. The closest town is Wubin (31km to the west-southwest) and the regional centre is Dalwallinu (43km to the southeast). The closest occupied dwelling to the Operation is Jibberding Farm out-house on freehold land owned by Phil Bywaters. This dwelling is located approximately 3.2km west of the Operation.

There are no other land uses in the general locality of the Operation apart from farming. Cropping occurs on the farming land surrounding Lake Goorly, undertaken by the Bywaters.

Table 2: Mining tenement and land tenure information for the LGC Tenements

Tenement:	M70/1079	M70/1114	M70/1115	M70/1118	M70/1191	M70/1255	M70/1256	M70/1257
Holder 1 - Phillip John Bywaters:	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Holder 2 – Craig Anthony Bywaters:	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Status:	Live	Live	Live	Live	Live	Live	Live	Live
Commenced:	12/12/2000	3/07/2003	24/10/2002	28/01/2003	3/11/2005	10/06/2008	10/06/2008	10/06/2008
Expiry:	11/12/2042	2/07/2024	23/10/2023	27/01/2024	2/11/2026	9/06/2029	9/06/2029	9/06/2029
Surveyed:	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Surveyed area (ha):	33.00	11.37	96.42	115.30	235.20	22.73	42.79	17.745
Local Government:	Dalwallinu	Dalwallinu	Dalwallinu	Dalwallinu	Dalwallinu	Dalwallinu	Dalwallinu	Dalwallinu
Mining status:	Active	Inactive	Inactive	Active	Active	Inactive	Active	Inactive
Mining approvals:	MP 47944 MP 35148	MP 47944	MP 47944	MP 47944 MP 32076 MP 18471 MP 18003 MP 17674	MP 47944 MP 5195 MP 5374 MP 32076	MP 47944	MP 47944 MP 32076	MP 47944
Ground status:	Gypsum mining and stockpiling	Undisturbed (mining not commenced)	Undisturbed (mining not commenced)	Gypsum mining and stockpiling	Gypsum mining	Undisturbed (mining not commenced)	Under rehabilitation (mining completed)	Undisturbed (mining not commenced)
Underlying tenure:	Freehold Lot 502 Bywaters (100%)	UCL (100%)	UCL (100%)	UCL (100%)	UCL (100%)	UCL (100%)	UCL (100%)	UCL (100%)

Table 2: Continued...

Tenement:	M70/1258	M70/1259	M70/1272	G70/200	L70/72	L70/84	L70/141
Holder 1 - Phillip John Bywaters:	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Holder 2 – Craig Anthony Bywaters:	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Status:	Live	Live	Live	Live	Live	Live	Live
Commenced:	10/06/2008	10/06/2008	10/06/2008	4/02/2004	25/02/2004	20/02/2006	16/03/2012
Expiry:	9/06/2029	9/06/2029	9/06/2029	3/02/2025	24/02/2025	19/02/2027	15/03/2033
Surveyed:	Yes	Yes	Yes	Yes	No	No	No
Surveyed area (ha):	13.11	93.73	156.75	6.0575	11.1985**	46.4297**	9.9070**
Local Government:	Dalwallinu	Dalwallinu	Dalwallinu	Dalwallinu	Dalwallinu	Dalwallinu	Dalwallinu
Mining status:	Inactive	Inactive	Inactive	Inactive	Active	Inactive	Inactive
Mining approvals:	MP 47944	MP 47944	MP 47944	MP 47944	MP 47944 MP 32076	MP 47944	MP 47944
Ground status:	Undisturbed (mining not commenced)	Undisturbed (mining not commenced)	Undisturbed (mining not commenced)	Undisturbed (mining not commenced)	Access road	Undisturbed (mining not commenced)	Undisturbed (mining not commenced)
Other tenure:	UCL (100%)	UCL (100%)	UCL (100%)	UCL (100%)	UCL (92.79%) Freehold Lot 413 (5.82%) Road Reserve (1.39%)	UCL (100%)	UCL (100%)

* Tenement, tenure and mining information was sourced Mineral Titles Online (DMIRS 2022a), Tengraph (DMIRS 2022b) and MINDEX (DMIRS 2022c).

** Not surveyed. Areas from Tengraph Object Details.

1.2 Areas of Disturbance

LGC commenced mining at Lake Goorly in 2003. Prior to this, Lake Goorly was undisturbed lakebed with no previous mining or other land developments. Initially, mining occurred on M70/1111 (now a dead tenement) and as a bulk sample on E70/3099 (now M70/1079), then moved to M70/1118, M70/1191 and M70/1257. M70/1111 is depleted of minable gypsum and was surrendered on 22/07/2009.

Areas of disturbance from the 2021 AER are provided in Table 3 and the current site layout is displayed in Figure 4. The Operation has been GPS mapped each year since 2010 for the AER. It should be noted that no mining disturbances have occurred on M70/1114, M70/1115, M70/1257, M70/1258, M70/1259, M70/1272, M70/1312, L70/141, G70/200 (excluding overlap with L70/72) and L70/84 (excluding overlap with M70/1118, M70/1191). Where mining has occurred over miscellaneous licences, disturbances have been apportioned against the mining lease only.

The current area of disturbance is 122.03ha of which 90.74ha has been rehabilitated (Table 3), refer to Plates 15 to 35.

Table 3: Areas of disturbance for the Operation

(Note that there is no disturbance on G70/200, L70/141, L70/71, L70/84, M70/1114, M70/1115, M70/1257, M70/1258, M70/1259 and M70/1272.)

Tenement	Mine Activity Type	Mine Activity Reference	Total Area of Activity (ha)				Land under Rehabilitation (ha)				Disturbance (ha)
			Area Approved	Area as of Previous reporting period	Area as of Current reporting period	Change	Stage 1	Stage 2	Total	Relinquishment	
L70/72	Transport or service infrastructure corridor	Access road	2.11	2.11	2.11	0.00	0	0	0.00	0	2.11
Total L70/72			2.11	2.11	2.11	0.00	0.00	0.00	0.00	0.00	2.11
M70/1079	Topsoil stockpile	Topsoil stockpile	0.89	0.76	0.89	0.13	0.05	0	0.05	0	0.84
M70/1079	Laydown or hardstand area	Hardstand / working area	2	2	2	0	0	0	0	0	2
M70/1079	Basic Raw Material Extraction Processing equipment or stockpile associated with basic raw material extraction	Stockpiling area	0.09	0.09	0.09	0	0	0	0	0	0.09
M70/1079	Borrow pit or shallow surface excavation (with a depth of less than 5 metres)	Gypsum mining area	7.09	6.44	7.09	0.65	1.47	3.9	5.37	0	1.72
M70/1079	Transport or service infrastructure corridor	Access road	1.08	1.08	1.08	0	0	0	0		1.08
Total M70/1079			11.15	10.37	11.15	0.78	1.52	3.90	5.42	0.00	5.73
M70/1118	Transport or service infrastructure corridor	Access road	2.75	2.75	2.75	0.00	0	0	0.00	0	2.75
M70/1118	Borrow pit or shallow surface excavation (with a depth of less than 5 metres)	Gypsum mining area	33.83	33.83	33.83	0.00	2.14	30.72	32.86	0	0.97
M70/1118	Laydown or hardstand area	Hardstand / working area	1.17	1.17	1.17	0.00	0	0	0.00	0	1.17

Tenement	Mine Activity Type	Mine Activity Reference	Total Area of Activity (ha)				Land under Rehabilitation (ha)				Disturbance (ha)
			Area Approved	Area as of Previous reporting period	Area as of Current reporting period	Change	Stage 1	Stage 2	Total	Relinquishment	
M70/1118	Basic Raw Material Extraction Processing equipment or stockpile associated with basic raw material extraction	Stockpiling area	2.53	2.53	2.53	0.00	0	0	0.00	0	2.53
M70/1118	Topsoil stockpile	Topsoil stockpile	0.42	0.42	0.42	0.00			0.00	0	0.42
M70/1118	Diversion channel or drain	Water collection channels	0.1	0.10	0.10	0.00			0.00	0	0.10
Total M70/1118			40.80	40.80	40.80	0.00	2.14	30.72	32.86	0.00	7.94
M70/1191	Transport or service infrastructure corridor	Access road	2.64	2.64	2.64	0.00	0	0.00	0.00	0	2.64
M70/1191	Laydown or hardstand area	Hardstand / working area	0.92	0.92	0.92	0.00	0	0.00	0.00		0.92
M70/1191	Diversion channel or drain	Water collection channels	0.53	0.53	0.53	0.00	0	0.00	0.00	0	0.53
M70/1191	Topsoil stockpile	Topsoil stockpile	1.38	1.38	1.38	0.00	0	0.00	0.00	0	1.38
M70/1191	Borrow pit or shallow surface excavation (with a depth of less than 5 metres)	Gypsum mining area	58.10	58.10	58.10	0.00	29.64	18.88	48.52	0	9.58
Total M70/1191			63.57	63.57	63.57	0.00	29.64	18.88	48.52	0.00	15.05
M70/1255	Building (other than workshop) or camp site	Site office	0.0014	0.0014	0.0014	0.0000	0.0000	0.0000	0.0000	0.0000	0.0014
M70/1255	Laydown or hardstand area	Hardstand / working area	0.3836	0.3836	0.3836	0.0000	0.0000	0.0000	0.0000	0.0000	0.3836
M70/1255	Basic Raw Material Extraction Processing equipment or stockpile associated with basic raw material extraction	Stockpiling area	0.0750	0.0750	0.0750	0.0000	0.0000	0.0000	0.0000	0.0000	0.0750

Tenement	Mine Activity Type	Mine Activity Reference	Total Area of Activity (ha)				Land under Rehabilitation (ha)				Disturbance (ha)
			Area Approved	Area as of Previous reporting period	Area as of Current reporting period	Change	Stage 1	Stage 2	Total	Relinquishment	
Total M70/1255			0.46	0.460	0.46	0.00	0.00	0.00	0.00	0.00	0.46
M70/1256	Borrow pit or shallow surface excavation (with a depth of less than 5 metres)	Gypsum mining area	3.94	3.9400	3.94	0.0000	0	3.94	3.94	0	0.00
Total M70/1256			3.94	3.94	3.94	0	0	3.94	3.94	0	0
Overall Total			121.20	121.25	122.03	0.78	33.30	57.44	90.74	0.00	31.29

1.3 Mining Operations

The Operation produces approximately 10,000 to 30,000 tonnes per year ('tpa') of gypsum. There are two product streams:

- agricultural gypsum (screened to remove conglomerated lumps).
- commercial gypsum for gyprock and cement manufacture (run of mine).

Approximately 4,000tpa of agricultural gypsum is sold to local farmers for soil amelioration. The agricultural gypsum is occasionally screened to remove the gypsum solids that form as conglomerated lumps up to 100mm in diameter. Normally, the lumps represent less than 1% of material mined. The remainder of sales consists of 'run of mine' unscreened material that is transported to Perth for gyprock or cement manufacture.

Mining operations involve 'free dig' shallow strip mining. The gypsum resource is identified visually and occurs in patches. A narrow strip mining sequence is utilized that ends in progressive rehabilitation. The two mining areas are on the lakebed and the shoreline fringing dunes (confined to M70/1079).

The mining sequence on the lakebed involves the following:

- Topsoil (kopi) and vegetation is pushed to one side of the initial strip mining area as a linear windrow using a medium sized "swamp" bulldozer. Between 200mm to 400mm of topsoil and vegetation is removed. The strip mining area can typically be 200m long by 50m wide.
- The bulldozer then pushes the gypsum material to one other side on the cleared strip. Gypsum material is identified visually as it is pushed with the resource lenses extending to 1.5m at its deepest but averaging 0.6m.
- An excavator is then used to stockpile the pushed up gypsum and load single side tippers that cart the gypsum to the stockpiling and screening area on M70/1118.
- The mined-out area is then landscaped to natural looking lakebed contours and the topsoil and vegetation windrow is replaced back across the rehabilitated surface. The rehabilitated surface then commences the regeneration process into a natural looking lakebed environment (Plates 15 to 30).
- At the screening and stockpiling area, the majority of gypsum is sold run-of-mine for cement manufacture. The haulage contractors undertake their own loading using the wheel loader.
- Approximately one quarter of material (<4,000tpa) is screened as agricultural gypsum. Material is passed through a grizzly screen and then a mobile vibrating screening plant. LGC undertakes the loading of agricultural gypsum and cartage to local farms.
- Maintenance grading of the mine access road occurs two to three times per year using a local contractor. The road was constructed using road base and capping gravel. Due to the elevated moisture conditions from the underlying lake environment and road capping, no dust is generated from traffic movement. Hence, watering of the road surface for dust control is not considered necessary.

The mining sequence on the shoreline dunes on M70/1079 involves the following:

- Topsoil (kopi) and vegetation is removed from the dune and stockpiled.

- The gypsum resource is excavated and stockpiled as run-of-mine product or screened to remove lumps.
- The mined-out area is landscaped to natural looking contours, covered with topsoil and scarified.

The mobile plant and equipment used onsite by LGC could include:

- Komatsu excavator PC200 (20t).
- Caterpillar D4 low ground pressure bulldozer.
- Komatsu WA200 wheel loader (9t)
- 2 x prime movers with single side tipper (25t load capacity).
- Grizzly screen.
- Mobile vibrating screening plant.
- 2,000L mobile fuel trailer.
- 4WD utes.

The above equipment is owned and maintained by LGC.

The following equipment is brought onto site by contractors:

- Prime mover and double or triple trailer combinations (haulage contractors off site).
- 14G or equivalent sized grader (contractor for road maintenance).

The only equipment maintenance occurring onsite is greasing and refuelling. The activities involving hydrocarbons at the Operation is greasing of machinery, diesel refueling and oil top up. All hydrocarbons are brought onto site when required on the back of a 4WD ute; diesel is contained a 1,000L self-bunded tank, oils in 50L drums and greases in canisters. Due to the proximity of the Great Northern Highway, no hydrocarbons are stored on site for security reasons. The annual diesel usage is less then 10,000L per year. Servicing and repairs to LGC equipment occurs on Jibberding farm or at commercial workshops at Dalwallinu.

Light vehicle and truck tyres are changed by the operators themselves and taken to Bridgestone Dalwallinu for repairs or replacement. Tyre repairs to the wheel loader are undertaken entirely by Bridgestone Dalwallinu using specialist equipment.

The road haulage and grading contractors undertake their own off-site servicing and repairs.

Apart from the above-mentioned hydrocarbon use, there are no other chemicals used in the Operation.

There is a small ablution unit and site office at the entrance to the stockpiling area. The site office is un-powered as grid power had not been connected.

The gypsum mining operation at Lake Goorly is above the watertable and located in areas of desiccated lakebed. This is a physical mining requirement as wet areas are not minable due to total machinery inaccessibility. The mining operations do not require dewatering and no water is required for processing. Operations may be constrained to higher ground in wetter years due to lake inundation. Every effort is made to avoid the need for equipment recovery due to bogging.

A works approval and licence to operate under the *Environmental Protection Act 1986* was originally issued for the Operation in 2007 for a Category 12 screening operation. The processing plant is used entirely for screening out lumps of gypsum to produce an agricultural gypsum product. There is no other processing of material occurring. Although

the material is dry screened, the natural moisture content of gypsum ensures that no dust is generated. The oversize reject from agricultural product screening is added to the gyprock (cement) gypsum product line; hence there are no waste streams. Oversize material is not critical for the cement gypsum product.

Following an inspection by the then Department of Environment and Conservation¹, Geraldton in 2008, the licence to operate was downgraded to a Category 70 Registration as the screening plant throughput was less than the 50,000tpa threshold for licensing. The current throughput of approximately 4,000tpa is now below the threshold for a Category 70 Registration (5,000 to 50,000tpa). Hence, the Category 70 Registration is no longer required.

Being a commercial mineral, a JORC style resource estimation is not applicable for the Operation. A simple resource calculation has been undertaken using GIS mapping of gypsum resource areas. The resource estimate could exceed 1,000,000 tonnes. This could equate to a mine life >30 years (assuming a rate of 30,000tpa). The estimated project completion date is thus 2052 (30 years from present).

1.4 Mine Closure Domains

Three mine closure domains have been identified in this MCP, these being:

- Mining excavations.
- Processing and stockpiling areas.
- Mine roads.

Rehabilitation requirements for each of these domains areas are linked into the intended and progressive mine closure activities discussed later in this MCP (refer to the Closure Task Register in Section 8.1).

1.5 Progressive Rehabilitation

The mining operation incorporates the progressive rehabilitation into ongoing activities. The objective for the post-mining landform is the restoration of mined-out areas to a natural looking salt lake landscape similar to the surrounding pre-mining environment. The post-mining land use is natural ecosystem. From previous experience at Lake Goorly, the above post-mining rehabilitation objective is readily and easily achievable. The Operation is thus considered as being a temporary surface disturbance. The location of areas of rehabilitation is displayed in Figure 5.

Examples of lakebed rehabilitation are displayed in Plates 15 to 30 and dune rehabilitation in Plates 31 to 35. The majority of rehabilitation has occurred on the lakebed as this is the main mining area.

The current (mapped 2021) areas of disturbance are provided in Table 3. LGC undertakes annual progressive rehabilitation. To date, 90.7ha or 74.33% out of a total area of disturbance of 122.03ha has been rehabilitated.

¹ Now part of the Department of Water and Environmental Regulation ('DWER').

DMIRS has three stages for land under rehabilitation:

- Stage 1 - Area of Mine Activities on which all rehabilitation earthworks have been completed in accordance with mine closure obligations.
- Stage 2 - Area of rehabilitated Mine Activities which have demonstrated progress from earthworks (Stage 1) towards the agreed post mining land use. Monitoring data which demonstrates rehabilitation progress must be retained to verify a Stage 2 classification.
- Relinquishment - Agreed mine closure criteria met, government 'sign off' achieved, and all obligations under the Mining Act removed and levy retired.

Of the rehabilitated areas:

- 33.3ha or 36.7% is assessed as being at Stage 1.
- 57.44ha or 63.3% is assessed as being at Stage 2 (or relinquishment).
- No areas have been relinquished by DMIRS.

Areas of disturbances in relation to mining approval are provided in Table 4. The currently approved mining proposal (MP 47944) specified an additional 84.47ha of disturbance over the existing disturbance of 83.08ha, or a total footprint of 167.55ha (Table 2). By subtraction from the 2021 AER mapped area of disturbance (122.03ha), the remaining area available for mining is thus 45.52ha. The average rate of quarry expansion since 2013 is <5ha per year. The remaining area for mining under MP 47944 is therefore likely to support mining for >9 years. LGC will submit a new MP for the entire Operation including the new tenements using the 2020 statutory MP format in the coming years to extend the mine life to 30+ years.

Table 4: Areas of disturbances in relation to mining approval

Year	Source	Description	Area (ha)
2014	MP 47944	Area of disturbance in 2014	83.08
		Additional requested are in MP	84.47
		Total approval footprint	167.55
2021	AER mapping	Area of disturbance in 2021	122.03
		Remaining area of approved disturbance	45.52

1.6 Native Vegetation Clearing Permit

All clearing at Lake Goorly requires a NVCP as the locality is contained within the Southwest clearing regulations Schedule 1 non-exempt area. Mining initially occurred under a series of smaller clearing permits that were superseded by overall purpose permit CPS 5955/1 that became live on 19 April 2014. CPS 5955/1 covered the 15 LGC tenements as well as M70/1312. The current version of the clearing permit is CPS 5955/3 that was re-issued on 04 April 2019 with the expiry being on 19 April 2024. The location of CPS 5955/3 is displayed in Figure 6. A copy of CPS 5955/3 is provided in Appendix B. CPS 5955/3 is a

purpose permit issued for the “clearing for the purposes of gypsum mining and associated activities”. CPS 5955/3 allows for the clearing of 84.47ha.

1.7 Section 18 Consent

The Operation occurs within the Department of Planning, Lands and Heritage (‘DPLH’) Mongers Lake Waterway Registered Site ID 24380 (‘Mongers Lake Waterway’) (DPLH 2022a). Mongers Lake Waterway is a mythological site that extends for approximately 180km in a north-south dimension and approximately 150km in an east-west dimension (DPLH 2022b). The site is ‘Y’ shaped, following a chain of lakes from Nullewa Lake in the west to Mongers Lake in the east and south to Lake Hillman (DPLH 2022b). The location of the Mongers Lake Waterway in relation to the Operation is displayed in Figure 7.

The Operation is subject to two *Aboriginal Heritage Act 1972* Section 18(3) Ministerial Consents (‘S18 Consents’) for gypsum mining at the Mongers Lake Waterway:

- Ministerial Reference No: 34-13313 (‘S18 Consent 34-13313’) issued on 27 June 2011; and
- Ministerial Reference No: 69-13337 (‘S18 Consent 69-1333’) issued on 09 April 2019.

Copies of both S18 consents are provided in Appendix C.

S18 Consent 34-13313 was issued for the following tenements:

- M70/1079, M70/1115, M70/1118, M70/1114, L70/84, G70/200, L70/72, M70/1272, M70/1258, M70/1259, M70/1257, M70/1256, M70/1255 and M70/1191.

S18 Consent 69-1333 was issued for tenements granted after the first consent, these being:

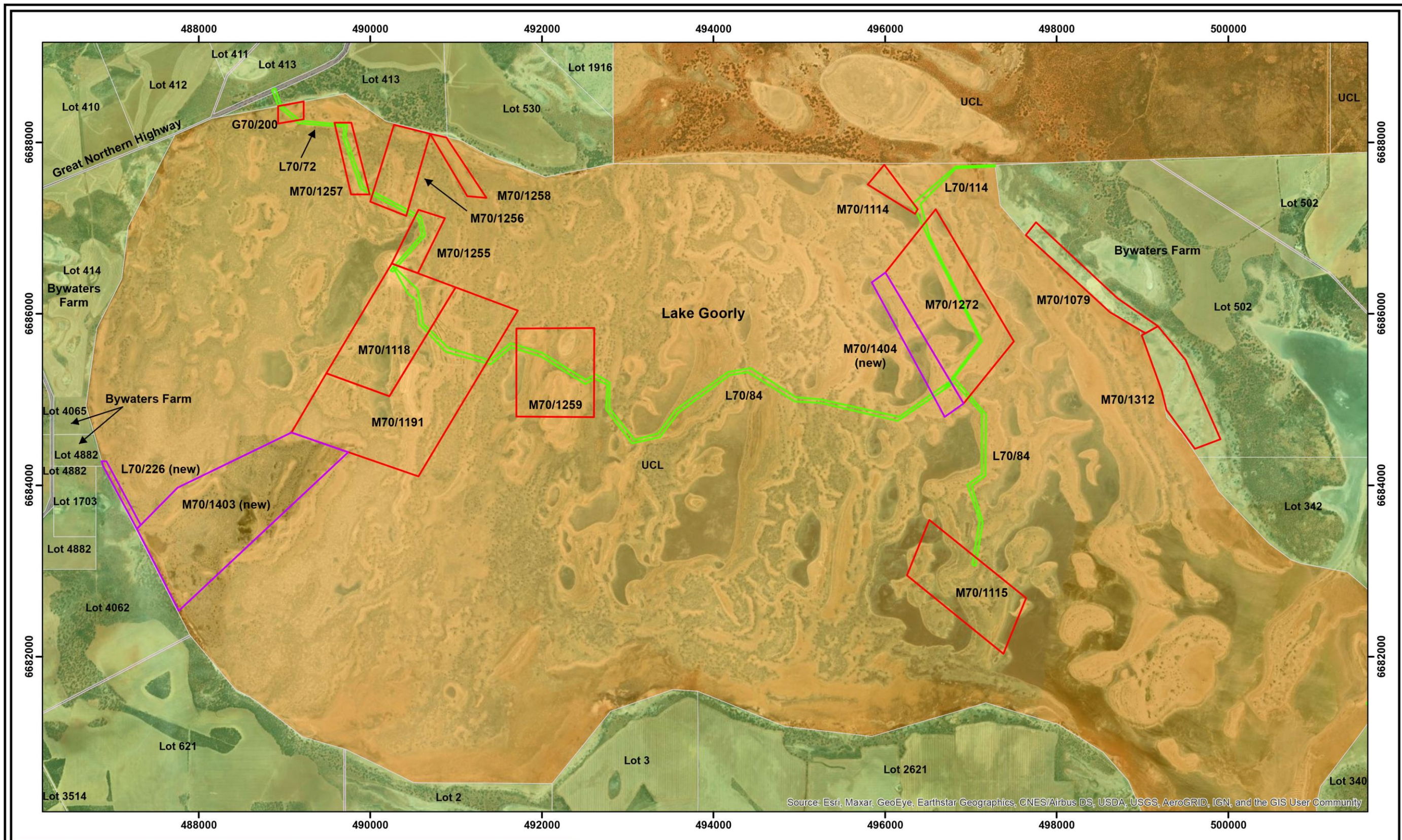
- E70/4426, E70/4427, E70/4467, M70/1312 and L70/141.

It should be noted that E70/4426, E70/4427, E70/4467 have been surrendered.

The S18 Consents were supported by three heritage surveys:

- Gifford P (2011). An Aboriginal Heritage Survey at Lake Goorly, North East of Wubin, Western Australia, for an Application under Section 18 of the *Aboriginal Heritage Act 1972*.
- Harris J and Hohnen J (2011). Report of an Archaeological Section 18 Application Survey at Lake Goorly, North of Wubin.
- Fordyce B (2015). Heritage Survey Report of an investigation of tenements M70/1312 and L70/171 for Bywaters Gypsum Supplies, Lake Goorly, Western Australia.

Under the S18 Consent 34-13313, LGC has to report to the Sites Register at the DPLH annually in regards to extent of impact from the Operation on Mongers Lake Waterway. The annual report also informs of the extent and success of rehabilitation.



Lake Goorly Contracting			
Figure 3: Land tenure at the Lake Goorly Gypsum Operation			
Drawn: C Newland	Authored: C Bywaters	Print Size: A3	Date: 08/08/2021
Map Name: Figure 3 Land Tenure Lake Goorly Gypsum Operation.mxd			
Base Map: ESRI Basemap "World Imagery" (date 12/11/2020)			

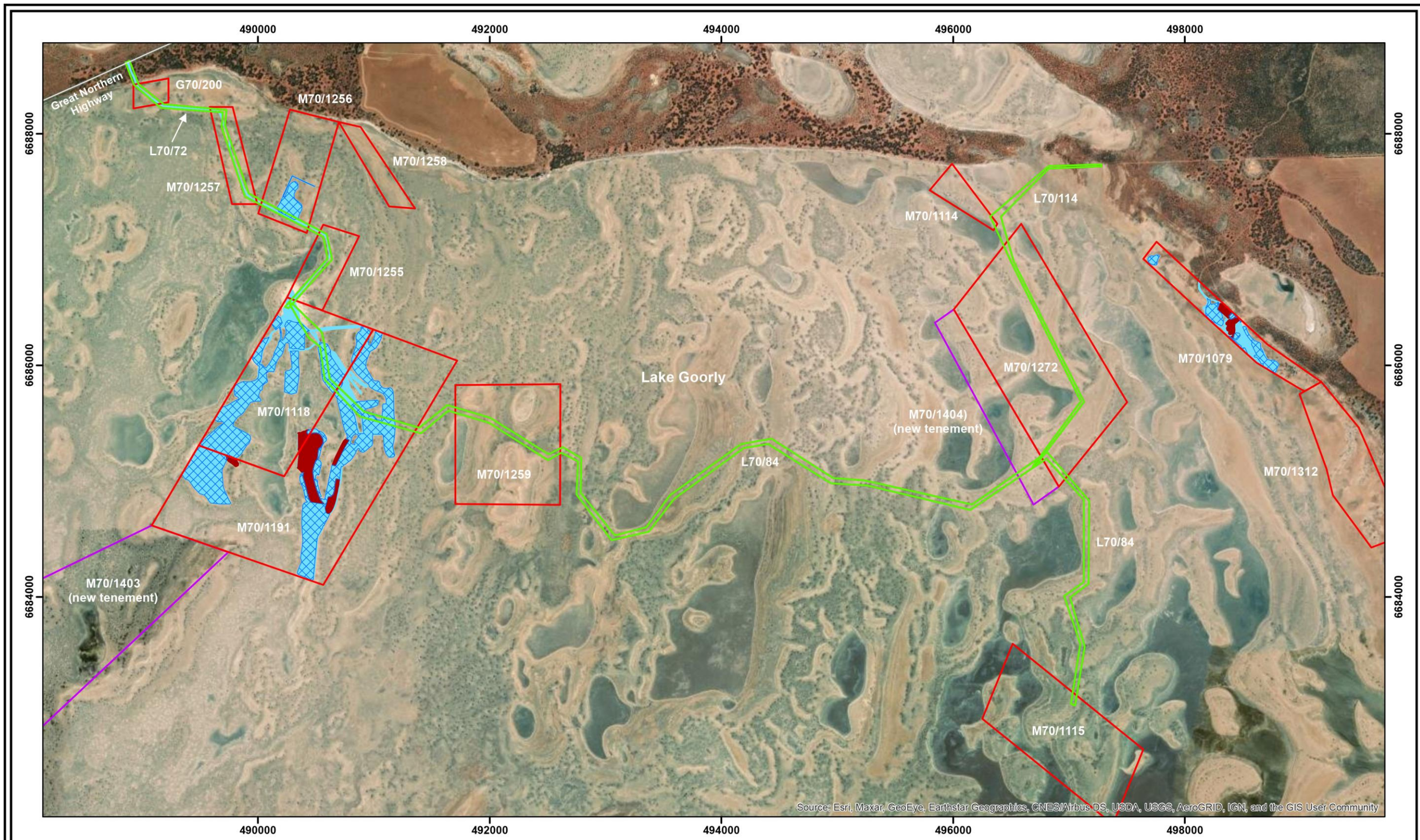
Legend		Land Tenure	
	Miscellaneous licences		Unallocated crown land
	Mining and general purpose leases		Freehold
	New tenements (2021)		Road reserve

N

Kilometres

GDA 1994 MGA Zone 50

Figure 3: Land tenure at the Lake Goorly Gypsum Operation



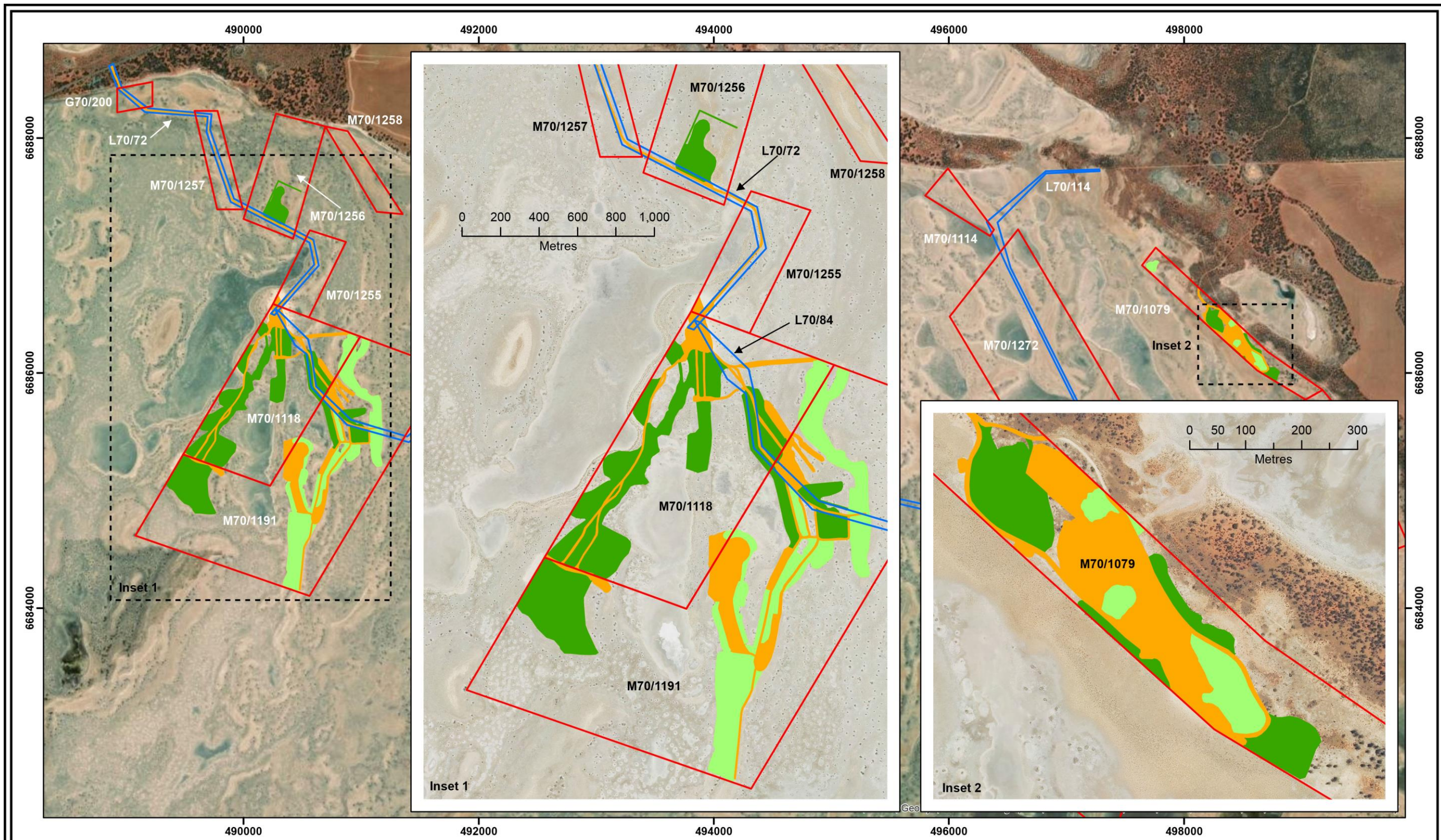
Lake Goorly Contracting			
Figure 4: Location of mining activities at the Lake Goorly Gypsum Operation			
Drawn: C Newland	Authored: C Bywaters	Print Size: A3	Date: 15/09/2021
Map Name: Figure 4 Location Mining Activities Lake Goorly Gypsum Operation.mxd			
Base Map: ESRI Basemap "World Imagery" (date 12/11/2020)			

Legend	
 Mining and general purpose leases	 Active mining areas
 Miscellaneous licences	 Areas worked previous years
 New tenements (not in approval envelope)	 Areas under rehabilitation

N

0 500 1,000 1,500 2,000
Metres
GDA 1994 MGA Zone 50

Figure 4: Location of mining activities at the Lake Goorly Gypsum Operation

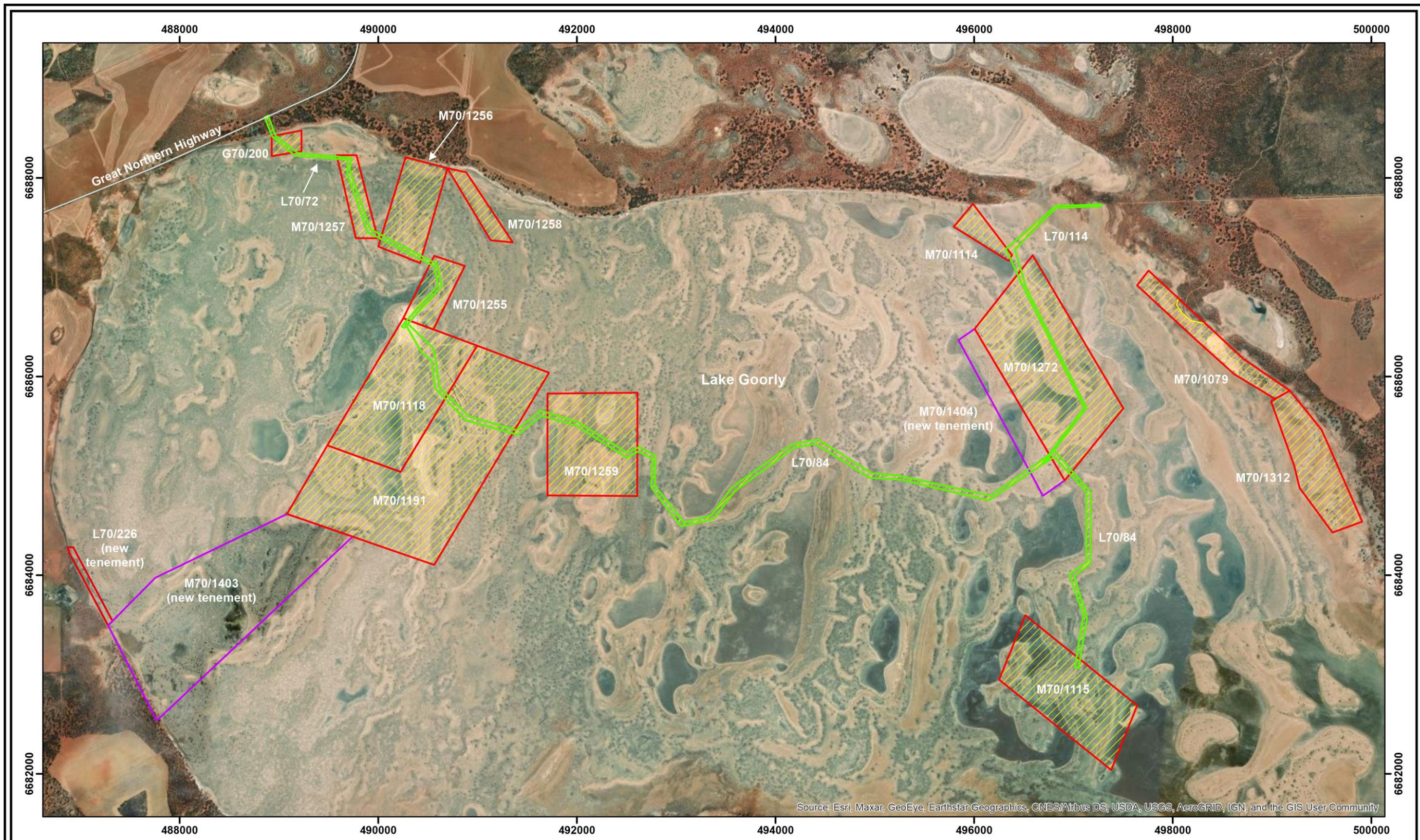


Lake Goorly Contracting			
Figure 5: Location of rehabilitation areas at the Lake Goorly Gypsum Operation			
Drawn: C Newland	Authored: C Bywaters	Print Size: A3	Date: 20/10/2021
Map Name: Figure 5 Location Rehabilitation Areas Lake Goorly Gypsum Operation.mxd			
Base Map: ESRI Basemap "World Imagery"			
Insert Maps: Landgate extract "MONGERS_2238_NOV_2016_MOSAIC.ECW"			

Legend	
 Rehabilitation Stage 1	 Mining and general purpose leases
 Rehabilitation Stage 2	 Miscellaneous licences
 Operational areas no rehabilitation	

Kilometres
GDA 1994 MGA Zone 50

Figure 5: Location of rehabilitation areas at the Lake Goorly Gypsum Operation



Lake Goorly Contracting			
Figure 6: Location of clearing permit CPS 5955/3 at the Lake Goorly Gypsum Operation			
Drawn: C Newland	Authored: C Bywaters	Print Size: A3	Date: 08/08/2021
Figure 6 Location Clearing Permit CPS 5955-3 Lake Goorly Gypsum Operation.mxd			
Base Map: ESRI Basemap "World Imagery" (date 12/11/2020)			

Legend

- Mining and general purpose leases
- Miscellaneous licences
- New tenements
- CPS 5955/3

N

0 1 2 3

Kilometres

GDA 1994 MGA Zone 50

Figure 6: Location of clearing permit CPS 5955/3 at the Lake Goorly Gypsum Operation

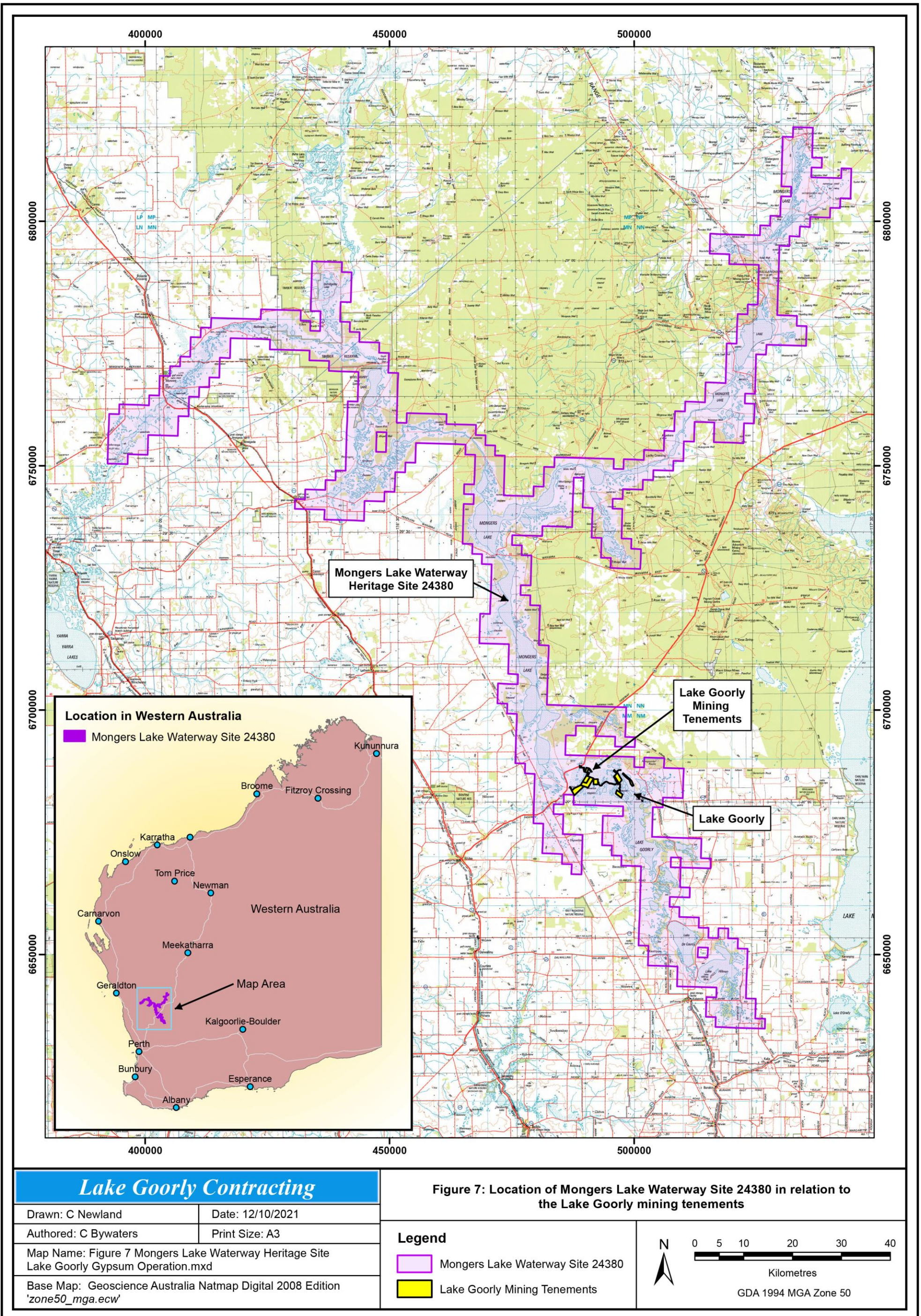


Figure 7: Location of Mongers Lake Waterway Site 24380 in relation to the Lake Goorly mining tenements

2 IDENTIFICATION OF CLOSURE OBLIGATIONS AND COMMITMENTS

As per the Statutory Guidelines for Mine Closure Plans, the MCP plan must detail all legal obligations for rehabilitation and closure that will affect the post-mining land use and closure outcomes.

