



**Level 2 Flora & Vegetation Survey
Lake Disappointment Project
Prepared For
Reward Minerals Limited**



**June 2018
FINAL (Version 2)**

**Prepared by:
Botanica Consulting
PO Box 2027
Boulder WA 6432
90930024**



Disclaimer

This document and its contents are to be treated as confidential and are published in accordance with and subject to an agreement between Botanica Consulting (BC) and the client for whom it has been prepared and is restricted to those issues that have been raised by the client in its engagement of BC. Neither this document nor its contents may be referred to or quoted in any manner (report or other document) nor reproduced in part or whole by electronic, mechanical or chemical means, including photocopying, recording or any information storage system, without the express written approval of the client and/or BC.

This document and its contents have been prepared utilising the standard of care and skill ordinarily exercised by Environmental Scientists in the preparation of such documents. All material presented in this document is published in good faith and is believed to be accurate at the time of writing. Any person or organisation who relies on or uses the document and its contents for purposes or reasons other than those agreed by BC and the client without primarily obtaining the prior written consent of BC, does so entirely at their own risk. BC denies all liability in tort, contract or otherwise for any loss, damage or injury of any kind whatsoever (whether in negligence or otherwise) that may be endured as a consequence of relying on this document and its contents for any purpose other than that agreed with the client.

Quality Assurance

An internal quality review process has been implemented to each project task undertaken by BC. Each document and its contents are carefully reviewed by core members of the Consultancy team and signed off at Director Level prior to issue to the client. Draft documents are submitted to the client for comment and acceptance prior to final production.

Document Job Number: 2016/54 & 2016/80

Prepared by: Lauren Pick
Senior Environmental Consultant
Botanica Consulting

Reviewed by: Andrea Williams
Director
Botanica Consulting

Approved by: Jim Williams
Director
Botanica Consulting

Contents	Page No.
1 Introduction	1
1.1 Project Description	1
1.2 Objectives	1
2 Regional Biophysical Environment	3
2.1 Regional Environment	3
2.2 Soils and Landscape Systems	5
2.3 Remnant Vegetation	8
2.4 Climate	12
2.5 Hydrology	14
2.6 Land Use	16
3 Survey Methodology	16
3.1 Desktop Assessment	16
3.2 Field Assessment	21
3.2.1 Sampling Quadrats	23
3.2.2 Targeted Survey	23
3.2.3 Personnel involved	25
3.2.4 Scientific licences	25
3.3 Data Analysis Tools	26
3.3.1 PATN Analysis	26
3.3.2 EstimateS	26
3.4 Flora survey limitations and constraints	27
4 Results	29
4.1 Desktop Assessment	29
4.1.1 Literature Review	29
4.1.2 Flora of Conservation Significance	30
4.1.3 Field Assessment	31
4.2 Flora of conservation significance	31
4.2.1 <i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al KS 867) (P1)	31
4.2.2 <i>Tecticornia</i> sp. nov. A and <i>Tecticornia</i> sp. nov. B (unrecognised taxon, K.A. Shepherd 867) CS	32
4.2.3 <i>Tecticornia</i> aff. <i>calyptrata</i> (potentially distinct taxon, K.A. Shepherd 867) CS	33
4.3 Floristic Communities	35
4.3.1 Heath of mixed <i>Tecticornia</i> spp. on Salt Lake edge (CD-CSSSF1)	37
4.3.2 Open mixed herbs in clay-loam depression (CD-OGHSR1)	38
4.3.3 Low forest of <i>Allocasuarina decaisneana</i> over open scrub of <i>Acacia/Grevillea</i> and mid-dense hummock grass of <i>Triodia basedowii</i> on sand dunes/ swales (D-CFW1)	40
4.3.4 Open low woodland of <i>Corymbia opaca</i> over low scrub of <i>Acacia/Grevillea</i> spp. and mid-dense hummock grass of <i>Triodia basedowii</i> on sand dunes/swales (D-HG1)	41
4.3.5 Scrub of <i>Acacia/Eremophila/Grevillea</i> spp. over mid-dense hummock grass of <i>Triodia basedowii</i> on sand dunes/ swales (D-HG2)	42
4.3.6 Low woodland of <i>Acacia</i> spp. over low scrub of <i>Senna artemisioides</i> and mixed dwarf scrub in drainage depression (OD-AFW1)	43
4.3.7 Open low woodland of <i>Eucalyptus camaldulensis/ Corymbia</i> spp. over mid-dense hummock grass of <i>Triodia</i> spp. in creekline (OD-EW1)	44
4.3.8 Low woodland of <i>Hakea lorea/ Melaleuca glomerata</i> over low heath of <i>Fimbristylis eremophila</i> in drainage depression (OD-OS1)	45
4.3.9 Open low woodland of <i>Corymbia</i> spp. over low scrub of <i>Acacia</i> spp. and mid-dense hummock grass of <i>Triodia</i> spp. in sandplain (P-HG1)	46
4.3.10 Open shrub mallee of <i>Eucalyptus gamophylla/ E. kingsmillii</i> subsp. <i>kingsmillii</i> over low scrub of <i>Acacia bivenosa</i> and mid-dense hummock grass of <i>Triodia basedowii</i> in sandplain (P-HG2)	47
4.3.11 Scrub of <i>Acacia</i> spp. over mixed low scrub and mid-dense hummock grass of <i>Triodia pungens</i> on rocky hillslope (RH-AFW1)	48
4.3.12 Open shrub mallee of <i>Eucalyptus gamophylla/ E. kingsmillii</i> subsp. <i>kingsmillii</i> over low scrub of <i>Acacia/ Grevillea</i> spp. and mid-dense hummock grass of <i>Triodia</i> spp. on rocky hillslope (RH-MWS1)	49

4.3.13	Low woodland of <i>Acacia</i> spp. over low scrub of <i>Eremophila/ Senna</i> spp. and mid-dense hummock grass of <i>Triodia basedowii</i> on rocky plain (RP-AFW1)	50
4.3.14	Open low woodland of <i>Corymbia aspera</i> over low scrub of <i>Acacia</i> spp. and mid-dense hummock grass of <i>Triodia basedowii</i> on rocky plain (RP-HG1)	51
4.4	Vegetation Condition	52
4.5	Introduced Plant Species	55
4.5.1	<i>Cenchrus ciliaris</i> (Buffel Grass)	55
4.6	Floristic Composition of the Lake Disappointment Potash Project Quadrats	56
4.6.1	Species Richness and accumulation estimates	58
4.7	Vegetation of Conservation Significance	60
4.7.1	Matters of National Environmental Significance	60
4.7.2	Matters of State Environmental Significance	60
5	Summary	62
6	Bibliography	63

Appendices

Appendix 1: Regional map of the Lake Disappointment Potash Project survey area including DPaW Flora of Conservation Significance and areas of Conservation Significance	65
Appendix 2: Vegetation maps of the Lake Disappointment Potash Project survey area	66
Appendix 3: List of species identified within each vegetation community	71
Appendix 4: GPS coordinates of Flora of Conservation Significance locations within Lake Disappointment Potash Project survey area (GDA94)	83
Appendix 5: GPS coordinates of Quadrat locations and Riparian Monitoring Transects (GDA94)	89
Appendix 6: Quadrat Datasheets	93
Appendix 7: Quadrat Photographs	94
Appendix 8: PATN Analysis results	95
Appendix 9: Vegetation Condition Rating	98

Tables

Table 1: Soil Landscape Systems within the Lake Disappointment Potash Project survey area	6
Table 2: Remaining Beard Vegetation Associations within Western Australia (DPaW, 2015)	9
Table 3: Definitions of Conservation Significant Flora	17
Table 4: Definitions of conservation significant communities	18
Table 5: Scientific Licences of Botanica Staff coordinating the survey	25
Table 6: Limitations and constraints associated with the flora and vegetation survey	27
Table 7: Previous Flora and Vegetation Surveys within the Lake Disappointment Potash Project and surrounding area	29
Table 8: Likelihood of occurrence for Flora of Conservation Significance within the survey area	30
Table 9: Summary of vegetation types within the Lake Disappointment Potash Project survey area	35
Table 10: Vegetation assemblage for Heath of mixed <i>Tecticornia</i> spp. on Salt Lake edge	37
Table 11: Vegetation assemblage for Open mixed herbs in clay-loam depression	38
Table 12: Vegetation assemblage for Low forest of <i>Allocasuarina decaisneana</i> over open scrub of <i>Acacia/ Grevillea</i> and mid-dense hummock grass of <i>Triodia basedowii</i> on sand dunes/ swales	40
Table 13: Vegetation assemblage for Open low woodland of <i>Corymbia opaca</i> over low scrub of <i>Acacia/Grevillea</i> spp. and mid-dense hummock grass of <i>Triodia basedowii</i> on sand dunes/swales	41
Table 14: Vegetation assemblage for Scrub of <i>Acacia/Eremophila/Grevillea</i> spp. over mid-dense hummock grass of <i>Triodia basedowii</i> on sand dunes/ swales	42
Table 15: Vegetation assemblage for Low woodland of <i>Acacia</i> spp. over low scrub of <i>Senna artemisioides</i> and mixed dwarf scrub in drainage depression	43
Table 16: Vegetation assemblage for Open low woodland of <i>Eucalyptus camaldulensis/ Corymbia</i> spp. over mid-dense hummock grass of <i>Triodia</i> spp. in creekline	44
Table 17: Vegetation assemblage for Low woodland of <i>Hakea lorea/ Melaleuca glomerata</i> over low heath of <i>Fimbristylis eremophila</i> in drainage depression	45
Table 18: Vegetation assemblage for Open low woodland of <i>Corymbia</i> spp. over low scrub of <i>Acacia</i> spp. and mid-dense hummock grass of <i>Triodia</i> spp. in sandplain	46
Table 19: Vegetation assemblage for Open shrub mallee of <i>Eucalyptus gamophylla/ E. kingsmillii</i> subsp. <i>kingsmillii</i> over low scrub of <i>Acacia bivenosa</i> and mid-dense hummock grass of <i>Triodia basedowii</i> in sandplain	47
Table 20: Vegetation assemblage for Scrub of <i>Acacia</i> spp. over mixed low scrub and mid-dense hummock grass of <i>Triodia pungens</i> on rocky hillslope	48

Table 21: Vegetation assemblage for Open shrub mallee of <i>Eucalyptus gamophylla</i> / <i>E. kingsmillii</i> subsp. <i>kingsmillii</i> over low scrub of <i>Acacia</i> / <i>Grevillea</i> spp. and mid-dense hummock grass of <i>Triodia</i> spp. on rocky hillslope.....	49
Table 22: Vegetation assemblage for Low woodland of <i>Acacia</i> spp. over low scrub of <i>Eremophila</i> / <i>Senna</i> spp. and mid-dense hummock grass of <i>Triodia basedowii</i> on rocky plain	50
Table 23: Vegetation assemblage for Open low woodland of <i>Corymbia aspera</i> over low scrub of <i>Acacia</i> spp. and mid-dense hummock grass of <i>Triodia basedowii</i> on rocky plain	51
Table 24: Vegetation Condition Rating for Vegetation types of the Lake Disappointment Potash Project survey area	52
Table 25: Vegetation communities with corresponding quadrats	56

Figures

Figure 1: Regional map of the Lake Disappointment Potash Project survey area	2
Figure 2: Map of Interim Biogeographic Regionalisation of Australia (IBRA)	4
Figure 3: Map of Soil Landscape Systems within the Lake Disappointment Potash Project survey area	7
Figure 4: Pre-European Vegetation Associations within the Lake Disappointment Potash Project survey area	11
Figure 5: Mean monthly rainfall and maximum temperature (January 1974 to January 2017) for the Telfer Aero weather station (#13030) (BoM, 2017a)	12
Figure 6: Monthly rainfall and mean monthly rainfall (January 2013 to March 2017) for the Telfer Aero weather station (#13030) (BoM, 2017a)	13
Figure 7: Average annual pan evaporation and evapotranspiration of Western Australia (BoM, 2017a)	13
Figure 8: Surface Hydrology of the Lake Disappointment Potash Project survey area (data obtained from Geoscience Australia, 2001)	15
Figure 9: Quadrat locations, survey area boundary and GPS tracks traversed throughout the Lake Disappointment Potash Project survey area	22
Figure 10: Diagram of riparian monitoring site layout	24
Figure 11: Riparian Vegetation Monitoring Program	25
Figure 12: Flora of Conservation Significance identified within the LDP Project survey area	34
Figure 13: Vegetation Condition Rating of the Lake Disappointment Potash Project survey area	54
Figure 14: Species accumulation curve	59

Plates

Plate 1: <i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd <i>et. al</i> KS 867) (P1)	31
Plate 2: <i>Tecticornia</i> sp. nov. A (unrecognised taxon, K.A. Shepherd 867) (CS)	32
Plate 3: <i>Tecticornia</i> sp. nov. B (unrecognised taxon, K.A. Shepherd 867) (CS)	32
Plate 4: <i>Tecticornia</i> aff. <i>calyptata</i> (CS)	33
Plate 5: Heath of mixed <i>Tecticornia</i> spp. on Salt Lake edge	37
Plate 6: Open mixed herbs in clay-loam depression	38
Plate 7: Claypan within Open mixed herbs in clay-loam depression	39
Plate 8: Low forest of <i>Allocasuarina decaisneana</i> over open scrub of <i>Acacia</i> / <i>Grevillea</i> and mid-dense hummock grass of <i>Triodia basedowii</i> on sand dunes/ swales	40
Plate 9: Open low woodland of <i>Corymbia opaca</i> over low scrub of <i>Acacia</i> / <i>Grevillea</i> spp. and mid-dense hummock grass of <i>Triodia basedowii</i> on sand dunes/swales	41
Plate 10: Scrub of <i>Acacia</i> / <i>Eremophila</i> / <i>Grevillea</i> spp. over mid-dense hummock grass of <i>Triodia basedowii</i> on sand dunes/ swales	42
Plate 11: Low woodland of <i>Acacia</i> spp. over low scrub of <i>Senna artemisioides</i> and mixed dwarf scrub in drainage depression	43
Plate 12: Open low woodland of <i>Eucalyptus camaldulensis</i> / <i>Corymbia</i> spp. over mid-dense hummock grass of <i>Triodia</i> spp. in creekline	44
Plate 13: Low woodland of <i>Hakea lorea</i> / <i>Melaleuca glomerata</i> over low heath of <i>Fimbristylis eremophila</i> in drainage depression	45
Plate 14: Open low woodland of <i>Corymbia</i> spp. over low scrub of <i>Acacia</i> spp. and mid-dense hummock grass of <i>Triodia</i> spp. in sandplain	46
Plate 15: Open shrub mallee of <i>Eucalyptus gamophylla</i> / <i>E. kingsmillii</i> subsp. <i>kingsmillii</i> over low scrub of <i>Acacia bivenosa</i> and mid-dense hummock grass of <i>Triodia basedowii</i> in sandplain	47
Plate 16: Scrub of <i>Acacia</i> spp. over mixed low scrub and mid-dense hummock grass of <i>Triodia pungens</i> on rocky hillslope	48
Plate 17: Open shrub mallee of <i>Eucalyptus gamophylla</i> / <i>E. kingsmillii</i> subsp. <i>kingsmillii</i> over low scrub of <i>Acacia</i> / <i>Grevillea</i> spp. and mid-dense hummock grass of <i>Triodia</i> spp. on rocky hillslope	49
Plate 18: Low woodland of <i>Acacia</i> spp. over low scrub of <i>Eremophila</i> / <i>Senna</i> spp. and mid-dense hummock grass of <i>Triodia basedowii</i> on rocky plain	50

Plate 19: Open low woodland of <i>Corymbia aspera</i> over low scrub of <i>Acacia</i> spp. and mid-dense hummock grass of <i>Triodia basedowii</i> on rocky plain.....	51
Plate 20: <i>Cenchrus ciliaris</i> (Buffel grass).....	55

Glossary

Acronym	Description
ANCA	Australian Nature Conservation Agency.
BAM Act	Biosecurity and Agriculture Management Act 2007, WA Government.
BC	Botanica Consulting.
BoM	Bureau of Meteorology.
CALM	Department of Conservation and Land Management (now DPaW), WA Government.
DAFWA	Department of Agriculture and Food, WA Government.
DEC	Department of Environment and Conservation (now DPaW), WA Government.
DEH	Department of Environment and Heritage Australian Government.
DEP	Department of Environment Protection (now DER), WA Government.
DEWHA	Department of the Environment, Water, Heritage and the Arts (now DotEE), Australian Government
DER	Department of Environment Regulation (formerly DEC, DoE), WA Government.
DMP	Department of Mines and Petroleum (formerly DoIR), WA Government.
DoE	Department of Environment (now DER/DPaW), WA Government.
DoIR	Department of Industry and Resources (now DMP), WA Government.
DotEE	Department of the Environment and Energy (formerly DSEWPaC, DEWHA, and DEH), Australian Government.
DoW	Department of Water, WA Government.
DPaW	Department of Parks and Wildlife (formerly DEC, CALM, DoE), WA Government.
DSEWPaC	Department of Sustainability, Environment, Water, Population and Communities (now DotE, formerly DEH, DEWHA), Australian Government.
EP Act	Environmental Protection Act 1986, WA Government.
EP Regulations	Environmental Protection (Clearing of Native Vegetation) Regulations 2004, WA Government.
EPA	Environmental Protection Authority, WA Government.
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999, Australian Government.
ESA	Environmentally Sensitive Area.
Ha	Hectare (10,000 square metres).
IBRA	Interim Biogeographic Regionalisation for Australia.
IUCN	International Union for the Conservation of Nature and Natural Resources – commonly known as the World Conservation Union.
Km	Kilometre (1,000 metres).
LDP Project	Lake Disappointment Potash Project (including Talawana Track)
MVG	Major Vegetation Groups.
NVIS	National Vegetation Information System.
OEPA	Office of the Environmental Protection Authority, WA Government.
PEC	Priority Ecological Community.
Reward	Reward Minerals Limited.
TEC	Threatened Ecological Community.
WA	Western Australia.
WAHERB	Western Australian Herbarium.
WC Act	Wildlife Conservation Act 1950, WA Government.

Executive Summary

Botanica Consulting (BC) was commissioned by Reward Minerals Limited (Reward) to undertake a Level 2 flora and vegetation survey of the Lake Disappointment Potash (LDP) Project (referred to as the 'survey area'), which is located within the Little Sandy Desert, approximately 138 km south of Telfer and 285 km east of Newman, Western Australia. The survey was initially conducted in autumn from the 20th to the 25th April 2013, covering an area of 89,130 ha (of which 60,886 ha was covered by Lake Disappointment). Forty-three quadrats (50m X 50m) were established during the initial survey. These quadrats were revisited in spring from the 17th October to the 19th October 2013. Additional surveys were conducted in September and December 2016, covering an area of approximately 134,800 ha, of which 70,567 ha was covered by Lake Disappointment. The 43 quadrats established in 2013 were re-visited in September 2016 and an additional 74 quadrats were established. The additional surveys included surveying the Talawana track, which provides access to the Project area (surveyed to a width of 1 km X 220 km length) and a minimum 2 km buffer around the proposed disturbance footprint for the LDP Project (including proposed borefield and area of potential groundwater drawdown). A total of 117 quadrats were established within the final survey area. All 117 quadrats were revisited in autumn (post wet season) from the 6th to the 10th March 2017.

Fourteen vegetation types were identified within the survey area. These vegetation types were located within six different landform types and comprised of eight major vegetation groups, which were represented by a total of 47 Families, 134 Genera and 327 Taxa (including 84 annual taxa).