An examination of potentially relevant legislation was undertaken in relation to mine closure obligations and commitments. The relevant legislation was identified as:

- *Mining Act 1978* (tenement conditions).
- *Environmental Protection Act 1986* (NVCP conditions).
- *Environmental Protection Act 1986* (licence to operate).
- *Mines Safety and Inspection Act 1994* and the *Mines Safety and Inspection Regulations 1995* (abandonment requirements for closure).
- *Aboriginal Heritage Act 1972* (Section 18 consent).

All statutory obligations relevant to rehabilitation and closure were incorporated into the 'Legal Obligations Register' provided as Appendix D. This register contains a summary of commitments and obligations from the following:

- Mining proposals and notices of intent.
- Tenement conditions.
- Clearing permit conditions.
- Licence to operate.
- Section 18 Notice under the *Aboriginal Heritage Act 1972*
- Safety requirements for abandonment.

In regards to the mine closure obligations and commitments from MCP 69523, rather than itemise each item, the information from MCP 69523 has been reproduced, reviewed and updated to form the core of this updated MCP.

Each of these legal obligations is discussed below.

2.1 Mining Proposals and Notices of Intent

The Operation has been the subject of various mining proposals (including notices of intent) that are listed in Table 2. Mining initially occurred under a number of smaller mining proposals (and notices of intent) for specific tenements. MP 47944 was submitted in 2014 for all tenements (except M70/1312 that had not been granted at that time) to replace and superseded all previous mining proposals.

All previous mining proposals and notices of intent were examined for closure obligations and commitments and this included MCPs that commenced, as a result of revisions to the *Mining Act 1978*, as from July 2011. The assessment concluded that the closure related information in each previous mining proposal was essentially the same due to the uniformity of resource, mining activities and rehabilitation techniques across all operational areas. Rather than repeat information, closure obligations and commitment were sourced from the final and overall mining proposal MP 47944, as detailed in Appendix D (Part A).

2.2 Tenement Conditions

A review of conditions was conducted in relation to the LGC Tenements for this MCP. The conditions relevant to mine closure are itemised in Appendix D (Part B). The requirements for the management of mining activities relevant to rehabilitation and closure are part of the current operational practices.

2.3 Clearing Permit Conditions

A copy of the Clearing Permit CPS 5955/3 is provided in Appendix B. The CPS 5955/3 conditions are provided in Appendix D (Part C) along with comments in relation to mine closure. The activities required under the conditions for CPS 5955/3 provide a basis for the management of clearing and collection of data that is consistent with the objectives for mine closure.

2.4 Section 18 Consents under the *Aboriginal Heritage Act 1972*

The Mongers Lake Waterway and the Section 18 Consents are discussed in Section 1.7. The conditions of the Section 18 Consents were reviewed (refer to Appendix C for a copy of the consents).

The conditions relevant to mine closure are provided in Appendix D Part.

S18 Consent 34-13313 has the following mine closure condition:

- Condition 1: Ensures rehabilitation of impacted areas occurs following cessation of mining activities.

Both S18 Consents require that the extent of disturbance and rehabilitation are reported to the Registrar of Aboriginal Sites. LGC provides this report annually.

2.5 Safety Requirements for Abandonment

The *Mines Safety and Inspection Act 1994* and the *Mines Safety and Inspection Regulations 1995* specify legislative requirements for mine abandonment. Relevant sections of mine safety legislation are reproduced in Appendix D Part E. The District Inspector of Mines regulates mine abandonment and will be consulted in due course in regards to closure requirements and pit abandonment.

2.6 Works Approval and Licence to Operate

A works approval and licence to operate under the *Environmental Protection Act 1986* was originally issued for the Operation in 2007 for a Category 12 screening operation. A copy of the licence to operate is provided at Appendix E.

The covering letter for the licence to operate contained the following paragraph:

"The Department of Environment and Conservation (DEC) has issued this licence without conditions on the basis that the premises is not expected to produce any emissions or discharges which may pose a significant risk to the environment. Should the emissions and

discharges from the premises be altered in such a manner as to pose a significant environmental impact, the DEC may choose to impose conditions on this licence at a later date through the amendment process.”

Hence, there were no licence conditions issued for the Operation.

Following an inspection by DEC* Geraldton in 2008, the licence to operate was downgraded to a Category 70 registration as the screening plant throughput was less than 50,000tpa. The threshold for registration is greater than 5,000tpa but less than 50,000tpa.

The current throughput of approximately 4,000tpa of agricultural gypsum is below the registration threshold. This throughput is expected to continue indefinitely. The licence has not been renewed as the throughput is below the registration threshold.

*Note: The DEC licensing branch is now part of the Department of Water and Environment ('DWER').

3 STAKEHOLDER ENGAGEMENT

Due to the location of the Operation on UCL in the Shire of Dalwallinu's jurisdiction or on farming land held by the Bywaters, there are very few direct stakeholders. The identified stakeholders are:

- Shire of Dalwallinu (UCL).
- Craig and Phil Bywaters (farming land).
- DMIRS Environmental Inspector.
- DMIRS District Inspector of Mines.
- Department of Planning, Lands and Heritage.

Stakeholder consultation information is discussed below and summaries in the Schedule of Stakeholder Engagement provided as Table 5.

Shire of Dalwallinu

A letter was written to the Shire of Dalwallinu in 2017 that stated the closure objectives and invited to Shire to provide any comment or input into mine closure. A copy of the letter is provided in Appendix F. The stated mine closure objectives were:

"The objective for the post-mining landform is the restoration of mined-out areas to a natural looking salt lake landscape similar to the surrounding Lake Goorly lakebed environment. The rehabilitation endpoint is to reinstate a chenopod - samphire community similar to the surrounding vegetation and with a functioning natural ecosystem. The post-mining land use is natural ecosystem."

These mine closure objectives remain the same in this MCP.

The Shire's Manager Regulation and Development Services, Doug Burke, met with Craig Bywaters on site on 27/08/2017 to inspect the rehabilitation and closure activities with Craig Bywaters. Mr Burke concluded that he had no issue with the current rehabilitation activities and had no further comment. A copy of the 2017 MCP was provided to the Shire for their records.

In 2021 as part of the MCP update, the Shire was again contacted to seek input into mine closure. Mr Burke visited the Operation on 14/10/2021 and inspected the Operation with Charles Newland. A copy of this email invitation is provided in Appendix F.

Mr Burke was shown the rehabilitated areas in 2021. In the discussions after the inspection with Craig Bywaters and Charles Newland, Mr Burke again remarked that he had no issues with the rehabilitation activities and had no further comment.

Craig and Phil Bywaters

The Bywaters were one of the original farming families in the Lake Goorly wheatbelt area. The family has >60 years association with Lake Goorly and surrounding areas. M70/1079 occurs on Freehold Lot 502 that is part of the Bywaters' farming land. Both Craig and Phil Bywaters have a keen interest in protecting the environmental values on Lake Goorly and the surrounding area. To this end they have always incorporated progressive rehabilitation into the mining operations (refer to Section 1.5)

In regards to M70/1079, their intention is to restore the mined out gypsum dunes to smaller landscaped dunes covered with native vegetation.

For the other tenements on Lake Goorly, their intention is to restore the lakebed to its original condition following the cessation of mining.

DMIRS Environmental Inspector

The role of the Environmental Inspector is for all aspects of environmental regulation and rehabilitation in relation to mine closure pursuant to the *Mining Act 1976*, to provide feedback and guidance on the MCP composition, and for site sign-off at the completion of mine closure. The feedback from the last MCP review is discussed in Table 1 and the comments, when relevant, have been actioned in this MCP.

The DMIRS assessment comments for this MCP will either be incorporated into the next MCP or used in an updated version of this MCP. If required, the Bywaters will meet with DMIRS to discuss any MCP issues. Given the simplicity of the operation and low level of environmental impact, a meeting with the DMIRS Environmental Inspector was not considered necessary at this stage.

LGC will approach DMIRS in the next few years in regards to areas that could potentially be subject to relinquished or sign-off. The sign-off would require a joint site inspection.

DMIRS District Inspector of Mines

Mine closure requirements will be discussed with the District Inspector of Mines closer to likely completion dates. The relevant legislation is outlined in Appendix D Part E and comes into effect just prior to closure. The District Inspector of Mines will inspect the site prior to closure to provide advice on decommissioning requirements. It is likely that abandonment bunds will not be required given that the final landform will have no pit walls or potential fall from height hazards (refer to Plate 30).

Department of Planning, Lands and Heritage

As discussed in Section 1.7, under the Section 18 notice issued under the *Aboriginal Heritage Act 1972*, LGC has to report to the DPLH Sites Register annually in regards to extent of impact from the Operation on Mongers Lake Waterway Site.

The annual report also informs of the extent and success of rehabilitation.

Table 5: Stakeholder engagement register

Stakeholder	Description of Engagement	Actions	Stakeholder Responses
Shire of Dalwallinu	Manager of the underlying tenure at Lake Goorly: unallocated crown land.	<p>Letter written to the Shire of Dalwallinu on 20/07/2017 stating the closure objectives and seeking the Shire’s comment or input into mine closure (Appendix F).</p> <p>Onsite meeting and site inspection with the Shire’s Manager Regulation and Development Services Doug Burke and Craig Bywaters on 27/08/2017 to discuss mine closure and rehabilitation.</p> <p>These closure objectives were emailed to the Shire again on 20/08/2021 seeking MCP input (Appendix F).</p> <p>Onsite meeting and site inspection with the Shire’s Manager Regulation and Development Services Doug Burke, Craig Bywaters and Charles Newland on 14/10/2021 to discuss mine closure and rehabilitation.</p>	<p>During both site visits in 2017 and 2021, the Shire’s Manager Regulation and Development Services Doug Burke concluded that he had no issue with the current rehabilitation activities and had no further comment</p>
Landholders and farmer Craig Bywaters and Phil Bywaters	Freehold farming land Lot 502 containing M70/1079.	The Bywaters will continue to incorporated progressive rehabilitation into the mining operations.	<p>In regards to M70/1079, the intention is to restore the mined out gypsum dunes to smaller landscaped dunes covered with native vegetation.</p> <p>For the other tenements on Lake Goorly, the intention is to restore the lakebed to its original condition following the cessation of mining.</p>
DMIRS Environmental Officer	<p>All aspects of environmental regulation and rehabilitation in relation to mine closure pursuant to the <i>Mining Act 1976</i>.</p> <p>Feedback and guidance on the MCP composition.</p>	Given the simplicity of the operation and low level of environmental impact, a meeting with the DMIRS Officer was not considered necessary at this stage. Rather the MCP to be reviewed and comments provided to LGC for inclusion in revised versions.	<p>DMIRS to provide review comments and any additional information will be provided and/or incorporated into an updated version of the current MCP or in the next MCP in three years.</p> <p>Meeting with DMIRS to occur if required.</p>

Stakeholder	Description of Engagement	Actions	Stakeholder Responses
	Sign-off for the final MCP.		DMIRS to be contacted in 2022 to request sign-off for some of the older areas of rehabilitation.
DMIRS District Inspector of Mines	Mine abandonment regulation pursuant to the <i>Mines Safety and Inspection Act 1994</i> and the <i>Mines Safety and Inspection Regulations 1995</i> .	<p>The District Inspector of Mines will be consulted as part of the mining approvals process and updated MCPs.</p> <p>The District Inspector of Mines is in contact with LGC through the Statutory Appointments and Record Book requirements under the <i>Mines Safety and Inspection Act 1994</i> and the <i>Mines Safety and Inspection Regulations 1995</i>.</p>	<p>The relevant legislation is discussed Section 2.5 and comes into effect just prior to closure. The District Inspector of Mines will inspect the Operation near closure and provide advice on decommissioning requirements including the placement of abandonment bunds.</p> <p>From discussions with the District Inspector of Mines, the main issue is inadvertent access to quarry areas after closure.</p>
Department of Aboriginal Affairs	Section 18 notice issued under the <i>Aboriginal Heritage Act 1972</i> and the Mongers Lake Waterway heritage site (Site ID 24380)	<p>Ensure rehabilitation of all impacted areas occurs progressively at cessation of mining activities.</p> <p>Provide written advice annually to the Registrar advising as to the extent of impact on the site from the mining operations.</p>	<p>Annual reporting continuing.</p> <p>Progressive rehabilitation continuing.</p>

4 BASELINE CLOSURE DATA AND ANALYSIS

The DEC report “Resource Condition Report for a Significant Western Australian Wetland: Lake Goorly” (DEC 2008a) has been used as a reference source for some of the baseline information provided in this section. The report is referred to as DEC (2008a)”.

4.1 Biogeographical Information

4.1.1 Climate

Weather data from the Bureau of Meteorology (‘BOM’) Dalwallinu weather station (No 8297) is displayed in Figure 8 and provided in Table 6 and (BOM 2022). The Dalwallinu weather station is located approximately 43km to the southwest of the Operation. The climate at Dalwallinu is considered as being very similar to that at Lake Goorly.

Lake Goorly is contained within the Southwest Wheatbelt region of Western Australia with an average rainfall of 297.8mm. Although the climate is very much influenced by a ‘Mediterranean’ style pattern with dry hot summers and cold wet winters, Lake Goorly is situated on the outer edge of the Wheatbelt at the edge of the semi-arid zone. It is expected that there would also be a component of semi-arid ‘Continental’ climate conditions influencing Lake Goorly.

The summer temperature range is extreme with a mean maximum temperature exceeding 35°C and as high as 46.9°C. Winter temperatures are milder but still warm, with mean maximum temperatures in excess of 17°C. Mean minimum temperatures vary from 18.4°C in summer to 6.0°C in winter (Table 6).

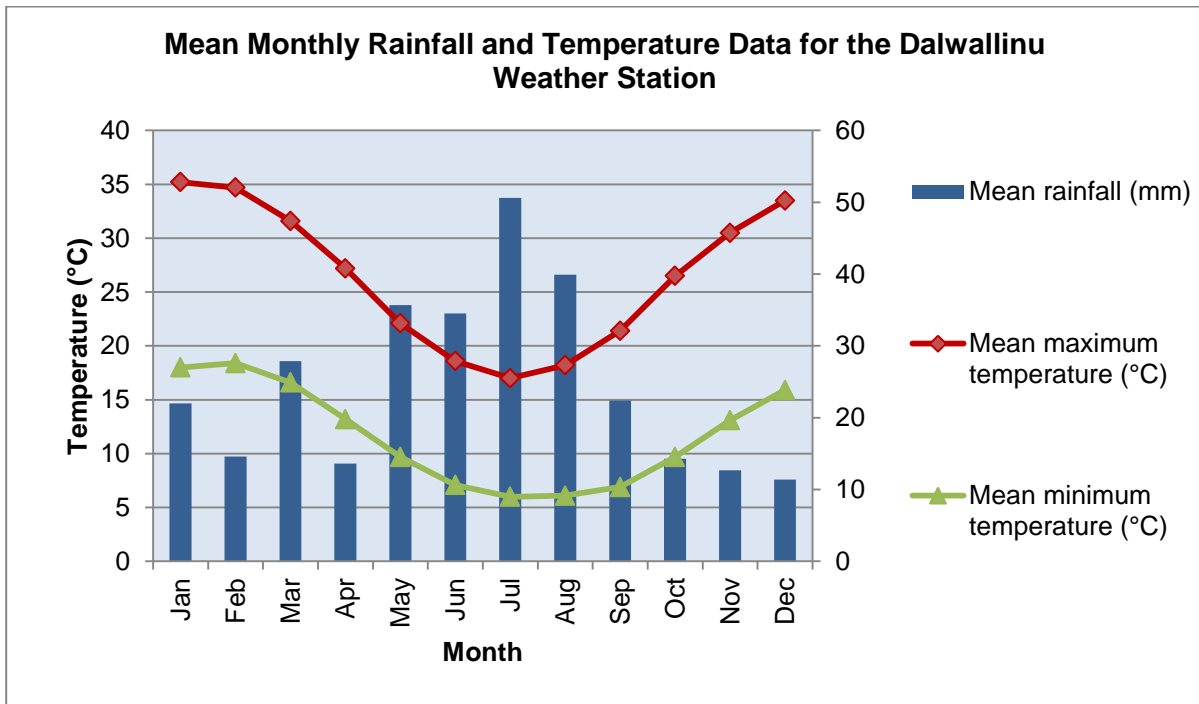


Figure 8: Mean monthly rainfall and temperature data for Dalwallinu BOM Station 8297

Table 6: Climatic information for Dalwallinu BOM 8297

Statistic Element*	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean maximum temperature (°C)	35.2	34.7	31.6	27.2	22.1	18.6	17	18.2	21.4	26.5	30.5	33.5	26.4
Highest temperature (°C)	46.5	46.9	41.6	39.2	34	28.1	25.3	30.8	35	40.1	43.5	45.6	46.9
Mean minimum temperature (°C)	18	18.4	16.6	13.2	9.7	7.1	6	6.1	6.9	9.7	13.1	15.9	11.7
Lowest temperature (°C)	10.5	9.3	6.5	3.4	1	0.3	-1	-1	-0.2	-1	4	5	-1
Mean rainfall (mm)	22	14.6	27.9	13.6	35.7	34.5	50.6	39.9	22.4	14.3	12.7	11.4	297.8
Highest rainfall (mm)	89.2	76	114.8	56.4	105.4	83	114.4	106.8	43.4	82.4	47.2	45.2	528.8
Lowest rainfall (mm)	0	0	0.8	0	4	3	14	16.6	4.4	0	0.2	0	170.6
Highest daily rainfall (mm)	63.4	26.2	77	38.8	53	30.8	59.4	29	35.2	32	37.8	27.8	77
Mean number of days of rain	3	3.2	3.7	3.9	8.6	11.9	14.7	13.5	9.7	4.9	3.7	2.1	82.9

*Data from Table 6 from the Bureau of Meteorology website: www.bom.gov.au for Dalwallinu BOM Station #8297 1997 to 2022

4.1.2 Regional Setting

The Operation is located on the northern section of Lake Goorly in the Shire of Dalwallinu, approximately 31km east-northeast from Wubin. Lake Goorly is a large salt lake that is dry for extended periods and then partially fills on an intermittent basis. Water levels and salinities are thus highly variable between inundation and desiccation cycles. For the much of the year the lakebed is dry.

The Lake Goorly region is relatively uninhabited with little infrastructure located nearby. The majority of the Operation is located on UCL that is surrounded by freehold farming land. The Great Northern Highway passes approximately 2.5km to the northwest of the stockpiling and processing area on M70/1118 (Figure 2). The predominant land use in the Lake Goorly area is grain cropping and sheep farming. The main regional centre is Dalwallinu, located approximately 43km to the southwest of the Operation. The farm neighbouring Lake Goorly is Jibberding Farm, owned by Phillip and Craig Bywaters. The Jibberding Farm homestead, occupied and Phillip Bywaters is located approximately 12km to the west-southwest of the Operation. The closest inhabited dwelling is an unrelated farmhouse located approximately 8km south of the Operation.

The Lake Goorly region occurs within the Interim Biogeographic Regionalisation of Australia ('IBRA') 'Avon Wheatbelt 2 (AW2 – Rejuvenated Drainage) Subregion' (DAWE 2018, Beecham 2001). The biogeography of the Avon Wheatbelt 2 Subregion has been described in detail by Beecham (2001). The Avon Wheatbelt 2 Subregion general description from Beecham (2001) is provided below:

The Avon Wheatbelt is an area of active drainage dissecting a Tertiary plateau in Yilgarn Craton. Gently undulating landscape of low relief. Proteaceous scrubheaths, rich in endemics, on residual lateritic uplands and derived sandplains; mixed eucalypt, *Allocasuarina huegeliana* and Jam-York Gum woodlands on Quaternary alluvials and eluvials. Within this, AW2 is the erosional surface of gently undulating rises to low hills with abrupt breakaways. Continuous stream channels that flow in most years. Colluvial processes are active. Soil formed in colluvium or in-situ weathered rock. Includes woodland of Wandoo, York Gum and Salmon Gum with Jam and Casuarina. (Beecham 2001)

4.1.3 Local Topography

Lake Goorly is a component of the Lake Moore – Mongers Lake Drainage System that was described by Beard (2000) as consisting of separate catchments which have been amalgamated by tectonism into the single outlet of the Moore River. The system comprises three main branches: a northern one of intermittent creeks coming down from Kirkalocka to Warriedar; a central one containing the extensive playa of Lake Moore; and a southern member consisting of the chain of salt lakes from Lake Hillman to Lake Goorly (Beard 2000). Lake Goorly occurs at the southern end of Mongers Lake and to the west of Lake More.

Lake Goorly is irregular in shape and approximately 30km long by 4km wide. A series of hydrologically linked claypans and smaller saline lakes surround Lake Goorly. As measured using ArcView, Lake Goorly and associated fringing areas occupy approximately 21,600ha.

The Lake Goorly lakebed contains areas of elevated gypsum precipitation and deposition occurring as surface layers to a maximum depth of 1.5m. The gypsum beds (the resource) are above the high water mark. Lower lying areas that are approximately 0.5m to 1.0m below the gypsum beds can pond from incident rainfall during the winter months. The mining areas are contained within the gypsum beds that remain dry and are minable

throughout the year. No groundwater is intersected during the mining operations. There is also no water used in the screening process.

The contour map of Lake Goorly and surrounds is provided as Figure 9. Lake Goorly is a low relief flat landform at a relatively uniform relative level ('RL') of 278m Australian Height Datum ('AHD') above mean sea level (Figure 9). The eastern shoreline where M70/1079 and M70/1312 occur consists of gypsum dunes that rise to approximately a RL of 284m AHD above mean sea level. The dunes themselves are approximately 3m to 4m in height.

4.1.4 State Level Vegetation Associations

Mapping of the pre-European vegetation within Western Australia was conducted at a 1:250,000 scale by J S Beard from 1964 to 1981 (Beard *et al.* 2013). The type, status, pre-European area (based on Beard's mapping) and remaining extent of native vegetation for the entire state has been assessed by the Department of Biodiversity, Conservation and Attractions ('DBCA') and the Department of Primary Industry and Regional Development ('DPIRD') using remote sensing techniques and GIS analysis to produce a statistical compendium called the 'Comprehensive, Adequate and Representative' Reserves system (Shepherd *et al.* 2002). Data has been updated on a regular basis with the information from the latest update being the "2018 Statewide Vegetation Statistics" (Government of Western Australia 2019). The 2018 Statewide Vegetation Statistics are associated with spatial data provided by Data WA as "*Pre_EuropeanVegetationDPIRD_006.shp*" (Data WA 2022a). The location of the LGC Tenements in relation to the DPIRD spatial data is displayed in Figure 10. The LGC Tenements occur in:

- *Jibberding 676.5* - *Halosarcia* open samphire shrubland.
- *Jibberding 125* - Bare areas; salt lakes.

Information on the extent of Vegetation Sub-associations *Jibberding 676.5* and *Jibberding 125* from the 2018 Statewide Vegetation Statistics is provided in Table 7.

Table 7: Information on the Statewide vegetation associations occurring within the LGC Tenements

Vegetation Association	Pre-European area	Current extent	Remaining	Pre-European % in IUCN Class I-IV Reserves*		Approved mining areas**	
	(ha)	(ha)	(%)	(ha)	(%)	(ha)	(%)
<i>Jibberding 125</i>	106,069.75	8,648.32	8.15	250.69	0.24	20	88.06
<i>Jibberding 676.5</i>	10,051.44	1,206.45	12.0	20.89	0.21	147.55	11.94
Total						167.55	100.00

*The International Union of Conservation of Nature (IUCN) Reserve Classes 1 to 4 are used as an indicator of areas considered protected under conservation estate.

**The approved mining area from MP 47944, assuming 20ha will be mined from M70/1079 (*Jibberding 125*)

Vegetation Sub-associations Jibberding 125 and Jibberding 676.5 have respective undisturbed remaining areas of 8,648.32ha and 1,206.45ha (Table 7, Government of Western Australia 2019). Both vegetation associations have been depleted by clearing with 8.15% and 12.0% of Vegetation Sub-associations Jibberding 125 and Jibberding 676.5 remaining, respectively. These vegetation sub-associations have a moderate representation within internationally recognised conservation estates (IUCN Reserve Classes 1 to 4, Table 7).

The proposed disturbances associated with the currently approved mining proposal (MP 47944) and the existing disturbance from previous mining proposals was calculated in Section 1.3 as 167.55ha. The total mining area of 167.55ha is considered insignificant when compared to the total area of Lake Goorly of 21,600ha. At the end of mining operations, the salt lake landscape will be restored. From past rehabilitation experience at Lake Goorly, the chenopod - samphire vegetation regrows quickly and the salt lake environment is rapidly restored (Plates 15 to 35). The overall impact from mining on vegetation at Lake Goorly is considered temporary as mined-out areas can be returned to a vegetated landscape similar to the pre-mining condition.

Given the moderate area of disturbance and the rehabilitation of all areas mined, the overall impact on regional vegetation associations from the Operation is thus considered as being minimal and temporary.

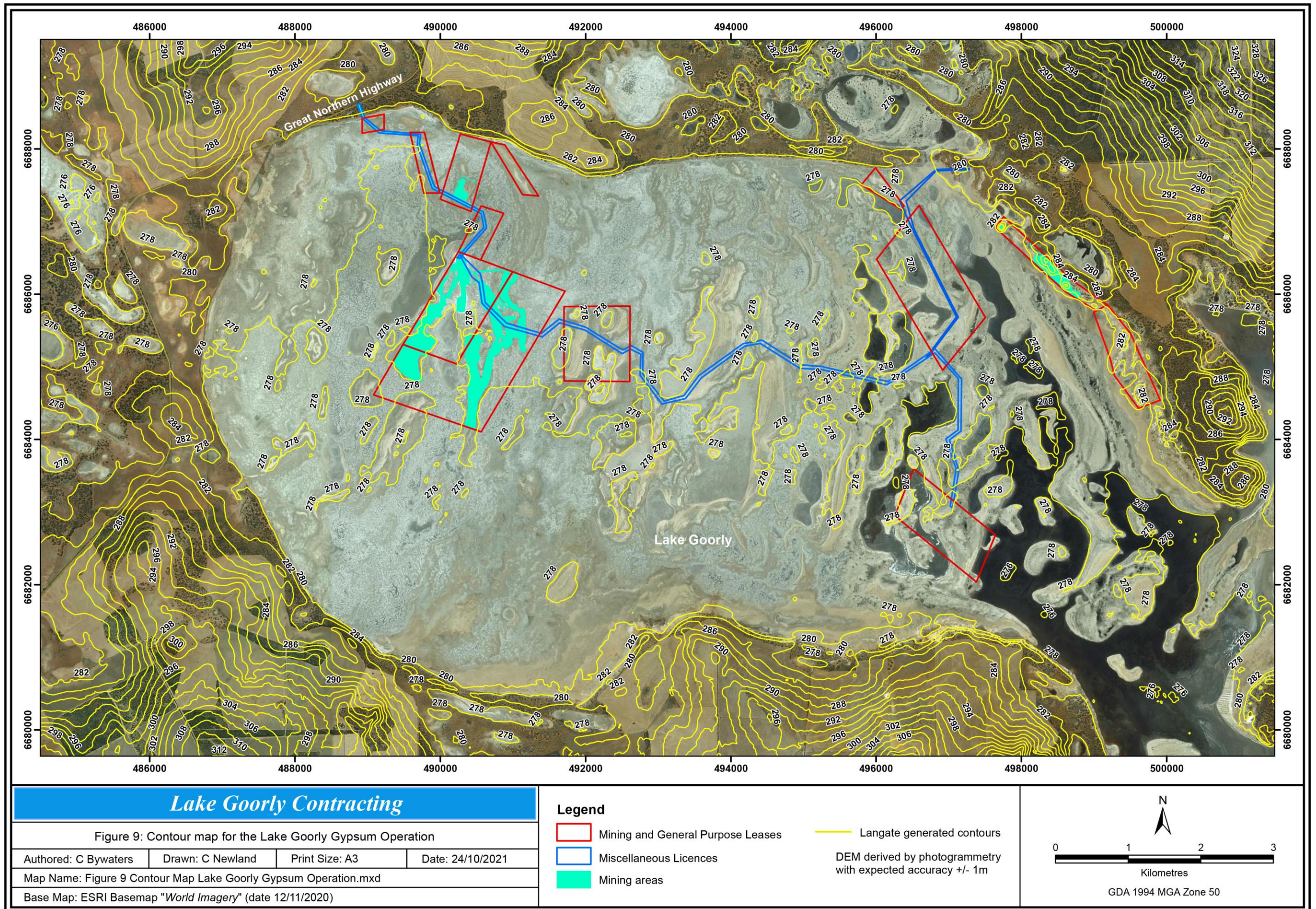


Figure 9: Contour map for the Lake Goorly Gypsum Operation

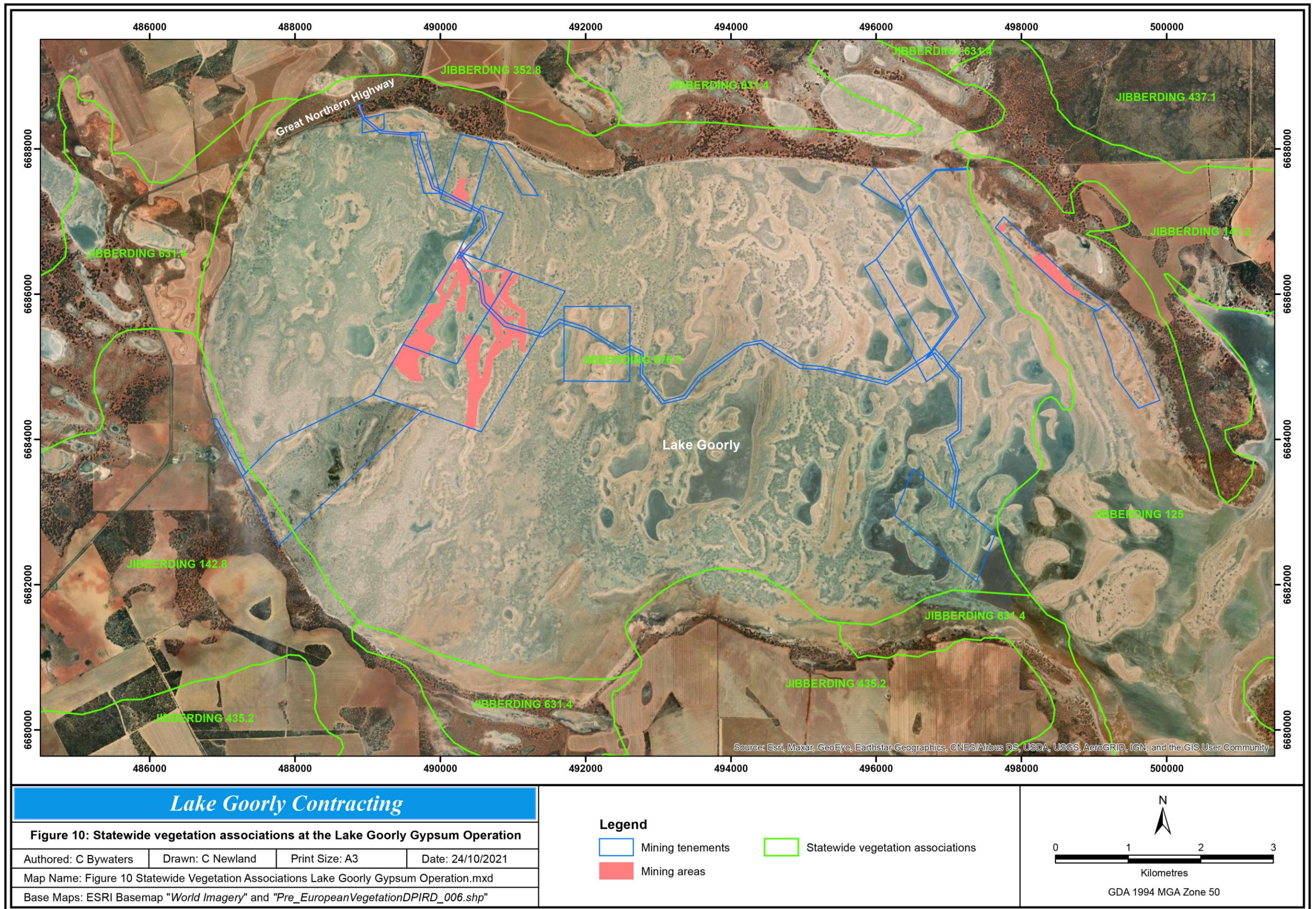


Figure 10: Statewide vegetation associations at the Lake Goorly Gypsum Operation

4.1.5 Hydrology

Hydrological information for Lake Goorly has been partially sourced from the DEC 2008 Report "Resource Condition Report for a Significant Western Australian Wetland: Lake Goorly" (DEC 2008a).

Lake Goorly inundates on an intermittent basis depending on seasonal rainfall. The lakebed alternates from being totally dry to times with total or partially ponding, as part of the inundation and desiccation cycle. Water levels are shallow due to the flat topography. A 30cm water depth was recorded by DEC in 1991 during a wetter period (DEC 2008a).

The following hydrological description of Lake Goorly was provided in the DEC (2008a):

"Lake Goorly is located in the Yarra Monger Catchment within the Yarra Yarra Drainage Basin. It is part of a chain of several thousand ephemeral saltlakes, playas and samphire-covered claypans, that stretch for approximately 300 km and cover an area of 250,000 ha. The major lakes in the system include Nullewa Lake, Weelhamby Lake, Mongers Lake, Lake DeCourey, Lake Hillman and Yarra Yarra Lake, which is the terminal point of the system (Fordyce 2005²).

Due to the flat terrain of the Yarra Yarra system, drainage is generally uncoordinated and each lake has its own internal drainage system (Fordyce 2005; NACC 2005³). In wet years, the lakes overflow along a broad drainage line, ending in Yarra Yarra Lake (NACC 2005). However, in most years surface water does not flow through the system. Instead, it ponds in waterlogged depressions or poorly defined drainage lines, and eventually infiltrates to the groundwater. The system's drainage lines, along with the broad valley floors that host them, are becoming progressively saltier as saline groundwater nears the surface. Across much of the subregion, groundwater is currently within 1-2 m of the surface (Fordyce 2005). It is uncertain if there is a surface or groundwater connection between Yarra Yarra Lake and the Coonderoo River, a tributary of the Moore River. It is believed that during the Eocene Epoch (40 million years ago) the system drained southwards, along the Darling Fault, to discharge through the Brockman River Valley (NACC 2005)." (DEC 2008a)

Being a salt lake system, the salinity at Lake Goorly is high to extreme but varies in relation to recharge and evaporation. DEC (2008a) report salinities varying from 50,000mg/L in 1991 when Lake Goorly had 30cm of water depth to 120,000mg/L in 2008 when surface water levels were shallower (DEC 2008a). At the time of DEC survey in 2008, Lake Goorly had high nitrogen, phosphorous and chlorophyll levels (DEC 2008a). The water quality analysis from the two DEC surveys is provided in Table 8. DEC commented that high concentration of nutrients and chlorophyll in the water were indicative of nutrient enrichment from surrounding agricultural lands (DEC 2008a).

² Fordyce, I. (2005) Final report on Feasibility Study 2003-2005. Yarra Yarra Catchment Management Group and Northern Agricultural Catchments Council Kalannie, Australia.

³ NACC. (2005) Regional Natural Resource Management Strategy: Northern Agricultural Region of Western Australia. Northern Agricultural Catchments Council, Perenjori, Australia.

Table 8: Water quality recorded in Lake Goorly by DEC (Table 2 from DEC 2008a)

Element	DEC August 1991	DEC August 2008
pH	9.69	8.22
Alkalinity (mg/L)	60	70
TDS (g/L)	52	120
Turbidity (NTU)	7.6	44
Colour (TCU)	8	5
Total nitrogen (µg/L)	-	4,200
Total phosphorus (µg /L)	-	280
Total soluble nitrogen (µg /L)	1,400	1,900
Total soluble phosphorus (µg /L)	30	5
Chlorophyll (µg /L)	56	6.5
Na (mg/L)	16,700	53,200
Mg (mg/L)	1,060	4,860
Ca (mg/L)	420	1,400
K (mg/L)	406	1,110
Cl (mg/L)	29,000	77,200
SO ₄ (mg/L)	2,040	9,380
HCO ₃ (mg/L)	73	85
CO ₃ (mg/L)	1	0.5

The underlying hydrogeology at Lake Goorly has salinities in excess of 20,000mg/L (DWER 2020). The aquifer has been described by DWER as surficial sediments and local aquifers of clay, alluvial and lacustrine (DWER 2020). Lake Goorly is contained within the 41,824km² Yarra Monger catchment (DWER 2020). There are no Public Drinking Water Source Areas ('PDWSAs') or other proclaimed groundwater areas in the Lake Goorly region (DWER 2020). The closest PDWSA is the Perenjori Water Reserve located approximately 83km northwest from the Operation (DWER 2020).

There are no major rivers near Lake Goorly. The two major rivers in the region are the Moore River, located approximately 48km southwest, and the Salt River, located approximately 65km to the north of Lake Goorly (Geoscience Australia 2009). As mentioned above, drainage is normally confined to each salt lake system with water either evaporating or infiltrating to groundwater. In wetter years, surface water flows along the chain of lakes ends up in Yarra Yarra Lake. Overland flows from Lake Goorly travel north to Mongers Lake then further north and then west via Lake Nullewa to Yarra Yarra Lake, a total distance of approximately 230km. Yarra Yarra Lake is possibly connected to a tributary of the Moore River.

The gypsum mining operations at Lake Goorly are above the watertable and located in areas of desiccated lakebed. This is a physical mining requirement as wet areas are not minable due to total machine inaccessibility. The mining operations do not require dewatering and no water is required for processing. At the end of operations, the salt lake landscape is restored and from past rehabilitation experience, the chenopod - samphire vegetation quickly regrows.

The overall impact on surface hydrology and groundwater from the Operation is thus considered as being negligible.

4.1.6 Surface Geology

Gypsum or hydrous calcium sulphate ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$) is an evaporite mineral, formed from the evaporation of saturated solutions that are high in the elemental calcium and sulfur. It has a score of 2 on the Mohs scale of mineral hardness.

The underlying geology of the Lake Goorly area was assessed using the Geological Survey of Western Australia ('GSWA') 1:500,000 interpreted bedrock geology spatial dataset (GSWA 2009). Lake Goorly is located in the Yilgarn Craton with underlying granite and mafic intrusive lithology (GSWA 2009).

Lake Goorly is of recent geological origin, formed in the Cainozoic Era in the Quaternary Period. The geomorphology consists of surficial sediments of sand, clay, alluvial and lacustrine.

The Lake Goorly gypsum resource has a uniform grade, consisting of gypsum fines with the occasional oversize particle of agglomerated gypsum in the pebble to cobblestone size range (less than 1% of overall volume).

The Lake Goorly gypsum deposits vary from 0m to 1.5 m in thickness, either from surface or immediately below a kopi layer (surface gypsum with discoloration from impurities). The gypsum deposit is patchy with an average minable depth of 0.6m that can extend to 1.5m. The kopi is between 0.1m and 0.3m in thickness and supports the chenopod - samphire vegetation communities.

4.1.7 Waste Rock and Tailings

There is no waste rock or tailings produced as a result of the Operation. Approximately 10 to 15% of the mined material is screened to produce agricultural gypsum. The oversize from the screening process consists of conglomerated gypsum particles that are added back into the commercial gypsum product line. Thus, all gypsum material excavated is sellable product.

All screening is dry and no chemical processing occurs.

4.1.8 Soils and Topsoil Management

The following description of soils has been taken from DEC's publication 'Resource Condition Report for a Significant Western Australian Wetland: Lake Goorly' (DEC 2008a).

Lake Goorly lies on Quaternary salt lake deposits of lacustrine silt and clay. Soils surrounding the lake consist of alluvial and colluvial deposits (transported clay, sand, lithic fragments) and residual deposits (sand, clay, duricrust). The Yarra Yarra Catchment, within which the lake lies, is a basin that is rimmed with granitic outcrop (Fordyce 2005).

Gradients are extremely low throughout the region, and the distinction between valley floor and valley sides is not always obvious. There is only about 40m fall along the Lake Goorly salt lake chain (Fordyce 2005).

The salt lake environment has resulted in sodic soils with no traditional duplex formation. A layer of kopi that supports the vegetation component overlies the gypsum deposit. The kopi is between 0.1m and 0.3m in thickness. The chenopod and samphire vegetation occurs in a hummock arrangement that facilitates the aeolian accumulations of gypsum and kopi material in each hummock mound. In areas of no kopi formation the clay lakebed is exposed. The mining sites on the LGC Tenements occur outside of regular inundation areas.

Based on the Digital Atlas of Australian Soils (ASRIS 2001), the survey area is contained within a single soil unit (as originally described in Northcote *et al.* 1960 to 1968) as:

- Sv4: Saline valleys and salt lakes-salt-lake channels mostly devoid of true soils, and their fringing areas: common soils are gypseous and saline loams (Um1.1) and (Um1.2) on riverine wash and usually underlain by clayey or sandy strata by about 12 in. Associated are small areas of the soils of the adjacent areas, in particular (Gn2.13, Gn2.12) soils with some (Um5.11), (Gc1.12), and (Gc1.22) soils often underlain by calcrete (kunkar); dunes and lunettes of sandy (Uc) soils such as (Uc1.21); and some patches of (Dr) soils.

Topsoil is removed from all areas to be disturbed. For stockpiling areas and roads, topsoil is removed to a depth of at least 150mm and stockpiled as linear windrows along the edge or verge of the cleared area. The stockpile height is less than 2m. The stored topsoil is clearly excluded from operational areas.

At mining sites, between 200mm to 400mm of topsoil and vegetation is removed and pushed to the edge of the excavation area. The stockpile height is less than 2m. Mined-out areas are progressively rehabilitated using the stockpiled topsoil. The mined-out area is landscaped to natural looking lakebed contours and the topsoil and vegetation windrow is replaced back across the rehabilitated surface. The aim is to rehabilitate areas entirely using topsoil, thus negating the need to use commercially sourced seed. This method of rehabilitation has been extremely successful in the past as the lakebed quickly regenerates to a natural looking environment (refer to Plates 15 to 35).

4.1.9 Acid Mine Drainage and Acid Sulfate Soils

Acid mine drainage ('AMD') is unlikely to be an issue as the material being excavated consists of gypsum that has precipitated from the lakebed and then reformed as surface dunal deposits through aeolian accumulation. There is no fresh rock with sulphidic mineralization being mined at Lake Goorly and hence no source of AMD material.

Acid sulfate soils ('ASS') form when wet or submerged soils containing iron sulphides are exposed to the atmosphere. These soils are commonly associated with wet areas such as mangroves, salt marshes, floodplains, swamps, wetlands, estuaries, and brackish or tidal lakes, particularly in low-lying coastal areas (WAPC 2003). The Lake Goorly environment is

continually being exposed to cycles of inundation and desiccation. Any acidic material in the surface and subsurface layers would have been oxidised some considerable time ago. The proposed Operation is confined to the dry gypsum deposits and is located above the water table. Hence, the deeper anaerobic lakebed sediments will not be exposed by mining operations.

Consequently, acid mine drainage and acid sulfate soil issues are not considered as being applicable to this mining operation.

4.1.10 Flora and Vegetation

The LGC Tenement area has been the subject of three vegetation surveys:

- Fordyce Dr I (2010). Flora and vegetation survey of a gypsum deposit in Lake Goorly, Dalwallinu Shire, M70/1118, M70/1191, M70/1256. Dr Ian Fordyce, January 2010.
- Fordyce Dr I (2011). Vegetation and Flora Survey of Lake Goorly, particularly areas of proposed disturbance with gypsum mining operations on M70/1079, 1114, 1115, 1118, 1191, 1255, 1256, 1257, 1258, 1259, 1272 and E70/3099 and associated special purpose tenements. Dr Ian Fordyce, April 2011.
- Newland Environmental (2013). Flora and Vegetation Survey of M70/1312. Newland Environmental, November 2013.

The three surveys have covered the entire suite of 16 mining tenements that form the Project area as well as the surrounding ground that was under expired exploration licence E70/3099. The surveys were undertaken by senior botanists in general accordance with the Environmental Protection Authority's Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia Guidance Statement No. 51.

The Fordyce reports identified two broad vegetation areas at Lake Goorly, these being:

- Lake Floor – all tenements except M70/1079.
- Lake Margin - M70/1079.

The Newland Environmental report was confined to M70/1313 on the Lake Margin as an extension from M70/1079.

Lake Floor (Fordyce 2010 and 2011 surveys)

The Lake Floor consisted of a single vegetation community, a simple samphire open shrubland, generally 20-30cm tall (Plate 36). Cover is irregular with some parts are almost entirely bare; on most of the sandy (gypsiferous) section, cover varies from <1 to 15%, but is usually <10%. Almost all of the samphire is a distinctive bluish grey variety, previously described as a glaucous variant of *Tecticornia halocnemoides* subsp. *catenulata*, but recently recognised as a species in its own right; *Tecticornia loriae* (Fordyce 2011).

Other less dominant taxa present included *Tecticornia pruinosa*, *T. leptoclada*, *T. peltata*, *T. halocnemoides*, two species of *Frankenia*, the salt-tolerant grass *Eragrostis dielsii*, scattered individuals and occasional clusters of the bluebush *Maireana oppositifolia*, and the saltbushes *Atriplex holocarpa* and *Atriplex nana*. An unusual and regionally uncommon species, which is particularly abundant in the central part of the lake, is the low, multi-stemmed shrub *Lawrenzia chrysoderma* (Fordyce 2011).

Note that no vegetation map for the Lake Floor was provided in the Fordyce reports due to the presence of only one community.

Lake Margin (Fordyce 2011 and Newland Environmental 2013 surveys)

Six vegetation communities were recognised in the Lake Margin on M70/1079, these being:

1. Sheoak (*Casuarina obesa*) open woodland, on tall dunes of pale pinkish brown, gypsiferous sand (Plate 37).
2. Abandoned and partially rehabilitated mining pits, where the gypsum sand has already been removed.
3. Bare (or almost bare) pale sand dunes -- grassy with scattered trees. This unit includes the pale yellow and pale brown gypsum dunes where future mining is planned.
4. Shrubland/woodland and occasional thicket of mixed acacias and *Eremophilas*, on reddish brown, loamy sand or sandy loam (Plate 38).
5. Lake-floor samphire, as described in the previous section. An almost monotypic shrubland/herbland of *Tecticornia loriae* on pale yellow silt, clay and fine-grained sand.
6. Mallee saltbush (*Atriplex stipitata*) with scattered trees, on a single, low, arcuate dune near the northwestern end of the tenement area. The substrate here is a distinctive reddish yellow, medium to coarse-grained, well-sorted, quartz sand.

The vegetation community map from Fordyce (2011) is reproduced as Figure 11.

The Newland Environmental (2013) survey continued on from M70/1079 into M70/1312 using adapted vegetation names from the Fordyce report. The vegetation association map from Newland Environmental (2013) is reproduced as Figure 12.

During the Fordyce (2011) survey, Priority 1 species *Acacia inceana* subsp. *latifolia* (Plate 39) was recorded as a common canopy tree/shrub species in the Vegetation Community 4 'Shrubland/woodland and occasional thicket of mixed *Acacias* and *Eremophilas*'. The mapped extent of this community and the recorded locations of individual *Acacia inceana* subsp. *latifolia* plants are displayed in Figure 13. The 'Shrubland/woodland and occasional thicket of mixed *Acacias* and *Eremophilas*' community extended just inside M70/1079 with the majority of the mapped population occurring to the east of M70/1079 (Figure 13). No *Acacia inceana* subsp. *latifolia* individuals were recorded within M70/1079 or M70/1312 (Fordyce 2011 and Newland Environmental 2013).

Fordyce (2011) remarked:

"The survey described here is the first report that this P1 plant might be more widespread than previously thought. I counted at least 40 individuals within 50 m of the point BY6Q1. By extrapolating this density over apparently similar (air-photo) habitat to the northeast of M70/1079, the total population is estimated at several thousand."

The areas near M70/1079 and M70/1312 where this species was located are outside of the mine impact area (Figure 13). LGC has imposed >50m buffer between any mining operations and the boundary of this population (Figure 13). This exclusion boundary has also been incorporated into the CPS 5955/3 shapefile that has been resupplied to DMIRS along with this clearing permit amendment. The exclusion boundary will be demarcated with flagging or fencing. The existing access track to M70/1079 passes through the population of *Acacia inceana* subsp. *latifolia* (Figure 13). This track is at its required operational width and will not be widened (i.e. no additional clearing required). Care will be taken to ensure that vegetation adjacent to the road windrows is not disturbed during road maintenance grading. It is considered that the mining operation will have no impact on either, individual plants of *Acacia inceana* subsp. *latifolia*, or on the conservation status of this species in general. The

Operation has been designed to avoid all individuals of the Priority 1 species *Acacia inceana* subsp. *latifolia*.

No other conservation significant species were located in the flora surveys covering the Project area.

An updated NatureMap search for conservation listed flora was conducted for this MCP and the results are provided in Appendix G (DBCA 2022). The results centred on 116° 56' 05" E, 29° 57' 48" S with a 10km circular buffer.

Eleven conservation taxa were listed for the search area. The results were the same as discussed in the 2017 MCP with one additional taxon listed: *Gnephosis setifera* (P1). The NatureMap map of the conservation listed taxa is displayed in Appendix G. The 11 conservation taxa are listed in Table 9 with an assessment of their likelihood of occurrence in the Project area and potential impact from mining.

Of the 11 NatureMap conservation listed flora species, five were considered unlikely to occur in the Project area due to a lack of suitable habitat, these being:

- *Eremophila sargentii* (P2).
- *Grevillea granulosa* (P3).
- *Grevillea tenuiloba* (P3).
- *Phebalium brachycalyx* (P3).
- *Psammomoya implexa* (P3).

Five conservation listed flora species were listed with habitat types that had some similarities to those in the Project area (lakebeds, shorelines, saline flats, sand ridges, sandplains etc), these being:

- *Frankenia conferta* (T).
- *Gnephosis setifera* (P1).
- *Grevillea nana* subsp. *abbreviata* (P2).
- *Pododthea pritzelii* (P3).
- *Verticordia mitchelliana* subsp. *mitchelliana* (P4).

However, none of these five species were recorded in either of the Fordyce surveys (Fordyce 2010 and Fordyce 2011), the Newland Environmental survey (Newland Environmental 2013) or the DEC survey (DEC 2008a). It would, therefore, appear that they are not present in the Project area.

One conservation taxon was recorded on the sandy plains near M70/1079 but was not located in the mining lease areas:

- *Acacia inceana* subsp. *latifolia* (P1).

A 50m exclusion buffer has been imposed for all mining areas from the closest recorded locations of *Acacia inceana* subsp. *latifolia* (Figure 13).

In summary, no NatureMap listed conservation flora species were assessed as being likely to be impacted by the Operation.



Plate 36: Typical view of the Lake Floor Sapphire Community (from Fordyce 2011)



Plate 37: She oak (*Casuarina obesa*) open woodland (from Fordyce 2011)



Plate 38: Shrubland/woodland and occasional thicket of mixed *Acacias* and *Eremophilas* (from Fordyce 2011)



Plate 39: *Acacia inceana* subsp. *latifolia* (Priority 1) near M70/1079 (from Fordyce 2011)

4.1.11 Environment Protection and Biodiversity Conservation Act 1999

A Department of the Agriculture, Water and the Environment ('DAWE') Protected Matters Search was conducted centered on the middle of the LGC Tenements (29° 56' 48' S, 116° 56' 05' E) with a 10km buffer (same coordinates as the NatureMap search). The search results are provided in Appendix H and the taxa listed in Table 10. Ten threatened flora species were listed under the *Environment Protection and Biodiversity Conservation Act 1999* ('EPBC Act 1999') for the Lake Goorly search area (DAWE 2022).

An assessment of their likelihood of occurrence in the Project area and potential impact from mining is provided in Table 10. It should be noted that *Frankenia conferta* was the only taxon listed by NatureMap for the same search area (the EPBC Act 1999 search had nine taxa not listed by DBCA). The EPBC Act 1999 search includes areas where habitat is "likely to occur" or "may occur" whereas NatureMap lists only actual recorded locations.

Of the 10 EPBC Act 1999 listed Threatened Flora species, eight were considered unlikely to occur in the Project area due to a lack of suitable habitat (Table 10), these being:

- *Caladenia drakeoides* (Endangered).
- *Dasymalla axillaris* (Critically Endangered).
- *Eremophila nivea* (Endangered).
- *Eremophila viscida* (Endangered).
- *Eucalyptus synandra* (Vulnerable).
- *Grevillea pythara* (Endangered).
- *Gyrostemon reticulatus* (Critically Endangered).
- *Hemiandra gardneri* (Endangered).

Two Threatened Flora species were listed with habitat types that had similarities to those in the Project area (gypsum or white-grey shallow sand over clay, saline flats, lake shorelines, fringing vegetation), these being:

- *Frankenia conferta* (Endangered).
- *Roycea pycnophylloides* (Endangered).

However, these two species were not recorded in either of the Fordyce surveys (Fordyce 2010 and Fordyce 2011), the Newland Environmental survey (Newland Environmental 2013) or the DEC survey (DEC 2008a). It would, therefore, appear that they are not present in the Project area.

In summary, no EPBC Act 1999 listed Threatened Flora species were assessed as being likely to be impacted by the Operation (Tables 9 and 10).

The Project area is within the search extent that contains the Federally listed TEC "*Eucalypt Woodlands of the Western Australian Wheatbelt*" (DAWE 2016). The spatial area of this TEC extends from Ravensthorpe and Mt Barker in the southwest to Mullewa in the Midwest (DAWE 2016). This TEC has the distinctive visual identifier of tall *Eucalyptus* species woodland communities with spreading upper canopy layers. The TEC is not present at Lake Goorly as there are no Eucalypt woodlands (refer to Plates 1 to 35). State listed PECs and TEC are discussed in Section 4.1.12.

Table 9: Conservation taxa listed by NatureMap and likelihood of occurrence in the Project area

Taxon	Status	Habitat Descriptions	Likelihood of Occurrence in the Project Area / Potential Impact from Mining
<i>Acacia inceana</i> subsp. <i>latifolia</i>	P1	Red/brown sandy loam, near samphire salt lakes, roadsides (FloraBase 2021).	The habitat description suggests that this taxon has no particular specificity for gypsum lakebeds and is therefore considered unlikely to occur on the actual Lake Goorly surface. It was recorded during the Fordyce (2011) survey on embankment plains, however, not in the mining tenements. A 50m exclusion buffer has been imposed for all mining areas. <i>Acacia inceana</i> subsp. <i>latifolia</i> individuals will not be impacted by mining operations. Potential Impact: None perceived
<i>Eremophila sargentii</i>	P2	Laterite, sandy loam, sandplains, hills (FloraBase 2021).	Unlikely to occur due to lack of suitable habitat. Potential Impact: None perceived
<i>Frankenia conferta</i>	T*	No habitat description in FloraBase. DAWE describes the preferred habitat as “around the high water mark of lake shorelines to the tops of low mounds within saline pan” (DAWE 2022) and “clay sands with gypsum or white-grey shallow sand over clay around the high water mark of salt lake shorelines, saline pans and localised swales subject to seasonal inundation” (DEC 2008b).	On the basis of preferred habitat preferences, this species could potentially occur in the Project area. However, <i>Frankenia conferta</i> was not recorded in either of the Fordyce surveys (Fordyce 2010 and Fordyce 2011), the Newland Environmental survey (Newland Environmental 2013) or the DEC survey (DEC 2008a). It would, therefore, appear to not be present in the Project area. Potential Impact: None perceived
<i>Gnephosis setifera</i>	P1	Sand, saline flats (FloraBase 2021).	On the basis DBCA habitat preferences, <i>Gnephosis setifera</i> has some potential of occurring in the Project area. This taxon was also not recorded in any of the above four cited surveys. It would, therefore, appear to not be present in the Project area. Potential Impact: None perceived
<i>Grevillea granulosa</i>	P3	Gravelly sand, loam, clay, sandplains (FloraBase 2021).	Unlikely to occur due to lack of suitable habitat. Potential Impact: None perceived
<i>Grevillea nana</i> subsp. <i>abbreviata</i>	P2	Sand, sandy loam (FloraBase 2021).	<i>Grevillea nana</i> subsp. <i>abbreviata</i> was recorded on the road verge near the end of L70/72. Given its habitat preference of sand and

Taxon	Status	Habitat Descriptions	Likelihood of Occurrence in the Project Area / Potential Impact from Mining
			sandy loam, it is considered unlikely to occur on the lakebed itself. This taxon was also not recorded in any of the above four cited surveys. It would, therefore, appear to not be present in the Project area. Potential Impact: None perceived
<i>Grevillea tenuiloba</i>	P3	Sand, clay loam, granite outcrops (FloraBase 2021).	Unlikely to occur due to lack of suitable habitat. Potential Impact: None perceived
<i>Phebalium brachycalyx</i>	P3	Sand, gravelly soils, lateritic uplands, hills (FloraBase 20219).	Unlikely to occur due to lack of suitable habitat. Potential Impact: None perceived
<i>Podotheca pritzelii</i>	P3	Sand, sand ridges in salt flats (FloraBase 2021).	On the basis DBCA habitat preferences, <i>Podotheca pritzelii</i> has minor potential of occurring in the Project area. This taxon was also not recorded in any of the above four cited surveys. It would, therefore, appear to not be present in the Project area. Potential Impact: None perceived
<i>Psammomoya implexa</i>	P3	Stony rises (FloraBase 2021).	Unlikely to occur due to lack of suitable habitat. Potential Impact: None perceived
<i>Verticordia mitchelliana</i> subsp. <i>mitchelliana</i>	P3	No habitat description in FloraBase. The records provided in the Atlas of Living Australia record sandy soils, sandplains or yellow sand as the associated habitat (ALA 2019). The base species <i>Verticordia mitchelliana</i> is recorded on white yellow or red sand, sandplain and salt lakes (FloraBase 2021).	On the basis habitat preferences, <i>Verticordia mitchelliana</i> subsp. <i>mitchelliana</i> has a very minor potential of occurring in the Project area. This visually prominent taxon was also not recorded in any of the above four cited surveys. It would, therefore, appear to not be present in the Project area. Potential Impact: None perceived

*Also EPBC Act 1999 listed, see below.

Table 10: Threatened Flora taxa listed under the *EPBC Act 1999* and likelihood of occurrence in the Project area

Taxon	Status	Habitat Descriptions	Likelihood of Occurrence in the Project Area / Potential Impact from Mining
<i>Caladenia drakeoides</i> (Hinged Dragon Orchid)	Endangered	Confined to seasonally moist rises above salt lakes in tall to medium shrubland dominated by Melaleuca and Acacia species over low shrubs and annuals. Soils are variable but consist mainly of grey sandy loam (DEC 2003a).	Unlikely to occur due to lack of suitable habitat. Potential Impact: None perceived
<i>Dasymalla axillaris</i> (Native Foxglove)	Critically Endangered	Sandy soils and is thought to be a disturbance opportunist as it has only been located in areas of recent disturbance (DAWE 2022).	Unlikely to occur due to lack of suitable habitat. Potential Impact: None perceived
<i>Eremophila nivea</i> (Silky Eremophila)	Endangered	Associated with open York Gum (<i>Eucalyptus loxophleba</i>) woodlands with open scrub, amongst low scrub and introduced grasses, in red-brown sandy loam and lateritic gravel, or in clayey loam near the edge of seasonal creeks (DAWE 2022).	Unlikely to occur due to lack of suitable habitat. Potential Impact: None perceived
<i>Eremophila viscida</i> (Varnish Bush)	Endangered	Brown, sandy-loam or red brown clay-loam soils, in open woodland in association with <i>Eucalyptus loxophleba</i> (York gum) and scrub vegetation (DAWE 2022).	Unlikely to occur due to lack of suitable habitat. Potential Impact: None perceived
<i>Eucalyptus synandra</i> (Jingymia Mallee)	Vulnerable	Sandy, lateritic soils in undulating or flat country with heath and scrub (DAWE 2022).	Unlikely to occur due to lack of suitable habitat. Potential Impact: None perceived
<i>Frankenia conferta</i> (Silky Frankenia)	Endangered	Grows among other halophytic shrubs on clay sands with gypsum or white-grey shallow sand over clay around the high water mark of salt lake shorelines, saline pans and localised swales subject to seasonal inundation (DEC 2008b). <i>Frankenia conferta</i> is discussed in the NatureMap search below.	On the basis of preferred habitat preferences, this species could potentially occur in the Project area. However, <i>Frankenia conferta</i> was not recorded in either of the Fordyce surveys (Fordyce 2010 and Fordyce 2011), the Newland Environmental survey (Newland Environmental 2013) or the DEC survey (DEC 2008a). It would, therefore, appear to not be present in the Project area. Potential Impact: None perceived

Taxon	Status	Habitat Descriptions	Likelihood of Occurrence in the Project Area / Potential Impact from Mining
<i>Grevillea pythara</i> (Pythara Grevillea)	Endangered	Known from one population at Pithara on brown gravelly, sandy loam on a weedy, disturbed road reserve (DAWE 2022).	Unlikely to occur due to lack of suitable habitat. Potential Impact: None perceived
<i>Gyrostemon reticulatus</i> (Net-veined Gyrostemon)	Critically Endangered	Dense shrublands on brown/yellow loamy sand and sloping topography (DAWE 2022).	Unlikely to occur due to lack of suitable habitat. Potential Impact: None perceived
<i>Hemiandra gardneri</i> (Red Snakebush)	Endangered	Deep yellow to yellow-white sand on sandplains and hills (DEC 2004).	Unlikely to occur due to lack of suitable habitat. Potential Impact: None perceived
<i>Roycea pycnophylloides</i> (Saltmat)	Endangered	Shorelines or on slight rises above open saline flats and major drainage channels in white to pale brown sand over sandy clay, either on their own or within nearby fringing vegetation (DEC 2006).	On the basis of preferred habitat preferences, this species could potentially occur in the Project area. However, <i>Roycea pycnophylloides</i> was not recorded in either of the Fordyce surveys (Fordyce 2010 and Fordyce 2011), the Newland Environmental survey (Newland Environmental 2013) or the DEC survey (DEC 2008a). It was also not listed in the NatureMap search. It would, therefore, appear to not be present in the Project area. Potential Impact: None perceived

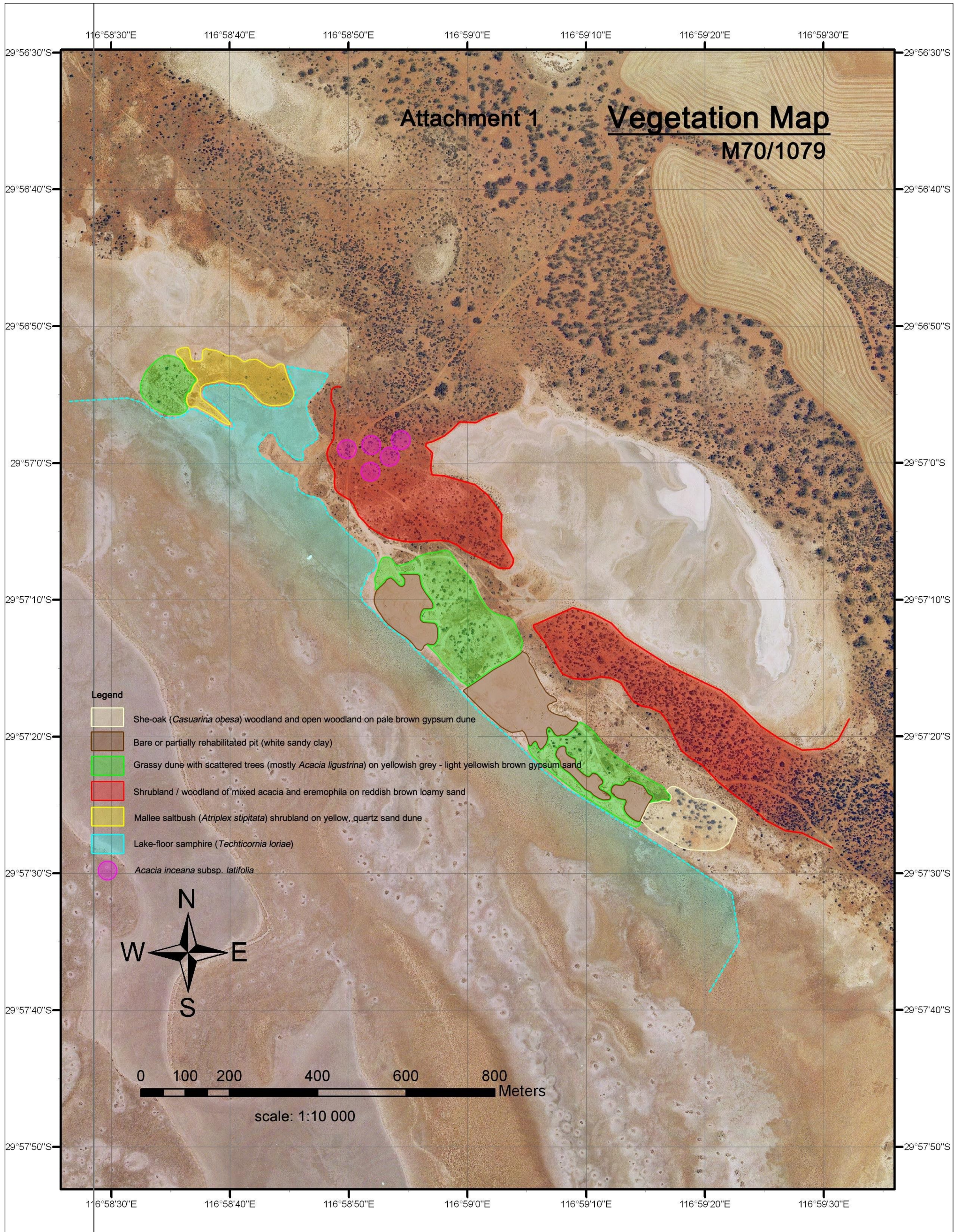


Figure 11: Vegetation communities for the Lake Margin (from Fordyce 2011)

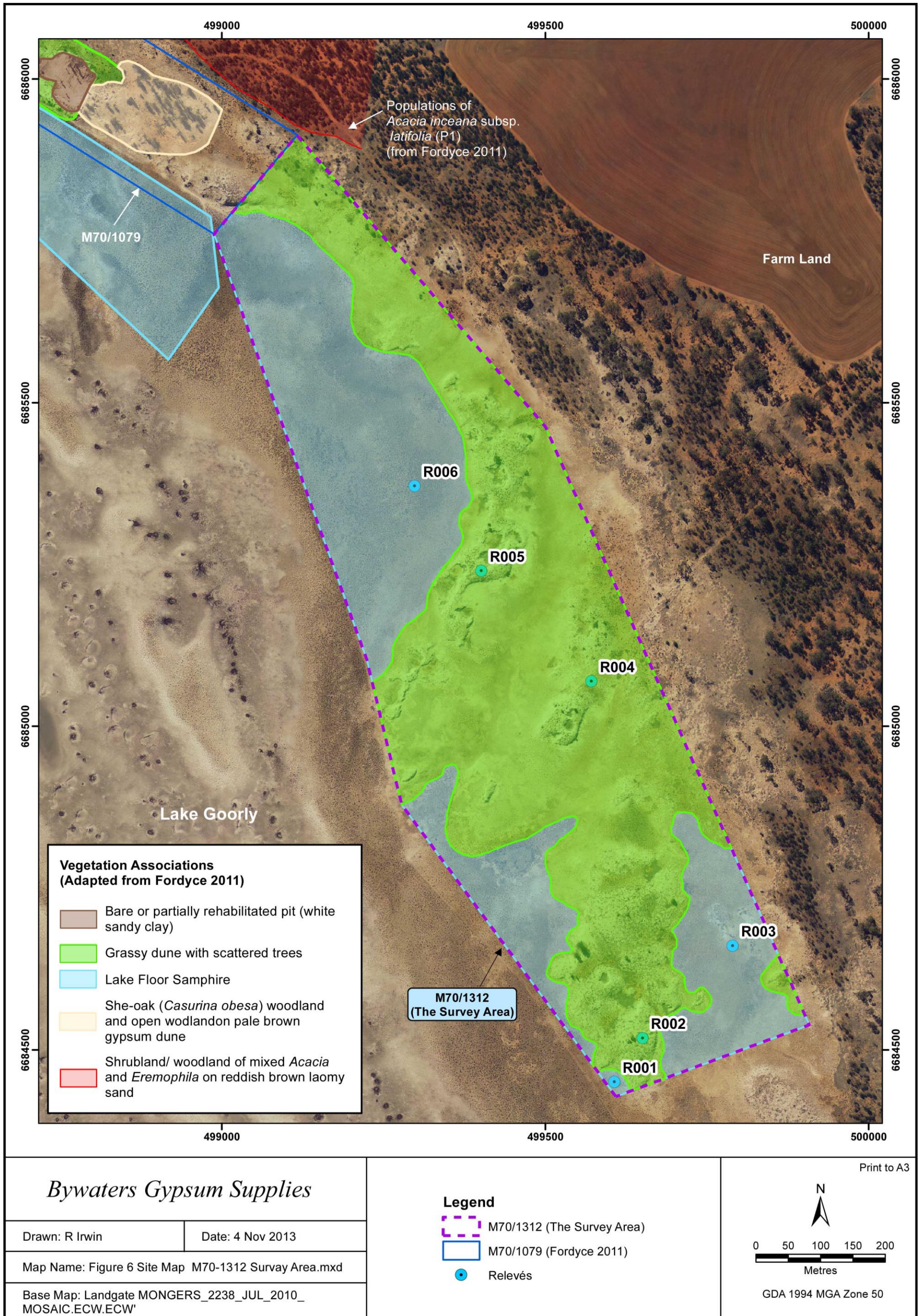
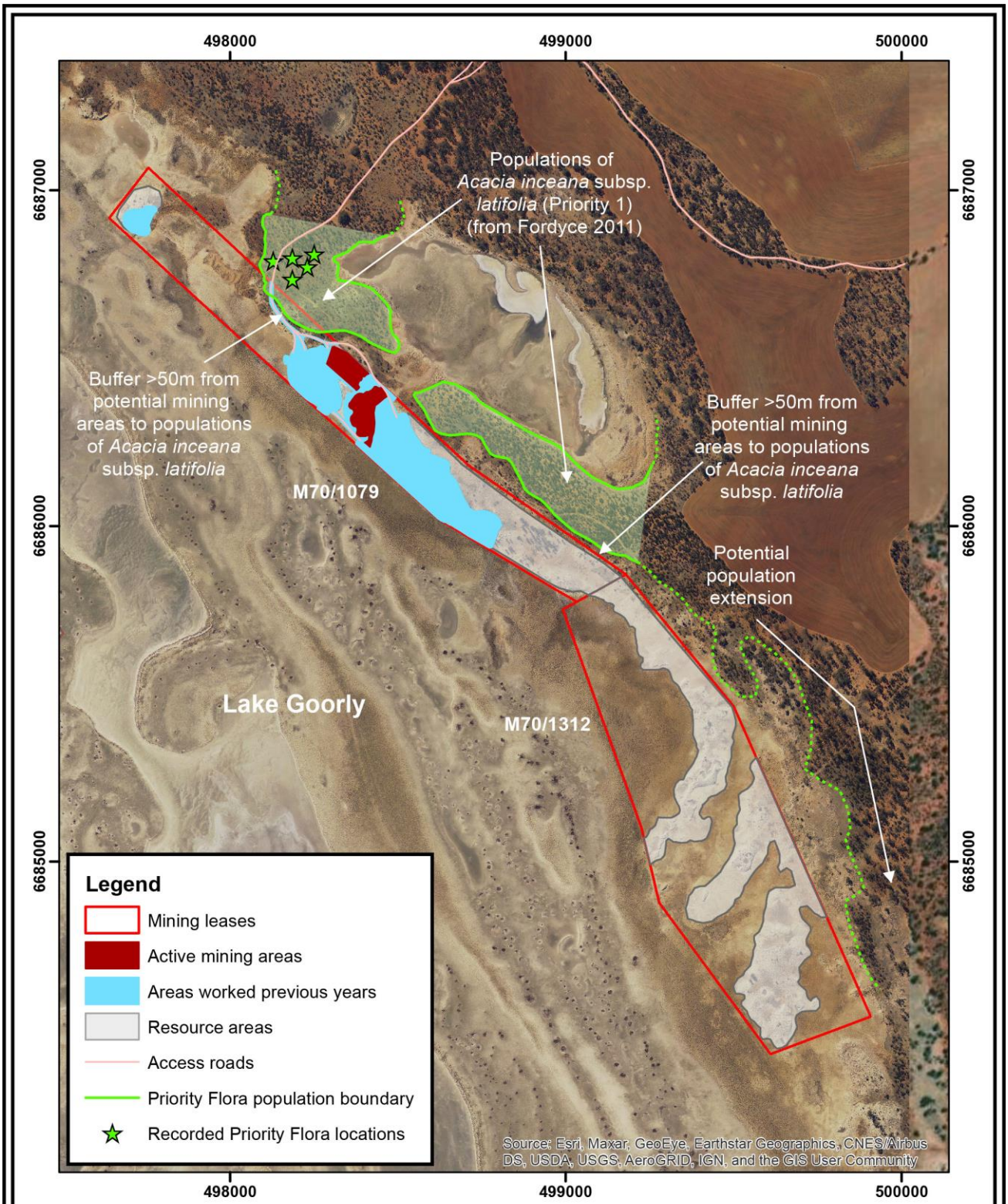


Figure 12: Vegetation Associations for M70/1312 (from Newland Environmental 2013)



Lake Goorly Contracting

Authored: C Bywaters	Date: 25/09/2021
Drawn: C Newland	Print Size: A4
Figure 13 Location Priority Flora Lake Goorly Gypsum Operation.mxd	
Base Map: Landgate extract "MONGERS_2238_JUL_2010_MOSAIC.ECW" over ESRI Basemap "World Imagery"	

Figure 13: Location of Priority Flora at the Lake Goorly Gypsum Operation

N

0 200 400 600

Metres

GDA 1994 MGA Zone 50

Figure 13: Location of Priority Flora at the Lake Goorly Gypsum Operation

4.1.12 Conservation Areas

Significant conservation areas within Western Australia include National Parks, Nature Reserves, TEC's, 'PEC's, Environmentally Sensitive Area ('ESA's), Schedule 1 (Non-permitted) Areas (land clearing legislation) and other types of DBCA managed lands.

The proximity of conservation areas in relation to the Operation was assessed using various datasets:

- ArcGIS shapefiles downloaded from Data WA for Land Clearing Regulations Schedule 1 Areas, ESA's, Ramsar Sites and DBCA Managed Lands (Data WA 2022a).
- Data WA WMS layer "Threatened Ecological Communities (DBCA-038)" (Data WA 2022b).
- Protected Matters Search Tool (Section 4.1.11, Appendix H).
- TEC listings for the Pilbara (DBCA 2018).
- PEC listings for the Pilbara (DBCA 2021).
- Tengraph (DMIRS 2022b).

In summary:

- The Project area is within the search extent that contains the Federally listed TEC "*Eucalypt Woodlands of the Western Australian Wheatbelt*" (DAWE 2016). As discussed in Section 4.1.11, this TEC is not present at Lake Goorly as there are no Eucalypt Woodlands. The vegetation types found in the LGC Tenements are described in Section 4.1.10.
- There are no state listed TECs near Lake Goorly. One PEC could possibly occur, as discussed in Section 4.1.13.
- The Lake Goorly area is contained within the non-exempt Schedule 1 Area for the Southwest Region. Hence, an NVCP is required for all mining activities involving the clearing of native vegetation.
- A large ESA/Register of National Estate called 'Site 18161 White Wells Vacant Crown Land' occurs approximately 2.1km north of the northern-most tenement (M70/1256). This site is also heritage listed as a 'White Wells Vacant Crown Land Place No 12410' by the Heritage Council of WA. There are no activities associated with the Operation that will occur anywhere near the White Wells Vacant Crown
- There are no DBCA managed lands occurring at Lake Goorly. The Lake Goorly region does have various conservation estates. The closest conservation estates are the Jibberding Nature Reserve located approximately 6km west-southwest from M70/1191 and the East Nugadong Nature Reserve located approximately 22km south from M70/1191. There are no National Parks near Lake Goorly.
- There are no PWDSAs near Lake Goorly. The closest PDWSA is the Perenjori Water Reserve located approximately 85km to the northwest.
- There are no EPA Red Book Areas near Lake Goorly. The closest EPA Red Book Area is the located approximately 27km to the west.
- Lake Goorly is not listed as a Ramsar Wetland or a Nationally Important Wetland (Environment Australia 2001). It is, however, considered to be a significant wetland by DEC (DEC 2008a). The level of conservation value is hard to ascertain as this is not specifically stated in the DEC report on Lake Goorly (DEC 2008a). The

importance of Lake Goorly appears to be ecologically based as it is one of the largest salt lakes in the 2000+ chain of salt lakes and saline claypans that extends from Yarra Yarra Lake to Nullewa Lake to Lake Weelhamby to Mongers Lake to Lake Goorly to Lake De Courcy to Lake Hillman and across to Lake Moore. This chain of lakes also forms an important mythological site known as Mongers Lake Waterway (Site ID 24380). Mongers Lake Waterway is discussed further in Section 1.7.

On the basis of no specific conservation rating from DBCA and its mythological importance, the conservation value of the Lake Goorly is therefore assumed as being moderately high. LGC realises that it is their responsibility as temporary stewards to ensure that their gypsum mining operations are conducted in such a manner as to have negligible impact on the conservation and mythological values of Lake Goorly. To this end, the mining footprint is minimal and all areas disturbed are restored to an original looking chenopod sapphire landscape. The Operation is thus viewed as creating a temporary surface disturbance.

4.1.13 Threatened Ecological Communities and Priority Ecological Communities

Spatial data from the Data WA WMS server for the location of TEC’s and PEC’s in the Lake Goorly region is displayed in Figure 14. From Figure 14, it can be seen that the district contains numerous TECs and few PECs. However, there are no TECs or PECs overlapping with the LGC Tenements (Figure 14).