Species composition assessments indicate there was minimal heterogeneity in species composition across the survey area, with majority of vegetation types intermixed into floristic groups despite differences in both dominant stratum taxa and landform; however, three distinct supergroups were identified. The first supergroup comprised of a mix of vegetation types identified in the field including quadrats from the dunefields, sandplains, open depressions (including Eucalypt quadrats associated with Mackay creek), rocky hillslopes and rocky plains. The second supergroup comprised quadrats from the Acacia Forests and Woodlands open depression (OD-AFW1) located in an isolated patch on the eastern edge of Mackay creek. The third supergroup comprised closed depression quadrats from the lake edge (CD-CSSSF1) and open herb community in low-lying depressions (CD-OGHSR1). Species composition of the riparian vegetation (CD-CSSSF1) showed little variation along the entire boundary of the lake, and was more closely related to low lying drainage depressions of the open herb community (CD-OGHSR1) than the dunefield/ sandplain, open depression and rocky communities; however, both communities were delineated into distinct floristic groups. The Chaos 2 richness estimator provided an estimated species richness of 269 species in 117 sample sites (quadrats). Species richness recorded for the 117 quadrats surveyed was 284 species (including annuals) which indicates survey intensity was adequate.

No Threatened Flora taxa listed under the Commonwealth *Environment Protection and Biodiversity Conservation (EPBC) Act 1999* or listed under the *Wildlife Conservation (WC) Act 1950*¹ were recorded within the survey area. One Priority Flora taxon as listed by the Department of Parks and Wildlife (DPaW) was recorded within the survey area; *Tecticornia* sp. Sunshine Lake (K.A. Shepherd et al KS 867) (P1) was identified within the Heath of mixed *Tecticornia* spp. on Salt Lake edge vegetation type. Two unrecognised taxa of *Tecticornia* (as identified by K.A. Shepherd 867) were also identified in the area, which are considered to be of Conservation Significance; *Tecticornia* sp. Nov A and *Tecticornia* sp. Nov B (K.A. Shepherd 867). These taxa are presently undergoing further taxonomic work by the Western Australian Herbarium (WAHERB). A third *Tecticornia* specimen; *Tecticornia* aff. *calyptrata*, identified by Kelly Shepherd as a potentially distinct taxon related to *Tecticornia calyptrata* is also provisionally considered to be of Conservation Significance and is also presently undergoing further taxonomic work by WAHERB.

¹ *Biodiversity Conservation Act 2016* received assent on 21 September 2016 with Parts of the Act coming into effect on 3 December 2016. Once fully enacted with enabling subsidiary regulations, it will replace the *Wildlife Conservation Act 1950*.

No Threatened Ecological Communities (TEC) pursuant to Commonwealth or State legislation were identified within the survey area. The survey area does not contain any world or national heritage places, wetlands of international importance (Ramsar Wetlands). Lake Disappointment is however listed by the Department of the Environment and Energy (DotEE) and Australian Nature Conservation Agency (ANCA) as a Nationally Important Wetland of Western Australia.

No Priority Ecological Communities (PEC) as listed by the Department of Parks and Wildlife (DPaW) were recorded within the survey area. No ecosystems listed under the International Union for Conservation of Nature (IUCN) Red list of Ecosystems occur within the survey area.

Approximately 16,550 ha southern extremity of the survey area is located within the proposed Lake Disappointment Nature Reserve (listed under the Environmental Protection Authority (EPA) Red Book recommendations for Conservation Reserves 1975-1993) which covers an area of 366,700 ha. The Lake Disappointment Nature Reserve was first listed in the EPA Red Book as an area of proposed conservation and proposed in the DPaW Goldfields, Regional Management Plan 1994-2004 however the recommendation was for the proposal to be deferred and addressed in the Pilbara Regional Management Plan. To date this proposed reserve has not been gazetted.

Approximately 350 ha of the survey area (mid-section of the Talawana track) is located within the Rudall River National Park which is listed as a Class A National Park managed by the DPaW.

Approximately 70,567 ha of the survey area is located in an Environmentally Sensitive Area (ESA) as listed under the *Environmental Protection (EP) Act 1986* which encompasses Lake Disappointment. An additional 350 ha of the survey area (mid-section of the Talawana track) is also located within an ESA which encompasses the entire Rudall River National Park.

Based on the vegetation condition rating scale adapted from Keighery, 1994 and Trudgen, 1988 (ranging from 'pristine' to 'completely degraded'), three vegetation types were rated as 'poor', one rated as 'good' and the remaining eleven vegetation types had a vegetation condition rating of 'very good'. One introduced species was identified within the survey area; *Cenchrus ciliaris* (Buffel grass). According to the Department of Agriculture and Food Western Australia (DAFWA) this species is not listed as a Declared Plant under Section 22 of the *Biosecurity and Agriculture Management (BAM) Act 2007*.

1 **Introduction**

1.1 **Project Description**

Botanica Consulting (BC) was commissioned by Reward Minerals Limited (Reward) to undertake a Level 2 flora and vegetation survey of the Lake Disappointment Potash (LDP) Project (referred to as the 'survey area'), which is located within the Little Sandy Desert, approximately 138 km south of Telfer and 285 km east of Newman, Western Australia. The survey covered an area of approximately 134,800 ha of which 70,567 ha was covered by Lake Disappointment (Figure 1). A total of 117 quadrats (50m X 50m) were established within the survey area, and surveyed over multiple seasons/ years in accordance with DPaW and EPA Technical Guidelines for Terrestrial Flora and Vegetation surveys.

Reward proposes to abstract potassium-rich brines from sediments associated with Lake Disappointment and to produce sulphate of potash by means of solar evaporation of the brine. The proposal includes the construction and use of associated mine infrastructure including evaporation ponds, water supply borefield, processing plant, offices, workshop, accommodation and roads. Waste salt would be stored in permanent stockpiles on the Lake Disappointment playa.

1.2 **Objectives**

The survey was conducted in accordance with *Guidance for the Assessment of Environmental Factors (No. 51) Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia* (EPA, 2004) and *Technical Guide - Flora and Vegetation Surveys for Environmental Impact Assessment – December 2016* (DPaW & EPA, 2016). The objectives of the assessment were to:

- gather background information on flora and vegetation in the target area (literature review, database and map-based searches);
- identify significant flora, vegetation/ecological communities and assess the potential sensitivity to impact;
- conduct a field survey to verify / ground truth the desktop assessment findings through targeted and detailed survey;
- undertake floristic community mapping to a scale appropriate for the bioregion and described according to the National Vegetation Information System (NVIS) structure and floristics;
- undertake vegetation condition mapping;
- assess the project area's plant species diversity, density, composition, structure and weed cover, using NVIS classification system for vegetation description;
- assess Matters of National Environmental Significance (MNES) and indicate whether potential impacts on MNES as protected under the EPBC Act are likely to require referral of the project to the Commonwealth DotEE; and
- determine the State legislative context of environmental aspects required for the assessment

Assessments on the potential impacts of the project development have been conducted and provided in a separate document; *Lake Disappointment Potash Project-Flora and Vegetation Impact Assessment* (BC, 2017).



Figure 1: Regional map of the Lake Disappointment Potash Project survey area

2 Regional Biophysical Environment

2.1 Regional Environment

The survey area lies within the Fortescue Botanical District and Keartland Botanical District of WA. The Fortescue Botanical District consists of predominantly tree and shrub-steppe communities with *Eucalyptus* trees, *Acacia* shrubs and *Triodia* species. Some Mulga occurs in valleys and there are short-grass plains on alluvia (Beard, 1990). The Keartland Botanical District consists predominantly of shrub steppes of *Acacia* and *Grevillea*, and *Triodia* spp. on dunes and swales. Patches of desert oak and Mulga also occur within the area (Beard, 1990).

Based on the Interim Biogeographic Regionalisation of Australia (IBRA), Version 7 (DotEE, 2012), the survey area is located within the Pilbara Bioregion and Little Sandy Desert Bioregion of WA (Figure 2). These IBRA Regions are further divided into subregions (Figure 2), with the survey area located within the:

- Chichester (PIL1) and Fortescue Plains (PIL2) subregion of the Pilbara Bioregion²; and
- Rudall (LSD1) and Trainor (LSD2) subregion of the Little Sandy Desert Bioregion^{2, 3}.

The Pilbara Bioregion has a semi-desert tropical climate, with active drainage in the Fortescue, De Grey and Ashburton river systems (McKenzie, May and McKenna, 2002). The Chichester Subregion (PIL 1) comprises the northern section of the Pilbara Craton. It is characterised by undulating Archaean granite and basalt plains including significant areas of basaltic ranges. Vegetation consists of plains supporting a shrub steppe characterised by *Acacia inaequilatera* over *Triodia pungens* hummock grasslands, while *Eucalyptus leucophloia* tree steppes occur on ranges (Kendrick & McKenzie, 2001). The Fortescue Plains Subregion (PIL2) is characterised by alluvial plains and drainage lines. Extensive salt marsh, mulga-bunch grass, and short grass communities occur on alluvial plains in the east. Deeply incised gorge systems occur in the western (lower) part of the drainage system. River gum woodlands fringe the drainage lines. This subregion serves as the northern limit of Mulga (*Acacia aneura*). An extensive calcrete aquifer (originating within a palaeo-drainage valley) feeds numerous permanent springs in the central Fortescue, supporting large permanent wetlands with extensive stands of river gum and cadjeput *Melaleuca* woodlands (Kendrick, 2001a).

The Little Sandy Desert Bioregion comprises red Quaternary dune fields with abrupt Proterozoic sandstone ranges of the Bangemall Basin. It includes the headwaters and course of the Rudall River. The region includes Savory Creek and the headwaters of the Rudall River, two desert rivers with near-permanent wetlands along their courses. Small permanent rock hole wetlands associated with ranges and uplands are locally significant water sources and have high biological and cultural significance. Small artificial wells have been constructed as water sources along the Canning Stock Route (McKenzie *et. al.*, 2002).

The Rudall Subregion (LSD1) is characterised by sparse shrub-steppe over *Triodia basedowii* on stony hills, with River Gum communities and bunch grasslands on alluvial deposits in and associated with ranges (Kendrick, 2001b). The Trainor Subregion (LSD2) is characterised by shrub steppe of Acacias, *Aluta maisonneuvei* and *Grevilleas* over *Triodia schinzii* on sandy surfaces. Vegetation also includes sparse shrub-steppe over *Triodia basedowii* on stony hills, with Eucalyptus and Coolibah communities and bunch grasslands on alluvial deposits and drainage lines associated with ranges (Cowan & Kendrick, 2001).

² Subregions of the haul road

³ Subregions of the mining area

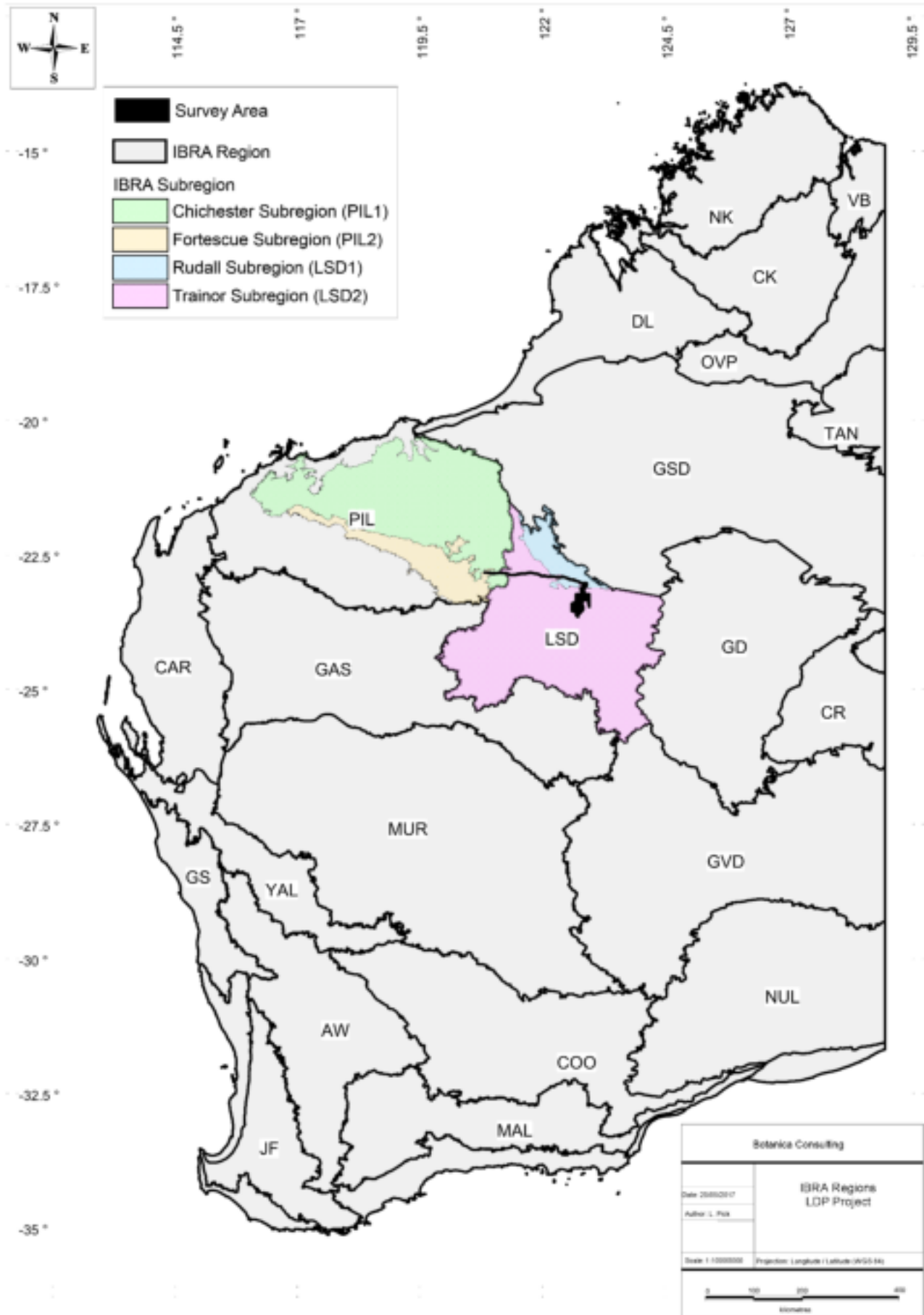


Figure 2: Map of Interim Biogeographic Regionalisation of Australia (IBRA)

2.2 Soils and Landscape Systems

The survey area lies within three soil-landscape Provinces:

1. Officer Province (13)
2. Paterson-Yeneena Province (15); and
3. Fortescue Province (28).

These Provinces are further divided into soil-landscape zones, with the survey area located within the:

- Little Sandy Desert Zone (131);
- Rudall River Zone (151);
- Yeneena Zone (152); and
- Jigalong Plains Zone (288).

The Little Sandy Desert Zone (131) is characterised by sandplains and dunes (with some hardpan wash plains, hills and ranges) on sedimentary rocks of the north-western Officer Basin. Soils include red sandy earths with red deep sands and some red loamy earths, red shallow loams and red-brown hardpan shallow loams. Vegetation comprises Spinifex grasslands with scattered Bloodwood and some Mulga shrublands. This zone is located in the western central Arid Interior between Lake Disappointment, Jigalong and Lake Burnside.

The Rudall River Zone (151) is characterised by hills and ranges (with some calcrete plains) on gneiss and sedimentary rocks of the Rudall Complex. Soils include stony soils, red shallow loams and bare rock with red shallow sands, red loamy earths and red sandy earths. Vegetation comprises Spinifex grassland with scattered Bloodwoods and Acacias. This zone is located in the western Arid Interior between Rudall River and Well No. 24 on the Canning Stock Route.

The Yeneena Zone (152) is characterized by sandplains and dunes (with hills, ranges and some salt lakes) on sedimentary rocks of the Yeneena Basin and Gibson Sub-basin. Soils comprise red sandy earths with red deep sands and some Salt Lake soils, stony soils, red loamy earths, red shallow loams and bare rock. Vegetation includes Spinifex grassland with scattered Bloodwoods and Acacias and some salt lakes. This zone is located in the western Arid Interior from Lake Disappointment to Telfer (Tille, 2006).

The Jigalong Plains Zone (288) is characterised by alluvial plains, sandplains, hills and ranges (with floodplains and hardpan wash plains) on sedimentary rocks of the Manganese Group (with some basalt and granite). Soils include red deep sands with red/brown non-cracking clays, red loamy earths, red deep sandy and loamy duplexes, stony soils and red shallow loams. Vegetation comprises Mulga woodlands/shrublands with spinifex and tussock grasslands. This zone is located in the eastern Pilbara between Jigalong, Ethel Creek and Balfour Downs (Tille, 2006).

These zones are further divided into soil landscape systems of the Rudall River Zone and Yeneena Zone within the survey area are shown in Table 1 and Figure 3 (ASRIS, 2014).

Table 1: Soil Landscape Systems within the Lake Disappointment Potash Project survey area

Province	Soil Landscape Zone	Landscape System/ Mapping Unit	Description
Fortescue	Jigalong Plains	Balfour System	Shale, gravel and clay plains supporting eremophila-cassia shrublands, tussock grasslands, and halophytic shrublands.
		Divide System	Gently undulating sandplains with minor dunes, supporting hard spinifex hummock grasslands with numerous shrubs.
		Robertson System	Hills and ranges of sedimentary rocks supporting hard spinifex grasslands.
		Spearhole System	Gently undulating gravelly hardpan plains and dissected slopes supporting groved mulga shrublands and hard spinifex.
		Zebra System	Hardpan plains with large linear gravelly sand banks supporting acacia tall shrublands with soft and hard spinifex.
Officer	Little Sandy Desert	AB44	Plains with a variable, but usually high, proportion of longitudinal sand dunes, and with some clay pans; scattered sandstone hills and laterite residuals are fairly common
		BA17	Flat-topped but sometimes steep-sided hills with extensive areas of bare rock-sandstones and other sedimentary rocks, but including some volcanics
		Balfour System	Shale, gravel and clay plains supporting eremophila-cassia shrublands, tussock grasslands, and halophytic shrublands.
		Buckshot System	Gravelly sandplains and occasional sand dunes supporting shrubby hard spinifex grasslands.
		Little Sandy System	Sandplains with linear and reticulate dunes supporting shrubby hard and soft spinifex grasslands.
Paterson-Yeneena	Rudall River	Fa31	Rugged ranges with extensive areas of bare rock largely on metamorphics and granites but with some inclusions of sandstones and conglomerates
		Fa32	Low ranges and hills largely on metamorphics and granites but with some inclusions of sandstones and conglomerates; extensive areas of bare rock; transgressed by dunes in places and flanked by small plains
	Yeneena 152	AB44	Plains with a variable, but usually high, proportion of longitudinal sand dunes, and with some clay pans; scattered sandstone hills and laterite residuals are fairly common
		SV9	Salt lakes, salt pans, and clay pans mostly devoid of true soils