The current DBCA descriptions for TEC’s and PEC’s were examined for communities that could occur locally and for similarities to the communities recorded in the flora surveys at Lake Goorly (DBCA 2018 and DBCA 2021). The Wheatbelt PECs numbers 20 and 22 were considered as occurring in the local area.

The Federally listed Eucalypt Woodlands of the Western Australian Wheatbelt (as discussed in Section 4.1.11) has a dual listing as Wheatbelt PEC 20. The DBCA description is provided below:

Wheatbelt PEC No 20	Category (WA)	Category EPBC Act
<p>Assemblages of gypsum dunes of the central and southern wheatbelt</p> <p>The community occurs in the IBRA Avon Wheatbelt 1 and 2 and Western Mallee subregions. It also includes outlying patches in the eastern parts of JAF01 Northern Jarrah Forests and JAF02 Jarrah Forests adjacent to the Avon Wheatbelt, that are off the Darling Range, and receive less than 600 mm mean annual rainfall. The structure of the ecological community is a woodland in which the minimum crown cover of the tree canopy in a mature woodland is 10%. The key dominant or co-dominant species of the tree canopy are species of Eucalyptus trees that typically have a single trunk. Native understorey is present but is of variable composition, being a combination of grasses, other herbs and shrubs.</p> <p>The description, area and condition thresholds that apply to the EPBC-listed TEC of the same name, also apply to this Priority ecological community.</p>	<p>Priority 3(iii)</p>	<p>No listing</p>

As mentioned previously, the Operation occurs on lakebed and fringing gypsum dunes are completely devoid of large trees or woodlands. This PEC and the synonymous Federal TEC are thus not present on site. The Operation is therefore unlikely to have any impact on the Eucalypt woodlands of the Western Australian Wheatbelt.

Wheatbelt PEC No 22 is associated with gypsum dunes and could thus be relevant to M70/1079. The DBCA description is provided below:

Wheatbelt PEC No 22	Category (WA)	Category EPBC Act
<p>Assemblages of gypsum dunes of the central and southern wheatbelt</p> <p>The community occurs on gypsum dunes that vary from 0.25m to 20m or more but most are only a few meters high. The dunes extend around the southern and eastern shores of salt lakes. Dunes vary in composition with clay, sand, gypsum and other materials occurring in various mixtures, and layering of gypsum and other components can also be found. The nature and composition of soil bearing gypsum is likely to be unique to a site. Most of the flora are gypsovags i.e. species also recorded widely on other soil types, probably migrants from adjacent plant communities however some occurrences include flora that are gypsophiles that are substantially confined to gypsum substrates. A range of genera and species including <i>Eucalyptus</i>, <i>Melaleuca</i>, <i>Callitris</i>, <i>Actinostrobus</i>, <i>Allocasuarina</i> and <i>Casuarina obesa</i>, and <i>Chenopodiaceae</i>, grasses and a wide range of other shrubs and perennial herbs occur in the community. Typical flora are from the genera <i>Atriplex</i>, <i>Austrostipa</i>, <i>Callitris</i>, <i>Casuarina</i>, <i>Eucalyptus</i>, <i>Melaleuca</i>, <i>Darwinia</i>, <i>Rhagodia</i>, <i>Lawrencina</i>, <i>Maireana</i> and <i>Leucopogon</i>. Some of these are less tolerant of salt and waterlogging but species such as <i>Tecticornias</i> and <i>Dysphyma crassifolia</i> may be present.</p> <p>Threats: Gypsum mining and associated altered hydrology, and secondary salinity</p>	<p>Priority 3(iii)</p>	<p>No listing</p>

The description of PEC 22 specifies a location in the “central and southern wheatbelt”. On the basis of geomorphology, landscape position and common floristic species, the gypsum dunes within M70/1079 could possibly represent Wheatbelt PEC 22, however, the location in the northeastern Wheatbelt is inconsistent with DBCA’s description.

Gypsum dunes are quite common at the edge of salt lakes in the Western Australia. Gypsum is precipitated from the lakebed surface and then windblown into dune formations along the shoreline. The gypsum dunes formations have been mapped by GSWA with spatial data provided in the “Surface geology of Australia 1:1,000,000 scale, Western Australia”, available from GSWA (DMIRS Data and Software Centre) (Stewart *et al.* 2008). Figure 15 displays the formation layer called “*lunette dunes 72955*” with a description of “*Quartz and gypsum dunes and mounds (kopi); may include minor silt, sand, gravel, and clay flats adjacent to playas; locally includes some playa sediments*”. The “*lunette dunes 72955*” shapefile when loaded into Google Earth Pro or ESRI World Imagery corresponds spatially to the dunes formations that fringe salt lakes, an example of which is shown in Figure 16.

Figure 15 also displays the Wheatbelt region in relation to the lunette dunes. Information on the area of GSWA mapped lunette dunes in Western Australia and their extent within the Wheatbelt is provided in Table 11.

Table 11: Information on the areas of lunette dunes in Western Australia and their extent within the Wheatbelt

GSWA mapped "lunette dunes 72955" in Western Australia (ha)	Wheatbelt subset of "lunette dunes 72955" (ha)	Potential PEC 22 dunes visible in the Lake Goorly region (northeastern Wheatbelt) on the ESRI ortho-basemap. (northeastern (ha)	Unmined gypsum dune within M70/1079 (ha)
4,792,619.18	592,315.88	>8,000	5.56

Note: Areas were calculated using ArcGIS.

From GPS site mapping and using ArcGIS, there is approximately 5.56ha of unmined gypsum dune within M70/1079. Wooded dune systems at the edge of salt lakes are easily identifiable on the ESRI ortho-basemap. From a partial and preliminary GIS mapping of possible PEC 22 areas within the salt lake systems in the northeastern Wheatbelt, it is estimated that there is >8,000ha of this landform visible on the ESRI ortho-basemap in the Lake Goorly region. The area of gypsum dune within M70/1079 (irrespective of whether it is PEC 22 or not) represents <0.07% of the lake-fringing dunes that are visible on the ESRI ortho-basemap for the northeastern Wheatbelt. The continued gypsum mining within M70/1079 is therefore considered as being highly unlikely to have any impact on the conservation status of PEC 22 (assuming it actually occurs at Lake Goorly).

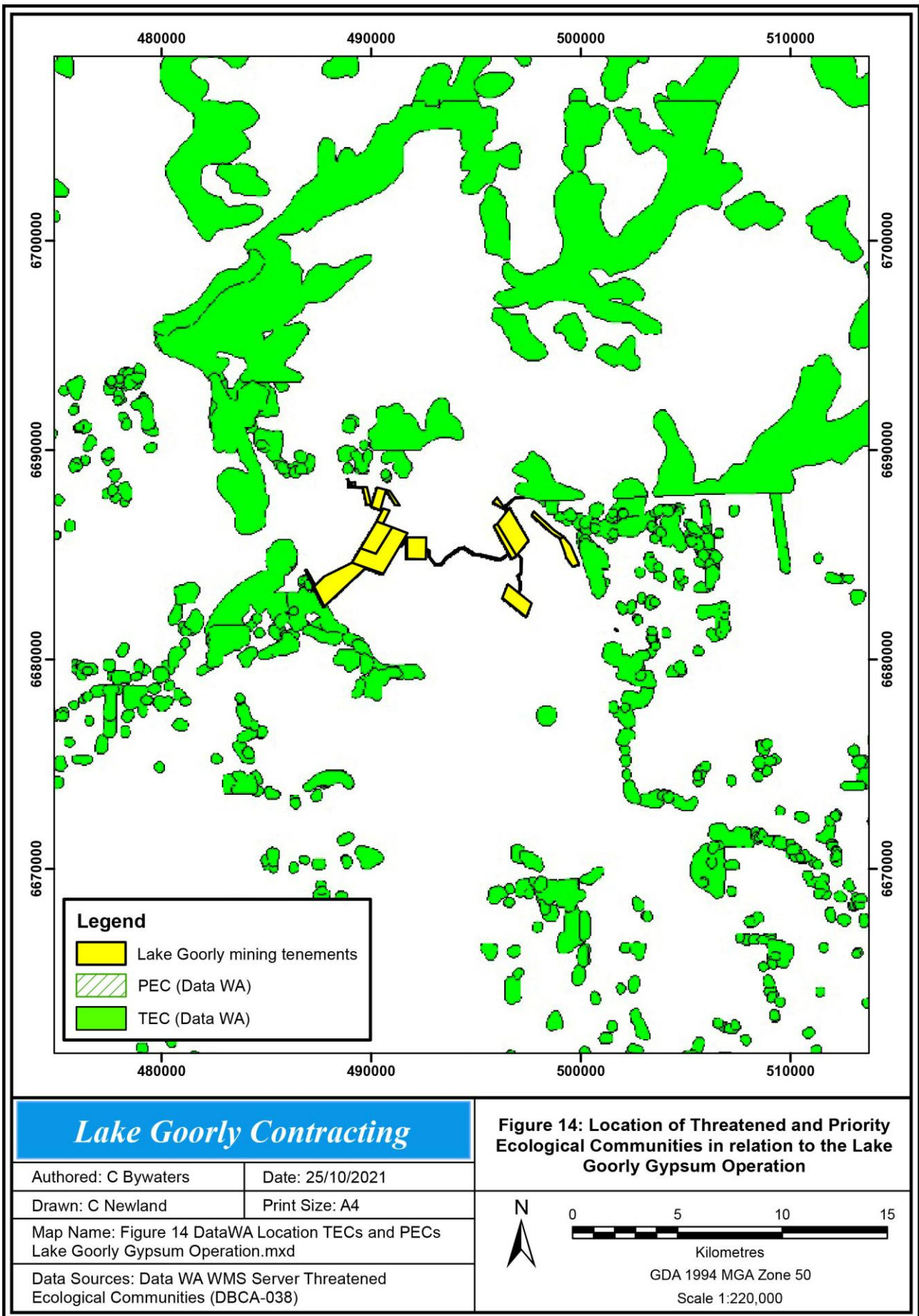
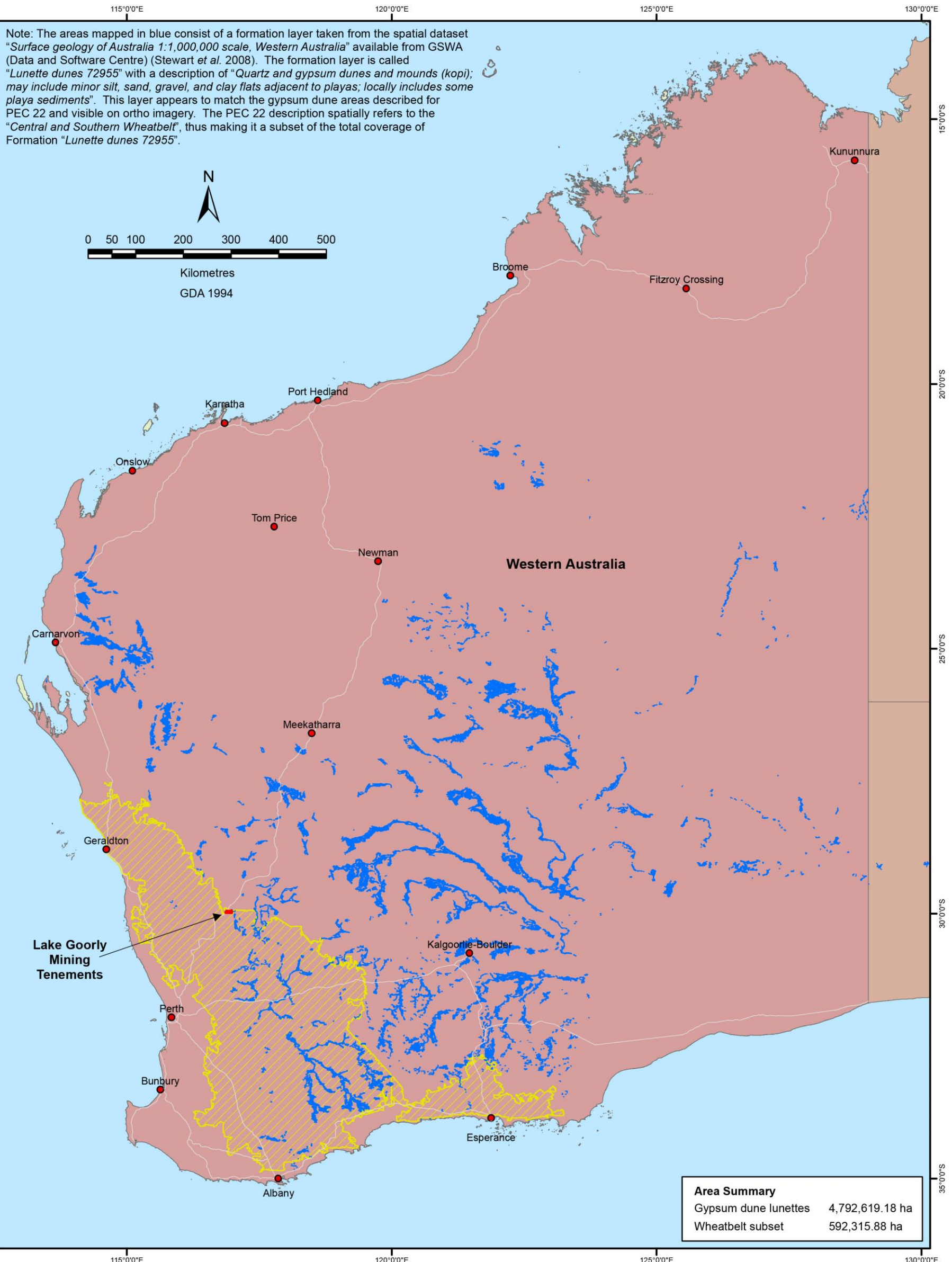


Figure 14: Location of Threatened and Priority Ecological Communities in relation to the Lake Goorly Gypsum Operation



Note: The areas mapped in blue consist of a formation layer taken from the spatial dataset "Surface geology of Australia 1:1,000,000 scale, Western Australia" available from GSWA (Data and Software Centre) (Stewart et al. 2008). The formation layer is called "Lunette dunes 72955" with a description of "Quartz and gypsum dunes and mounds (kopi); may include minor silt, sand, gravel, and clay flats adjacent to playas; locally includes some playa sediments". This layer appears to match the gypsum dune areas described for PEC 22 and visible on ortho imagery. The PEC 22 description spatially refers to the "Central and Southern Wheatbelt", thus making it a subset of the total coverage of Formation "Lunette dunes 72955".

Area Summary	
Gypsum dune lunettes	4,792,619.18 ha
Wheatbelt subset	592,315.88 ha

Lake Goorly Contracting	
Drawn: C Newland	Date: 04/02/2022
Authored: C Bywaters	Print Size: A3
Map Name: Figure 15 Location GSWA Mapped Gypsum Dune Lunettes.mxd	
Spatial Data: GSWA Surface geology of Western Australia "WA_SGP_1M.shp", extract "Formation: lunette dunes 72955" and DPIRD Wheatbelt boundary of Western Australia "WheatbeltofWADPIRD_024.shp"	

Figure 15: Location of GSWA mapped gypsum dune lunettes

Legend

- Gypsum dune lunettes (GSWA)
- Wheatbelt (DPIRD)
- Highways
- Major towns

Figure 15: Location GSWA mapped gypsum dune lunettes

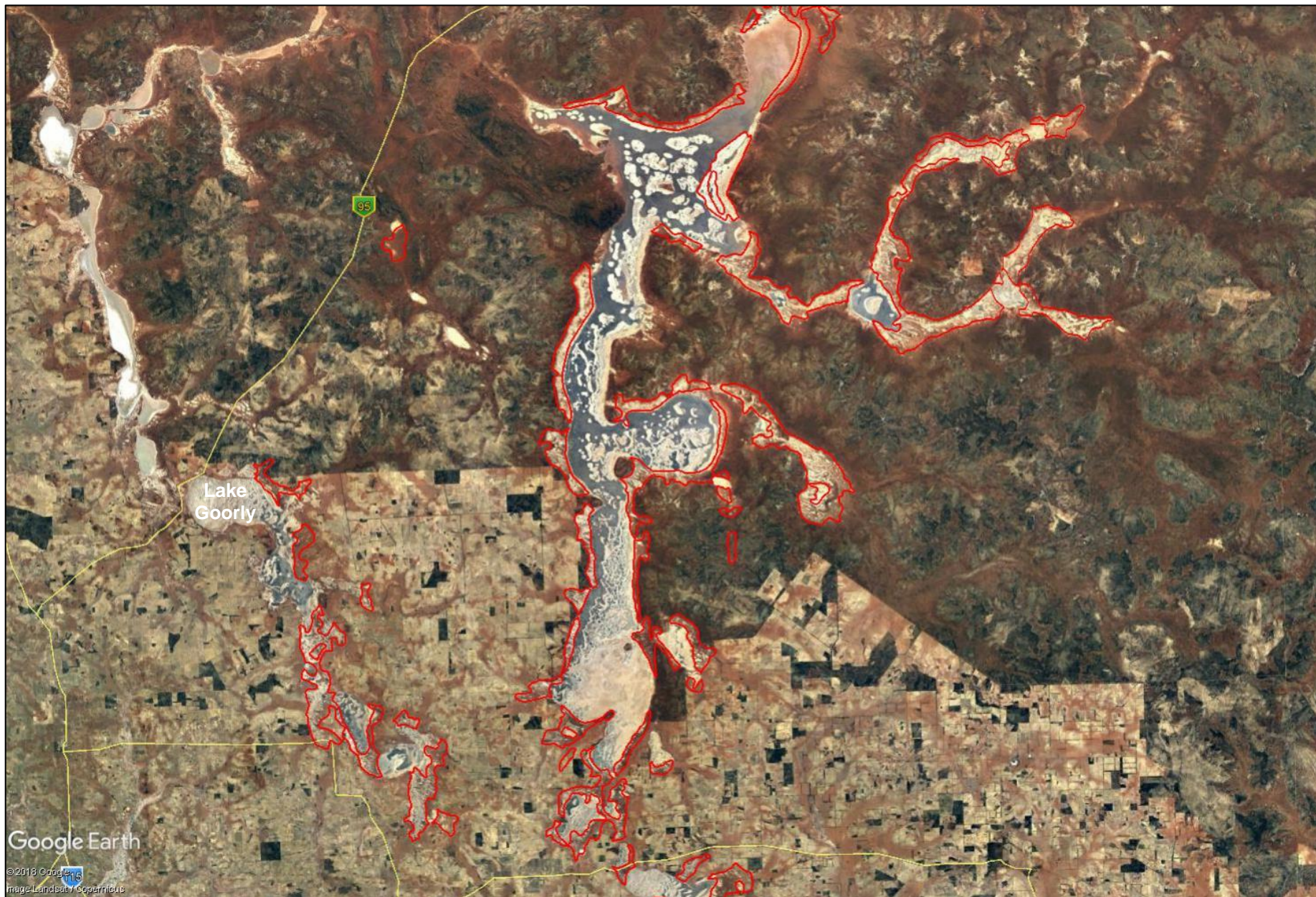


Figure 16: The “*Lunette dunes 72955*” shapefile loaded into Google Earth Pro (Lake Goorly locality)

4.1.14 Fauna Assessment

An assessment was conducted of the types of fauna communities occurring at Lake Goorly and the potential impacts on conservation significant fauna from the Operation in the 2017 MCP. The assessment involved:

- Reviewing a DEC report biological assessment entitled 'Resource Condition Report for a Significant Western Australian Wetland, Lake Goorly' (DEC 2008a).
- An EPBC Act 1999 search for threatened fauna species.
- A Nature Map Search undertaken for conservation listed fauna.
- Assessment of the potential impact from the proposed mining operations on conservation significant fauna that could potentially occur in the Lake Goorly area.

This MCP has been updated with current EPBC Act 1999 and NatureMap and searches, Appendices G and I, respectively.

DEC Report for Lake Goorly

A fauna assessment of Lake Goorly was conducted by DEC in 2008 as part of the Lake Goorly resource condition study (DEC 2008a). This fauna component of the study assessed aquatic invertebrates, fish, waterbirds and terrestrial vertebrates (DEC 2008a).

A summary from DEC (2008a) is provided below:

Aquatic Invertebrates

Lake Goorly is a primary salt lake, a characteristic of which is a naturally low diversity. In two studies referred to in DEC (2008a), the aquatic invertebrate species count was 15 in 1991 and 4 in 2008 (Table 12). The decrease in invertebrate numbers between the two studies was attributable to the natural cycle of increasing salinities as water levels become shallower in dryer seasons. The two groups of fauna recorded were crustaceans and insects. Interestingly, a different suite of species were found between each survey, reflecting the current environmental conditions. DEC commented that "All species recorded from Lake Goorly are widespread species" (DEC 2008a).

Table 12: Aquatic invertebrate species identified from Lake Goorly in 1991 and 2008 (taken from Table 7 in DEC 2008a)

Class	Order	Family	Taxa (to identifiable level)	Survey	
				1991	2008
Crustacea	Anostraca	Branchiopodidae	<i>Parartemia informis</i>	Y	
Crustacea	Anostraca	Branchiopodidae	<i>Parartemia</i> sp.		Y
Crustacea	Cladocera	Chydoridae	<i>Chydoridae</i> sp	Y	
Crustacea	Cladocera	Daphniidae	<i>Daphniopsis truncata</i>	Y	
Crustacea	Ostracoda	Cyprididae	<i>Australocypris insularis</i>	Y	
Crustacea	Ostracoda	Cyprididae	<i>Diacypris compacta</i>	Y	

Class	Order	Family	Taxa (to identifiable level)	Survey	
				1991	2008
Crustacea	Ostracoda	Cyprididae	<i>Platycypris baueri</i>	Y	
Crustacea	Isopoda	Oniscidae	<i>Haloniscus searlei</i>	Y	
Insecta	Coleoptera	Dytiscidae	<i>Necterosoma penicillatus</i>	Y	
Insecta	Coleoptera	Hydrophilidae	<i>Berosus munitipennis</i>	Y	
Insecta	Coleoptera	Staphylinidae	<i>Staphylinidae</i> sp		Y
Insecta	Diptera	Diptera	<i>Diptera</i> sp	Y	
Insecta	Diptera	Ceratopogonidae	<i>Monohelea</i> sp. 3 (SAP)	Y	
Insecta	Diptera	Tabanidae	<i>Tabanidae</i> sp	Y	
Insecta	Diptera	Ephydriidae	<i>Ephydriidae</i> sp		Y
Insecta	Diptera	Chironomidae	<i>Chironomidae</i> sp		Y
Insecta	Diptera	Chironomidae	<i>Procladius paludicola</i>	Y	
Insecta	Diptera	Chironomidae	<i>Tanytarsus fuscithorax/semibarbitarsus</i>	Y	
Total				15	4

Fish

No fish were observed in either survey and DEC reported that there were no previous records of fish in Lake Goorly (DEC 2008a).

Water Birds

A total of 11 water bird species were recorded at Lake Goorly in the 1999 Salinity Action Plan Wetland Biological Survey and the 2008 DEC survey (DEC 2008a) (Table 13). Six of these species have conservation listings; these being:

- *Gelochelidon nilotica* (Gull-billed Tern) - EPBC Act 1999 Marine and Migratory.
- *Thinornis ruficapillus* (Hooded Plover) - DBCA Priority 4, EPBC Act 1999 Marine.
- *Charadrius ruficapillus* (Red-capped Plover) - EPBC Act 1999 Marine.
- *Recurvirostra novaehollandiae* (Red-necked Avocet) - EPBC Act Marine.
- *Larus novae-hollandiae* (Silver Gull) - EPBC Act Marine.
- *Chlidonias hybridus* (Whiskered Tern) - EPBC Act Marine.

The above species have been included in the fauna impact assessment provided in Table 14.

DEC commented that Lake Goorly had a low waterbird diversity that was possibly due to the lack of mid and upper story vegetation (DEC 2008a). The littoral vegetation is primarily

composed of a low chenopod-samphire shrubland which lacks waterbird roosting and breeding habitat. Predation by foxes was suggested as another reason for low diversity (DEC 2008a).

Table 13: Waterbirds recorded at Lake Goorly by DEC (2008a)

Species Name	Common Name	DEC Survey		Conservation Listings
		1999	2008	
<i>Anas rhynchotis</i>	Australasian Shoveler	Y		
<i>Tadorna tadornoides</i>	Australian Shelduck	Y	Y	
<i>Cladorhynchus leucocephalus</i>	Banded Stilt	Y		
<i>Anas gracilis</i>	Grey Teal	Y		
<i>Gelochelidon nilotica</i>	Gull-billed Tern	Y		EPBC Act 1999 Marine
<i>Thinornis rubricollis</i>	Hooded Plover	Y		DBCA Priority 4 EPBC Act 1999 Marine
<i>Charadrius ruficapillus</i>	Red-capped Plover	Y		EPBC Act 1999 Marine
<i>Recurvirostra novaehollandiae</i>	Red-necked Avocet	Y	Y	EPBC Act 1999 Marine
<i>Larus novaehollandiae</i>	Silver Gull	Y		EPBC Act 1999 Marine
<i>Egretta novaehollandiae</i>	White-faced Heron	Y		
<i>Chlidonias hybridus</i>	Whiskered Tern	Y		EPBC Act 1999 Marine
Total		11	2	

Terrestrial Vertebrates

DEC (2008a) reported that there was no evidence of vertebrate fauna observed during the surveys and also that the WA Museum has no fauna records for within 5km of Lake Goorly (DEC 2008a).

EPBC Act 1999 Search

The EPBC Act 1999 search results are provided in Appendix H. Eight threatened fauna species were listed:

- *Calidris ferruginea* (Curlew Sandpiper) – EPBC Act 1999 Critically Endangered.
- *Falco hypoleucos* (Grey Falcon) - EPBC Act 1999 Vulnerable.
- *Leipoa ocellata* (Malleefowl) - EPBC Act 1999 Vulnerable.
- *Pezoporus occidentalis* (Night Parrot) - EPBC Act 1999 Endangered.

- *Rostratula australis* (Australian Painted Snipe) - EPBC Act 1999 Endangered.
- *Dasyurus geoffroyi* (Western Quoll) - EPBC Act 1999 Vulnerable.
- *Idiosoma nigrum* (Shield-backed Trapdoor Spider) - EPBC Act 1999 Vulnerable.
- *Egernia stokesii badia* (Western Spiny-tailed Skink) – EPBC Act 1999 Endangered.

There were six Listed Migratory Species and 11 Listed Marine Species in the EPBC Act 1999 search, consisting of:

- *Calidris ferruginea* (Curlew Sandpiper) - EPBC Act 1999 Critically Endangered, Marine and Migratory.
- *Rostratula australis* or *benghalensis* (Australian Painted Snipe) - EPBC Act 1999 Endangered and Marine.
- *Apus pacificus* (Fork-tailed Swift) - EPBC Act 1999 Marine and Migratory.
- *Motacilla cinerea* (Grey Wagtail) - EPBC Act 1999 Marine and Migratory.
- *Actitis hypoleucos* (Common Sandpiper) - EPBC Act 1999 Marine and Migratory.
- *Calidris acuminata* (Sharp-tailed Sandpiper) - EPBC Act 1999 Marine and Migratory.
- *Calidris melanotos* (Pectoral Sandpiper) - EPBC Act 1999 Marine and Migratory.
- *Ardea ibis* (Cattle Egret) - EPBC Act 1999 Marine.
- *Chalcites osculans* (Black-eared Cuckoo) - EPBC Act 1999 Marine.
- *Merops ornatus* (Rainbow Bee-eater) - EPBC Act 1999 Marine.
- *Thinornis rubricollis* (Hooded Plover) - EPBC Act 1999 Marine.

NatureMap Conservation Listed Fauna

The results of the updated search using NatureMap for conservation listed fauna are provided in Appendix I. The results centred on 116° 56' 05" E, 29° 57' 48" S with a 10km circular buffer. Six conservation fauna were listed for the search area:

- *Actitis hypoleucos* (Common Sandpiper) – International Agreement.
- *Calidris ferruginea* (Curlew Sandpiper) - Threatened.
- *Calidris ruficollis* (Red-necked Stint) – International Agreement.
- *Gelochelidon nilotica* (Gull-billed Tern) – International Agreement.
- *Leipoa ocellata* (Malleefowl) - Threatened.
- *Thinornis rubricollis* (Hooded Plover, Hooded Dotterel) – Priority 4.

The combined State and Federally listed conservation fauna are provided in Table 14 along with an assessment of which conservation significant fauna could potentially occur at the Operation area and potential impact from mining operations.

Impact on Conservation Listed Fauna

Twenty three conservation listed fauna were assessed in Table 14. The assessment outcome was that the Operation was unlikely to have any significant impact on conservation listed fauna on the basis that:

- Avoidance of Wetland Habitat: Although many of the conservation significant fauna have potential of occurring at Lake Goorly, most of the avifauna species are associated with inundated areas (following rainfall). Mining operations avoid the inundated and ponded areas.
- Mobility: Most of the conservation significant fauna identified as potentially occurring at Lake Goorly have the ability to egress from areas being disturbed by the mining activities.
- Minimal Disturbance Area: The area of mining disturbance associated with the Operation is considered minimal in relation to the broad distribution of these species and the availability of suitable habitat elsewhere (locally, regionally, nationally or globally).
- No Direct Impact: No conservation significant fauna were considered as being at risk on an individual basis from the Operation.

Table 14: Assessment of conservation significant fauna that could potentially occur at Lake Goorly the potential impact from mining operations

Threatened Taxon	NatureMap	EPBCA 1999	DEC 2008a	Status	Distribution and Habitat	Likelihood of occurrence and potential impacts from the proposed mining operations
<i>Calidris ferruginea</i> Curlew Sandpiper	Y	Y	N	<i>BC Act 2016</i> Critically Endangered and International Agreement <i>EPBC Act 1999</i> Critically Endangered, Marine and Migratory (Bonn, CAMBA, JAMBA, ROKAMBA)	Curlew Sandpipers mainly occur on intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and also around non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms. They are also recorded inland, though less often, including around ephemeral and permanent lakes, dams, waterholes and bore drains, usually with bare edges of mud or sand. They occur in both fresh and brackish waters. Occasionally they are recorded around floodwaters (Higgins and Davies 1996). In Western Australia, they are widespread around coastal and sub-coastal plains from Cape Arid to south-west Kimberley Division, but are more sparsely distributed between Carnarvon and Dampier Archipelago (DAWE 2022).	The salt lake and samphire environment at Lake Goorly appears to be suitable habitat for the Curlew Sandpiper during periods on inundation. Assessment outcome: The area of mining disturbance associated with the Operation is considered negligible in relation to the huge area of potentially better wetland habitat occurring nationally and globally. Mining operations also avoid the inundated and ponded areas that would provide suitable habitat. The Curlew Sandpiper is a highly mobile with the ability to egress from areas being disturbed. On the basis of mobility and mining not occurring in ponded areas, it is considered highly unlikely that the Curlew Sandpiper would be impacted by the Operation.
<i>Falco hypoleucos</i> Grey Falcon	N	Y	N	<i>BC Act 2016</i> Vulnerable <i>EPBC Act 1999</i> Vulnerable	The Grey Falcon occurs over in arid and semi-arid Australia (DAWE 2022). The species frequents timbered lowland plains, particularly acacia shrublands that are crossed by tree-lined water courses. It has been observed hunting in treeless areas and frequents tussock grassland and open woodland (DAWE 2022).	The samphire chenopod salt lake vegetation at Lake Goorly is completely devoid of habitat considered suitable for the Grey Falcon for roosting or nesting (no trees). It could overfly for hunting purposes, except that there is a general lack of prey species on the lakebed Assessment outcome: The Grey Falcon is a highly mobile with the ability to egress from areas being disturbed. On the basis of its mobility and lack of suitable habitat types and prey, it is considered highly unlikely that Grey Falcon would be impacted by the Operation.

Threatened Taxon	NatureMap	EPBCA 1999	DEC 2008a	Status	Distribution and Habitat	Likelihood of occurrence and potential impacts from the proposed mining operations
<i>Leipoa ocellata</i> Malleefowl	Y	Y	N	<i>BC Act 2016</i> Vulnerable <i>EPBC Act 1999</i> Vulnerable	The Malleefowl occurs in semi-arid regions across the southern half of Australia, in predominantly shrubland and low woodland habitats, often with dominant mallee vegetation (DAWE 2022).	The samphire chenopod salt lake vegetation at Lake Goorly is completely devoid of habitat considered suitable for the Malleefowl. Additionally, fox predation (neighbouring farming areas) could have severely impacted on local Malleefowl populations. Assessment outcome: On the basis of lack of suitable habitat types, it is considered highly unlikely that Malleefowl would occur at the Operation.
<i>Pezoporus occidentalis</i> Night Parrot	N	Y	N	<i>BC Act 2016</i> Critically Endangered <i>EPBC Act 1999</i> Endangered	The current distribution of the Night Parrot is not known (DAWE 2022). The Night Parrot was not recorded at Lake Goorly in the NatureMap search. The Night Parrot Most has been associated with habitat types such as spinifex grasslands and chenopod shrublands in the arid and semi-arid zones, shrubby samphire and chenopod associations, scattered trees and shrubs, Acacia woodlands, treeless areas and watercourses (DAWE 2022).	The Lake Goorly environment lacks the spinifex hummock grassland component that is commonly associated with the Night Parrot. Additionally, the surrounding farm land is devoid of native vegetation and hence suitable habitat for this species. This species has also not been recorded near Lake Goorly. Assessment outcome: On the basis of lack of suitable spinifex habitat both at Lake Goorly and in the surrounding farmland, it is considered highly unlikely that the Night Parrot would occur at the Operation.

Threatened Taxon	NatureMap	EPBCA 1999	DEC 2008a	Status	Distribution and Habitat	Likelihood of occurrence and potential impacts from the proposed mining operations
<p><i>Rostratula australis</i> Australian Painted Snipe</p> <p>(Marine listed marine as <i>Rostratula benghalensis</i>)</p>	N	Y	N	<p>BC Act 2016 Endangered</p> <p>EPBC Act 1999 Endangered and Marine</p>	<p>The Australian Painted Snipe generally inhabits shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and claypans. They also use inundated or waterlogged grassland or saltmarsh, dams, rice crops, sewage farms and bore drains (DAWE 2022, Marchant and Higgins 1993).</p>	<p>The salt lake and samphire environment at Lake Goorly appears to be suitable habitat for the Australian Painted Snipe during periods on inundation.</p> <p>Assessment outcome: The area of mining disturbance associated with the Operation is considered negligible in relation to the huge area of potentially better wetland habitat occurring nationally and globally. Mining operations also avoid the inundated and ponded areas that would provide suitable habitat.</p> <p>The Australian Painted Snipe is a highly mobile with the ability to egress from areas being disturbed. On the basis of mobility and mining not occurring in ponded areas, it is considered highly unlikely that the Australian Painted Snipe would be impacted by the Operation.</p>
<p><i>Dasyurus geoffroii</i> Chuditch, Western Quoll</p>	N	Y	N	<p>BC Act 2016 Vulnerable</p> <p>EPBC Act 1999 Vulnerable</p>	<p>The Chuditch is found in varying densities throughout the jarrah forest and south coast regions of Western Australia (DAWE 2022). It also occurs at lower densities in the Goldfields and Wheatbelt.</p> <p>The Chuditch use a range of habitats including forest, mallee shrublands, woodland and desert. The most dense populations have been found in riparian jarrah forest areas.</p> <p>Chuditch survival is dependent on adequate numbers of suitable den and refuge sites (horizontal hollow logs or earth burrows) and sufficient prey biomass (large invertebrates, reptiles and small mammals) (DAWE 2022).</p>	<p>The Lake Goorly samphire environment totally lacks moderate to large sized vegetation or any other habitat types that the Chuditch might utilise.</p> <p>Assessment outcome: Lake Goorly is completely devoid of habitat considered suitable for the Chuditch for shelter, refuge, camouflage, denning and for prey availability.</p> <p>On the basis of a total lack of suitable habitat types, it is considered highly unlikely that the Chuditch would occur at the Operation.</p>

Threatened Taxon	NatureMap	EPBCA 1999	DEC 2008a	Status	Distribution and Habitat	Likelihood of occurrence and potential impacts from the proposed mining operations
<i>Idiosoma nigrum</i> Shield-backed Trapdoor Spider	N	Y	N	BC Act 2016 Endangered EPBC Act 1999 Vulnerable	The Shield-backed Trapdoor Spider burrows in heavy clay soils in open York gum (<i>Eucalyptus loxophleba</i>), salmon gum (<i>E. salmonophloia</i>), Wheatbelt Wando (<i>E. capillosa</i>) woodlands with Jam (<i>A. acuminata</i>) forming a sparse understorey (Clarke and Spier-Ashcroft 2003). A thin layer of woodland litter is required for foraging (Clarke and Spier-Ashcroft 2003).	Lake Goorly is completely devoid of habitat considered suitable for the Shield-backed Trapdoor Spider. Assessment outcome: On the basis of lack of suitable habitat types, it is considered highly unlikely that Shield-backed Trapdoor Spider would occur at the Operation.
<i>Egernia stokesii</i> subsp. <i>badia</i> Western Spiny-tailed Skink	N	Y	N	BC Act 2016 Vulnerable EPBC Act 1999 Endangered	The Western Spiny-tailed Skink is found in woodlands with numerous fallen hollow logs or in rocky crevices or under boulders in stony hills and (DAWE 2022, Wilson and Swan 2008). The crucial habitat element appears to be refuge habitat of either hollow logs or rock crevices.	Lake Goorly is completely devoid of habitat types considered suitable for the Western Spiny-tailed Skink. Assessment outcome: On the basis of a complete lack of suitable habitat types, it is considered highly unlikely that Western Spiny-tailed Skink would occur at the Operation.
<i>Apus pacificus</i> Fork-tailed Swift	N	y	N	BC Act 2016 International Agreement EPBC Act 1999 Marine and Migratory (CAMBA, JAMBA and ROKAMBA)	The Fork-tailed Swift migrates to Australia from breeding grounds in Siberia, the Himalayas, Japan and Southeast Asia in October each year, with most departing in April the following year (Pizzey and Knight 2007). It is an aerial feeder over open country from semi-deserts to coasts, islands and occasionally populated areas and forests (Pizzey and Knight 2007).	Based on distribution, the Fork-tailed Swift could occur at Lake Goorly. Assessment outcome: Due to the complete lack of roosting trees, it is considered unlikely that that this species would inhabit the Lake Goorly area except as an overfly transient. The Fork-tailed Swift is highly mobile with the ability to egress from areas being disturbed. It is considered highly unlikely that the Fork-tailed Swift would be impacted by the Operation.