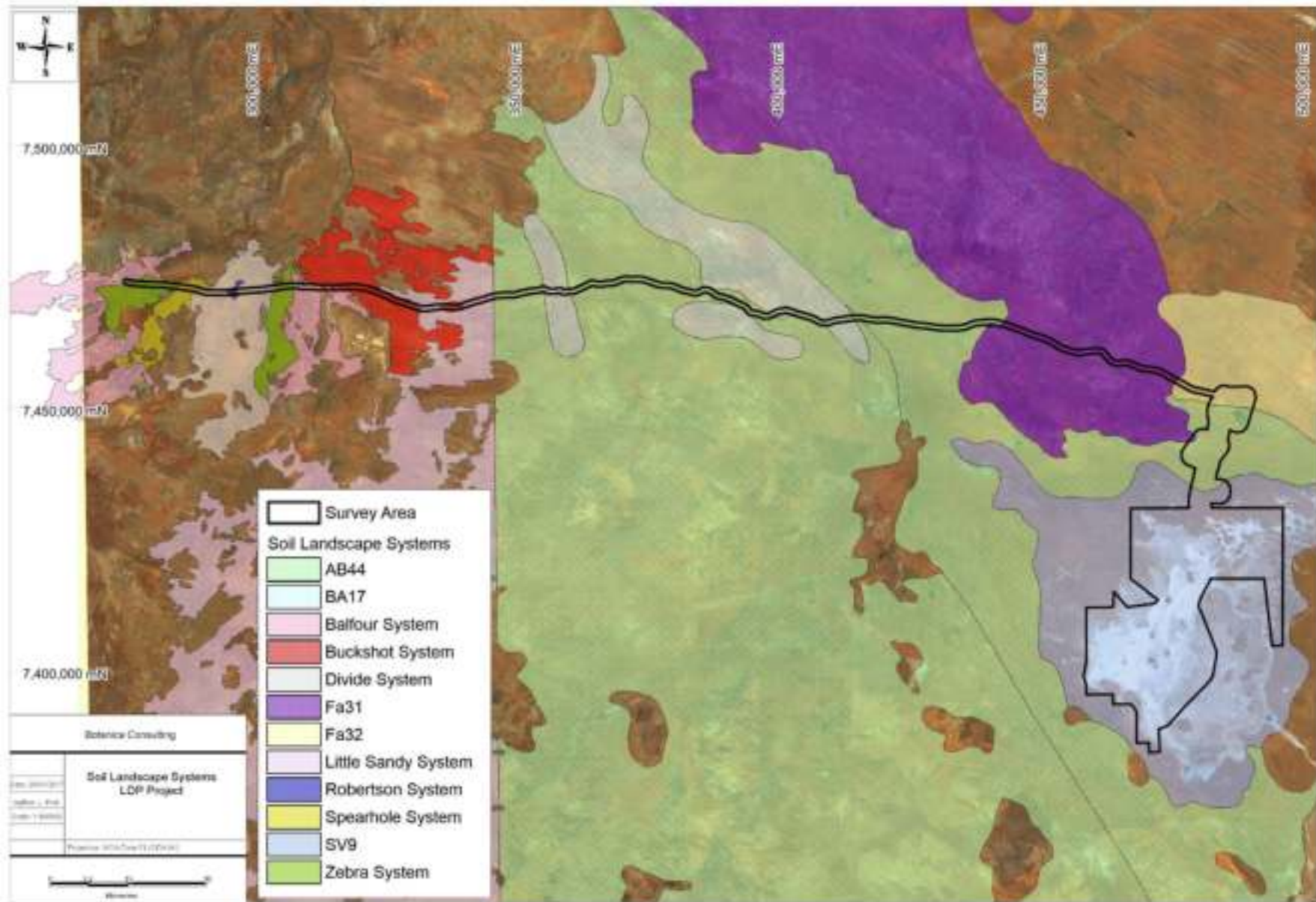


Figure 3: Map of Soil Landscape Systems within the Lake Disappointment Potash Project survey area

2.3 Remnant Vegetation

The DAFWA GIS file (2011) indicates that the survey area is located within Pre-European Beard vegetation associations Abydos Plain – Chichester 18, 29 & 111 in the Chichester (PIL1) subregion, Fortescue Valley 29 in the Fortescue (PIL2) subregion, Little Sandy Desert 99, 152 and 158 in the Rudall (LSD1) subregion, and Little Sandy Desert 99, 117, 125, 134, 158 & 194 in the Trainor (LSD2) subregion (Figure 4). The extent of these vegetation associations as specified in the *2015 Statewide Vegetation Statistics* (DPaW, 2015) is provided in Table 2.

Areas retaining less than 30% of their pre-European vegetation extent may experience exponentially accelerated species loss, while areas with less than 10% are considered “endangered” (EPA, 2000). All of the vegetation types present in the areas intersected by the LDP Project development envelope are estimated to remain at 99% or more of their estimated pre-European extent. The development of the LDP Project will not significantly reduce the extent of pre-European vegetation associations.

Table 2: Remaining Beard Vegetation Associations within Western Australia (DPaW, 2015)

IBRA subregion	Vegetation association	Pre-European Extent (Ha)	Current Extent (Ha)	Pre-European extent remaining (%)	% of Current extent within DPaW managed lands	Vegetation Description (Beard, 1990)
PIL1	Abydos Plain – Chichester 18***	28,665.23	28,665.23	100.00	0.00	Low woodland; Mulga
	Abydos Plain – Chichester 29***	58,426.56	58,426.56	100.00	0.00	Sparse low woodland; Mulga, discontinuous in scattered groups
	Abydos Plain – Chichester 111**	80,894.59	80,894.59	100.00	0.00	Hummock grasslands, shrub steppe; <i>Eucalyptus gamophylla</i> over hard spinifex
PIL2	Fortescue Valley 29*	872,485.65	872,316.44	99.98	9.6	Sparse low woodland; Mulga, discontinuous in scattered groups
LSD1	Little Sandy Desert 99*	398,672.56	398,672.56	100.00	35.71	Hummock grasslands, shrub steppe; <i>Acacia coriacea</i> & <i>Hakea</i> over hard spinifex <i>Triodia basedowii</i>
	Little Sandy Desert 152**	52,919.05	52,919.05	100.00	0.00	Hummock grasslands, grass steppe; soft & hard spinifex soft spinifex
	Little Sandy Desert 158	178,188.03	178,188.03	100.00	79.58	Hummock grasslands, shrub steppe; kanji over <i>Triodia basedowii</i>
LSD2	Little Sandy Desert 99***	65,175.27	65,175.27	100.00	0.00	Hummock grasslands, shrub steppe; <i>Acacia coriacea</i> & <i>Hakea</i> over hard spinifex <i>Triodia basedowii</i>
	Little Sandy Desert 117*	95,838.81	95,838.81	100.00	21.09	Hummock grasslands, grass steppe; soft spinifex
	Little Sandy Desert 125**	225,060.80	225,060.80	100.00	0.00	Bare areas; salt lakes
	Little Sandy Desert 134**	7,363,935.12	7,363,935.12	100.00	1.64	Mosaic: Hummock grasslands, open low tree steppe; desert bloodwood and feathertop spinifex (on) sandhills / Hummock grasslands, shrub steppe; mixed shrubs over spinifex between sandhills

IBRA subregion	Vegetation association	Pre-European Extent (Ha)	Current Extent (Ha)	Pre-European extent remaining (%)	% of Current extent within DPaW managed lands	Vegetation Description (Beard, 1990)
	Little Sandy Desert 158***	49,274.47	49,274.47	100.00	2.03	Hummock grasslands, shrub steppe; kanji over <i>Triodia basedowii</i>
	Little Sandy Desert 194***	59,063.95	59,063.95	100.00	0.00	Hummock grasslands, tree steppe; desert oak & hard spinifex between sandhills

*Low Reservation Priority according to the International Union for Conservation of Nature (IUCN)

**Medium Reservation Priority according the IUCN

***High Reservation Priority according the IUCN

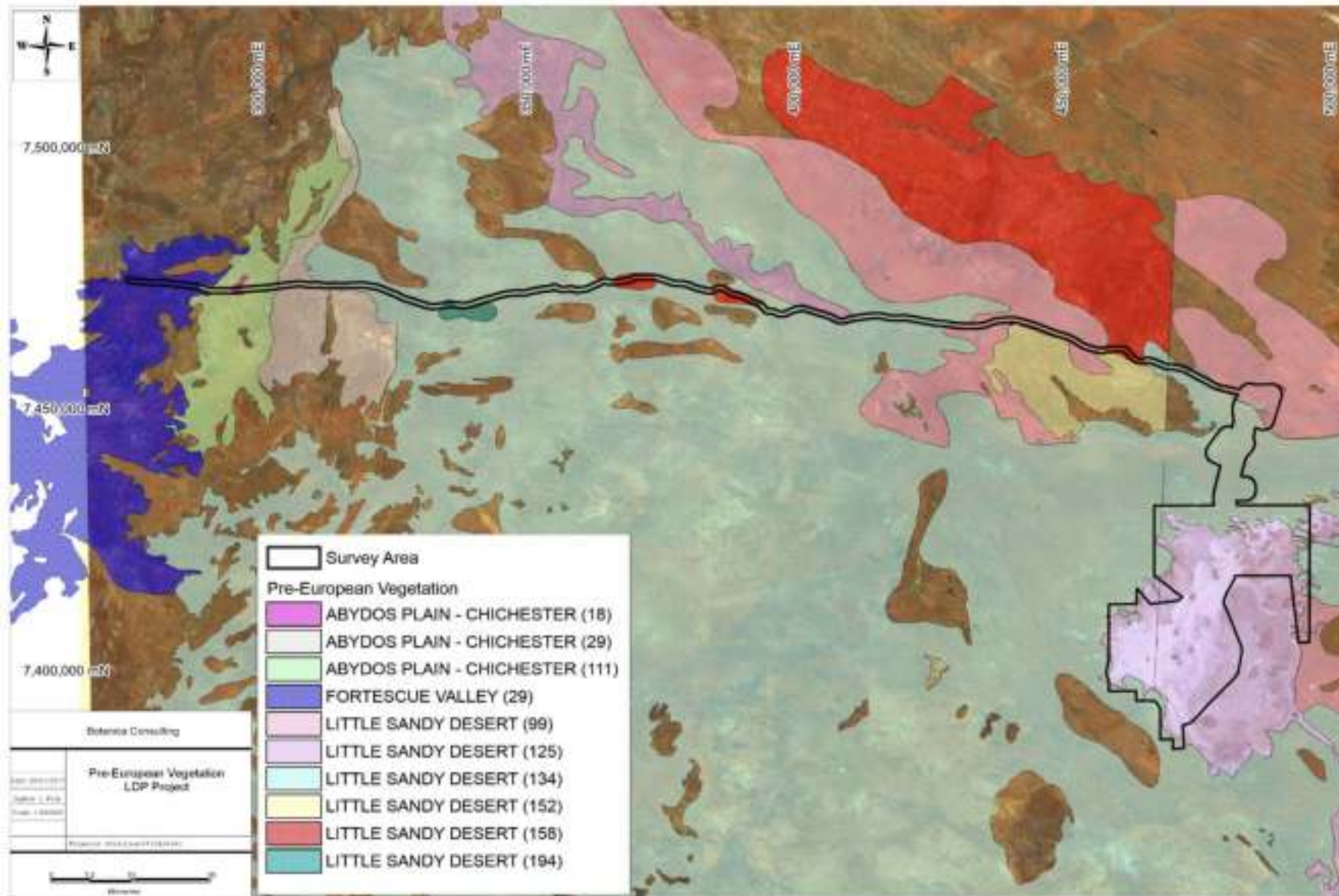


Figure 4: Pre-European Vegetation Associations within the Lake Disappointment Potash Project survey area

2.4 Climate

The climate of both the Rudall and Trainor subregions is characterised as arid with summer rainfall in the Rudall subregion and episodic summer rainfall in the Trainor subregion (Kendrick, 2001). Rainfall data for the Telfer Aero weather station (#13030) obtained from the Bureau of Meteorology (BoM) located approximately 133 km north-west of the LDP Project is provided in Figure 5 (BoM, 2017a). Annual rainfall for 2013 (first year of survey) was above average (363mm) recording a total of 603mm. Rainfall was highest in January and February. In 2016 (second year of survey) rainfall was below average (192mm). In January and February 2017 (prior to third year of survey), rainfall levels exceeded the annual average, recording 494.8mm (Figure 6). The survey area has an annual pan evaporation rate of approximately 3600-4000mm and an average annual evapotranspiration rate of 300mm (Figure 7).

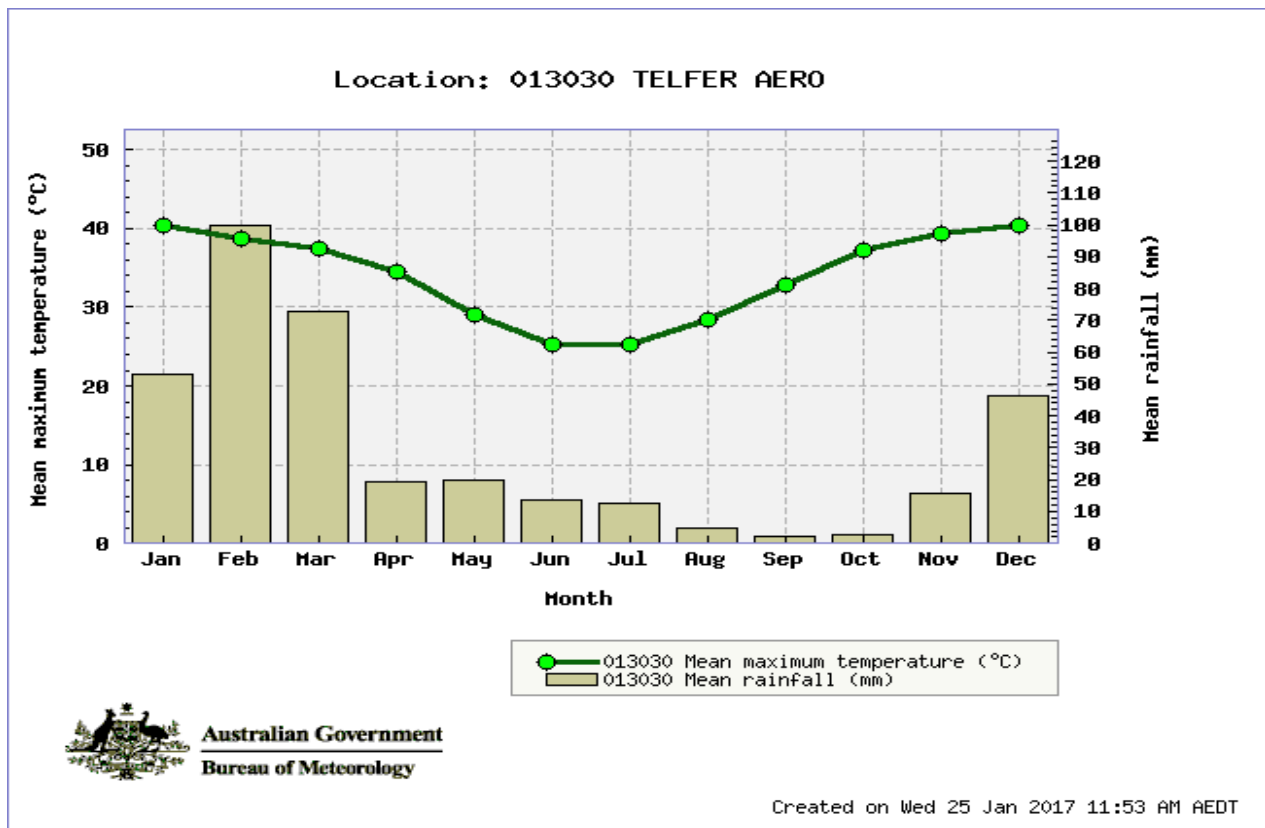


Figure 5: Mean monthly rainfall and maximum temperature (January 1974 to January 2017) for the Telfer Aero weather station (#13030) (BoM, 2017a)

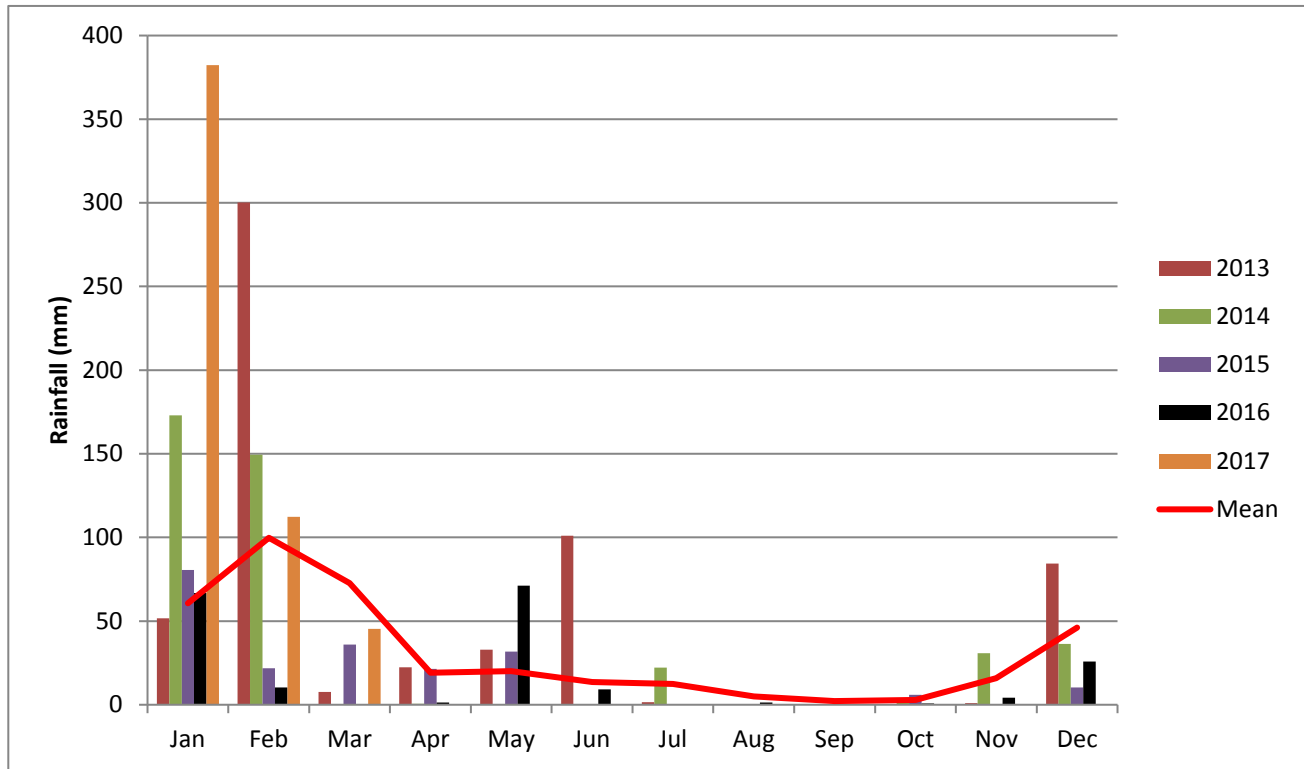


Figure 6: Monthly rainfall and mean monthly rainfall (January 2013 to March 2017) for the Telfer Aero weather station (#13030) (BoM, 2017a)