Threatened Taxon	NatureMap	EPBCA 1999	DEC 2008a	Status	Distribution and Habitat	Likelihood of occurrence and potential impacts from the proposed mining operations
<i>Motacilla cinerea</i> Grey Wagtail	N	Y	N	<p>BC Act 2016 International Agreement</p> <p>EPBC Act 1999 Marine and Migratory (CAMBA, JAMBA, ROKAMBA)</p>	<p>The Grey Wagtail has a global distribution with a habitat preference for fast-flowing mountain streams and rivers with and exposed rocks, forested areas, lowland watercourses, canals, weirs, farm land, sewage farms, forest tracks, tea estates and towns (BirdLife International 2021a).</p>	<p>Apart from periods of inundation, the dry Lake Goorly samphire environment is considered as being generally unsuitable habitat for the Grey Wagtail.</p> <p>Assessment outcome: On the basis of lack of suitable habitat types, it is considered highly unlikely that the Grey Wagtail would occur at the Operation.</p> <p>The area of mining disturbance associated with the Operation is considered negligible in relation to the huge area of potentially better wetland habitat and farmland occurring locally and nationally. Mining operations also avoid the inundated and ponded areas that could provide habitat.</p> <p>The Grey Wagtail is a highly mobile with the ability to egress from areas being disturbed.</p> <p>It is considered highly unlikely that the Grey Wagtail would be impacted by the Operation.</p>
<i>Actitis hypoleucos</i> Common Sandpiper	Y	Y	N	<p>BC Act 2016 International Agreement</p> <p>EPBC Act 1999 Marine and Migratory (Bonn, CAMBA, JAMBA, ROKAMBA)</p>	<p>The Common Sandpiper utilises a wide range of coastal habitats and some inland wetlands, with varying levels of salinity, and is mostly found around muddy margins or rocky shores and rarely on mudflats (Geering <i>et al.</i> 2007). This species occurs globally, the Australian migratory population breeds in the Russian far east (Higgins and Davies 1996).</p>	<p>The salt lake and samphire environment at Lake Goorly appears to be suitable habitat for the Common Sandpiper during periods on inundation.</p> <p>Assessment outcome: The area of mining disturbance associated with the Operation is considered negligible in relation to the huge area of potentially better wetland habitat occurring nationally and globally. Mining operations also avoid the inundated and ponded areas that would provide suitable habitat.</p> <p>The Common Sandpiper is a highly mobile with the ability to egress from areas being disturbed.</p> <p>On the basis of mobility and mining not occurring in ponded areas, it is considered highly unlikely that the Common Sandpiper would be impacted by the Operation.</p>

Threatened Taxon	NatureMap	EPBCA 1999	DEC 2008a	Status	Distribution and Habitat	Likelihood of occurrence and potential impacts from the proposed mining operations
<p><i>Calidris acuminata</i> Sharp-tailed Sandpiper</p>	<p>N</p>	<p>Y</p>	<p>N</p>	<p><i>BC Act 2016</i> International Agreement</p> <p><i>EPBC Act 1999</i> Marine and Migratory (Bonn, CAMBA, JAMBA, ROKAMBA)</p>	<p>The Sharp-tailed Sandpiper is a migratory species with a global distribution. It breeds in northern Siberia and then migrates to various locations throughout the world including Australis where it can inhabit both inland and coastal locations and in both freshwater and saline habitats (DAWE 2022).</p> <p>The habitat types include brackish wetlands, mud flats, saltmarsh with low vegetation, lagoons, swamps, lakes and pools near the coast, dams, waterholes, soaks, bore drains, salt pans, hypersaline salt lakes, saltworks and sewage farms (DAWE 2022).</p>	<p>The salt lake and samphire environment at Lake Goorly could potentially provide habitat for the Sharp-tailed Sandpiper during periods of inundation. The value of this habitat for foraging is questioned as aquatic fauna levels appear low and cyclical DEC (2008a). The Lake Goorly environment is thus not considered as representing ideal foraging habitat for the Sharp-tailed Sandpiper.</p> <p>Assessment outcome: The area of mining disturbance associated with the Operation is considered negligible in relation to the huge area of potentially better wetland habitat occurring nationally and globally. Mining operations also avoid the inundated and ponded areas that could provide suitable habitat.</p> <p>The Sharp-tailed Sandpiper is a highly mobile with the ability to egress from areas being disturbed. It is considered highly unlikely that the Sharp-tailed Sandpiper would be impacted by the Operation.</p>

Threatened Taxon	NatureMap	EPBC Act 1999	DEC 2008a	Status	Distribution and Habitat	Likelihood of occurrence and potential impacts from the proposed mining operations
<i>Calidris melanotos</i> Pectoral Sandpiper	N	Y	N	<p>BC Act 2016 International Agreement</p> <p>EPBC Act 1999 Marine and Migratory (Bonn, JAMBA, ROKAMBA)</p>	<p>The Pectoral Sandpiper is a migratory species with a global distribution that breeds in Russia and North America (DAWE 2022). This species is rarely recorded in Western Australia.</p> <p>The Pectoral Sandpiper prefers shallow fresh to saline wetlands and is found at coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains, artificial wetlands, fringing mudflats and samphire communities (DAWE 2022).</p> <p>The Pectoral Sandpiper is omnivorous; consuming algae, seeds, crustaceans, arachnids and insects.</p>	<p>The salt lake and samphire environment at Lake Goorly could potentially provide habitat for the Pectoral Sandpiper during periods of inundation. The value of this habitat for foraging is questioned as aquatic fauna levels appear low and cyclical DEC (2008a) and the lake ponds are dry for extended periods.</p> <p>The Lake Goorly environment is thus not considered as representing ideal foraging habitat for the Pectoral Sandpiper.</p> <p>Assessment outcome: The area of mining disturbance associated with the Operation is considered negligible in relation to the huge area of potentially better wetland habitat occurring nationally and globally. Mining operations also avoid the inundated and ponded areas that could provide suitable habitat.</p> <p>The Pectoral Sandpiper is a highly mobile with the ability to egress from areas being disturbed.</p> <p>It is considered highly unlikely that the Pectoral Sandpiper would be impacted by the Operation.</p>
<i>Ardea ibis</i> Cattle Egret	N	Y	N	<p>No DBCA conservation listing</p> <p>EPBC Act 1999 Marine</p>	<p>The Cattle Egret occurs over much of Australia although not in arid interior areas (DAWE 2022). It colonised Australia from Indonesia in the 1940s and now inhabits stock paddocks, pastures, cultivated areas, rubbish tips, tidal mudflats and drains (Pizzey and Knight 2007). The Cattle Egret forages on grasshoppers during the breeding season and is known to consume other insects including cicadas, centipedes, spiders, cattle ticks, frogs (including cane toads), lizards (particularly skinks) and small mammals (DAWE 2022).</p>	<p>The salt lake and samphire environment at Lake Goorly is not considered as being typical Cattle Egret habitat.</p> <p>Assessment outcome: On the basis of lack of suitable habitat types, it is considered unlikely that the Cattle Egret would preferentially inhabit the Lake Goorly area, especially given available of pasture areas locally.</p> <p>This Cattle Egret is a highly mobile with the ability to egress from areas being disturbed.</p> <p>It is considered highly unlikely that the Cattle Egret would be impacted by the Operation.</p>

Threatened Taxon	NatureMap	EPBCA 1999	DEC 2008a	Status	Distribution and Habitat	Likelihood of occurrence and potential impacts from the proposed mining operations
<i>Chalcites osculans</i> Black-eared Cuckoo	-	Y	N	No DBCA conservation listing <i>EPBC Act 1999</i> Marine	The Black-eared Cuckoo occurs throughout Australia in drier woodlands, scrublands, mallee, mulga, lignum, saltmarsh and riverside thickets (Pizzey and Knight 2007).	The low and open Lake Goorly samphire environment is considered as being generally unsuitable habitat for the Black-eared Cuckoo. Assessment outcome: The area of mining disturbance associated with the Operation is considered negligible in relation to the huge area of potentially better wetland habitat and farmland occurring locally and nationally. Mining operations also avoid the inundated and ponded areas that could provide habitat. The Black-eared Cuckoo is a highly mobile with the ability to egress from areas being disturbed. It is considered highly unlikely that the Black-eared Cuckoo would be impacted by the Operation.
<i>Merops ornatus</i> Rainbow Bee-eater	-	Y	N	No DBCA conservation listing <i>EPBC Act 1999</i> Marine	The Rainbow Bee-eater is distributed throughout Southeast Asia and Australia (Pizzey and Knight 2007). It occurs throughout mainland Australia although it is thinly distributed in the arid central regions (DAWE 2022). The Rainbow Bee-eater occurs in a range of habitat types: open forests, woodlands, shrublands, coastal dunes, mangroves, grasslands and in various cleared or semi-cleared habitats, including farmland and areas of human habitation (DAWE 2022). The Rainbow Bee-eater breeds in Australia and nests in burrows.	Based on distribution, the Rainbow Bee-eater could occur at Lake Goorly for foraging and overfly. Due to the complete lack of roosting trees, it is considered unlikely that this species would inhabit the Lake Goorly area. Assessment outcome: The Rainbow Bee-eater could potentially occur at Lake Goorly as an overfly and foraging transient but is considered unlikely to inhabit this area due to lack of roosting habitat. The Rainbow Bee-eater is a highly mobile with the ability to egress from areas being disturbed. It is considered highly unlikely that the Rainbow Bee-eater would be impacted by the Operation.

Threatened Taxon	NatureMap	EPBCA 1999	DEC 2008a	Status	Distribution and Habitat	Likelihood of occurrence and potential impacts from the proposed mining operations
<p><i>Charadrius rubricollis</i> (<i>Thinornis rubricollis</i>) Hooded Plover, Hooded Dotterel</p>	Y	Y	y	<p>DBCAs Priority 4</p> <p>EPBC Act 1999 Marine</p>	<p>In Western Australia, the Hooded Plover inhabits coastal areas, estuaries, beaches and inland lakes (BirdLife Australia 2021b, Pizzey and Knight 2007). This species nests on the upper levels of beaches adjacent to sand dunes or on lake shores (Environment Australia 2000). The Hooded Plover was recorded at the southern end of Lake Goorly in 1999 as part of the Salinity Action Plan Wetland Biological Survey (DEC 2008a).</p>	<p>The salt lake and samphire environment at Lake Goorly appears to be suitable habitat for the Hooded Plover and this species has been recorded at Lake Goorly.</p> <p>Assessment outcome: The area of mining disturbance associated with the Operation is considered minimal in relation to the surrounding areas and regional areas of salt lake environment.</p> <p>The Hooded Plover is a highly mobile with the ability to egress from areas being disturbed.</p> <p>On this basis, it is considered highly unlikely that the Hooded Plover would be impacted by the Operation.</p>
<p><i>Calidris ruficollis</i> Red-necked Stint</p>	Y	N	N	<p>BC Act 2016 International Agreement</p> <p>EPBC Act 1999 Marine and Migratory (Bonn, CAMBA, JAMBA, ROKAMBA)</p>	<p>The Red-necked Stint is a summer migrant to Australia from breeding grounds in Siberia (DAWE 2022).</p> <p>In Australasia, the Red-necked Stint is mostly found in coastal areas. They have been known to occur in ephemeral or permanent shallow wetlands near the coast or inland (DAWE 2022).</p>	<p>The salt lake and samphire environment at Lake Goorly could potentially provide habitat for the Red-necked Stint during periods of inundation.</p> <p>Assessment outcome: The area of mining disturbance associated with the Operation is considered minimal in relation to the surrounding areas and regional areas of salt lake environment.</p> <p>The Red-necked Stint is a highly mobile with the ability to egress from areas being disturbed.</p> <p>On this basis, it is considered highly unlikely that the Red-necked Stint would be impacted by the Operation.</p>
<p><i>Gelochelidon nilotica</i> Gull-billed Tern</p>	Y	N	Y	<p>BC Act 2016 International Agreement</p> <p>EPBC Act 1999 Marine and Migratory (CAMBA)</p>	<p>The Gull-billed Tern is a migrant species that occurs throughout Australia at coastal and inland locations (Pizzey and Knight 2007). This species has been recorded at Lake Goorly (DEC 2008a).</p>	<p>The Gull-billed Tern was recorded at recorded at Lake Goorly in 1999.</p> <p>Assessment outcome: The area of mining disturbance associated with the Operation is considered minimal in relation to the national distribution of this species.</p> <p>The Gull-billed Tern is a highly mobile with the ability to egress from areas being disturbed.</p> <p>It is considered highly unlikely that this species would be impacted by the Operation.</p>

Threatened Taxon	NatureMap	EPBCA 1999	DEC 2008a	Status	Distribution and Habitat	Likelihood of occurrence and potential impacts from the proposed mining operations
<i>Charadrius ruficapillus</i> Red-capped Plover	N	N	Y	EPBC Act 1999 Marine	The Red Capped Plover occurs throughout Australia at coastal and inland locations (Pizzey and Knight 2007). This species has been recorded at Lake Goorly (DEC 2008a).	The Red Capped Plover was recorded at Lake Goorly in 1999. Assessment outcome: The area of mining disturbance associated with the Operation is considered minimal in relation to the national distribution of this species. The Red Capped Plover is a highly mobile with the ability to egress from areas being disturbed. It is considered highly unlikely that this species would be impacted by the Operation.
<i>Recurvirostra novaehollandia</i> Red-necked Avocet	N	N	Y	EPBC Act 1999 Marine	The Red-necked Avocet is highly nomadic within Australia and is found in coastal regions across most of the country except in the far north (DAWE 2022). They have a preference for brackish shallow wetlands (Simpson and Day 1999)	The salt lake and samphire environment at Lake Goorly could potentially provide habitat for the Red-necked Avocet during periods of inundation. This species has been recorded at Lake Goorly. Assessment outcome: The area of mining disturbance associated with the Operation is considered minimal in relation to the surrounding areas and regional areas of salt lake environment. The Red-necked Avocet is a highly mobile with the ability to egress from areas being disturbed. On this basis, it is considered highly unlikely that the Red-necked Avocet would be impacted by the Operation.
<i>Larus novae-hollandiae</i> Silver Gull	N	N	Y	EPBC Act 1999 Marine	The Silver Gull occurs throughout the entirety of Australia at coastal and inland locations (Pizzey and Knight 2007). This species has been recorded at Lake Goorly (DEC 2008a).	The Silver Gull was recorded at Lake Goorly in 1999. Assessment outcome: The area of mining disturbance associated with the Operation is considered minimal in relation to the national distribution of this species. The Silver Gull is a highly mobile with the ability to egress from areas being disturbed. It is considered highly unlikely that this species would be impacted by the Operation.

Threatened Taxon	NatureMap	EPBCA 1999	DEC 2008a	Status	Distribution and Habitat	Likelihood of occurrence and potential impacts from the proposed mining operations
<i>Chlidonias hybridus</i> Whiskered Tern	N	N	Y	EPBC Act 1999 Marine	The species utilises a variety of wetland habitats but shows a preference for freshwater marshlands with scattered pools (Higgins and Davies 1996). It has been known to frequent inland flooded saltmarshes in Australia (Higgins and Davies 1996).	<p>The salt lake and samphire environment at Lake Goorly could potentially provide habitat for the Whiskered Tern during periods of inundation. This species has been recorded at Lake Goorly.</p> <p>Assessment outcome: The area of mining disturbance associated with the Operation is considered minimal in relation to the surrounding areas and regional areas of salt lake environment.</p> <p>The Whiskered Tern is a highly mobile with the ability to egress from areas being disturbed.</p> <p>On this basis, it is considered highly unlikely that the Whiskered Tern would be impacted by the Operation.</p>

4.1.15 Social Environment

Lake Goorly occurs in a relatively uninhabited area with the closest inhabited dwelling being the Jibberding Farm out-house located approximately 3.2km west of the Operation. The next closest inhabited dwelling in a farmhouse located >8km to the south of the Operation.

The closest town is Wubin (population 146 – 2006 Census) located approximately 31km west-southwest from the Operation. The regional centre is Dalwallinu (population 628) located approximately 43km to the south-southwest of the Operation. The Mt Gibson Gold Mine is located approximately 32km to the northeast of the Operation.

Apart from the Operation, there are no other land users utilising Lake Goorly. The Operation occurs primarily on UCL with no underlying landholders or pastoralists. M70/1079 and M70/1313 occur on part of the Bywaters farming estate (Freehold Lot 502).

As there are no other land users in the area, it is considered unlikely that Operation will have any impact on the social environment.

A search was conducted using the State Heritage Office 'Inherit Heritage Database' (DPLH 2022c). The Inherit Heritage Database contains comprehensive information about cultural heritage places listed in the State Register of Heritage Places, local government inventories, the Australian Government's heritage list and other non-government lists and surveys (DPLH 2022c).

The search was conducted using the parameter of local government area "Dalwallinu" and the resultant spatial map was examined. There are no heritage places at Lake Goorly. The closest heritage places are "Cailbro School", "East Buntine School Site" and "Wubin Rocks". The closest of these sites, Cailbro School, is >7.5km south of the Operation. The Operation is therefore unlikely to have any impact on European heritage.

Aboriginal heritage is discussed in Section 1.7.

4.2 Other Closure Related Data

A GAP analysis was undertaken in the 2017 MCP in order to identify other datasets required to manage and undertake mine closure. Only one GAP was identified:

- Establishment of monitoring sites.

In 2017, 10 photomonitoring points with 10 paired controls were established in rehabilitation sites of different ages. The monitoring report is provided every two or three years as an attachment to the AER.

The GAP analysis was repeated for this MCP. No further gaps were identified; consistent with a simple and shallow gypsum mining operation with no major identified environmental issues.

4.3 Data Analysis and Implications for Mine Closure

Consistent with the small scale and low impact nature of the Operation, no knowledge gaps or data modelling/analysis requirements have been identified at this stage. The requirements to successfully close small quarries are simple and straightforward with no significant environmental challenges.

5 POST-MINING LAND USES

5.1 Post-mining Land Uses

The Operation has been separated into three mine closure domains on the basis of site-specific rehabilitation requirements, these being:

- Mining excavations.
- Processing and stockpiling areas.
- Mine roads.

Rehabilitation requirements for each of these operational areas are linked into the intended post-mining land use, endpoint landforms, closure objectives and completion criteria.

The objective for the post-mining landform is the restoration of all mining disturbances to a natural looking salt lake landscape similar to the surrounding environment.

The rehabilitation endpoint aim is to reinstate a samphire community on the lakebed and a shrubland community on the fringing dunes that are similar to the surrounding natural communities and with a functioning ecosystem.

There are no commercial land uses proposed for the post-mining areas.

The post-mining land use is thus a reinstated “natural” ecosystem as similar as possible to the original ecosystem (samphire community on the lakebed and a shrubland community on the fringing dunes).

The return of a natural lakebed environment will reinstate the ecological and heritage values of the ex-mining areas. As demonstrated from previous experience at Lake Goorly, the above post-mining landform and rehabilitation endpoint objectives are readily achievable.

There are no alternative post-mining landform or rehabilitation endpoint objectives. The proposed post-mining landform and rehabilitation endpoint objectives are considered as being the most suitable option for Lake Goorly, given its ecological and heritage significance. These objectives are also unlikely to create any subsequent environmental issues. LGC will consult with the DMIRS Environmental Officer and Shite to approval for any proposed changes to the above stated post-mining landform and rehabilitation endpoint objectives.

5.2 Closure Objectives

LGC has adopted six primary objectives for the closure of post-mining landforms. Post-mining landforms must be:

- Stable;
- Erosion resistant;
- Non-polluting;
- Consistent with local landscape aesthetics;
- Revegetated with native vegetation; and
- Safe.

Each closure objective is discussed below in relation to the three operational areas and the post-mining landform endpoint.

5.2.1 Stable

The mining excavations will be landscaped to natural looking lakebed contours with topsoil and vegetation replaced back across rehabilitated surface. The fringing tenements (M70/1079 and M70/1312) will have the gypsum dunes reshaped to a lower, natural looking contour utilising any overburden material that is encountered.

The stockpiling and processing area will have all infrastructure, mining equipment and stockpiles removed. The entire area will be landscaped to pre-mining contours. All re-contoured areas will then be covered with topsoil and deep ripped to facilitate the return of native vegetation and a natural ecosystem. Deep ripping will be used to break soil compaction.

The mine roads will have windrows graded back in and the entire road area landscaped to original pre-mining contours. The landscaped ex-road will then be covered with topsoil and deep ripped to break soil compaction and facilitate the return of native vegetation and a natural ecosystem.

The final result of the rehabilitation will be the restoration of a flat, stable lakebed or low fringing dunes, similar to the pre-mining natural condition.

5.2.2 Erosion Resistant

As mentioned in Section 5.2.1, the mining excavations, stockpiling and processing area, and access roads will be restored to a flat lakebed environment similar to the pre-mining condition. The fringing dunes will be reshaped to a lower, natural looking contour utilising any overburden material that is encountered. Deep ripping will ensure that compacted pavements are broken to allow water infiltration and root penetration. The respreading of topsoil has been proven to be adequate in the revegetation of disturbed areas. This resultant surface with flat topography and chenopod - samphire vegetation is expected to have the same erosion resistance properties as the existing lakebed.

The closure rehabilitation activities proposed for the Operation will result in erosion resistant post-mining landforms.

5.2.3 Non-polluting

There are no pollution sources associated with the Operation. There are no waste rock dumps, tailings disposal or acid mine drainage issues. No chemicals will be used onsite apart from minimal quantities of hydrocarbons. Hydrocarbons will not be stored on site. Vehicle maintenance and repairs occurs offsite. Any spillages from mobile plant and equipment will be noted and remediated immediately. All rubbish and scrap material will be removed for disposal at the Dalwallinu Shire Landfill. The Operation is therefore non-polluting. It is therefore considered highly unlikely that any polluted areas will be created during the operational stage. There are no known contaminated sites at the Operation.

The closure rehabilitation activities proposed for the Operation will therefore result in non-polluting post-mining landforms.

5.2.4 Consistent with Local Landscape Aesthetics

All rehabilitated areas will be designed, constructed and revegetated to blend into the natural landscape. The final rehabilitated area will consist of a chenopod - samphire salt lake landscape similar to the surrounding lake environment.

The rehabilitation earthworks for the mining excavations, processing areas and site roads will involve removing stockpiles, levelling windrows, respreading topsoil and ripping. The use of topsoil with vegetation impregnation should facilitate natural regrowth without the need for seeding. Species will be selected from those present in the area pre-mining use as determined by the vegetation surveys (Fordyce 2010, Fordyce 2011 and Newland Environmental 2013), refer to Section 4.1.10.

By landscaping, ripping and re-using topsoil, it is expected that the revegetated post-mining landforms at the processing areas and roads will quickly become indiscernible from the surrounding natural environment.

The closure rehabilitation activities proposed for the Operation will therefore result in rehabilitated surfaces that are consistent with local landscape aesthetics.

5.2.5 Revegetated with a Functioning Native Vegetation Ecosystem

As described above, the final rehabilitated landscape will consist of a samphire community or fringing dune shrubland similar to the surrounding vegetation and with a functioning natural ecosystem. Previous rehabilitation undertaken by LGC at Lake Goorly has demonstrated that this is an achievable outcome. Plates 15 to 35 display photos of rehabilitation in varying stages. Comparative photos of rehabilitated areas to analogue sites are visually similar (e.g. Plate 18 vs Plate 21, Plate 20 vs Plate 22, Plate 23 vs Plate 24, and Plate 25 vs Plate 26).

LGC intends to develop a landform that is revegetated using only locally occurring native species and with a functioning ecosystem similar to that occurring in the surrounding unmined areas. The aim is to reinstate a high level of biological diversity into the mined-out areas. Where possible, vegetation community endpoints will aim to recreate the pre-mining structural descriptions provided by Fordyce (2010), Fordyce (2011) and Newland Environmental (2013).

Species occurring within the Operation discussed in Section 4.1.10. LGC intends to regrow at least 75% of these species, at foliage covers that are similar to pre-mining structural descriptions provided by Fordyce (2010), Fordyce (2011) and Newland Environmental (2013).

5.2.6 Safe

The Operation will be left in a safe condition in regards to both humans and animals, pursuant to Regulation 28 of the *Mining Regulations 1981*.

Public safety will be undertaken by ensuring that:

- DMIRS District Inspector of Mines is consulted regarding placement of abandonment bunds and other abandonment requirements.
- All vehicle access to site is blocked or removed.
- No vertical drop-off points are left.
- Appropriate sign-posting will be utilised.

- All fencing and remnant material is removed.

Animal safety will be undertaken by ensuring that:

- No open excavations or any open holes will remain that could trap or injure native animals or stock.
- All remnant material that could pose a threat to fauna is removed.

Additionally, LGC will give notice to the District Inspector of Mines that mining operations are abandoned in accordance with Section 42(1)(c) of the *Mines Safety and Inspection Act 1994* and provide the notification information required under Regulation 3.16 of the *Mines Safety and Inspection Regulations 1995*. Final mine plans will also be provided to the State Mining Engineer as required under Section 88(1) of the *Mines Safety and Inspection Act 1994*. As required under Section 42(2) of the *Mines Safety and Inspection Act 1994*, the District Inspector of Mines must inspect the abandoned mine to determine that the site is safe and whether additional works are required.

The closure rehabilitation activities proposed for the Operation will therefore result in a safe post-mining landform.

6 CLOSURE RISK ASSESSMENT

6.1 Identification of Closure Risks

Identification and assessment of the environmental risks associated with the Operation that may adversely impact on the mine closure objectives are described in the following sections. The following risks were identified.

- Loss of conservation values from inadequate or no rehabilitation.
- Degradation of the Aboriginal heritage site from inadequate or no rehabilitation.
- Degradation of aquatic systems from mine generated water contaminants.
- Inadequate topsoil management leading to poor quality rehabilitation (lack of vegetation coverage and poor diversity, weed infestation).
- Poor hydrocarbon management creating localised soil and surface water contamination.
- Uncontrolled domestic or industrial wastes creating land degradation.
- Lack of environmental competency in the workforce resulting in poor quality (not acceptable) final land surfaces.
- Loss of potential lakebed habitat resulting from inadequate or poor rehabilitation.

6.2 Risk Management Process

LGC has based its risk management process on:

- Risk Management – Principles and Guidelines (AS/NZS ISO 31000:2009) (Standards Australia/Standards New Zealand 2009).
- Handbook, Managing environment-related risk (HB 203:2012) (Standards Australia/Standards New Zealand 2012).
- Occupational health and safety management systems - General guidelines on principles, systems and supporting techniques (AS/NZS 4804:2001) (Standards Australia/Standards New Zealand 2001).

In 2009, the International Organisation for Standardization ('ISO') released the risk management standard called '*ISO 31000:2009 Risk Management – Principles and Guidelines (ISO 31000)*' to provide organisations with principles and generic guidelines on risk management. These principle and guidelines were adopted by Standards Australia and re-issued as '*AS/NZS ISO 31000:2009 Risk Management - Principles and Guidelines*' as a replacement for the '*AS/NZS 4360:2004 Risk Management*' standard.

With relevance to mine closure, specific guidance is provided by the '*Handbook, Managing environment-related risk*' (HB 203:2012) with additional reference material drawn from '*Occupational health and safety management systems - General guidelines on principles, systems and supporting techniques*' (AS/NZS 4804:2001)

LGC has used AS/NZS ISO 31000:2009 to assess the risks associated with the Operation for both safety and environmental management. The definitions from AS/NZS ISO 31000:2009 have been adopted by LGC as provided in Table 15.

Table 15: Definitions of risk from AS/NZS ISO 31000:2009

Risk	<i>The effect of uncertainty on objectives.</i>	Risk Management	<i>Coordinated activities to direct and control an organisation with regard to risk.</i>
Risk assessment	<i>Overall process of risk identification, risk analysis and risk evaluation.</i>	Risk treatment	<i>Process to modify risk.</i>
Likelihood	<i>The chance of something happening.</i>	Consequence	<i>The outcome of an event that affects the ability to achieve the objectives.</i>
Hazard	<i>Source of potential harm.</i>	Likelihood	<i>Chance of something happening.</i>

Risk is described as “*the effect of uncertainty on objectives*”. The definition of risk management is “*coordinated activities to direct and control an organisation with regard to risk*”. In order to manage risks, risks arising from the Operation must first be identified, analysed in terms of “likelihood” and “consequence” and evaluated through a risk assessment process. The assessment process commonly takes the form of a risk matrix. LGC’s risk assessment matrix is described below.

AS/NZS ISO 31000:2009 has five steps for the process of managing risk:

- Establishing the context.
- Risk identification.
- Risk analysis.
- Risk evaluation.
- Risk treatment.

Each step is interconnected through ‘*monitoring and review*’, and ‘*communication and consultation*’.

The risk assessment matrix is based on quantitatively identifying the initial risk and then reassessing the risk after management controls are in place. Management controls were selected so the identified rehabilitation and closure risks would be reduced to ‘As Low as Reasonably Practicable’ (‘ALARP’). In determining management controls, the following hierarchy of control principles was adopted:

- Elimination of the hazard;
- Substitution with a lower risk activity or product;
- Engineering solutions to reduce the impact of the hazard; and
- Implementation of administrative procedures to control the hazard.

In undertaking the risk analysis component of the overall assessment, the approach focussed on addressing the ‘credible worst case consequence of the risk and the likelihood of the credible worst case consequence occurring’. This approach was deemed the most appropriate due to the scale of the Operation and the lack of potential for significant environmental impacts to occur.

The definitions used to determine the likelihood of an event occurring ranges from Almost Certain to Rare (Table 16). The approach taken in the risk assessment was to quantify the risk using a combination of its likelihood (Table 16) and consequences (Table 17) to determine the numerical risk rating score (Table 18). The likelihood and consequences are rated for both the inherent risks (before the application of risk management measures) and residual risks (after application of risk management measures). The calculated risk rating scores range from 1 (rare and insignificant) to a maximum of 25 (almost certain and extreme). The risk assessment table for mine closure is presented in Table 19, as discussed in Section 6.4.

Table 16: Likelihood definitions

Descriptor		Expected Frequency	Probability of occurrence within lifetime of the Project or Present Probability (%)	
1	Rare	Unlikely to ever occur	Highly unlikely, but it may occur in exceptional circumstances	0 – 10%
2	Unlikely	Less than once per five years	Not expected, but there's a slight possibility it may occur at some time.	11 – 40%
3	Possible	Less than once per year, but more than once per five years	The event might occur at some time as there is a history of infrequent occurrence of similar issues with similar projects/ activities.	41 – 60%
4	Likely	Less than once per month, but more than once per year	There is a strong possibility the event will occur as there is a history of frequent occurrence with similar projects /activities.	61 – 90%
5	Almost certain	More than once per month	The event is expected to occur at some time as there is a history of continuous occurrence with similar projects/activities.	91 – 100%

Table 17: Consequence definitions

1	2	3	4	4
Insignificant	Minor	Moderate	Major	Extreme
Site is safe, stable and non-polluting. Post mining land use is not adversely affected	The site is safe, all major landforms are stable, and any stability or pollution issues are contained and require no residual management. Post-mining land use is not adversely affected	The site is safe, and any stability or pollution issues require minor, ongoing maintenance by end land-user	The site cannot be considered safe, stable or non-polluting without long-term management or intervention. Agreed post mining land-use cannot proceed without ongoing management.	The site is unsafe, unstable and/ or causing pollution or contamination that will cause an ongoing residual affect. The post-mining land use cannot be achieved.

Table 18: Risk rating matrix

Consequence						
	Risk Score	1 Insignificant	2 Minor	3 Moderate	4 Major	5 Extreme
Likelihood	5 Almost Certain	5 Medium	10 Medium	15 High	20 High	25 High
	4 Likely	4 Low	8 Medium	12 High	16 High	20 High
	3 Possible	3 Low	6 Medium	9 Medium	12 High	15 High
	2 Unlikely	2 Low	4 Low	6 Moderate	8 Medium	10 Medium
	1 Rare	1 Low	2 Low	3 Low	4 Low	5 Medium
Risk Score = Likelihood x Consequence						
12 – 25 = High		5 - 10 = Medium			1 -4 = Low (Acceptable)	
Specific management programs and treatments required to reduce risk to acceptable levels.		Develop procedures to reduce the risk to acceptable levels.			Reassess risk if any changes occur.	

Table 19: Risk assessment table for mine closure

No.	Potential Risk	Description of Risk (Hazard)	Inherent Risk				Management Measures (Mitigation)	Residual Risk			
			Likelihood	Consequence	Risk Score	Risk Rating		Likelihood	Consequence	Risk Score	Risk Rating
1.	Loss of conservation values from inadequate or no rehabilitation	Although not part of a conservation estate, the Lake Goorly environment is considered as having moderate to high conservation value on the basis of the unique landscape, potential inland wetlands during periods of inundation and the heritage significance of Mongers Lake Walkway. The total area of impact from previous mining disturbances and those approved under MP 47944 is 167.55ha. If mining disturbances are left un-rehabilitated, the overall impact on conservation values from the Lake Goorly area could be high at a local level.	3	4	12	High	Continue with progressive rehabilitation. Ensure that rehabilitation is undertaken to high standards. Ensure that the ground surface is levelled prior to topsoil respreading. Remove all old causeway roads. Reassess older rehabilitation sites and undertake augmentation work if considered warranted. Implement the closure task register.	1	2	2	Low

No.	Potential Risk	Description of Risk (Hazard)	Inherent Risk				Management Measures (Mitigation)	Residual Risk			
			Likelihood	Consequence	Risk Score	Risk Rating		Likelihood	Consequence	Risk Score	Risk Rating
2	Degradation of the Aboriginal heritage site from inadequate or no rehabilitation	The LGC Tenements are contained within heritage site Mongers Lake Waterway (Site ID 24380). Poor quality rehabilitation could adversely affect the value of this site. The Section 18 notice requires the rehabilitation of impacted areas following cessation of mining activities.	4	4	16	High	Undertake the mine closure activities as specified above for “Loss of conservation values from poor or no rehabilitation” . Comply with Section 18 notice conditions for any artefactual or skeletal material encountered. Consult with the Traditional Owners regarding the quality of mine closure rehabilitation. Ensure that the lake surface is restored to its former flat contours. Implement the closure task register.	2	2	4	Low
3	Degradation of aquatic systems from mine generated water contaminants	The Operation occurs on lake system with lower lying areas that intermittently pond. There is potential to cause degradation to aquatic systems by allowing the impacts from mining to affect surface water. The impacts could be silt from runoff from mining areas, hydrocarbon spillages or physical disturbance to pond areas.	3	3	9	Medium	Ensure the no mining activities occur near ponded areas. Ensure that runoff streams from mining areas are contained to site or directed away from ponded areas. Restore the lake surface to as per the closure objectives. Undertake the mine closure activities as specified below for “Poor hydrocarbon management creating localised contamination” .	2	1	2	Low

No.	Potential Risk	Description of Risk (Hazard)	Inherent Risk				Management Measures (Mitigation)	Residual Risk			
			Likelihood	Consequence	Risk Score	Risk Rating		Likelihood	Consequence	Risk Score	Risk Rating
4	Inadequate topsoil management leading to poor quality rehabilitation (lack of vegetation coverage and poor diversity, weed infestation)	Topsoil has been stockpiled at various locations. Inadequate management could see topsoil buried rather than respread as a topping layer. This could significantly impact on the rate of regrowth return and the success of the final community structure and floristics. Poor topsoil management could promote weed invasion.	4	4	16	High	<p>Ensure the topsoil management strategy outlined in Section 4.1.8 is continued.</p> <p>Topsoil to be removed from all areas to be disturbed and stockpiled.</p> <p>Ensure that topsoil stockpiles are protected and that topsoil health is maintained. Store in low windrows, sign post to exclude from operational areas. Cleared vegetation will be stored separately with the stockpiled topsoil to assist maintenance of the seed bank.</p> <p>Exclude weed infested topsoil from rehabilitation use.</p> <p>Respread topsoil over all areas to be rehabilitated as soon as possible after mining is completed.</p> <p>Undertake rehabilitation earthworks in wetter months.</p> <p>Ensure that site operators are experienced and competent with topsoil harvesting and respreading.</p>	2	2	4	Low

No.	Potential Risk	Description of Risk (Hazard)	Inherent Risk				Management Measures (Mitigation)	Residual Risk			
			Likelihood	Consequence	Risk Score	Risk Rating		Likelihood	Consequence	Risk Score	Risk Rating
5	Poor hydrocarbon management creating localised soil and surface water contamination	The Operation has the potential of causing localised hydrocarbon contamination issues from tank ruptures and spillages. The risk to the Lake Goorly environment is moderate due to the relatively small volumes involved.	3	3	9	Medium	<p>All site personnel will receive a suitable level of training in hydrocarbon management to ensure they are aware of company protocol for use, storage and disposal of hydrocarbons.</p> <p>Ensure that all machinery and equipment is maintained such that hydrocarbon leakage is minimised.</p> <p>Check equipment coming onto site for leakages. Plant and equipment will be inspected on a daily basis to ensure that the likelihood of spillage is minimised. Remove equipment and machinery from site for repairs immediately upon developing a hydrocarbon leak.</p> <p>Spill kits will be kept at the processing and stockpiling area. The spill kits will be inspected and replenished on a regular basis.</p> <p>Examine the ground for hydrocarbon staining. For spillages of more than 30cm in diameter, excavate any hydrocarbon stained soil and transport to the hydrocarbon bioremediation area at the Shire’s bioremediation facility.</p> <p>Fuel storages to be properly bunded.</p> <p>Re-fuelling to occur at lower risk areas where should any spillage occur, it can be immediately treated with a spill kit and the residue collected for off-site disposal.</p>	1	2	2	Low

No.	Potential Risk	Description of Risk (Hazard)	Inherent Risk				Management Measures (Mitigation)	Residual Risk			
			Likelihood	Consequence	Risk Score	Risk Rating		Likelihood	Consequence	Risk Score	Risk Rating
6	Uncontrolled domestic or industrial wastes creating land degradation	There will be very little domestic or industrial wastes resulting from the Operation. All ancillary rubbish generated onsite such as lunch wrappers or old tyres will be collected and disposed of at the Dalwallinu Landfill. The main risk is that uncontrolled dumping could occur via a third party	3	2	6	Medium	Progressively removed all rubbish and scrap during the operational stages. Conduct a final 'emu parade' as part of the mine closure rehabilitation. Include waste management in the site induction. Lock the gate when the site is unoccupied. Maintain vigilance for intruders and the possibility of illegal dumping. Cleanup any illegal dumping and remove to the Dalwallinu Landfill.	1	1	1	Low

No.	Potential Risk	Description of Risk (Hazard)	Inherent Risk				Management Measures (Mitigation)	Residual Risk			
			Likelihood	Consequence	Risk Score	Risk Rating		Likelihood	Consequence	Risk Score	Risk Rating
7	Lack of environmental competency in the workforce resulting in poor quality (not acceptable) final land surfaces	Lack of environmental and rehabilitation competency could result in poor mine closure practices. Workforce environmental induction and training requirements have been implemented to ensure that all personnel are aware of requisite environmental management commitments and this will extend to mine closure activities. Competency training and assessment for both operators and supervisors will be undertaken prior to the commencement of any major rehabilitation program and mine closure. The inductions also include the Aboriginal heritage requirements. The workforce selection and education program will assist in ensuring that high standards of environmental management are maintained at the Operation during closure stages.	3	5	15	High	<p>Ensure only competent operators are involved with mine rehabilitation and that closure activities.</p> <p>Assess operators for competency.</p> <p>Ensure that all personnel involved with mine closure are provided with clear instructions for closure rehabilitation activities.</p> <p>All closure rehabilitation activities to be undertaken under the supervision of an experienced rehabilitation practitioner.</p>	2	2	4	Low

No.	Potential Risk	Description of Risk (Hazard)	Inherent Risk				Management Measures (Mitigation)	Residual Risk			
			Likelihood	Consequence	Risk Score	Risk Rating		Likelihood	Consequence	Risk Score	Risk Rating
8	Loss of potential lakebed habitat resulting from inadequate or poor rehabilitation	Various conservation listed flora and fauna species were recorded in the surveys and desktop searches for the Lake Goorly area (Sections 4.1.10 and 4.1.14). The loss of habitat from poor rehabilitation could have minor impact on these species.	3	2	6	Medium	Undertake the mine closure activities as specified above for “Loss of conservation values from poor or no rehabilitation” . Implement the closure task register.	1	2	2	Low

6.3 Risk assessments where MCP plan is included in a mining proposal

This MCP is submitted independently for an ongoing operation and is not associated with a mining proposal. The risk assessment presented herein therefore relate to the mine closure undertakings but are also applicable to ongoing operations.

6.4 Risk Assessment Information

Table 19 describes each inherent (perceived) risk and potential impacts. Due the low impact nature of the Operation with no significant potential contamination sources or environmental issues, very few risks were identified. From Table 19, it can be seen that each of the Inherent Risks were in the High or Medium rating categories, and the subsequent management strategies have effectively mitigated the Residual Risks to the Low category. The risk mitigation strategies depend on both current operational controls as well as implementation of the Closure Risk Register. The rehabilitation undertaken to date over a 20 year period has demonstrated that restoration of the lakebed to an original condition is an achievable outcome (refer to Plates 15 to 35).

6.5 Further guidance material

Various publications have been drawn upon to assist with closure planning and rehabilitation, in particular:

- Mine Closure and Completion, Leading Practice Sustainable Development Program for the Mining Industry; Department of Industry, Tourism and Resources (DITR 2006a);
- Mine Rehabilitation, Leading Practice Sustainable Development Program for the Mining Industry; Department of Industry, Tourism and Resources (DITR 2006b);
- Environmental Management of Quarries; Development, Operation and Rehabilitation Guidelines (DMIRS 1994);
- ANZMEC Strategic Framework for Mine Closure (ANZMEC 2000);
- Preparation of a Mining and Rehabilitation Program (MARP) - Extractive Mineral Operations (PIRSA 2008);
- Guidelines for Mine Closure Planning in Queensland (QMC 2001);
- Mining, Minerals and Sustainable Development, Appendix B: Mine Closure, Working Paper No 34 (MMSD 2002); and
- Planning for Integrated Mine Closure: Toolkit; International Council on Mining and Metals (ICMM 2008).

These publications have been used to derive the closure outcomes, objectives and methodology presented in this MCP.

6.6 Site specific assessment

The management controls in Table 19 were selected so the identified rehabilitation and closure risks would be reduced to 'As Low as Reasonably Practicable'. The ALARP Residual Risks were all mitigated to Low (Table 19).

The Operation has been subject to regular environmental inspections undertaken by Newland Environmental since 2010. The assessments have consistently found that there are no issues posing any significant environmental risks. There are also no site specific requirements identified in relation to mine closure.

6.7 Materials Characterisation

The gypsum resource is relatively uniform in composition. A typical analysis from the Chem Centre is provided as Appendix J.