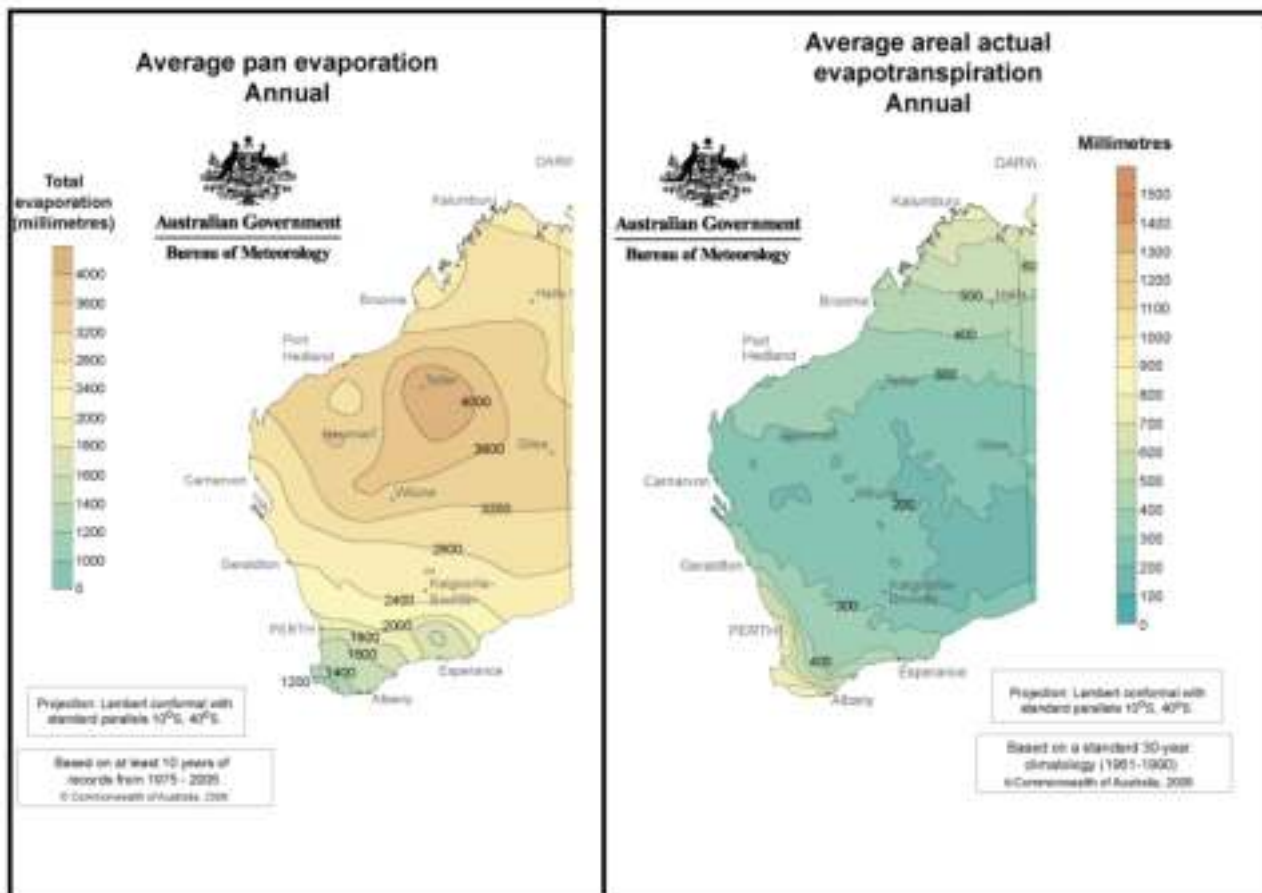


Figure 7: Average annual pan evaporation and evapotranspiration of Western Australia (BoM, 2017a)

2.5 Hydrology

The southern extremity of the survey area occurs within Lake Disappointment (often referred to as the Savory Creek system) which is described as a mega scale irregular sumpland with numerous microscale to macroscale islands. The Lake Disappointment playa is a major feature of the Little Sandy Desert bioregion. Savory Creek is an extensive creek over 280 km long and approximately 150m wide at its maximum, occasionally flooding to 2 km width. It is one of only two significant drainage systems that flow into the Little Sandy Desert. Savory Creek originates in the Bangemall Basin, flows across the Savory Basin and into Lake Disappointment (Lynch, 1995).

Lake Disappointment lies at the lowest point of the Little Sandy Desert. The lake bed consists of poorly consolidated saline lacustrine sediments (clay, silt, sand and gypsum). The surrounding area is composed of mixed aeolian-lacustrine silt, sand and kopi forming longitudinal dunes trending east-west, interspersed with minor salt lakes and claypans (Lynch, 1995).

Savory Creek enters Lake Disappointment from the north-west, but flow is impeded by a substantial sand bar to form a large permanent pool upstream of the point at which the tributary discharges to the playa. The lake is also fed by smaller ephemeral creeks and direct precipitation (Lynch, 1995).

The margins of Lake Disappointment and lower reaches of Savory Creek support samphire communities, but there are no vascular plants on the salt-encrusted lake bed. Principle species on islands and dunes surrounding the lake are spinifex *Triodia schinzii* and *Triodia pungens* with scattered shrubs, mainly *Acacia* and *Grevillea*. The eastern side of the lake is characterised by scattered shrubs of *Acacia coriacea* and *Hakea* over an open-hummock grassland of another Spinifex *Triodia basedowii*. There are large areas of Desert Oak *Allocasuarina decaisneana* on the western side (Lynch, 1995).

According to the Geoscience Australia database (2001) there are several non-perennial/ intermittent drainage lines within the survey area, some of which drain towards Lake Disappointment (Figure 8). Drainage channels of Lake Disappointment were formed much earlier under wetter conditions and have often been obscured by sand so that mapping must depend on contours, on valley-bottom calcrete deposits, salt lakes and pans (Beard, 2005). A map showing the hydrology of the LDP Project survey area is provided in Figure 8.

According to the Department of Water (DoW) groundwater salinity database (DoW, 2016), groundwater salinities in the survey area ranges from TDS 1000-3000 mg/L (along the majority of the Talawana track, Mackay creek area) to TDS >35,000 mg/L associated with Lake Disappointment.

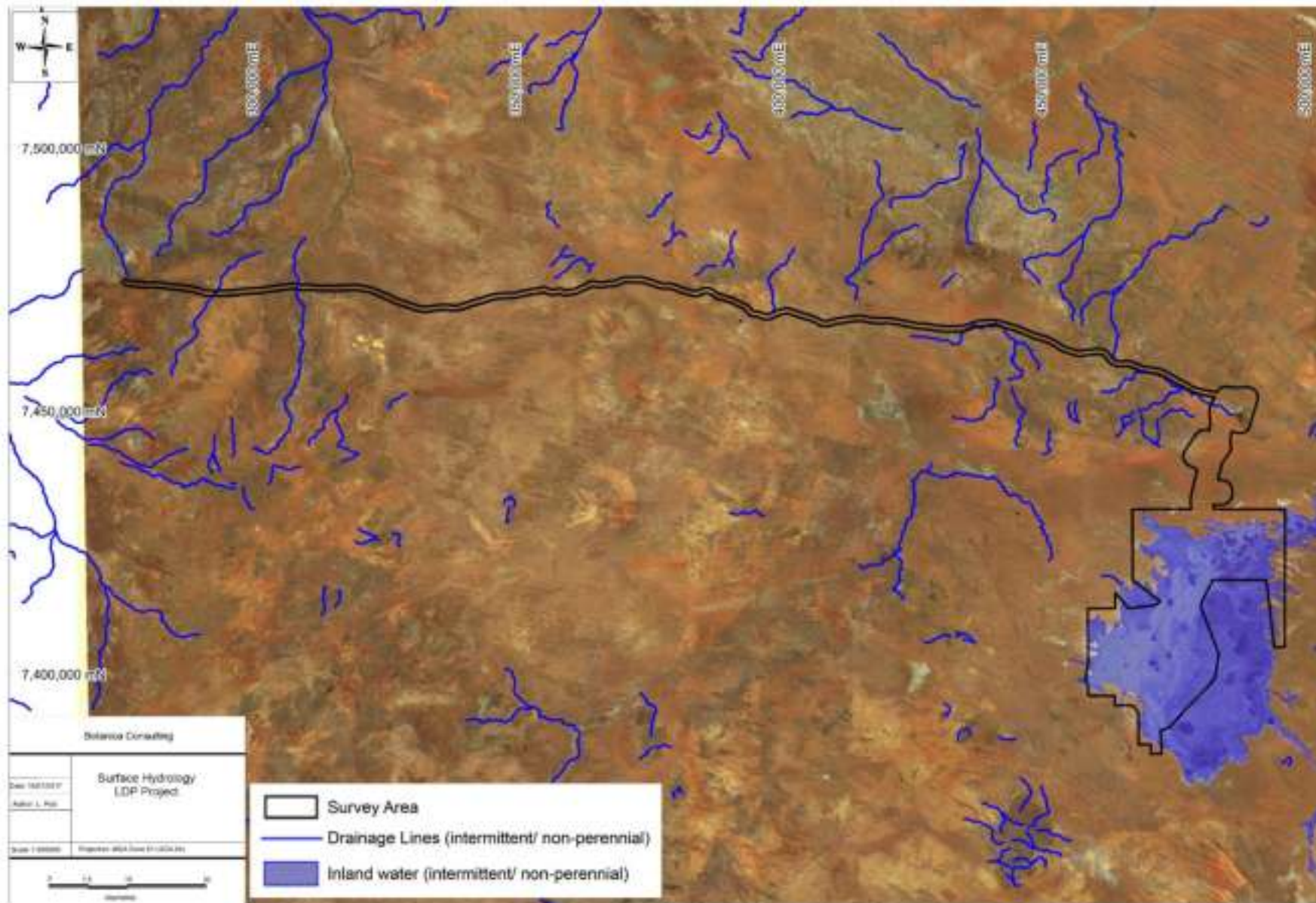


Figure 8: Surface Hydrology of the Lake Disappointment Potash Project survey area (data obtained from Geoscience Australia, 2001)

2.6 Land Use

The dominant land uses of the region include Grazing – native pastures, Aboriginal lands and Reserves, Unallocated Crown Land (UCL) & Crown Reserves, Conservation, and Mining leases (Cowan & Kendrick, 2001; Kendrick, 2001; McKenzie *et. al.*, 2002). Current land use for Lake Disappointment includes Aboriginal usage and mineral exploration.

3 Survey Methodology

3.1 Desktop Assessment

Searches of the following databases were undertaken to aid in the compilation of a list of flora within the survey area:

- DPaW Priority/ Threatened Flora Database Search (DPaW, 2012a)
- DPaW Priority/ Threatened Ecological Communities Database Search (DPaW, 2012b)
- DPaW NatureMap Database (DPaW, 2016a);
- DotEE Protected Matters search tool (DotEE, 2016a).

The NatureMap and Protected Matters searches were conducted for an area encompassing a 40 km radius of the following centre coordinates:

- 121° 11' 40" E, 22 50' 11" S
- 121° 59' 34" E, 22 53' 28" S
- 121° 47' 12" E, 23 01' 23" S
- 121° 45' 51" E, 23 25' 60" S

It should be noted that these lists are based on observations from a broader area than the survey area (40 km radius) and therefore may include taxa not present. The databases also often include very old records that may be incorrect or in some cases the taxa in question have become locally or regionally extinct. Information from these sources should therefore be taken as indicative only. Local knowledge and information also needs to be taken into consideration when determining what actual species may be present within the specific area being investigated.