Typically, the material mined consists of:

- Gypsum minimum 9% to 96%.
- Salt maximum 1.1%.
- Ca 22% to 23%.
- Mg maximum 0.1%.
- Na maximum 0.4%.
- S average of 18.5%.

No other issues detrimental to mine closure were identified.

6.8 Contaminated sites

There are no pre-existing, suspected or proposed contaminated sites associated with the Operation and no recorded sites under the *Contaminated Sites Act 2003*.

There will be no dangerous goods or hazardous substances used on site.

The Operation therefore has no issues associated with dangerous goods, hazardous substances or contaminated sites.

7 CLOSURE OUTCOMES AND COMPLETION CRITERIA

7.1 Closure Outcomes

Closure outcomes are discussed in detail in Section 5.2 in relation to each of the objectives for post-mining landforms;

These outcomes linked to the post-mining land use of a reinstated “natural” ecosystem as similar as possible to the original ecosystem (samphire community on the lakebed and a shrubland community on the fringing dunes).

7.2 Completion Criteria

Completion criteria (and outcomes) have been developed in consideration of a 12 year history of undertaking progressive rehabilitation at the Operation. Completion criteria have been developed to meet the post-mining land use and closure objectives, these being:

Post-mining land use:

- Reinstated samphire community / fringing dune shrubland.

Endpoint Landform

- Return of a native ecosystem - restoration of the lakebed or fringing dune environment

Closure objectives:

- Stable;
- Erosion resistant;
- Non-polluting;
- Consistent with local landscape aesthetics;
- Revegetated with native vegetation; and
- Safe.

Specific completion criteria for the Operation in relation to post-mining land uses, endpoints landforms and the closure objectives are provided in Table 20.

7.3 Rehabilitation Revegetation Endpoints

LGC intends to develop a landform that is revegetated using only locally occurring native species and with a functioning ecosystem similar to that occurring in the surrounding unmined areas/pre-mining environment.

The aim is to reinstate a high level of biological diversity into the disturbed areas. Where possible, vegetation community endpoints will aim to recreate the pre-mining structural descriptions provided by Fordyce (2010), Fordyce (2011) and Newland Environmental (2013), refer to Section 4.1.10.

The Fordyce (2010 and 2011) surveys were conducted using 10m x 10m quadrats on the lake floor and 20m x 20m quadrats on the lake margin. Ten monitoring 20m x 20m sites were established in 2017 in areas of differing rehabilitation age on the lake floor. Each

monitoring site contains two sites: an area of mine rehabilitation that is in close proximity to natural lakebed (control). The 2017 Monitoring Report has been submitted along the AER. These monitoring sites will be photographed annually and with floristic assessment occurring on a biennial basis, or longer periods if regrowth is slow. This methodology will be re-utilised to monitor and assess the level of completion of rehabilitation revegetation. Additionally, the monitoring survey will be conducted in general accordance with:

- Standard Operating Procedure, Establishing Vegetation Quadrats, SOP No: 6.1. Department of Parks and Wildlife (DPaW 2009).
- Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia. Guidance Statement No. 51 (EPA 2004).
- Rehabilitation of Terrestrial Ecosystems. Guidance Statement No. 6 (EPA 2006).

When sufficient numerical or nominal data is available, statistical analysis will be undertaken using a diversity index such as the Shannon–Wiener index and / or ordination.

Table 20: Completion criteria for the MCP domains

Closure Domain	Indicative Completion Criteria	Completion Criteria Attainment Indicator	Measurement Tools
Post-mining Land Use - All Domain Areas (except previously barren lakebed)	Reinstated samphire community / fringing dune shrubland.	Assessment of rehabilitated landforms from a structural perspective in comparison to locally occurring chenopod – samphire communities.	Visual assessment undertaken with photomonitoring at reference points for verification. This indicator is subjective. The rehabilitated landform should resemble surrounding natural landforms. Ten monitoring sites established in 2017. Each monitoring sites has a mine rehabilitation site next to a natural lakebed control site. Overall site assessment mapping. Vegetation monitoring sites comparing rehabilitation to control sites.
Endpoint Landform - All Domain Areas	Return of a native ecosystem - restoration of the lakebed or fringing dune environment	Biological assessment is required to determine the extent of ecosystem return. This assessment would occur at the end of mine closure using the various monitoring activities undertaken and with specific emphasis on conservation significant fauna. The assessment would occur as a total site overview.	Overall site assessment mapping. Vegetation monitoring plots and fauna assessment. Success measures: <ul style="list-style-type: none"> • A 75% floristic species return. • Vegetation structural assessment using height and foliage cover similar to the associations recorded pre-mining and found locally. This assessment may be repeated over several years and the results reported to DMIRS for discussion. When sufficient numerical or nominal data is available, statistical analysis will be undertaken using a diversity index such as the Shannon–Wiener index and / or ordination.
Closure Objective 1 - All Domain Areas	Stable	The final result of the rehabilitation will be the restoration of a flat, stable lakebed environment similar to the pre-mining condition	Site assessment undertaken for any signs of instability. Photomonitoring of land surface.
Closure Objective 2 - All Domain Areas	Erosion resistant	Rehabilitated mining areas showing no signs of rilling or erosion gullies.	Site assessment undertaken for any signs of instability. Photomonitoring of land surface.

Closure Domain	Indicative Completion Criteria	Completion Criteria Attainment Indicator	Measurement Tools
		<p>Rehabilitated processing areas, infrastructure areas and roads showing no visible signs of signs of rilling or erosion gullies.</p> <p>Due to the flat lakebed surface water will naturally pool and a re-assortment and self-levelling of surface material is likely following periods of inundation.</p>	
Closure Objective 3 - All Domain Areas	Non-polluting	<p>Rehabilitated mining areas – not applicable.</p> <p>Rehabilitated processing areas, infrastructure areas and roads showing no signs of pollutants or hydrocarbon stained soils.</p>	<p>Visual assessment undertaken with photomonitoring of any identified issues. Assessment is for hydrocarbon stained soils. The stained soil will be excavated and removed to the Shire bioremediation area. Insignificant soil staining (surface staining less than 5cm in depth and less than 0.5m² in area) will be scarified left in situ to self-remediate.</p>
Closure Objective 4 - All Domain Areas	Consistent with local landscape aesthetics	<p>Rehabilitated mining areas look aesthetically similar to surrounding natural features.</p> <p>Rehabilitated processing areas, infrastructure areas and roads look aesthetically similar to surrounding natural features.</p> <p>The lakebed is to be restored to a flat contour similar to the original surface, thus reinstating the previous surface hydrology (ponding).</p>	<p>Overall site assessment mapping.</p> <p>Vegetation photomonitoring plots. Visual assessment undertaken with photomonitoring at reference points for verification. This indicator is subjective. The rehabilitated landform should resemble surrounding natural landforms.</p>
Closure Objective 5 - All Domain Areas	Revegetated with native vegetation	<p>Vegetation community endpoints will aim to recreate the pre-mining structural descriptions provided by Fordyce (2010), Fordyce (2011) and Newland Environmental (2013).</p>	<p>See measurement tools for “Endpoint Landform - All Domain Areas” in table above.</p>
Closure Objective 6 - All Domain Areas	Safe	<p>Notification of acceptance from the DMIRS District Inspector of Mines regarding placement and construction of abandonment bunds, and abandonment notification in</p>	<p>Site assessment undertaken with photomonitoring for verification.</p> <p>Specific parameters assess against:</p> <ul style="list-style-type: none"> • Access to site blocked or removed.

Closure Domain	Indicative Completion Criteria	Completion Criteria Attainment Indicator	Measurement Tools
		<p>accordance with Section 42 of the Mines Safety and Inspection Act 1994.</p> <p>All vehicle access to site is blocked or removed.</p> <p>No vertical drop-off points are left, unless bunded or fenced.</p> <p>Appropriate sign-posting will be utilised.</p> <p>All fencing and remnant material is removed.</p> <p>Any fuels or other hydrocarbons are removed from site.</p>	<ul style="list-style-type: none"> • No vertical drop-off points are left, unless bunded or fenced. • Appropriate sign-posting. • All fencing and remnant material removed. • Joint site inspection with the District Inspector of Mines

8 CLOSURE IMPLEMENTATION

LGC has incorporated rehabilitation as an intrinsic and integral part of mining development, from the initial planning stages, operationally through progressive rehabilitation and then to final decommissioning and site closure. LGC is committed to undertaking progressive rehabilitation as part of ongoing operations, whenever practical.

Closure implementation activities have been developed in relation to each of the three operational areas (domains), these being:

- Mining excavations.
- Stockpiling and processing area.
- Access roads.

Rehabilitation requirements for each of these operational areas is linked into the intended post-mining land use, endpoint landforms, closure objectives, mine closure risks and completion criteria, refer to Sections 5, 6 and 7.

8.1 Closure Task Register

As per the 2020 MCP guidelines, a Closure Task Register is presented below.

Operational Requirements (during mining operations):

- Topsoil will be removed from all areas prior to mining disturbances, wherever available.
- Ensure that topsoil stockpiles are protected and that topsoil health is maintained. Topsoil will be stockpiled in low windrows of below 2m and stored at the edge of working areas and excluded from operational areas.
- Cleared vegetation may be stored separately from the stockpiled topsoil to ensure integrity of the seed bank.
- Mined-out and redundant areas will be assessed for suitability for progressive rehabilitation. Undertake progressive rehabilitation whenever possible.
- Undertake weed vigilance and control any weed outbreaks.
- Incorporate progressive rehabilitation into the mining operation as much as possible.
- Submit the updated MCP to DMIRS for review and approval every three years or as otherwise required.
- Submit updated environmental and rehabilitation data to DMIRS on a yearly basis with the AER.
- Continue monitoring as regular intervals (possibly every two or three years depending on the rate of regrowth). Provide the monitoring report to DMIRS with the AER.

Pre-Closure Planning:

- Conduct a field assessment of all mine closure areas. Accurately map all mine closure areas into domains. Identify rehabilitation tasks for each domain.
- Undertake a weed survey to determine weed densities and locations of weed occurrences. Use this information for rehabilitation planning and completion criteria planning.
- Consult with the DMIRS Environmental Officer and the Shire of Dalwallinu regarding rehabilitation and closure requirements.
- Consult with the DMIRS District Inspector of Mines regarding the placement of abandonment bunds and abandonment notification. Construct abandonment bunds as required. Refer to the DMIRS guidelines 'Safety bund walls around abandoned open pit mines' (DMIRS 1997).
- Produce a final MCP that includes stakeholder considerations for approval by DMIRS. Develop a Final Closure Task Register as part of the closure and rehabilitation process to manage all requisite activities.
- Implement the approved MCP and Final Closure Task Register.

Preliminary Activities:

- Notify the DMIRS Environmental Officer and Shire of Dalwallinu of the commencement date for rehabilitation.
- Notify the District Inspector of Mines of abandonment in accordance with Section 42(1)(c) of the *Mines Safety and Inspection Act 1994* and provide the notification information required under Regulation 3.16 of the *Mines Safety and Inspection Regulations 1995*.
- Remove any portable equipment and infrastructure.
- Conduct an 'emu parade' of the entire area to search for scrap material and rubbish that may have been missed. Remove any scrap material and rubbish for transfer to the Dalwallinu Shire Landfill.
- Minimise weed contamination as much as possible prior to commencement of rehabilitation. Wash down all machinery used for rehabilitation prior to entry onto site to prevent weed contamination
- Where practicable, eradicate all introduced plants from areas to be rehabilitated. Use herbicides as required. Check that any rootstock material is treated with herbicide or physically removed.
- Wash down all machinery used for rehabilitation prior to entry onto site to prevent weed contamination.
- Topsoil to be checked for weeds. Weed infested soil will be excluded from rehabilitation use.
- Examine ground for hydrocarbon staining. Excavate any hydrocarbon stained soil and transport to the hydrocarbon bioremediation area of the Dalwallinu Shire Landfill or other approved bioremediation areas.

Mining Excavations:

- Check for weeds and eradicate prior to commencement of earthmoving activities.
- Landscape the mining excavation to natural looking lakebed contours.
- Ensure that the final surface is similar in appearance to the surrounding flat lakebed by levelling any overburden piles and road causeways.
- Landscaped areas will then be covered with topsoil and vegetation to facilitate the return of native vegetation and a natural ecosystem.
- Rip or scarify compacted areas, avoiding deep furrows that could channelize runoff.
- Ensure that all access to the mining areas is blocked (see Mine Roads below).

Stockpiling and Processing Areas:

- Re-check for weeds and eradicate prior to commencement of earthmoving activities.
- Remove of any remaining infrastructure.
- Remove all remnant stockpiles from site or use as excavation backfill.
- Undertake landscaping earthworks to restore the entire stockpiling and processing area to pre-mining contours.
- Respread brush and topsoil over the rehabilitated surface and scarify or rip the entire surface using multiple tynes.
- Deep rip any compacted areas or hardstand using a bulldozer at full ground penetration.
- Ensure that all access to the processing and stockpiling area is removed (roads ripped) or blocked.

Mine Roads:

- Re-check for weeds and eradicate, where practical, prior to commencement of earthmoving activities.
- Grade windrow material back across the road surface.
- Remove any causeway material and use to backfill mining excavations.
- Undertake landscaping earthworks to restore the road area to pre-mining, natural looking lakebed contours.
- Respread brush and topsoil over the rehabilitated surface and scarify or rip the entire surface using multiple tynes.
- Deep rip any compacted areas or hardstand using a bulldozer at full ground penetration.
- Prevent access onto rehabilitated areas by blocking potential entry points via ripping or earth bunds.

Post Rehabilitation:

- Appropriate sign-posting as required.
- Notify the DMIRS Environmental Officer and Shire of Dalwallinu of the completion of rehabilitation earthworks.
- Notify the District Inspector of Mines of abandonment in accordance with Sections 42 and 88 of the *Mines Safety and Inspection Act 1994*.
- Document and map rehabilitation activities for inclusion in the AER.
- Ensure that all entry points into rehabilitated areas are securely blocked.
- Monitor for weed outbreaks and implement weed spraying campaigns as necessary.
- Assess status of natural revegetation using topsoil, after two years. Seed with locally occurring native species, if considered necessary.
- Commence monitoring (refer to Section 9).

The Closure Task Register will be implemented in the event of unexpected closure or prolonged suspension of operations.

8.2 Research, Investigation and Trials

Research or trials are not currently being undertaken and are not considered warranted given that LGC has developed considerable expertise in undertaking rehabilitation at Lake Goorly over the past 12 years, as well as the ease to achieve successful rehabilitation. Also, these are no known site specific environmental issues associated with mine closure at Lake Goorly.

8.3 Progressive Rehabilitation

Progressive rehabilitation will continue to be undertaken as part of ongoing mining operations. LGC has consistently ensured that at any one time that approximately 75% of the excavation disturbance has had rehabilitation earthworks undertake.

8.4 Early Closure - Permanent Closure or Suspended Operations under Care and Maintenance

The Closure Task Register will be implemented in the event of unexpected closure or prolonged suspension of operations.

8.5 Decommissioning

By implementing the Closure Task Register in conjunction with progressive rehabilitation, the Operation will be successfully decommissioned to the post-mining land use of a reinstated samphire community on the lakebed and a shrubland community on the fringing dunes. There will be no decommissioning legacy issues.

9 CLOSURE MONITORING AND MAINTENANCE

Monitoring is currently occurring at the Operation in the form of:

- Rehabilitation sites: 10 paired rehabilitation plots (10 revegetation quadrats versus 10 adjacent analogue control quadrats).
- General site assessment as part of the AER inspections.

No fauna monitoring is proposed at this point in time due to the paucity of species occurrence and lack of impact conservation listed species.

As discussed in Section 1.2, approximately 90.7ha or 74.33% of the total disturbance footprint of 122.03ha has been rehabilitated. Of the rehabilitated area, 57.44ha or 63.3% is assessed as being at Stage 2. LGC will approach DMIRS in the next few years in regards to areas that could potentially be subject to relinquished / sign-off. The establishment of monitoring quadrats is the first part of this process. Drone imagery will be provided to DMIRS as part of the relinquishment request along with an updated monitoring report including statistical analysis. The drone imagery will be flown at a height to clearly show individual samphire plants to aid in the regrowth assessment.

The DMIRS comments from the 2017 MCP in Table 1 Section 6 are that “Trigger levels should be stated for when remedial tasks will be undertaken for soil erosion, weeds or disruptions to surface water.” From examination of previously rehabilitated areas that go back 20 years, there is no evidence of soil erosion, weeds or disruptions to surface water. If any of these issues are observed at any level they will be reported in the AER and next MCP, and immediate remedial action undertaken by LGC.

9.1 Rehabilitation Monitoring

In 2017, 10 rehabilitation sites and 10 paired analogue sites were established. Each site is a 20m x 20m quadrat with permanent corner markers (dumpy pegs). Each control site has been located on undisturbed lakebed paired to a nearby rehabilitation site (refer to Plates 17 to 29). The control was chosen to be as close as possible to the rehabilitation site in an identical looking community and landform. A monitoring report is provided with the AER at regular intervals. Due to the slow growth of the samphire community, monitoring will likely be undertaken every second or third year. It should be noted that Monitoring Site 3 has been placed on barren lakebed as this was where mining occurred (refer to Plates 27 to 29).

Post-closure, monitoring of rehabilitation sites will continue until sign-off relinquishment by DMIRS, estimated at 5 to 10 years after operations finish. At least three monitoring cycles are planned over this post-closure timeframe.

Rehabilitation monitoring includes the following:

- Floristic assessment of the 10 rehabilitation sites and 10 paired control sites for:
 - Flora species present.
 - Numbers of each species.
 - Heights and percent foliage cover for each species.
 - Description of structural strata in accordance with NVIS Level 4.
 - Leaf litter presence or absence, and percent cover (if present).

- Any issues quadrat such as weeds, erosion, patchy regrowth, remedial action.
- Photographs of the plot from the same reference post to the back post, photographs of the ground surface and lateral photographs to show strata.
- Statistical analysis of the paired plots using following diversity indices:
 - Species diversity: Simpson's Index;
 - Species Abundance: Bray Curtis Distance measure; and/or
 - Species present / absence: Sørensen – Dice Index.
 - Paired t-Tests.

The results of the statistical analysis will determine when the rehabilitation communities are similar to the control sites. A 75% community similarity is the end point objective. In regards to Monitoring Site 3 (no vegetation), the assessment will be subjective, based on visual appearance (i.e. flat barren lakebed).

9.2 General Site Assessment

The general site assessment results are reported in the AER and could include the following:

- Overview of the status of rehabilitation and any other environmental issue.
- Site maps showing the location and stage of rehabilitated areas.
- Photographs of rehabilitated areas (not the monitoring sites).
- Evaluation of the effectiveness and success of rehabilitation techniques.
- Weed assessment.
- Erosion assessment.
- Description of any environmental issues and plans or activities undertaken to remediate these issues.

10 FINANCIAL PROVISION FOR CLOSURE

Areas of disturbance for the Operation are provided in Table 4. The undertaking of extensive progressive rehabilitation as part of ongoing operations has significantly reduced the current mine closure liability. Approximately 74% of mining disturbances have been rehabilitated. Estimated costs for mine closure are provided in Table 20. The costs in Table 20 are subject to the following assumptions:

- The majority of rehabilitation earthworks for excavations (approximately 75% of the disturbance by area) have been completed at closure (this involves backfilling, levelling to original contours and covering with topsoils as shown in Plates 15 to 30).
- Any provisional (unforeseen) remedial costs will not exceed \$10,000. This assumption is considered as being reasonable given that the site has no significant environmental uncertainties.

The mine closure costs now include a revised cost for vegetation monitoring as per the DMIRS comments for the 2017 MCP (Table 1, Comment 10). Monitoring of rehabilitation sites will be undertaken annually after closure until sign-off and relinquishment of bonds by DMIRS, estimated at 5 to 10 years. It is assumed that three monitoring regimes will be required over 10 rehabilitation sites and 10 analogue sites.

LGC will undertake an annual review of the financial provisions required to undertake mine closure. Progressive rehabilitation will continue to be undertaken annually to reduce the final closure costs as much as possible.

Table 21: Estimated costs for mine closure

Task	Estimated Cost (\$)
Pre-Closure Planning:	
Conduct a field assessment all mine closure areas. Accurately map all mine closure areas into domains.	2,400
Undertake a weed survey to determine weed densities and locations of weed occurrences. Use this information for rehabilitation planning and completion criteria planning.	480
Consult with the Shire and DMIRS Environmental Officer regarding rehabilitation and closure requirements.	480
Consult with the DMIRS District Inspector of Mines regarding the abandonment.	240
Produce a MCP for approval by DMIRS. Develop a Task Register as part of the closure and rehabilitation process to manage all requisite activities.	4,800
Implement the approved MCP.	120
Preliminary Rehabilitation:	
Notify the Shire and DMIRS Environmental Officer of the commencement date for rehabilitation.	120
Notify the District Inspector of Mines of abandonment in accordance with Sections 42 and 88 of the Mines Safety and Inspection Act 1994.	60
Remove any portable equipment and infrastructure.	3,750

Task	Estimated Cost (\$)
Conduct an 'emu parade' to search for scrap material and rubbish. Remove any scrap material and rubbish from site and transfer to the Dalwallinu Shire landfill.	1,200
Eradicate all introduced plants from areas to be rehabilitated. Use herbicides as required. Check that any rootstock material is treated with herbicide or physically removed.	960
Wash down all machinery used for rehabilitation prior to entry onto site to prevent weed contamination.	240
Topsoil to be checked for weeds. Weed infested soil will be excluded from rehabilitation use.	240
Examine ground for hydrocarbon staining. Excavate any hydrocarbon stained soil and transport to the hydrocarbon bioremediation area of the Dalwallinu Shire Landfill, other approved bioremediation areas.	960
Mining Excavations:	
Check for weeds and eradicate prior to commencement of earthmoving activities.	120
Batter back excavation edges and general landscaping to create natural looking contours that blend in with local topography. The final landform will resemble the surrounding lakebed.	7,500
Landscaped areas will then be covered with topsoil to facilitate the return of native vegetation and a natural ecosystem.	2,500
Rip or scarify all rehabilitation areas but avoiding deep furrows that could channelize runoff.	1,250
Ensure that all access to the mining areas is blocked (see Mine Roads below).	1,000
Processing and Stockpiling Area:	0
Check for weeds and eradicate prior to commencement of earthmoving activities.	240
Remove all remnant stockpiles from site or use as mining area backfill.	1,250
Undertake landscaping earthworks to restore the entire stockpiling area to pre-mining contours.	2,500
Respread brush and topsoil over the rehabilitated surface and scarify or rip the entire surface using multiple tynes.	1,250
Deep rip any compacted areas or hardstand. Deep ripping will occur using a single tyne from a large bulldozer at full depth ground penetration.	1,250
Ensure that all access to the Processing and Stockpiling Area is removed (roads ripped) or blocked.	500
Mine Roads:	
Re-check for weeds and eradicate, where practical, prior to commencement of earthmoving activities.	120
Grade windrow material back across the road surface.	3,600
Undertake landscaping earthworks to restore the road area to pre-mining contours.	1,800

Task	Estimated Cost (\$)
Deep rip the entire surface to break soil compaction. Deep ripping will occur using a single large tyne from a large bulldozer at full depth ground penetration.	2,700
Respread brush and topsoil over the rehabilitated surface and scarify or rip the entire surface using multiple tynes.	900
Prevent access onto rehabilitated areas by blocking potential entry points with large boulders, logs or earth bunds.	720
Post Rehabilitation:	
Appropriate sign-posting.	960
Notify the DMIRS Environmental Officer of the completion of rehabilitation earthworks.	120
Monitor for weed outbreaks and implement weed spraying campaigns as necessary.	1,200
Assess status of natural revegetation using topsoil, after two wet seasons. Seed with locally occurring native species, if considered necessary.	1,440
Provisional remedial costs	10,000
Monitoring:	
Monitoring of rehabilitation sites will be undertaken annually after closure until sign-off and relinquishment of bonds by DMIRS, estimated 10 years. Assume 3 monitoring regimes over 10 rehabilitation sites and 10 analogue sites. Monitoring for vegetation establishment	15,000
Total	73,970

11 MANAGEMENT OF INFORMATION AND DATA

All mining related environmental data in relation to the Operation will be provided to DMIRS electronically, including:

- Mining proposals;
- Baseline reports accompanying mining proposals;
- MCPs;
- NVCPs;
- AERs;
- MRF data; and
- Any other relevant reports or information.

All data will also retained by:

- LGC as hard copy reports and electronic data.
- Newland Environmental Pty Ltd as electronic data.

Newland Environmental Pty Ltd also undertakes a daily server backup of all LGC electronic information.

Reporting of rehabilitation performance will be undertaken in accordance with regulatory requirements. Rehabilitation reporting in the AER will include details of:

- Rehabilitation monitoring results for the reporting period;
- Maintenance / remedial actions completed or planned; and
- New rehabilitation that has been undertaken on-site.

The results of monitoring will be used internally on an annual basis to assess rehabilitation performance and identify whether alternative management strategies are required or if completion criteria require review. This reviewed information will be provided in the next AER and MCP.

12 REFERENCES

ANZMEC (2000). Strategic Framework for Mine Closure. Australian and New Zealand Minerals and Energy Council and Minerals Council of Australia. ISBN 0 642 72138 6.

ASRIS (1991). Digital Atlas of Australian Soils. ESRI shapefile downloaded from the Australia Soil Resource Information System. http://www.asris.csiro.au/themes/Atlas.html#Atlas_Downloads.

Beard J S (2000). Drainage evolution in the Moore-Monger System, Western Australia. *Journal of the Royal Society of Western Australia*, 83:29-38, 2000.

Beard J S, Beeston G R, Harvey J M, Hopkins A J M, Shepherd D P (2013). The vegetation of Western Australia at the 1:3,000,000 scale. Explanatory memoir. Second edition. *Conservation Science Western Australia* 9, 1–152.

Beecham B (2001). Avon Wheatbelt 2 (AW2 - Rejuvenated Drainage subregion). In *A Biodiversity Audit of Western Australia's 53 Biogeographic Subregions in 2002*. (McKenzie, N. L., May, J. E., and McKenna, S., eds). Department of Environment and Conservation, Perth, Australia.

BirdLife International (2021a). Species factsheet: *Motacilla cinerea*. BirdLife International factsheet, <http://www.birdlife.org>.

BirdLife Australia (2021b). Species factsheet for the Hooded Plover *Thinornis rubricollis*. BirdLife Australia, <http://www.birdlife.org.au/bird-profile/hooded-plover>.

BOM (2022). Climate Statistics for the Dalwallinu Meteorological Station 8297. Bureau of Meteorology. <http://www.bom.gov.au/climate/averages>.

Clarke G M and Spier-Ashcroft F (2003). A Review of the Conservation Status of Selected Australian Non-Marine Invertebrates. National Heritage Trust. <http://www.environment.gov.au/resource/review-conservation-status-selected-australian-non-marine-invertebrates>.

Data WA (2022a). data.wa.gov.au, Shared Location Information Platform. <https://data.wa.gov.au/home>.

Data WA (2022b). WMS Layers from Data WA - Threatened Ecological Communities (DBCA-038), https://services.slip.wa.gov.au/public/services/SLIP_Public_Services/Environment/MapServer/WMServer?

DAWE (2016). Eucalypt Woodlands of the Western Australian Wheatbelt: a nationally protected ecological community. Department of the Agriculture, Water and the Environment, <http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>.

DAWE (2018). Interim Biogeographic Regionalisation for Australia (IBRA) version 7.0. Spatial dataset available from Department of the Agriculture, Water and the Environment, <http://www.environment.gov.au>,

DAWE (2022). Protected Matters Search Tool for listings under the *Environment Protection and Biodiversity Conservation Act 1999*. Online search tool, Department of the Agriculture,

Water and the Environment, <http://www.environment.gov.au/epbc/protected-matters-search-tool>.

DBCA (2018). List of Threatened Ecological Communities endorsed by the Western Australia Minister for the Environment. Species and Communities Branch, Department of Biodiversity, Conservation and Attractions (correct to 28 June 2018). <https://www.dbca.wa.gov.au/plants-and-animals/threatened-species-and-communities/wa-s-threatened-ecological-communities>.

DBCA (2021). Priority Ecological Communities for Western Australia Version 32. Species and Communities Branch, Department of Biodiversity, Conservation and Attractions, 15 July 2021. <https://www.dbca.wa.gov.au/plants-and-animals/threatened-species-and-communities/wa-s-threatened-ecological-communities>.

DBCA (2022). NatureMap online database, Mapping Western Australia's Biodiversity. Department of Biodiversity, Conservation and Attractions. <https://naturemap.dbca.wa.gov.au/>.

DEC (2003a). Interim Recovery Plan No. 141. Hinged Dragon Orchid (*Caladenia drakeoides*). Interim Recovery Plan 2003-2008. Department of Environment and Conservation, July 2003.

DEC (2003b). Interim Recovery Plan No. 124. Pinnate leaved Eremophila (*Eremophila pinnatifida* ms). Interim Recovery Plan 2002- 2007, Department of Environment and Conservation, 2003.

DEC (2004). Interim Recovery Plan No. 183. Red Snakebush (*Hemiandra gardneri*). Interim Recovery Plan 2004- 2009, Department of Environment and Conservation, September 2004.

DEC (2006). Interim Recovery Plan No. 231. Saltmat (*Roycea pycnophylloides*). Interim Recovery Plan 2006-2011. Department of Environment and Conservation, December 2006.

DEC (2007). Interim Biogeographic Regionalisation of Australia, Subregions for Western Australia. ESRI Shapefile purchased from the Department of Environment and Conservation. September 2007.

DEC (2008a). Resource Condition Report for a Significant Western Australian Wetland: Lake Goorly. Department of Environment and Conservation, Perth, Western Australia, July 2009.

DEC (2008b). Interim Recovery Plan No. 253. Silky Frankenia (*Frankenia conferta*). Interim Recovery Plan 2008-2013. Department of Environment and Conservation, April 2008.

DITR (2006a). Mine Closure and Completion. Leading Practice Sustainable Development Program for the Mining Industry. Department of Industry, Tourism and Resources, October 2006. <http://www.ret.gov.au/resources/Documents/LPSDP/LPSDP-MineClosureCompletionHandbook.pdf>.

DITR (2006b). Mine Rehabilitation. Leading Practice Sustainable Development Program for the Mining Industry. Department of Industry, Tourism and Resources, October 2006. <http://www.ret.gov.au/resources/Documents/LPSDP/LPSDP-MineRehabilitationHandbook.pdf>.

DMIRS (1994). Environmental Management of Quarries; Development, Operation and Rehabilitation Guidelines. Department of Mines, Industry Regulation and Safety, November 1994.

DMIRS (1997). Safety Bund Walls around Abandoned Open Pit Mines Guideline. Department of Mines, Industry Regulation and Safety.

DMIRS (2020). Mine Closure Plan Guidance - How to prepare in accordance with Part 1 of the Statutory Guidelines for Mine Closure Plans, Version 3.0, Effective from 3 March 2020. Department of Mines, Industry Regulation and Safety.

DMIRS (2022a). Mineral Titles Online. Department of Mines, Industry Regulation and Safety tenement web-based database, <http://www.dmir.s.wa.gov.au/Online-Systems-1527.aspx>.

DMIRS (2022b). Tengraph. Department of Mines, Industry Regulation and Safety tenement online mapping system, <http://www.dmp.wa.gov.au/Online-Systems-1527.aspx>.

DMIRS (2022c). MINDEX. Department of Mines, Industry Regulation and Safety online database form mines and mineral deposits. <http://minedext.dmp.wa.gov.au/minedex/external/common/appMain.jsp>.

DPLH (2022a). Aboriginal Heritage Enquiry System. Department of Planning, Lands and Heritage website. <https://www.wa.gov.au/service/aboriginal-affairs/aboriginal-cultural-heritage/search-aboriginal-sites-or-heritage-places-ahis#aboriginal-heritage-inquiry-system>

DPLH (2022a). Spatial data for heritage sites "places.shp", Aboriginal Heritage Enquiry System. Department of Planning, Lands and Heritage website. <https://www.wa.gov.au/service/aboriginal-affairs/aboriginal-cultural-heritage/search-aboriginal-sites-or-heritage-places-ahis#spatial-information-downloads>

DPLH (2022c). 'InHerit' Heritage Place Search Database. Department of Planning, Lands and Heritage website. <http://inherit.stateheritage.wa.gov.au/public>.

DWER (2020). Geographical Atlas, hydrological data purchased from the Department of Water and Environmental Regulation, Perth. <https://atlases.water.wa.gov.au/idelve/dowdataext/download/default.html>.

DPaW (2009). Standard Operating Procedure, Establishing Vegetation Quadrats, SOP No: 6.1. Department of Parks and Wildlife, June 2009.

Environment Australia (2000). The Action Plan for Australian Birds. Department of Water, Heritage and the Arts. Environment Australia, 1999. ISBN 0 6425 4683 5. <http://www.environment.gov.au/biodiversity/threatened/publications/action/birds2000>.

Environment Australia (2001). A Directory of Important Wetlands in Australia, Third Edition. Environment Australia, Canberra.

EPA (2004). Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia. Guidance Statement No. 51. Guidance for the Assessment of Environmental Factors, Western Australia (in accordance with the Environmental Protection Act 1986). Environmental Protection Authority, June 2004.

EPA. (2006). Rehabilitation of Terrestrial Ecosystems. Guidance Statement No. 6. Guidance for the Assessment of Environmental Factors, Western Australia (in accordance with the Environmental Protection Act 1986). Environmental Protection Authority, June 2006.

Fordyce B. (2015). Heritage Survey Report of an investigation of tenements M70/1312 and L70/127 for Bywaters Gypsum Supplies, Lake Goorly, Western Australia. Unpublished report prepared for by Ben Fordyce for Lake Goorly Contracting, June 2015.

Fordyce Dr I (2005). Final report on Feasibility Study 2003-2005. Yarra Yarra Catchment Management Group and Northern Agricultural Catchments Council Kalannie, Australia.

Fordyce Dr I (2010). Flora and vegetation survey of a gypsum deposit in Lake Goorly, Dalwallinu Shire, M7011118, M70/1191, M70/1256 Dr Ian Fordyce Yarra Yarra Catchment Management Group Kalannie, January 2010.

Fordyce Dr I (2011). Vegetation and Flora Survey of Lake Goorly, particularly areas of proposed disturbance with gypsum mining operations on M70/1079, 1114, 1115, 1118, 1191, 1255, 1256, 1257, 12588, 1259, 1272 and E70/3099 and associated special purpose tenements.' Unpublished report prepared by Dr Ian Fordyce for Bywaters Gypsum Supplies April 2011.

FloraBase (2021). FloraBase the Western Australian Flora. Department of Environment and Conservation, Como, Western Australia. <https://florabase.dbca.wa.gov.au/>

Gifford P (2011). An Aboriginal Heritage Survey at Lake Goorly, North East of Wubin, Western Australia, for an Application under Section 18 of the *Aboriginal Heritage Act 1972*.

Geering A, Agnew S and Harding S (2007). Shorebirds of Australia. CSIRO Publishing. Melbourne, ISBN: 9780643101340.

Geoscience Australia (2009). Online Topographical Data for the Perenjori 1:250,000 Map Sheet No SF5002. Geoscience Australia, Canberra. https://www.ga.gov.au/products/servlet/controller?event=DEFINE_PRODUCTS.

Government of Western Australia (2019). 2018 Statewide Vegetation Statistics incorporating the CAR Reserve Analysis (Full Report). Current as of March 2019. WA Department of Biodiversity, Conservation and Attractions, Perth, <https://catalogue.data.wa.gov.au/dataset/dbca-statewide-vegetation-statistics>.

GSWA (2009). 1:500 000 Interpreted Bedrock Geology of Western Australia Spatial Data. Geological Survey of Western Australia. Department of Mines and Petroleum Data and Software Centre. <http://www.dmp.wa.gov.au/4895.aspx>.

Harris J and Hohnen J (2011). Report of an Archaeological Section 18 Application Survey at Lake Goorly, North of Wubin.

Higgins P J and Davies S J J F (1996). Handbook of Australian, New Zealand and Antarctic Birds. Volume Three - Snipe to Pigeons. Melbourne, Victoria: Oxford University Press.

ICMM (2008). Planning for Integrated Mine Closure: Toolkit, International Council on Mining and Metals, London, United Kingdom. <http://www.icmm.com/page/9568/planning-for-integrated-mine-closure-toolkit>.

Marchant S and Higgins P J (1993). Handbook of Australian, New Zealand and Antarctic Birds, Volume 2: Raptors to Lapwings, Melbourne, Oxford University Press.

MMSD (2002). Mining for the Future, Appendix B: Mine Closure, Working Paper No 34. Mining, Minerals and Sustainable Development, April 2002.

NACC. (2005) Regional Natural Resource Management Strategy: Northern Agricultural Region of Western Australia. Northern Agricultural Catchments Council, Perenjori, Australia.

Newland Environmental (2013). Flora and Vegetation Survey of M70/1312 – Lake Goory Gypsum Operation. Unpublished report prepared by Newland Environmental Pty Ltd for Bywaters Gypsum Supplies, November 2013.

Northcote K H with Beckmann G G, Bettenay E, Churchward H M, Van Dijk D C, Dimmock, G M, Hubble G D, Isbell R F, McArthur W M, Murtha G G, Nicolls K D, Paton T R, Thompson C H, Webb A A and Wright M J (1960-1968). Atlas of Australian Soils, Sheets 1 to 10 with explanatory data. CSIRO and Melbourne University Press: Melbourne.

PIRSA (2008). Preparation of a Mining and Rehabilitation Program (MARP) (Extractive Mineral Operations). Department of Primary Industries and Resources South Australia. Mining Regulation and Rehabilitation. Regulatory Guideline No 6 Revision 1.7, May 2008.

Pizzey, G. and Knight, F. (2007). The Field Guide to the Birds of Australia. HarperCollins Publishers Australia, ISBN 0207199353.

QMC (2001). Guidelines for Mine Closure Planning in Queensland. Queensland Mining Council, ISBN 095787010, April 2001.

Shepherd D P, Beeston G R and Hopkins A J M (2002). Native Vegetation in Western Australia. Resource Management Technical Report 249. Department of Agriculture, Western Australia, South Perth.

Simpson, K and Day N (1999). Field Guide to Australian Birds, 6th Edition. Australia, 1999

Standards Australia/Standards New Zealand (2009). AS/NZS ISO 31000:2009. Risk Management – Principles and Guidelines. Jointly published by Standards Australia and Standards New Zealand, ISBN 0 7337 9289 8.

Standards Australia/Standards New Zealand (2012). HB 203:2012. Handbook, Managing environment-related risk. Jointly published by Standards Australia and Standards New Zealand, ISBN 978 1 74342 059 1

Standards Australia/Standards New Zealand (2001). AS/NZS 4804:2001. Occupational health and safety management systems - General guidelines on principles, systems and supporting techniques. Jointly published by Standards Australia and Standards New Zealand, ISBN 0 7337 4092 8.

Stewart AJ, Sweet IP, Needham RS, Raymond OL, Whitaker AJ, Liu SF, Phillips D, Retter, AJ, Connolly DP, Stewart G (2008). Surface geology of Australia 1:1,000,000 scale, Western Australia. Spatial dataset "WA_SGP_1M.shp", Data and Software Centre, Geological Survey of Western Australia, Department of Mines, Industry Regulation and Safety, <https://dasc.dmp.wa.gov.au/dasc/>

WAPC (2003). Acid Sulfate Soils. Planning Bulletin 64. Western Australian Planning Commission, Issn 1324-9142, November 2003.

Wilson S K and Swan G (2008). A complete guide to reptiles of Australia. Reed New, Australia, 2008.

13 APPENDICES

Appendix A	DMIRS approval letter for Mine Closure Plan Registration ID 69523
Appendix B	Clearing Permit CPS 5955/3
Appendix C	Section 18 Notices for the Lake Goorly Gypsum Operation
Appendix D	Obligations and Commitments Register
Appendix E	Licence to Operate for the Lake Goorly Gypsum Operation
Appendix F	Copy of correspondence to the Shire of Dalwallinu
Appendix G	NatureMap search for conservation listed flora at Lake Goorly
Appendix H	<i>EPBC Act 1999</i> Protected Matters Report for Lake Goorly
Appendix I	NatureMap search for conservation listed fauna at Lake Goorly
Appendix J	Typical analysis of the gypsum material

APPENDIX A

DMIRS approval letter for Mine Closure Plan Registration ID 69523

Dated: 16 October 2017



Government of **Western Australia**
 Department of **Mines, Industry Regulation and Safety**

Our ref Registration ID : 69523
 Enquiries Alex Ruschmann
 (08) 9222 3442
 alex.ruschmann@dmirs.wa.gov.au

The Registered Manager
 Lake Goorly Contracting
 4411 Goodlands road
 KALANNIE WA 6468

Attention: Mr Craig Bywaters

Dear Sir/Madam

APPROVAL FOR MINE CLOSURE PLAN - MINE CLOSURE PLAN - LAKE GOORLY GYPSUM - J00805 FOR LAKE GOORLY GYPSUM / BYWATERS.

REGISTRATION ID: 69523

I refer to your Mine Closure Plan dated 31 August 2017, for the Lake Goorly Gypsum / Bywaters project that has been assessed by this Department. The document satisfies the Schedule of Conditions associated with the tenements for this project.

Approval is hereby given for the Mine Closure Plan to be implemented. This plan is to be reviewed and lodged with the Department in accordance with revised conditions.

Please note the following points, which should be addressed before resubmission of the Mine Closure Plan in "2020":

Section of the Mine Closure Plan	Comments
Closure Obligations & Commitments	This section did not identify and discuss all of the relevant legislation that must be considered for the project. An example is the Wildlife Conservations Act (1950) that was mentioned in section 7.1.10.
Stakeholder Engagement	The level of detail provided in this section reflects good consultation at this stage of the project. However, the schedule of consultation for closure only requires consultation 3 years prior to closure. Considering the project has a stated 60 year mine life and mine areas will be closed-out over this period, LGC should consider on-going closure consultation.
Completion Criteria	The project aims to reinstate the natural surface water flow on the lake surface. The completion criteria should capture this objective.

000827.Alex.RUSCHMANN

Mineral House 100 Plain Street East Perth WA 6004
 Cnr Hunter and Broadwood Streets, Locked Bag 405 Kalgoorlie WA 6433
www.dmirs.wa.gov.au
 ABN 69 410 335 356

Section of the Mine Closure Plan	Comments
Risk Assessment Matrix	<p>It would be beneficial to present a description of the Consequence ratings (insignificant – catastrophic) and the Likelihood ratings (rare – almost certain).</p> <p>The risk assessment has grouped risk pathways that have inherently different risk ratings. There can be multiple risk pathways for environmental factors and objectives. It may be beneficial to list the different reasons (pathways) that can lead to inadequate topsoil management and a loss in viability of the seedbank.</p>
Closure Implementation	The post rehabilitation section should include monitoring of water flow/ponding and if surface drainage on the lake is not adequate remedial actions should be undertaken to reinstate the natural surface water flows.
Closure Monitoring & Maintenance	Trigger levels should be stated for when remedial tasks will be undertaken for soil erosion, weeds or disruptions to surface water.
	Timeframes for monitoring and remedial tasks should be more specific.
	The methodology should be stated for the vegetation and fauna assessments that will determine if completion criteria have been attained.
	The site has completed a large amount of rehabilitation and may wish to seek sign-off on rehabilitation areas that have attained completion criteria prior to closure of the site. This could be discussed in this section of the MCP.
Financial Provisioning	This section should state the assumptions made during financial provisioning. An example of this is that specific costs were given for remedial actions after closure. This would assume an assumption was made on the total area that may require remedial activities.
	The cost provisioning for vegetation and fauna monitoring were low given the commitments in completion criteria that these assessments will be undertaken.
Management of Information & Data	All records relevant to mining activities should be retained and made available if required by the department; not just the information required for Annual Environmental Reporting, the Mining Rehabilitation Fund and/or Mine Closure Plans.

Areas of Closure Plan that is considered well done and worthy of recognition:

Section of the Mine Closure Plan	Comments
Project Summary	This section provided a concise summary of the project, mining activities, approvals and environmental receptors.
Post-mining Land Use and Closure Objectives	The post mining land use is appropriate and achievable. The closure objectives are linked to stakeholder consultation and the surrounding environment.
Collection & Analysis of Closure Data	The information presented was very detailed given the relatively simple mining operations. The analysis of closure data determined the factors that would be important for closure planning and implementation.

I advise that I intend to recommend to the Minister responsible for the *Mining Act 1978* that he impose further conditions on the tenements linked to this project under the provisions of Section 84/46A of the *Mining Act 1978*. A schedule of further conditions is attached.

Should you have any queries regarding the recommended condition(s), please contact Environmental Officer - Alex Ruschmann on (08) 9222 3442.

Yours faithfully



Karen Caple | Acting Executive Director
Environment
16 October 2017

Attached: *Recommended Further Conditions*

APPENDIX B

Clearing Permit CPS 5955/3



CLEARING PERMIT

Granted under section 51E of the Environmental Protection Act 1986

Purpose Permit number:	5955/3
Duration of Permit:	From 19 April 2014 to 19 April 2024
Permit Holder:	Phillip John Bywaters and Craig Anthony Bywaters

The Permit Holder is authorised to clear native vegetation subject to the following conditions of this Permit.

PART I - CLEARING AUTHORISED

- 1. Land on which clearing is to be done**
 General Purpose Lease 70/200
 Mining Lease 70/1079
 Mining Lease 70/1114
 Mining Lease 70/1115
 Mining Lease 70/1118
 Mining Lease 70/1191
 Mining Lease 70/1255
 Mining Lease 70/1256
 Mining Lease 70/1257
 Mining Lease 70/1258
 Mining Lease 70/1259
 Mining Lease 70/1272
 Mining Lease 70/1312
 Miscellaneous Licence 70/72
 Miscellaneous Licence 70/84
 Miscellaneous Licence 70/141
- 2. Purpose for which clearing may be done**
 Clearing for the purposes of gypsum mining and associated activities.
- 3. Area of Clearing**
 The Permit Holder shall not clear more than 84.47 hectares of native vegetation within the areas cross-hatched yellow on attached Plan 5955/3.
- 4. Type of Clearing Authorised**
 The Permit Holder shall not clear native vegetation unless the purpose for which the clearing is authorised is enacted within three months of the authorised clearing being undertaken.
- 5. Application**
 This Permit allows the Permit Holder to authorise persons, including employees, contractors and agents of the Permit Holder, to clear native vegetation for the purposes of this Permit subject to compliance with the conditions of this Permit and approval from the Permit Holder.

PART II – MANAGEMENT CONDITIONS**6. Weed control**

When undertaking any clearing or other activity authorised under this Permit, the Permit Holder must take the following steps to minimise the risk of the introduction and spread of *weeds*:

- (i) clean earth-moving machinery of soil and vegetation prior to entering and leaving the area to be cleared;
- (ii) ensure that no *weed*-affected soil, *mulch*, *fill* or other material is brought into the area to be cleared; and
- (iii) restrict the movement of machines and other vehicles to the limits of the areas to be cleared.

PART III - RECORD KEEPING AND REPORTING**7. Records to be kept**

The Permit Holder must maintain the following records for activities done pursuant to this Permit:

In relation to the clearing of native vegetation authorised under this Permit:

- (i) the location where the clearing occurred, recorded using a Global Positioning System (GPS) unit set to Geocentric Datum Australia 1994 (GDA94), expressing the geographical coordinates in Eastings and Northings or decimal degrees;
- (ii) the date that the area was cleared;
- (iii) the size of the area cleared (in hectares); and
- (iv) purpose for which clearing was undertaken.

8. Reporting

- (a) The Permit Holder shall provide a report to the General Manager Environmental Compliance, Resource and Environmental Compliance Division, Department of Mines, Industry Regulation and Safety by 31 August each year for the life of this permit, demonstrating adherence to all conditions of this permit, and setting out the records required under Condition 7 of this permit in relation to clearing carried out between 1 August and 31 July of the previous year.
- (b) Prior to 19 April 2024, the Permit Holder must provide to the General Manager Environmental Compliance, Resource and Environmental Compliance Division, Department of Mines, Industry Regulation and Safety a written report of records required under Condition 7 of this Permit where these records have not already been provided under Condition 8(a) of this Permit.

DEFINITIONS

The following meanings are given to terms used in this Permit:

fill means material used to increase the ground level, or fill a hollow;

mulch means the use of organic matter, wood chips or rocks to slow the movement of water across the soil surface and to reduce evaporation;

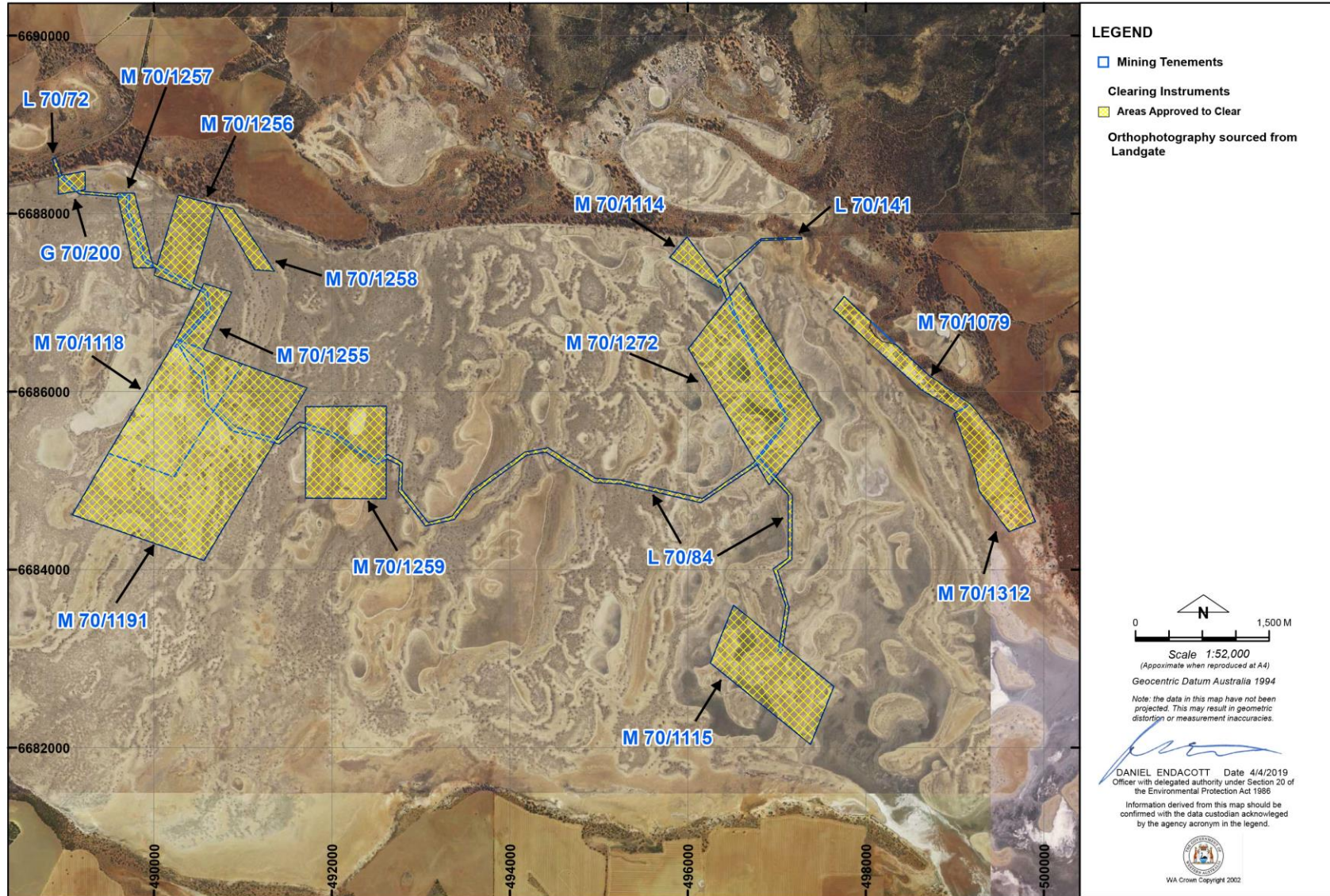
weed/s means any plant -
(a) that is a declared pest under section 22 of the *Biosecurity and Agriculture Management Act 2007*; or
(b) published in a Department of Biodiversity, Conservation and Attractions Regional Weed Rankings Summary, regardless of ranking; or
(c) not indigenous to the area concerned.



Daniel Endacott
General Manager Environmental Compliance
Resource and Environmental Compliance Division
04 April 2019

Officer with delegated authority under Section 20
of the *Environmental Protection Act 1986*

PLAN 5955/3



APPENDIX C

Section 18 Notices for the Lake Goorly Gypsum Operation



Hon Peter Collier MLC
Minister for Energy; Training and Workforce Development; Indigenous Affairs

Our Ref: 34-13313

Mr Craig A Bywaters
Owner
C/- PO Box 2
KALANNIE WA 6468

Dear Mr Bywaters

I refer to the section 18 notice ("the Notice") dated 12 April 2011 submitted by Phillip John Bywaters, Craig Anthony Bywaters & the Executor of the Estate of Maurice Anthony Leeson (Dec.) ("the Landowner") on behalf of Phillip Bywaters and Craig Anthony Bywaters ("the Applicant") to the Aboriginal Cultural Material Committee ("ACMC") pursuant to section 18(2) of the *Aboriginal Heritage Act 1972* ("AHA"). The Notice was considered at the 1 June 2011 ordinary ACMC meeting.

The Notice advised that you wish to use the land described in Item 4 of the Notice as Tenements M70/1079, M70/1115, M70/1118, M70/1114, L70/84, G70/200, L70/72, M70/1272, M70/1258, M70/1259, M70/1257, M70/1256, M70/1255 & M70/1191 ("the Land"), for the purpose described in Item 6 of the Notice as development, maintenance, use and rehabilitation of a gypsum mine and associated infrastructure ("the Purpose").

In accordance with my powers under section 18(3) of the AHA and following consideration of recommendations from the ACMC, I hereby grant consent to the use of the Land for the Purpose subject to the conditions set out below.

I am advised that based on current knowledge the Purpose will impact upon one Aboriginal site within the meaning of section 5 of the AHA ("Site") on the Land. The Site is DIA 24380 (Mongers Lake Waterway).

Conditions of Consent

That the Applicant (on behalf of the Landowner):

1. Ensures rehabilitation of impacted areas of the Land occurs following cessation of mining activities.

Level 11, Dumas House, 2 Havelock Street, West Perth Western Australia 6005
Telephone: +61 8 9213 7150 Facsimile: +61 8 9213 7155 Email: Minister.Collier@dpc.wa.gov.au

-2-

2. Immediately cease carrying out the Purpose if human skeletal remains ("Remains") are found and report the matter to the Western Australia Police and the Registrar of Aboriginal Sites ("Registrar"). Where it is determined that the Remains are Aboriginal in origin and not a police matter, they must remain *in situ* and undisturbed until the Registrar makes a decision about how to proceed in respect of the Remains. The Landowner must at its expense manage the Remains in accordance with the Registrar's decision and notify the whereabouts of the Remains to the Registrar.
3. Provide to the Registrar annually, or at the completion of the Purpose if the Purpose is completed within one year, a written report advising the Registrar whether and to what extent the Purpose has impacted on all or any Sites or objects within the meaning of section 6 of the AHA ("Objects") that may be located on the Land and to assist the ACMC to reassess the status of the Sites. This report is to include a detailed description of:
 - a. whether such Sites or Objects have been partially or entirely impacted by the Purpose;
 - b. the level, type and effect of any such impact (including, where possible, the provision of photographs taken during and after the impact);
 - c. where Sites or Objects have been salvaged, when and how such salvage took place, who was present at the salvage and, subject to issues of cultural confidentiality, to where the material was re-located.

This condition should not be construed as preventing the proponent from advising the Registrar in writing of all or any of the matters outlined above at any time prior to the completion of the Purpose. The Registrar and the ACMC welcome the provision of comprehensive and ongoing information about Sites and Objects in Western Australia.

Failure to comply with these conditions may constitute an offence under section 55 of the AHA. The Department of Indigenous Affairs ("DIA") carries out routine checks on compliance with conditions of Ministerial consents.

Requests and Advice

The following information has been provided by the ACMC for the information and guidance of the Landowner (or authorised Agent) and does not constitute a condition of consent.

The ACMC requests that the Landowner (or authorised Agent) give due consideration to requests made by the Aboriginal people consulted about the Purpose regarding the protection of Aboriginal heritage and the recognition of Aboriginal culture and history. For

-3-

example, recognition of Aboriginal heritage values, beliefs and prior occupation of the area may be conveyed through interpretive signage, street naming or murals.

In addition, the Landowner (or authorised Agent) should make all persons employed or engaged in respect of the Purpose aware of their obligations under the AHA. The Landowner (or authorised Agent) should insert into all and any relevant contracts, project plans, scopes of works, tenders and other similar documents, a requirement that such persons should examine relevant information on the DIA website at:

- <http://www.dia.wa.gov.au/Heritage--Culture/>

Right of Review of Decision

Where the Landowner (or authorised Agent) is aggrieved by a decision of the Minister made under section 18(3) of the AHA, the Landowner may apply to the State Administrative Tribunal for a review of the decision. The Tribunal's website is www.sat.justice.wa.gov.au.

Other Matters

This consent can only be relied upon by the Landowner (or authorised Agent). Any subsequent owner of the land within the meaning of the AHA must make their own application under the AHA.

Copies of the AHA, the *Aboriginal Heritage Regulations 1974* and the *State Administrative Tribunal Act 2004* may be viewed and downloaded from the website of the State Law Publisher at www.slp.wa.gov.au.

If you have any queries in relation to your application, please contact Mr Simon Keenan, DIA Senior Heritage Officer, on 9235 8132.

Kind regards



Hon Peter Collier MLC
**MINISTER FOR ENERGY;
TRAINING AND WORKFORCE DEVELOPMENT; INDIGENOUS AFFAIRS**

27 JUN 2011

cc. Mr Philip J Bywaters and Mr Maurice A Lesson
PO Box 2
KALANNIE WA 6468



Hon Ben Wyatt MLA
Treasurer; Minister for Finance; Aboriginal Affairs; Lands

Our Ref: 69-13337

Mr Charles Newland
Environmental Manager
Newland Environment
Lake Goorly Contracting
PO Box 1027
KALAMUNDA WA 6926

Dear Mr Newland

I refer to the Notice submitted under Section 18(2) of the *Aboriginal Heritage Act 1972*, dated 19 December 2018 by Lake Goorly Contracting on behalf of Craig Anthony Bywaters and Phillip John Bywaters (the Notice).

The Notice advised that you wish to use the Land described as Tenements M70/1312, L70/141, E70/4426, E70/4427 and E70/4467 (Land) for the Purpose described as being the Lake Goorly Gypsum Mining Project, for mining gypsum layers on the lake bed surface as shallow strips followed by progressive rehabilitation, levelling excavations and pushing back topsoil and low impact drilling (Purpose).

I am advised that your intended use will impact upon one Aboriginal site within the meaning Section 5 of the *Aboriginal Heritage Act 1972*. The Aboriginal site is ID 24380 (Mongers Lake Waterway).

Pursuant to Section 18(3) of the *Aboriginal Heritage Act 1972*, I have granted consent with conditions. The form of Consent is enclosed. I draw your attention to the additional information attached, which is provided for your assistance.

If you have any queries in relation to this matter, please contact Mr Matthew Franklin, Team Leader, Heritage, Department of Planning, Lands and Heritage, on (08) 6551 8000.

Yours sincerely

Ben Wyatt MLA
MINISTER FOR ABORIGINAL AFFAIRS

Enc.

09 APR 2019

Level 11, Dumas House, 2 Havelock Street, West Perth, Western Australia 6005
Telephone: +61 8 6552 5900 Fax: +61 8 6552 5901 Email: Minister.Wyatt@dpc.wa.gov.au

ABORIGINAL HERITAGE ACT 1972**CONSENT PURSUANT TO SECTION 18(3)**

CONSENT GRANTED TO: Lake Goorly Contracting on behalf of Craig Anthony Bywaters and Phillip John Bywaters.

IN RESPECT OF THE LAND: Tenements M70/1312, L70/141, E70/4426, E70/4427 and E70/4467.

THE PURPOSE: Lake Goorly Gypsum Mining Project, for mining gypsum layers on the lake bed surface as shallow strips followed by progressive rehabilitation, levelling excavations and pushing back topsoil and low impact drilling.

REFERENCE: 69-13337

SITE(S) TO BE IMPACTED: ID 24380 (Mongers Lake Waterway).

CONDITIONS OF CONSENT

That the consent holder:

1. Provides a written report to the Registrar of Aboriginal Sites within 60 days of the completion of the Purpose, advising whether and to what extent the Purpose has impacted on all or any Sites located on the Land. The final report should include a detailed description of:
 - a. what extent the Purpose has impacted any Aboriginal Site on the Land;
 - b. where any Aboriginal Site has been impacted, whether such Site has been partially or wholly impacted by the Purpose, and the level, effect and type of any such impact – preferably by the provision of photographs taken before and after the impact;
 - c. where any Aboriginal Site has been subject to archaeological or cultural salvage, when and how such salvage took place, who was present at the salvage and where the material was re-located, the results of the salvage and any subsequent analysis conducted; and
 - d. the results and findings of any monitoring of ground disturbing works associated with the Purpose.

SECTION 18 CONSENTS

ADDITIONAL INFORMATION

The following information is provided for the guidance of the consent holder and does not constitute conditions of consent.

1. Right of Review of Decision

Where a consent holder is aggrieved by a decision of the Minister made under Section 18(3) of the *Aboriginal Heritage Act 1972*, including the conditions to which the consent is subject, application may be made to the State Administrative Tribunal for a review. The Tribunal's website is www.sat.justice.wa.gov.au.

2. Consent is Non-Transferable

Consent may be relied upon only by the named consent holder in respect of the named land. Any successor in title must give its own notice under the *Aboriginal Heritage Act 1972*.

3. Traditional Knowledge Holder

Agreements reached with Traditional Owners and knowledge holders entered into on behalf of the consent holders are acknowledged and supported.

4. Conditions of Consent

- The Department of Planning, Lands and Heritage (DPLH) carries out routine audits on compliance with the conditions of consent.
- Failure to comply with the conditions of consent may constitute an offence under Section 55 of the *Aboriginal Heritage Act 1972*.
- It is recommended that the consent holder informs all employees and others engaged in the development of their obligations under the *Aboriginal Heritage Act 1972*, especially with regard to skeletal material.
- Reports to the Registrar of Aboriginal Sites (the Registrar) should use the Section 18 Report Back template which can be downloaded from the DPLH website at <https://www.dplh.wa.gov.au/information-and-services/aboriginal-heritage/land-use-under-the-aha/section-18-notices>.
- The Registrar welcomes any additional information about Aboriginal sites within the meaning of Section 5 of the *Aboriginal Heritage Act 1972*, or objects within the meaning of Section 6 of the *Aboriginal Heritage Act 1972*.

5. Legislation

The *Aboriginal Heritage Act 1972*, the *Aboriginal Heritage Regulations 1974* and the *State Administrative Tribunal Act 2004* may be viewed and downloaded from the State Law Publisher website at www.slp.wa.gov.au

APPENDIX D

Obligations and Commitments Register

Part A: Mining Proposal MP 47944

Part B: Tenement Conditions

Part C: Clearing Permit CPS 5955/3 Conditions

Part D: Section 18 (AHA) Conditions of Consent

Part E: Relevant mine abandonment sections from the *Mines Safety and Inspection Act 1994* and the *Mines Safety and Inspection Regulations 1995*

Part A: Mining Proposal MP 47944

MP Page	Commitment
28	LGC make the commitment to ensure complete compliance with all tenement conditions for the Lake Goorly Gypsum Operation
31	LGC make the commitment to ensure the Lake Goorly Gypsum Operation is in complete compliance with <i>Environmental Protection (Clearing of Native Vegetation) Regulations 2004</i>
31	LGC make the commitment to ensure that there are ongoing notifications/consultations with all relevant stakeholders throughout the mine life at the Lake Goorly Gypsum Operation
86	LGC make the commitment not to undergo any activities without consultation and subsequent advice from the DAA or granted Section 18 approvals (where applicable) and to respect Aboriginal heritage in the Operation.
94	LGC make the commitment that all topsoil will be stockpiled in low windrows of below 1.5m in height, and clearly excluded from operational areas. Cleared will be vegetation stockpiled separately.
96	LGC make the commitment to obtaining all relevant licences from the appropriate government body, prior to conducting any works.
97	LGC make the commitment to continue consultation with relevant stakeholders throughout the life of the Operation.
100	LGC will minimise impacts to fauna and fauna habitat during construction and operation and will restrict heavy vehicle movements to designated roads to minimise disturbance to fauna habitat.
102	LGC will adopt the Waste Management Hierarchy in dealing with waste and ensure that all waste materials are disposed of according to the relevant waste regulations.
104	LGC commit to ensuring all hydrocarbon contaminated soil is excavated and removed to the appropriate area of the Shire of Dalwallinu landfill facility.
106	LGC will undertake construction and operation of the Operation in a manner designed to minimise impacts on the existing environment such as flora, vegetation and fauna, and optimise opportunities for rehabilitation.

Part B: Generic tenement conditions relevant to mine closure

Tenement Condition (similar conditions with slight differences such as DoIR vs DMP have been re-worded using DMP)	M70/1079	M70/1114	M70/1115	M70/1118	M70/1191	M70/1255	M70/1256	M70/1257	M70/1258	M70/1259	M70/1272	M70/1312	G70/200	L70/72	L70/84	L70/141
All surface holes drilled for the purpose of exploration are to be capped, filled or otherwise made safe after completion.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y				
All costeans and other disturbances to the surface of the land made as a result of exploration, including drill pads, grid lines and access tracks, being backfilled and rehabilitated to the satisfaction of the Environmental Officer, Department of Industry and Resources (DMP). Backfilling and rehabilitation being required no later than 6 months after excavation unless otherwise approved in writing by the Environmental Officer, DMP	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y					
All disturbances to the surface of the land made as a result of exploration, including costeans, drill pads, grid lines and access tracks, being backfilled and rehabilitated to the satisfaction of the Environmental Officer, Department of Mines and Petroleum (DMP). Backfilling and rehabilitation being required no later than 6 months after excavation unless otherwise approved in writing by the Environmental Officer, DMP.												Y				
All waste materials, rubbish, plastic sample bags, abandoned equipment and temporary buildings being removed from the mining tenement prior to or at the termination of exploration program.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y			
Unless the written approval of the Environmental Officer, DMP is first obtained, the use of scrapers, graders, bulldozers, backhoes or other mechanised equipment for surface disturbance or the excavation of costeans is prohibited. Following approval, all topsoil being removed ahead of mining operations and separately stockpiled for replacement after backfilling and/or completion of operations.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y		Y			

Tenement Condition (similar conditions with slight differences such as DoIR vs DMP have been re-worded using DMP)	M70/1079	M70/1114	M70/1115	M70/1118	M70/1191	M70/1255	M70/1256	M70/1257	M70/1258	M70/1259	M70/1272	M70/1312	G70/200	L70/72	L70/84	L70/141
Unless the written approval of the Environmental Officer, DMP is first obtained, the use of drilling rigs, scrapers, graders, bulldozers, backhoes or other mechanised equipment for surface disturbance or the excavation of costeans is prohibited. Following approval, all topsoil being removed ahead of mining operations and separately stockpiled for replacement after backfilling and/or completion of operations.												Y				
The development and operation of the project being carried out in such a manner so as to create the minimum practicable disturbance to the existing vegetation and natural landform	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y		Y	Y		Y
All topsoil and vegetation being removed ahead of all mining operations and being stockpiled for later respreading or immediately respread as rehabilitation progresses.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y		Y	Y	Y	
At the completion of operations, all buildings and structures being removed from site or demolished and buried to the satisfaction of the Executive Director, Environment Division, DMP.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y		Y	Y	Y	
All rubbish and scrap is to be progressively disposed of in a suitable manner.	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y		Y	Y	Y	
At the completion of operations, or progressively where possible, all access roads and other disturbed areas being covered with topsoil, deep ripped and revegetated with local native grasses, shrubs and trees to the satisfaction of the Director, Environment Division, DMP.				Y	Y											
On the completion of operations or progressively when possible, all waste dumps, tailings storage facilities, stockpiles or other mining related landforms must be rehabilitated to form safe, stable, non-polluting structures which are integrated with the surrounding landscape and support self sustaining, functional ecosystems comprising suitable, local provenance species or alternative agreed outcome to the satisfaction of the	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y		Y	Y	Y	Y

Tenement Condition (similar conditions with slight differences such as DoIR vs DMP have been re-worded using DMP)	M70/1079	M70/1114	M70/1115	M70/1118	M70/1191	M70/1255	M70/1256	M70/1257	M70/1258	M70/1259	M70/1272	M70/1312	G70/200	L70/72	L70/84	L70/141
Executive Director, Environment Division, DMP																
Where surface disturbance activities are proposed on the licence which are not associated with development or construction proposals, the prior written approval of the Environmental Officer, DMP must be obtained before the use of drilling rigs, scrapers, graders, bulldozers, backhoes or other mechanised equipment for the proposed surface disturbance activities. Following approval, all topsoil being removed ahead of operations and separately stockpiled for replacement after backfilling and/or completion of operations.																y
Development and operations, as approved by the Inspector, being carried out in such a manner so as to create the minimum practicable disturbance to the existing vegetation and natural landform.														Y	Y	
A Mine Closure Plan is to be submitted in the Annual Environmental Reporting month specified in tenement conditions in the year specified below, unless otherwise directed by an Environmental Officer, DMIRS. The Mine Closure Plan is to be prepared in accordance with the "Guidelines for Preparing Mine Closure Plans" available on DMIR's website:	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Part C: Clearing Permit CPS 5955/3 Conditions

Number	Condition	Relation to mine closure
Part I – Clearing Authorised		
1	<p>Land on which clearing is to be done M70/1079, M70/1114, M70/1115, M70/1118, M70/1191, M70/1255, M70/1256, M70/1257, M70/1258, M70/1259, M70/1272, M70/1312, G70/200, L70/72, L70/84 and L70/141</p>	Clearing is confined to the 16 LGC Tenements.
2	<p>Purpose for which clearing may be done Clearing for the purpose of gypsum mining and associated activities.</p>	Clearing is undertaken for the purpose of mining of gypsum mining and associated activities.
3	<p>Area of Clearing The Permit Holder must not clear more than 84.47 hectares of native vegetation. All clearing must be within the area shaded yellow on attached Plan 5955/3.</p>	Unless another clearing permit is issued clearing will be restricted to the allowed limit of 84.47ha. The cumulative area cleared under CPS 5955/2 was 28.23ha (August 2017).
4	<p>Type of Clearing Authorised The Permit Holder shall not clear native vegetation unless the purpose for which the clearing is authorised is enacted within three months of the authorised clearing being undertaken.</p>	Mining occurs sequentially in the following order; clearing of vegetation, clearing and storage of topsoil, mining of gypsum product, landscaping works, spreading of topsoil, spreading of vegetation. All clearing occurs immediately before mining activities take place.
5	<p>Application This Permit allows the Permit Holder to authorise persons, including employees, contractors and agents of the Permit Holder, to clear native vegetation for the purposes of this Permit subject to compliance with the conditions of this Permit and approval from the Permit Holder.</p>	All clearing is undertaken by the permit holders or their agents.

Number	Condition	Comment in relation to mine closure
Part II – Management Conditions		
6	<p>Weed Control</p> <p>When undertaking any clearing or other activity authorised under this Permit, the Permit Holder must take the following steps to minimise the risk of the introduction and spread of weeds:</p> <ul style="list-style-type: none"> (i) clean earth-moving machinery of soil and vegetation prior to entering and leaving the area to be cleared; (ii) ensure that no weed-affected soil, mulch, fill or other material is brought into the area to be cleared; and (iii) restrict the movement of machines and other vehicles to the limits of the areas to be cleared. 	<p>Machinery is cleaned prior to being brought onto site.</p> <p>No soil, mulch, fill or other material is brought into the area to be cleared.</p> <p>Machinery only operates within the designated impact areas.</p>
Part III – Record Keeping and Reporting		
7	<p>Records to be kept</p> <p>The Permit Holder must maintain the following records for activities done pursuant to this Permit:</p> <p>In relation to the clearing of native vegetation authorised under this Permit,</p> <ul style="list-style-type: none"> (i) the location where the clearing occurred, recorded using a Global Positioning System (GPS) unit set to Geocentric Datum Australia 1994 (GDA94), expressing the geographical coordinates in Eastings and Northings or decimal degrees; (ii) the date that the area was cleared; (iii) the size of the area cleared (in hectares); and (iv) purpose for which clearing was undertaken. 	<p>Areas cleared are mapped annually using a hand held GPS or DGPS with all measurements taken in GDA 1994 projected to MGA Zone 50. All spatial data, both GPS track logs and waypoints are stored by Newland Environmental Pty Ltd and backed-up by LGC. All spatial data is converted to shapefile and mapped using ArcGIS and added to the disturbance shapefile from the previous year. The shapefile also includes metadata information. At the time of survey, the date of clearing of each area is provided by LGC. The areas that have been rehabilitated are also recorded for submission to DMIRS under the MRF. Site mapping occurred in October 2021.</p> <p>Areas cleared are calculated using ArcGIS from the spatial data collected in the field survey.</p> <p>The purpose of the clearing is gypsum mining and associated activities. This purpose will not change.</p>

Number	Condition	Comment in relation to mine closure
8	<p>Reporting</p> <p>(a) The Permit Holder shall provide a report to the Director Operations, Environment, Department of Mines and Petroleum by 31 August each year for the life of this permit, demonstrating adherence to all conditions of this permit, and setting out the records required under Condition 7 of this permit in relation to clearing carried out between 1 August and 31 July of the previous year.</p> <p>(b) Prior to 19 April 2024, the Permit Holder must provide to the Director Operations, Environment, Department of Mines and Petroleum a written report of records required under Condition 7 of this Permit where these records have not already been provided under Condition 8(a) of this Permit.</p>	<p>The annual clearing report has been lodged each year. The final report will be submitted as per condition 8(b).</p>

Part D: Conditions relevant to mine closure condition from the Section 18 Consents

S18 Consent	No	Condition
34-13313	1	Ensures rehabilitation of impacted areas of the Land occurs following cessation of mining activities.
	3	<p>Provide to the Registrar annually, or at the completion of the Purpose if the Purpose is completed within one year, a written report advising the Registrar whether and to what extent the Purpose has Impacted on all or any Sites or objects within the meaning of section 6 of the AHA ("Objects") that may be located on the Land and to assist the ACMC to reassess the status of the Sites.</p> <p>This report is to include a detailed description of:</p> <ul style="list-style-type: none"> a) whether such Sites or Objects have been partially or entirely impacted by the Purpose; b) the level, type and effect of any such impact (including, where possible, the provision of photographs taken during and after the impact); c) where Sites or Objects have been salvaged, when and how such salvage took place, who was present at the salvage and, subject to issues of cultural confidentiality, to where the material was re-located.
69-13337	1	<p>Provides a written report to the Registrar of Aboriginal Sites within 60 days of the completion of the Purpose, advising whether and to what extent the Purpose has impacted on all or any Sites located on the Land. The final report should include a detailed description of:</p> <ul style="list-style-type: none"> a) what extent the Purpose has impacted any Aboriginal Site on the Land; b) where any Aboriginal Site has been impacted, whether such Site has been partially or wholly impacted by the Purpose, and the level, effect and type of any such impact - preferably by the provision of photographs taken before and after the impact; c) where any Aboriginal Site has been subject to archaeological or cultural salvage, when and how such salvage took place, who was present at the salvage and where the material was re-located, the results of the salvage and any subsequent analysis conducted; and d) the results and findings of any monitoring of ground disturbing works associated with the Purpose.

Part E: Relevant mine abandonment sections from the *Mines Safety and Inspection Act 1994* and the *Mines Safety and Inspection Regulations 1995*

Mines Safety and Inspection Act 1994

42 Commencement or suspension of mining to be notified

- (1) The principal employer or the manager of a mine must, in accordance with the regulations, notify the district inspector for the region in which the mine is situated —
- (a) before mining operations are commenced at the mine; or
 - (b) before mining operations are recommenced after their suspension; or
 - (c) before mining operations are abandoned; or
 - (d) before mining operations are suspended.

The principal employer or the manager must at the same time as giving notice under subsection (1) provide such evidence as is necessary to satisfy the district inspector for the region in which the mine is situated that the obligations under the Act as to commencement, recommencement, abandonment, or suspension of mining operations, as the case may require, have been complied with; and on receiving such a notice the district inspector must inspect the mine and verify the evidence provided with the notice and make a record accordingly.

- (2)

88 Plans of mine at its abandonment or suspension

Where mining operations are about to be abandoned or suspended, the principal employer, or if a receiver has been appointed in respect of a principal employer, that receiver, or the manager must cause to be prepared to the satisfaction of the district inspector for the region in which the mine is situated an accurate plan or plans of the mining operations to the time of abandonment or discontinuance and must furnish that plan or those plans to the State mining engineer in accordance with the regulations before the mining operations are abandoned or suspended.

- (1)

89 Plans of mine at its abandonment or suspension

If mining operations are abandoned or suspended, the principal employer at the mine at that time must keep all record books and log books that have been kept under this Act in respect of the mine for a period of 6 years from the time of abandonment or suspension; and if the principal employer appears likely to go into liquidation or receivership must take steps to ensure that such record books and log books are safely kept for that period.

- (3)

104 Regulations

- (zm) prescribing the measures which must be taken before mining operations are suspended and during any period of suspension or before a mine is closed or abandoned and after closure or abandonment;

*Mines Safety and Inspection Regulations 1995***Division 2 — Notification of commencement or suspension of mining operations****3.10 Term used: notification**

In this Division —

notification means notification under section 42 of the Act.

3.11 Notification to be in writing

Each notification must be in writing.

3.12 General details to be included in notification

Each notification must include the following details —

- (a) the name and location of the mine; and
- (b) the number of the lease, tenement or other interest; and
- (c) the name and address of the principal employer at the mine; and
- (d) what mining operations are to be affected, and whether they are to be commenced, recommenced, abandoned or suspended; and
- (e) the date on which the mining operations are to be commenced, recommenced, abandoned or suspended (as the case may be)

3.16 Details to be included in notification of abandonment

Notification of the abandonment of mining operations at a mine must, in addition to the details set out in regulation 3.12, include the following details —

- (a) details of precautions taken to ensure that access to underground workings has been secured against unauthorised entry; and
- (b) details of precautions taken to prevent inadvertent access to open pit workings; and
- (c) details of precautions taken to prevent, so far as is practicable, any post mining subsidence into underground workings, by back-filling stope voids and by other appropriate measures; and
- (d) details of precautions taken to ensure that all plant and equipment have been removed or secured and left in a safe condition; and
- (e) details of precautions taken to remove or properly dispose of all hazardous substances at the mine; and
- (f) any plans required to be prepared under section 88 of the Act.

13.8 Geotechnical considerations

- (1) The principal employer at, and the manager of, a mine must ensure that geotechnical aspects are adequately considered in relation to the design, operation and abandonment of quarry operations.

13.15 Mine boundaries

- (2) The manager of a mine must ensure that excavations in a quarry are not mined so close to the boundaries of a tenement or other land holding, which is owned by a person other than the principal employer of the mine, that adequate room is not left to install protection against inadvertent access by persons after the quarry is abandoned.

16.25 Records

- (5) Each responsible person must transfer all records specified by the State mining engineer, to the State mining engineer, before a mining operation is abandoned, and for that purpose the manager must notify the State mining engineer of any intention to abandon the mining operation in the near future.

APPENDIX E

Licence to Operate for the Lake Goorly Gypsum Operation



Department of
Environment and Conservation

Your ref: 8124/1
Our ref: L88/06
Enquiries: Steve Checker
Phone: 08 9964 5978
Fax: 08 9964 5983
Email: steve.checker@dec.wa.gov.au

Mr Craig Bywaters
Lake Goorly Gypsum Mine
PO Box 2
KALANNIE WA 6468

Dear Craig

ENVIRONMENTAL PROTECTION ACT 1986 - LICENCE
Lake Goorly Gypsum Mine
DoIR Mining Tenements M70/1118 and M70/1191
Jibberding WA 6612

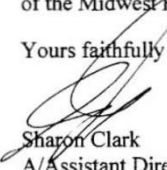
You are advised that your application for a licence to operate the works prescribed under the *Environmental Protection Act 1986* at the above-mentioned location has been approved subject to the attached conditions. Enclosed is your licence together with receipt number DoE-05405 for the prescribed fee.

The Department of Environment and Conservation (DEC) has issued this licence without conditions on the basis that the premises is not expected to produce any emissions or discharges which may pose a significant risk to the environment. Should the emissions and discharges from the premises be altered in such a manner as to pose a significant environmental impact, the DEC may choose to impose conditions on this licence at a later date through the amendment process.

If any specification of this licence aggrieves you, you may lodge an appeal, accompanied by the \$50.00 fee, with the Minister for the Environment within 21 days from the date on which this licence is received. Members of the public may also appeal conditions. Please contact the Appeal Convenor's Office on 9221 8711 after the closing date of appeals to check whether any appeals were received.

If you have any questions relating to the licence, please do not hesitate to contact Steve Checker of the Midwest Region on 9964 5978.

Yours faithfully


Sharon Clark
A/Assistant Director Regional Services, Environment

Thursday, 8 February 2007

DIRECTOR GENERAL AND ENVIRONMENTAL SERVICES DIVISIONS: The Atrium, 168 St Georges Terrace, Perth, Western Australia
Phone: (08) 6364 6500 Fax: (08) 6364 6520 TTY: 1800 505 630

PARKS AND CONSERVATION SERVICES DIVISIONS: Executive: Corner of Australia II Drive and Hackett Drive, Crawley, Western Australia
Phone: (08) 9442 0300 Fax: (08) 9386 1578 Operations: 17 Dick Perry Avenue, Technology Park, Kensington, Western Australia
Phone: (08) 9334 0333 Fax: (08) 9374 0498 Teletype: (08) 9334 0546

POSTAL ADDRESS FOR ALL DIVISIONS: Locked Bag 104, Bentley Delivery Centre, Western Australia 6983
www.dec.wa.gov.au



Department of
Environment and Conservation

LICENCE FOR PRESCRIBED PREMISES

Environmental Protection Act 1986

LICENCE NUMBER 8124/1

FILE NUMBER L88/06

LICENSEE AND OCCUPIER OF PREMISES

C.A. Bywaters
PO Box 2
KALANNIE WA 6468

NAME AND LOCATION OF PREMISES

Lake Goorly Gypsum Mine
Department of Industry and Resources Mining Tenements M70/1118 and M70/1191
JIBBERDING WA 6612

PRESCRIBED PREMISES CATEGORY

Schedule 1 of the *Environmental Protection Regulations 1987*

CATEGORY	DESCRIPTION	CAPACITY
12	Screening etc. of material.	Up to 100,000 tonnes per annum

NIL CONDITIONS OF LICENCE

Officer delegated under Section 20
of the *Environmental Protection Act 1986*

Date of Issue: Thursday, 8 February 2007

ISSUE DATE	Thursday, 8 th February 2007
COMMENCEMENT DATE	Thursday, 8 th February 2007
EXPIRY DATE	Tuesday, 7 th February 2012



Department of
Environment and Conservation

ENVIRONMENTAL ASSESSMENT REPORT

LICENCE NUMBER: L88/06
LICENCE FILE NUMBER: 8124/1
APPLICATION DATE: 05/01/2006
EXPIRY DATE: 07/02/2012

PREMISES DETAILS

LICENSEE AND OCCUPIER

C.A. Bywaters
PO Box 2
Kalannie WA 6468

PREMISES

Lake Goorly Gypsum Mine
DoIR Mining Tenements M70/1118 and M70/1191
Jibberding WA 6612

PRESCRIBED PREMISES CATEGORY

Table 1: Prescribed Premises Category from Schedule 1 of the *Environmental Protection Regulations 1987*

Category number	Description	Production or Design Capacity	Nominated Rate of Throughput	Throughput Classification *
12	Screening, etc. of material.	(maximum plant capability) 70,000 tonnes per year	(actual/current) 70,000 tonnes per year	50,000 to 100,000 tonnes per year.

* From Schedule 4 of the *Environmental Protection Regulations 1987*

This Environmental Assessment Report (EAR) has been drafted for the purposes of detailing information on the management and mitigation of emissions and discharges from the prescribed premises. The objective of the EAR is to provide a risk assessment of emissions and discharges, and information on the management of other activities occurring onsite which are not related to the control of emissions and discharges from the prescribed premises activity. It is important to note that the licence is not a mechanism to regulate those activities that occur on-site that are not related to the prescribed premises activity.

Basis of Assessment

The Lake Goorly Gypsum Mine has been assessed as “prescribed premises” category number 12 under Schedule 1 of the *Environmental Protection Regulations 1987*. Category 12 is for the “Screening, etc. of material” and is described as premises on which material extracted from the ground is screened, washed, crushed, ground, milled, sized or separated. The threshold for licensing of this category is 50,000 tonnes per annum.

The Lake Goorly Gypsum Mine screens gypsum extracted from the bed of a salt lake (Lake Goorly). The premises is proposing to screen up to 70,000 tonnes of gypsum per annum.

1.0 BACKGROUND



Department of
Environment and Conservation

ENVIRONMENTAL ASSESSMENT REPORT

1.1 GENERAL COMPANY DESCRIPTION

Lake Goorly contracting has been operating the mine for several years at an approximate rate of 70,000 tonnes of gypsum per annum without needing to screen the product. Recently, however, the quality of the gypsum mined is such that screening may be required.

The DEC has not received any complaints to date relating to emissions from Lake Goorly

1.2 LOCATION OF PREMISES

The Lake Goorly Gypsum Mine is located at Lake Goorly, approximately 30 km north-east of Wubin within the Shire of Dalwallinu. Lake Goorly is an intermittent gypsum lake which is dry in the vicinity of the gypsum operations for most of the year. Water sampling conducted in 1999 showed water quality in Lake Goorly as hypersaline (approximately 52,000mg/L Total Dissolved Solids).

The area surrounding Lake Goorly is principally samphire-dominated scrubland. Lake Goorly itself is largely devoid of native vegetation and no clearing is proposed for the foreseeable future operation of the mine.

The nearest residence to the mine is an isolated farmhouse, approximately 5 km from the Lake Goorly Gypsum operations.

The gypsum processing area is located in the north-western part of Lake Goorly and is currently contained within mining lease M70/1118. The proponent has been recently granted approval to take gypsum from an adjacent retention lease, M70/1191. No processing will be conducted on the adjacent lease, and the mine will not be increasing the rate of throughput as a result of the expansion in the short term.

1.3 PROCESS DESCRIPTION

Gypsum is mined damp from the lakebed, screened and deposited into stockpiles. The stockpiles are left to dry and the gypsum is transported to Perth. There is no further processing of the ore following the stockpiling. The mine employs a 20 tonne excavator, a D4 dozer, 2 semi-tippers, 2 loaders and a screening plant for this process.



Department of
Environment and Conservation

ENVIRONMENTAL ASSESSMENT REPORT

1.4 REGULATORY CONTEXT

1.4.1 Part IV Environmental Protection Act 1986, Environmental Impact Assessment

The Lake Goorly Gypsum Mine has not been assessed under Part IV of the *Environmental Protection Act 1986*.

1.4.2 Part V Environmental Protection Act 1986, Environmental Management

The Lake Goorly Gypsum Mine has been operating for several years without requiring an *Environmental Protection Act 1986* licence or registration as the gypsum was not washed, screened or otherwise processed. Due to recent changes in the quality of the product currently mined, the proponent is now proposing to screen the gypsum. With this proposed change in operation, the premises has been assessed as a 'prescribed premises' Category 12 for 'Screening etc. of material'.

The DEC has no record of any complaints made against this facility.

1.4.3 Other DMA's Legislation which applies

The Department of Industry and Resources (DoIR) administer the following applicable acts/regulations:

- Mining Act 1978;
- Mining Regulations 1981;
- Mine Safety & Inspection Act 1994; and
- Mine Safety & Inspection Regulations 1995 (MSIR 1995).

The Department of Consumer and Employment Protection (DoCEP) administers the *Explosives & Dangerous Goods (Dangerous Goods Handling & Storage) Regulations 1992*.

1.4.4 Rights in Water Irrigation Act 1914

The mine does not use any water onsite.

1.4.5 Local Government Authority

The Lake Goorly Gypsum Mine is located within the Shire of Dalwallinu. M70/1118 and M70/1191 are zoned rural, with the processing of gypsum being an approved use for that zoning.

2.0 STAKEHOLDER AND COMMUNITY CONSULTATION

SUBMISSIONS RECEIVED DURING 21 DAY PUBLIC COMMENT PERIOD

The Application for Licence details for this facility were advertised in the West Australian newspaper on 15 January 2007 as a means of advising stakeholders and to seek public comments. No submissions were received.

3.0 EMISSIONS AND DISCHARGES RISK ASSESSMENT



Department of Environment and Conservation

ENVIRONMENTAL ASSESSMENT REPORT

The DoE considers that conditions should focus on regulating emissions and discharges of significance. Where appropriate, emissions and discharges which are not significant should be managed and regulated by other legislative tools or management mechanisms.

The following section assesses the environmental risk of potential emissions from the Lake Goorly Gypsum Mine. In order to determine the site’s appropriate environmental regulation, an emissions and discharges risk assessment was conducted of the Lake Goorly Gypsum Mine using the environmental risk matrix outlined in Appendix B. The results of this are summarized in Table 2:

Table 2: Risk assessment and regulatory response summary table.

Risk factor	Significance of emissions	Socio-Political Context of Each Regulated Emission	Risk Assessment	DoE Regulation (EP Act - Part V)	Other management (legislation,tools,agencies)
Air emissions	Nil No emissions to air expected.	1 - No known or expected socio-political interest/ impact.	E – no regulation required.	LIC– no conditions	NPI Reporting of Emissions
Dust emissions	1- Insignificant No dust emissions associated with prescribed activity - Screening is conducted whilst material is wet. Gypsum stockpiles are deposited wet and form a surface crust when dry which prevents dust lift-off. Minor dust emissions associate with loading.	1 - No known or expected socio-political interest/ impact. Mine site is relatively isolated with no sensitive premises within 5km.	E – no regulation required	LIC– no conditions	General provisions of the EP Act
Odour emissions	Nil No odour emissions expected	1 - No known or expected socio-political interest/ impact. Mine site is relatively isolated with no sensitive premises within 5m.	E – no regulation required.	LIC– no conditions	General provisions of the EP Act
Noise emissions	1 - Insignificant Minor noise expected. Premises expected to meet Noise Regulations	1 - No known or expected socio-political interest/ impact. Mine site is relatively isolated with no sensitive premises within 5km.	E – other management mechanisms	LIC– no conditions	EP Noise Regulations
Light emissions	1 - Insignificant Plant operating only during daylight hours.	1 - No known or expected socio-political interest/ impact. Mine site is relatively isolated with no sensitive premises within 5km.	E – no regulation required.	LIC– no conditions	General provisions of the EP Act
Discharges to	Nil	1 - No known or	E – other	LIC– no conditions	UD Regulations



Department of Environment and Conservation

ENVIRONMENTAL ASSESSMENT REPORT

water	No discharges to water expected.	expected socio-political interest/ impact.	management mechanisms		
Discharges to land	Nil No discharges to land expected	1 - No known or expected socio-political interest/ impact.	E – no regulation required.	LIC– no conditions	UD Regulations
Solid / liquid wastes	Nil No solid/liquid wastes expected to be produced.	1 - No known or expected socio-political interest/ impact.	E – no regulation required.	LIC– no conditions	Controlled Waste Regulations, UD Regulations
Hydrocarbon/ chemical storage	1 - Insignificant Fuel onsite supplied by a 2,000-litre mobile tanker. Any spillage of hydrocarbons from the tanker can be addressed under the <i>Environmental Protection (Unauthorised Discharges) Regulations 2005</i>	1 - No known or expected socio-political interest/ impact.	E – other management mechanisms	LIC– no conditions	General Provisions of EP Act
Native vegetation clearing	None proposed.	1 - No known or expected socio-political interest/ impact.	E – no regulation required	LIC– no conditions	
Contaminated site identification	Site not identified as contaminated.	1 - No known or expected socio-political interest/ impact.	E – other management mechanisms	LIC– no conditions	Contaminated Sites Branch (DEC),

4.0 GENERAL SUMMARY AND COMMENTS

C.A. Bywaters has applied for a licence under the *Environmental Protection Act 1986* for the Lake Goorly Gypsum Mine. The premises has been operating for several years without incident but is now proposing to start processing product (by way of screening) and will therefore require *Environmental Protection Act 1986* licensing. The actual amount of gypsum that will be screened will vary, but will potentially be up to 70,000 tonnes per annum (the total throughput of the mine).

There are no emissions or discharges of significance associated with this project. The lake Goorly Gypsum Mine has been operating for several years without any recorded incidents or complaints.

Due to the assessment of emissions and discharges from the Lake Goorly Gypsum Mine as low environmental risk, the DEC will not initially require the management of environmental issues through licence conditions. The licence is proposed to be issued for five years in accordance with DEC policy for low-risk sites.



Department of Environment and Conservation

ENVIRONMENTAL ASSESSMENT REPORT

OFFICER PREPARING REPORT

Steve Checker

Position: Natural Resource Management Officer
Midwest Regional Office
Department of Environment & Conservation
9964 5978

8 January 2007

ENDORSEMENT

Craig Scott

Position: A/Program Manager
Midwest/Gascoyne Regional Office
Department of Environment & Conservation
9964 5978

8 January 2007

APPENDIX B: EMISSIONS AND DISCHARGES RISK ASSESSMENT MATRIX

Table 3: Measures of Significance of Emissions

Emissions as a percentage of the relevant emission or ambient standard		Worst Case Operating Conditions (95 th Percentile)			
		>100%	50 – 100%	20 – 50%	<20%*
Normal Operating Conditions (50 th Percentile)	>100%	5	N/A	N/A	N/A
	50 – 100%	4	3	N/A	N/A
	20 – 50%	4	3	2	N/A
	<20%*	3	3	2	1

*For reliable technology, this figure could increase to 30%

Table 4: Socio-Political Context of Each Regulated Emission

		Relative proximity of the interested party with regards to the emission				
		Immediately Adjacent	Adjacent	Nearby	Distant	Isolated
Level of Community Interest or Concern*	5	High	High	Medium High	Medium	Low
	4	High	High	Medium High	Medium	Low
	3	Medium High	Medium High	Medium	Low	No
	2	Low	Low	Low	Low	No
	1	No	No	No	No	No

Note: These examples are not exclusive and professional judgement is needed to evaluate each specific case

*This is determined by the DoE using the DoE "Officer's Guide to Emissions and Discharges Risk Assessment" May 2006.



Department of Environment and Conservation

ENVIRONMENTAL ASSESSMENT REPORT

Table 5: Emissions Risk Reduction Matrix

		Significance of Emissions				
		5	4	3	2	1
Socio-Political Context	High	A	A	B	C	D
	Medium High	A	A	B	C	D
	Medium	A	B	B	D	E
	Low	A	B	C	D	E
	No	B	C	D	E	E

PRIORITY MATRIX ACTION DESCRIPTORS

- A = Do not allow (fix)
- B = licence condition (setting limits + EMPs - short timeframes)(setting targets optional)
- C = licence condition (setting targets + EMPs - longer timeframes)
- D= EIPs, other management mechanisms/licence conditions (monitoring/reporting)/other regulatory tools
- E = No regulation, other management mechanisms

Note: The above matrix is taken from the DoE Officer's Guide to Emissions and Discharges Risk Assessment May 2006.

APPENDIX F

Copy of correspondence to the Shire of Dalwallinu

Charles Newland

From: Charles Newland
Sent: Friday, 20 August 2021 12:24 PM
To: mpds@dalwallinu.wa.gov.au
Cc: Craig Bywaters
Subject: Update of Mine Closure Plan for lake Goorly Gypsum

Hello Doug

Hope all is going well.

We spoke in 2017 about the mine closure plan for the Lake Goorly gypsum operation that culminated in you meeting Craig Bywaters onsite. DMIRS requires that the mine closure plan is updated every 3 to 5 years, hence this email. I am preparing the update and again seek any comment from stakeholders. The same objective is proposed for mine closure:

- “The objective for the post-mining landform is the restoration of mined-out areas to a natural looking salt lake landscape similar to the surrounding Lake Goorly lakebed environment. The rehabilitation endpoint is to reinstate a chenopod - samphire community similar to the surrounding vegetation and with a functioning natural ecosystem. The post-mining land use is natural ecosystem.”

Very little has changed on site since your last visit. The operation has continued with progressive rehabilitation of mine-out areas. To date, approximately 75% of mined areas have been rehabilitated.

The Shire is invited again to input or comment on mine closure.

Regards

Charles Newland
Environmental Consultant
Mining and Exploration
Newland Environmental
+61 (0) 8 9293 0411
+61 (0) 408 099 891
charles@newlandenviro.com.au
newlandenviro.com.au



Lake Goorly Contracting

Lake Goorly Contracting
PO Box 2
Kalannie WA 6468

20 July 2017

Jean Sutherland
Chief Executive Officer
Shire of Dalwallinu
PO Box 141
DALWALLINU WA 6609

Dear Jean

MINE CLOSURE PLAN FOR THE LAKE GOORLY GYPSUM PROJECT

Lake Goorly Contracting ('LGC'), formerly trading as Bywaters Gypsum Supplies, has been mining gypsum at Lake Goorly since 2003. The Lake Goorly Gypsum Project ('the Project') is located at the northern end of Lake Goorly, approximately 31km east-northeast from Wubin and near the Great Northern Highway (Figure 1).

LGC is a business owned and operated by local farmers Craig and Phil Bywaters, who are also the owners of surrounding farming land.

The Project has two product streams:

- commercial gypsum for cement manufacture; and
- agricultural gypsum for paddock soil improvement.

Mining occurs as a simple excavation and loading operation involving the 'free-dig' harvesting of gypsum from the lakebed in a strip mining sequence and trucking to stockpiles. The gypsum resource is patchy in occurrence and up to 1.0m deep from surface.

Mining has always been linked to progressive rehabilitation such that the areas mined are usually rehabilitated in the same 12 month period. To date, approximately 75% of the mining disturbed areas have been rehabilitated.

Prior to excavation, the topsoil layer is pushed to either side of the strip mining area and stockpiled as a linear windrow. Following mining, the disturbance area is landscaped back to a flat lakebed contour and the topsoil layer respread over the surface. The rehabilitation technique is considered to be successful as within a few years, the rehabilitated areas can be indiscernible from the surrounding un-mined natural lakebed. The natural chenopod vegetation communities readily recolonise the rehabilitated areas.

The site is operated under a mining proposal that was approved by the Department of Mines, Industry Regulation and Safety ('DMIRS'). Flora, fauna and Aboriginal heritage studies were undertaken as part of the assessment process for the mining proposal.

Under a revision to the *Mining Act 1978*, all mining sites in Western Australia are required to operate under an approved Mine Closure plan ('MCP') that is updated on a three yearly

Mine Closure Plan

Lake Goorly Contracting

Lake Goorly Gypsum Project

August 2016

cycle. The Project currently operates under a MCP that was approved in 2014. As per DMIRS regulations, the three yearly MCP update is being prepared and in accordance with the new MCP guidelines that require stakeholder consultation.

Due to the location of the Project on vacant crown land in the Shire's jurisdiction and farming land held by the Bywaters family, there are very few direct stakeholders, the Shire being one of them.

The purpose of this letter is to seek the Shire's comment or input, if you consider it necessary, in regards to the proposed mining closure objective, as stated below:

The objective for the post-mining landform is the restoration of mined-out areas to a natural looking salt lake landscape similar to the surrounding Lake Goorly lakebed environment. The rehabilitation endpoint is to reinstate a chenopod - samphire community similar to the surrounding vegetation and with a functioning natural ecosystem. The post-mining land use is natural ecosystem.

From previous experience at Lake Goorly, the above post-mining landform and rehabilitation endpoint objectives are readily achievable. The Project is thus considered as being a temporary surface disturbance. Photos of rehabilitated areas compared to natural lakebed are attached.

There are no alternative post-mining landform or rehabilitation endpoint objectives. The proposed post-mining landform and rehabilitation endpoint objectives are considered as being the most suitable option for Lake Goorly, given its ecological and heritage significance. These objectives are also unlikely to create any subsequent environmental issues. .

Please contact myself on 0427 988 650 / lakegoorly@gmail.com for any further information or to provide any comment.

Yours faithfully



Craig Bywaters
Lake Goorly Contracting

Mine Closure Plan
Lake Goorly Gypsum Project

Lake Goorly Contracting
August 2016



Photo of rehabilitated area



Photo of natural lakebed

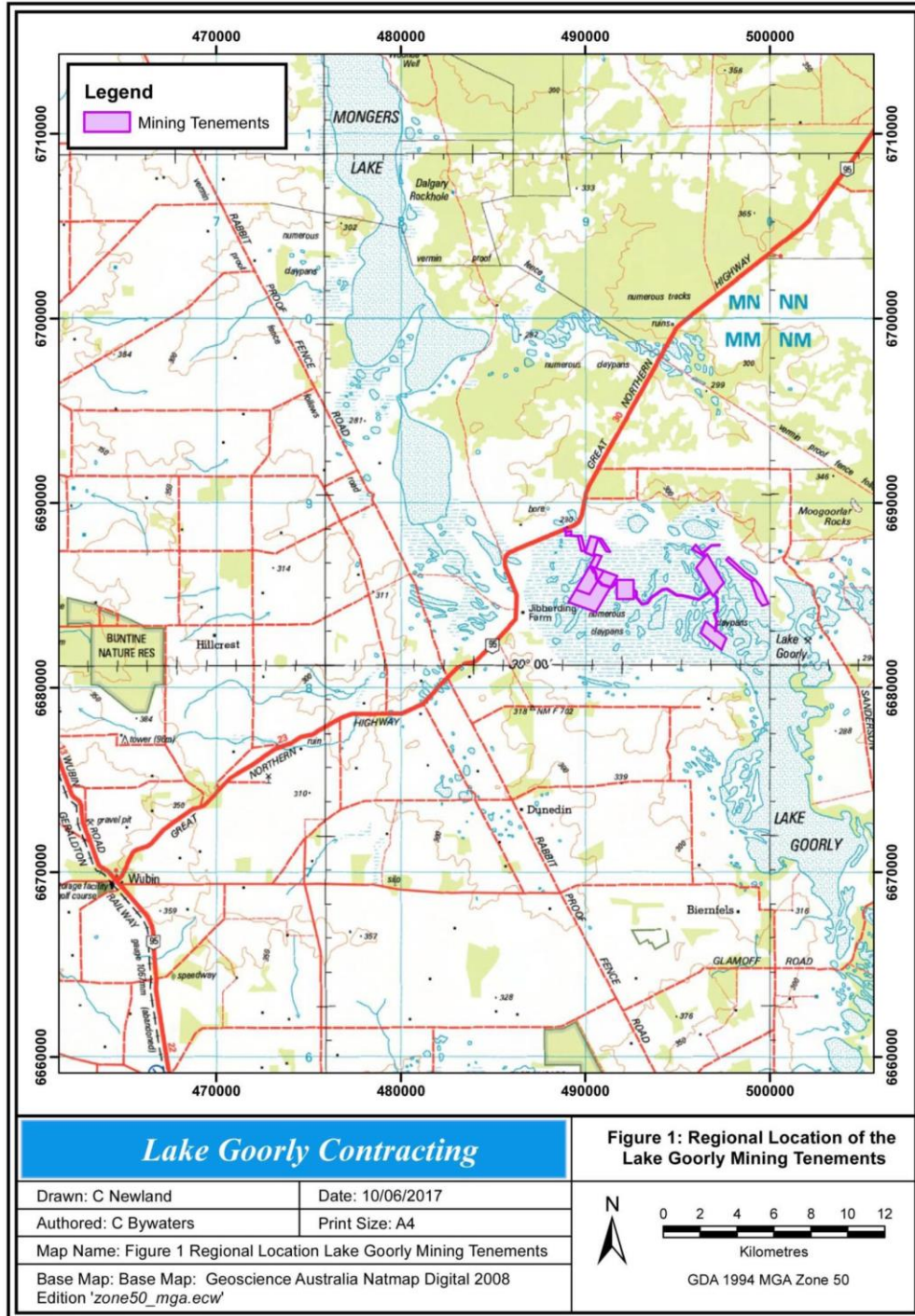


Figure 1: Regional Location of the Lake Goorly Mining Tenements

APPENDIX G

NatureMap search for conservation listed flora at Lake Goorly

Parameters:	Plantae, Conservation Taxa
Method:	Circle
Centre:	116° 56' 05" E, 29° 57' 48" S
Buffer:	10km



NatureMap Species Report

Created By Guest user on 18/02/2022

Kingdom Plantae
Conservation Status Conservation Taxon (T, X, IA, S, P1-P5)
Current Names Only Yes
Core Datasets Only Yes
Method 'By Circle'
Centre 116° 56' 05" E, 29° 57' 48" S
Buffer 10km

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
1.	18106 <i>Acacia inceana</i> subsp. <i>latifolia</i>		P1	
2.	7285 <i>Eremophila sargentii</i>		P2	
3.	5192 <i>Frankenia conferta</i> (<i>Silky Frankenia</i>)		T	
4.	12626 <i>Gnephosis setifera</i>		P1	
5.	2013 <i>Grevillea granulosa</i>		P3	
6.	13420 <i>Grevillea nana</i> subsp. <i>abbreviata</i>		P2	
7.	2103 <i>Grevillea tenuiloba</i>		P3	
8.	4496 <i>Phebalium brachycalyx</i>		P3	
9.	12733 <i>Poddotheca pritzelii</i>		P3	
10.	19913 <i>Psammomya implexa</i>		P3	
11.	36802 <i>Verticordia mitchelliana</i> subsp. <i>mitchelliana</i>		P3	

Conservation Codes
 T - Rare or likely to become extinct
 X - Presumed extinct
 IA - Protected under international agreement
 S - Other specially protected fauna
 1 - Priority 1
 2 - Priority 2
 3 - Priority 3
 4 - Priority 4
 5 - Priority 5

¹ For NatureMap's purposes, species flagged as endemic are those whose records are wholly contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only records from that datasource are used to determine if a species is restricted to the query area.



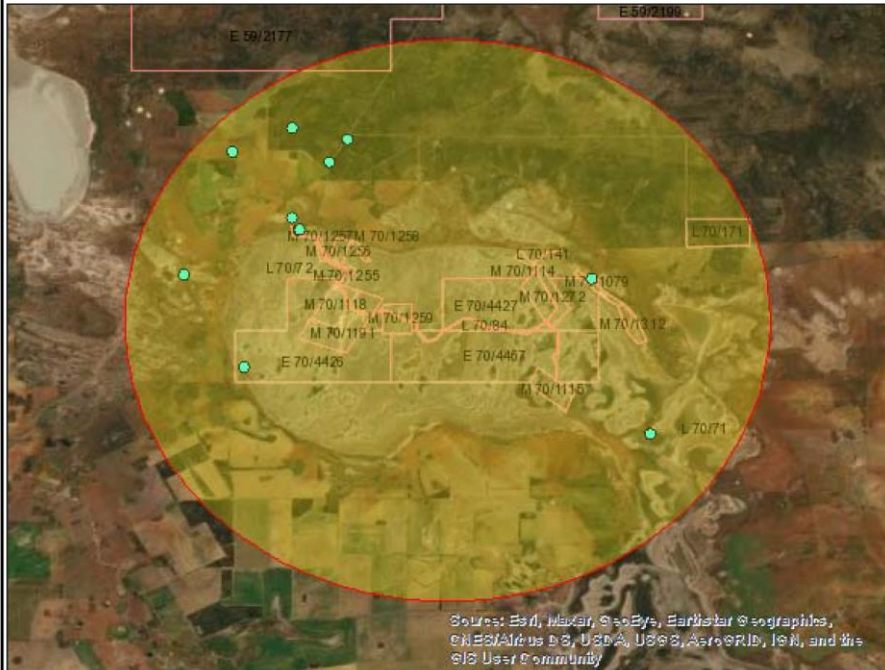
NatureMap

Mapping Western Australia's biodiversity

Conservation Flora Lake Goorly

Printed by Guest user on 8/4/2021

Query details : Kingdom=Plantae; Conservation Status=Conservation Taxon (T, X, IA, S, P1-P5); Current Names Only=Yes; Core Datasets Only=Yes; Method='By Circle'; Centre=116° 56' 05" E,29° 57' 48" S; Buffer=10km;



- Search Results**
- Selected
 - Selected Species
 - All Results
 - Default
 - Confirmed
 - Corrected
 - Reported
 - Reference Layers**
 - Major WA Towns
 -
 - Major WA Towns
 -
 - Major WA Towns
 -
 - Mining Tenements (live)
 - Live tenements
 - State Borders
 -

Sources: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



NatureMap is a collaborative project of the Department of Biodiversity, Conservation and Attractions, Western Australia, and the Western Australian Museum.

APPENDIX H

EPBC Act 1999 Protected Matters Report for Lake Goorly

Method:	Circle
Centre:	116° 56' 05" E, 29° 57' 48" S
Buffer:	10km



Australian Government
**Department of Agriculture,
 Water and the Environment**

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

Report created: 23/02/22 17:58:12

[Summary](#)

[Details](#)

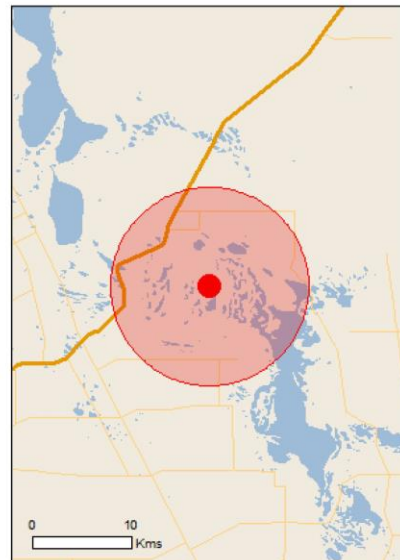
[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

[Acknowledgements](#)



This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2015

[Coordinates](#)

Buffer: 10.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	1
Listed Threatened Species:	18
Listed Migratory Species:	6

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at <http://www.environment.gov.au/heritage>

A [permit](#) may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	11
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	13
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities [\[Resource Information \]](#)

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Eucalypt Woodlands of the Western Australian Wheatbelt	Critically Endangered	Community likely to occur within area

Listed Threatened Species [\[Resource Information \]](#)

Name	Status	Type of Presence
------	--------	------------------

Birds

Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
---	-----------------------	---

Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat may occur within area
---	------------	--

Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat known to occur within area
---	------------	---

Pezoporus occidentalis Night Parrot [59350]	Endangered	Species or species habitat may occur within area
--	------------	--

Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
--	------------	--

Mammals

Dasyurus geoffroii Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat may occur within area
---	------------	--

Other

Idiosoma nigrum Shield-backed Trapdoor Spider, Black Rugose Trapdoor Spider [66798]	Vulnerable	Species or species habitat likely to occur within area
--	------------	--

Plants

Caladenia drakeoides Hinged Dragon Orchid [68687]	Endangered	Species or species habitat may occur within area
--	------------	--

Dasymalla axillaris Native Foxglove [38829]	Critically Endangered	Species or species habitat may occur within area
--	-----------------------	--

Eremophila nivea Silky Eremophila [14431]	Endangered	Species or species habitat may occur within
--	------------	---

Name	Status	Type of Presence area
Eremophila viscida Varnish Bush [2394]	Endangered	Species or species habitat likely to occur within area
Eucalyptus synandra Jingymia Mallee [3753]	Vulnerable	Species or species habitat likely to occur within area
Frankenia conferta Silky Frankenia [6074]	Endangered	Species or species habitat may occur within area
Grevillea pythara Pythara Grevillea [64525]	Endangered	Species or species habitat may occur within area
Gyrostemon reticulatus Net-veined Gyrostemon [8491]	Critically Endangered	Species or species habitat likely to occur within area
Hemiandra gardneri Red Snakebush [7945]	Endangered	Species or species habitat may occur within area
Roycea pycnophylloides Saltmat [21161]	Endangered	Species or species habitat likely to occur within area
Reptiles		
Egernia stokesii badia Western Spiny-tailed Skink, Baudin Island Spiny-tailed Skink [64483]	Endangered	Species or species habitat likely to occur within area
Listed Migratory Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Chrysococcyx osculans Black-eared Cuckoo [705]		Species or species habitat likely to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area
Thinornis rubricollis Hooded Plover [59510]		Species or species habitat known to occur within area

Extra Information

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resources Audit, 2001.

Name	Status	Type of Presence
Birds		
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Streptopelia senegalensis Laughing Turtle-dove, Laughing Dove [781]		Species or species habitat likely to occur within area
Mammals		
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Carrichtera annua Ward's Weed [9511]		Species or species habitat may occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat may occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Tamarix aphylla Athel Pine, Athel Tree, Tamarisk, Athel Tamarisk, Athel Tamarix, Desert Tamarisk, Flowering Cypress, Salt Cedar [16018]		Species or species habitat likely to occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-29.96314 116.93482

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [Office of Environment and Heritage, New South Wales](#)
- [Department of Environment and Primary Industries, Victoria](#)
- [Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [Department of Environment, Water and Natural Resources, South Australia](#)
- [Department of Land and Resource Management, Northern Territory](#)
- [Department of Environmental and Heritage Protection, Queensland](#)
- [Department of Parks and Wildlife, Western Australia](#)
- [Environment and Planning Directorate, ACT](#)
- [Birdlife Australia](#)
- [Australian Bird and Bat Banding Scheme](#)
- [Australian National Wildlife Collection](#)
- Natural history museums of Australia
- [Museum Victoria](#)
- [Australian Museum](#)
- [South Australian Museum](#)
- [Queensland Museum](#)
- [Online Zoological Collections of Australian Museums](#)
- [Queensland Herbarium](#)
- [National Herbarium of NSW](#)
- [Royal Botanic Gardens and National Herbarium of Victoria](#)
- [Tasmanian Herbarium](#)
- [State Herbarium of South Australia](#)
- [Northern Territory Herbarium](#)
- [Western Australian Herbarium](#)
- [Australian National Herbarium, Canberra](#)
- [University of New England](#)
- [Ocean Biogeographic Information System](#)
- [Australian Government, Department of Defence Forestry Corporation, NSW](#)
- [Geoscience Australia](#)
- [CSIRO](#)
- [Australian Tropical Herbarium, Cairns](#)
- [eBird Australia](#)
- [Australian Government – Australian Antarctic Data Centre](#)
- [Museum and Art Gallery of the Northern Territory](#)
- [Australian Government National Environmental Science Program](#)
- [Australian Institute of Marine Science](#)
- [Reef Life Survey Australia](#)
- [American Museum of Natural History](#)
- [Queen Victoria Museum and Art Gallery, Inveresk, Tasmania](#)
- [Tasmanian Museum and Art Gallery, Hobart, Tasmania](#)
- Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the [Contact Us](#) page.

© Commonwealth of Australia
 Department of Agriculture, Water and the Environment
 GPO Box 858
 Canberra City ACT 2601 Australia
 +61 2 6274 1111

APPENDIX I

NatureMap search for conservation listed fauna at Lake Goorly

Parameters:	Animalia, Conservation Taxa
Method:	Circle
Centre:	116° 56' 05" E, 29° 57' 48" S
Buffer:	10km



NatureMap Species Report

Created By Guest user on 18/02/2022

Kingdom Animalia
Conservation Status Conservation Taxon (T, X, IA, S, P1-P5)
Current Names Only Yes
Core Datasets Only Yes
Method 'By Circle'
Centre 116° 56' 05" E, 29° 57' 48" S
Buffer 10km

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
1.	41323 <i>Actitis hypoleucos</i> (Common Sandpiper)		IA	
2.	24784 <i>Calidris ferruginea</i> (Curlew Sandpiper)		T	
3.	24788 <i>Calidris ruficollis</i> (Red-necked Stint)		IA	
4.	47954 <i>Gelochelidon nilotica</i> (Gull-billed Tern)		IA	
5.	24557 <i>Leipooa ocellata</i> (Malleefowl)		T	
6.	48135 <i>Thinornis rubricollis</i> (Hooded Plover, Hooded Dotterel)		P4	

Conservation Codes
 T - Rare or likely to become extinct
 X - Presumed extinct
 IA - Protected under international agreement
 S - Other specially protected fauna
 1 - Priority 1
 2 - Priority 2
 3 - Priority 3
 4 - Priority 4
 5 - Priority 5

¹ For NatureMap's purposes, species flagged as endemic are those whose records are wholly contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only records from that datasource are used to determine if a species is restricted to the query area.



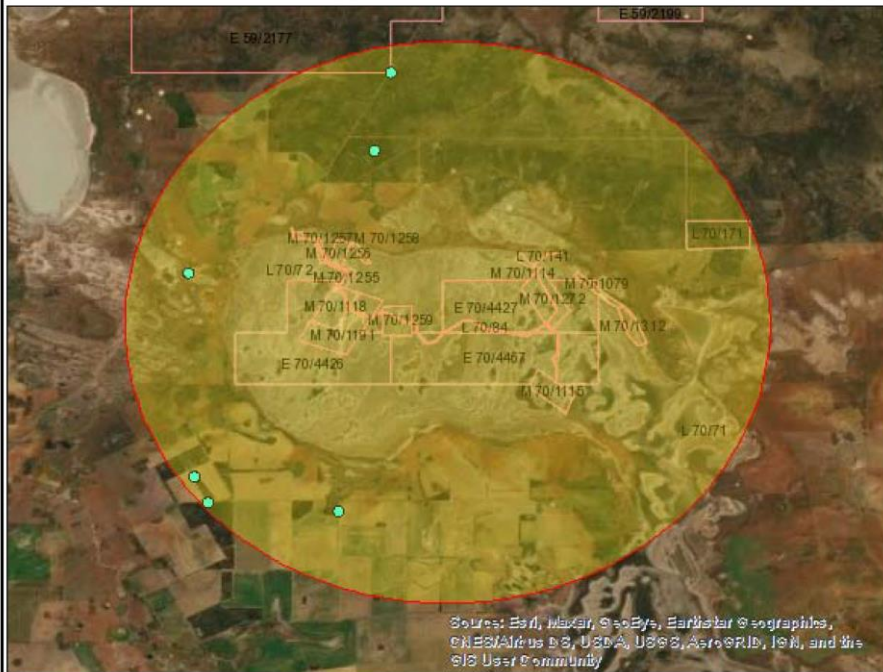
NatureMap

Mapping Western Australia's biodiversity

Conservation Fauna Lake Goorly

Printed by Guest user on 8/4/2021

Query details : Kingdom=Animalia; Conservation Status=Conservation Taxon (T, X, IA, S, P1-P5); Current Names Only=Yes; Core Datasets Only=Yes; Method='By Circle'; Centre=116° 56' 05" E, 29° 57' 48" S; Buffer=10km;



Search Results

Selected

- Selected Species

All Results

- Default
- Confirmed
- Corrected
- Reported

Reference Layers

Major WA Towns

•

Major WA Towns

•

Major WA Towns

•

Mining Tenements (live)

- Live tenements

State Borders

—

Sources: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



Department of Biodiversity, Conservation and Attractions



NatureMap is a collaborative project of the Department of Biodiversity, Conservation and Attractions, Western Australia, and the Western Australian Museum.

APPENDIX J

Typical analysis of the gypsum material



ChemCentre
Land Resources
Report of Examination



Purchase Order: None
Your Reference:
ChemCentre Reference: 12A0299

Lake Goorley Contracting
PO Box 2
Kalannie WA 6468

PO Box 1250, Bentley Delivery Centre
Bentley WA 6983
T +61 8 9422 9800
F +61 8 9422 9801
www.chemcentre.wa.gov.au
ABN 40 991 885 705

Attention: Craig Bywaters

Final Report on 8 samples of gypsum received on 12/02/2013

<u>LAB ID</u>	<u>Client ID and Description</u>
12A0299 / 001	Lease 1 Sample 1
12A0299 / 002	Lease 1 Sample 2
12A0299 / 003	Lease 1 Sample 3
12A0299 / 004	Lease 1 Sample 4
12A0299 / 005	Lease 2 Sample 1
12A0299 / 006	Lease 2 Sample 2
12A0299 / 007	Lease 2 Sample 3
12A0299 / 008	Lease 2 Sample 4

Analyte		Gypsum	Salt	Ca	Mg	Na	S
Method		calcS	calcNa	(ICPg)	(ICPg)	(ICPg)	(ICPg)
Unit		%	%	%	%	%	%
Lab ID	Client ID						
12A0299/001	Lease 1 Sample 1	94	<0.1	22.1	<0.1	<0.1	17.5
12A0299/002	Lease 1 Sample 2	95	<0.1	22.5	0.1	<0.1	17.7
12A0299/003	Lease 1 Sample 3	95	<0.1	22.3	<0.1	<0.1	17.6
12A0299/004	Lease 1 Sample 4	93	<0.1	22.3	0.2	<0.1	17.3
12A0299/005	Lease 2 Sample 1	92	<0.1	20.8	<0.1	<0.1	17.1
12A0299/006	Lease 2 Sample 2	95	0.4	21.7	0.1	0.2	17.8
12A0299/007	Lease 2 Sample 3	98	0.4	22.4	<0.1	0.2	18.2
12A0299/008	Lease 2 Sample 4	98	0.3	22.2	0.1	0.1	18.2