Prior to the field surveys, a combined search of the DPaW Flora of Conservation Significance databases (DPaW, 2012a) was undertaken within an 80km radius of the survey area. Significant flora species identified through the database search were examined on the Western Australian Herbarium's (WAHERB) web page prior to the survey, to familiarise staff with their appearance. Locations of Threatened Flora and Priority Flora were overlaid on aerial photography of the area. Vegetation descriptions and available images of the Threatened/ Priority Flora were also obtained from Florabase.

The conservation significance of flora taxa was assessed using data from the following sources:

- EPBC Act. Administered by the Australian Government (DotEE);
- WC Act. Administered by the WA Government (DPaW)⁴;
- Red List produced by the Species Survival Commission (SSC) of the World Conservation Union (also known as the IUCN Red List – the acronym derived from its former name of

⁴ *Biodiversity Conservation Act 2016* received assent on 21 September 2016 with Parts of the Act coming into effect on 3 December 2016. Once fully enacted with enabling subsidiary regulations, it will replace the *Wildlife Conservation Act 1950*.

the International Union for Conservation of Nature). The Red List has no legislative power in Australia but is used as a framework for State and Commonwealth categories and criteria; and

- DPaW Priority Flora list. A non-legislative list maintained by DPaW for management purposes (DPaW).

Table 3 represents the definitions of Flora of Conservation Significance ratings under the WC Act and EPBC Act.

Table 3: Definitions of Conservation Significant Flora

Code	Category
State categories of threatened and priority species	
T	Threatened Flora "flora that has been declared to be 'likely to become extinct or is rare, or otherwise in need of special protection', pursuant to section 23F (2) of the Wildlife Conservation Act."
P1	Priority One – Poorly Known Taxa "Taxa which are known from one or a few (generally <5) populations which are under threat, either due to small population size, or being on lands under immediate threat. Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey."
P2	Priority Two – Poorly Known Taxa "Taxa which are known from one or a few (generally <5) populations, at least some of which are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under consideration for declaration as 'rare flora', but urgently need further survey."
P3	Priority Three – Poorly Known Taxa "Taxa which are known from several populations and the taxa are not believed to be under immediate threat (i.e. not currently endangered), either due to the number of known populations (generally >5), or known populations being large, and either widespread or protected. Such taxa are under consideration for declaration as 'rare flora' but needs further survey."
P4	Priority Four – Rare Taxa "Taxa which are considered to have been adequately surveyed and which, whilst being rare (in Australia), are not currently threatened by any identifiable factors. These taxa require monitoring every 5 – 10 years."
P5	Priority Five-Conservation Dependent Taxa Taxa that are not threatened but are subject to a specific conservation program, the cessation of which would result in the species becoming threatened within five years.
Commonwealth categories of threatened species	
Extinct	Taxa where there is no reasonable doubt that the last member of the species has died.
Extinct in the wild	Taxa where it is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
Critically endangered	Taxa that are facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
Endangered	Taxa which are not critically endangered and is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.

Code	Category
Vulnerable	Taxa which are not critically endangered or endangered and is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.
Conservation dependent	Taxa which are the focus of a specific conservation program the cessation of which would result in the species becoming vulnerable, endangered or critically endangered; or (b) the following subparagraphs are satisfied: (i) the species is a species of fish; (ii) the species is the focus of a plan of management that provides for actions necessary to stop the decline of, and support the recovery of, the species so that its chances of long term survival in nature are maximised; (iii) the plan of management is in force under a law of the Commonwealth or of a State or Territory; (iv) cessation of the plan of management would adversely affect the conservation status of the species.

Conservation significant flora identified during the database searches were assessed and ranked for their likelihood of occurrence within the survey area. The rankings and criteria used were:

- Unlikely: Area is outside of the currently documented distribution for the species and /or no suitable habitat (type, quality and extent) was identified as being present during the field/desktop assessment.
- Possible: Area is within the known distribution of the species in question and habitat of at least marginal quality was identified as being present during the field/desktop assessment, supported in some cases by recent records being documented from within or near the area.
- Known to Occur: The species in question was positively identified as being present during the field survey.

A search of the DPaW PEC and TEC database was also conducted within a 40km radius of the survey area (DPaW, 2012b). Table 4 represents the definitions of Threatened and Priority Ecological Communities.

Table 4: Definitions of conservation significant communities

Category Code	Category
State categories of Threatened Ecological Communities (TEC)	
PTD	Presumed Totally Destroyed An ecological community will be listed as Presumed Totally Destroyed if there are no recent records of the community being extant and either of the following applies: records within the last 50 years have not been confirmed despite thorough searches or known likely habitats or; all occurrences recorded within the last 50 years have since been destroyed.
CE	Critically Endangered An ecological community will be listed as Critically Endangered when it has been adequately surveyed and is found to be facing an extremely high risk of total destruction in the immediate future, meeting any one of the following criteria:

Category Code	Category
	<p>The estimated geographic range and distribution has been reduced by at least 90% and is either continuing to decline with total destruction imminent, or is unlikely to be substantially rehabilitated in the immediate future due to modification;</p> <p>The current distribution is limited i.e. highly restricted, having very few small or isolated occurrences, or covering a small area;</p> <p>The ecological community is highly modified with potential of being rehabilitated in the immediate future.</p>
E	<p>Endangered</p> <p>An ecological community will be listed as Endangered when it has been adequately surveyed and is not Critically Endangered but is facing a very high risk of total destruction in the near future. The ecological community must meet any one of the following criteria:</p> <p>The estimated geographic range and distribution has been reduced by at least 70% and is either continuing to decline with total destruction imminent in the short term future, or is unlikely to be substantially rehabilitated in the short term future due to modification;</p> <p>The current distribution is limited i.e. highly restricted, having very few small or isolated occurrences, or covering a small area;</p> <p>The ecological community is highly modified with potential of being rehabilitated in the short term future.</p>
V	<p>Vulnerable</p> <p>An ecological community will be listed as Vulnerable when it has been adequately surveyed and is not Critically Endangered or Endangered but is facing high risk of total destruction in the medium to long term future. The ecological community must meet any one of the following criteria:</p> <p>The ecological community exists largely as modified occurrences that are likely to be able to be substantially restored or rehabilitated;</p> <p>The ecological community may already be modified and would be vulnerable to threatening process, and restricted in range or distribution;</p> <p>The ecological community may be widespread but has potential to move to a higher threat category due to existing or impending threatening processes.</p>
Commonwealth categories of Threatened Ecological Communities (TEC)	
CE	<p>Critically Endangered</p> <p>If, at that time, an ecological community is facing an extremely high risk of extinction in the wild in the immediate future (indicative timeframe being the next 10 years).</p>
E	<p>Endangered</p> <p>If, at that time, an ecological community is not critically endangered but is facing a very high risk of extinction in the wild in the near future (indicative timeframe being the next 20 years).</p>
V	<p>Vulnerable</p> <p>If, at that time, an ecological community is not critically endangered or endangered, but is facing a high risk of extinction in the wild in the medium–term future (indicative timeframe being the next 50 years).</p>

Category Code	Category
Priority Ecological Communities (PEC)	
P1	<p>Poorly-known ecological communities</p> <p>Ecological communities with apparently few, small occurrences, all or most not actively managed for conservation (e.g. within agricultural or pastoral lands, urban areas, active mineral leases) and for which current threats exist.</p>
P2	<p>Poorly-known ecological communities</p> <p>Communities that are known from few small occurrences, all or most of which are actively managed for conservation (e.g. within national parks, conservation parks, nature reserves, State forest, un-allocated Crown land, water reserves, etc.) and not under imminent threat of destruction or degradation.</p>
P3	<p>Poorly known ecological communities</p> <p>Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or:</p> <p>Communities known from a few widespread occurrences, which are either large or within significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat, or;</p> <p>Communities made up of large, and/or widespread occurrences, that may or not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing and inappropriate fire regimes.</p>
P4	<p>Ecological communities that are adequately known, rare but not threatened or meet criteria for near threatened, or that have been recently removed from the threatened list. These communities require regular monitoring.</p>
P5	<p>Conservation Dependent ecological communities</p> <p>Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.</p>

3.2 Field Assessment

The flora survey was initially conducted in autumn from the 20th to the 25th April 2013, covering an area of 89,130 ha (of which 60,886 ha was covered by Lake Disappointment). Forty-three quadrats (50m X 50m) were established during the initial survey. These quadrats were revisited in spring from the 17th October to the 19th October 2013. Additional surveys were conducted in September and December 2016, covering an area of approximately 134,800 ha of which 70,567 ha was covered by Lake Disappointment. The 43 quadrats established in 2013 were re-visited in September 2016 and an additional 74 quadrats were established. The additional surveys included surveying of the Talawana track (surveyed to a width of 1 km X 220 km length) and a minimum 2 km buffer around the proposed disturbance footprint for the LDP Project (including proposed borefields and area of potential groundwater drawdown). A total of 117 quadrats were established within the final survey area. All 117 quadrats were revisited in autumn (post wet season) from the 6th to the 10th March 2017.

Prior to the commencement of field work, aerial photography was inspected and obvious differences in the vegetation assemblages were identified. The different vegetation communities identified were then inspected during the field survey to assess their validity. A handheld GPS unit was used to record the coordinates of the boundaries between vegetation communities. At each sample point, the following information was recorded:

- GPS location;
- Photograph of vegetation;
- Dominant taxa for each stratum;
- All vascular taxa (including annual taxa);
- Landform classification;
- Vegetation condition rating;
- Collection and documentation of unknown plant specimens; and
- GPS location, photograph and collection of flora of conservation significance if encountered.

Unknown specimens collected during the survey were identified with the aid of samples housed at the BC Herbarium and WAHERB. Vegetation types were classified in accordance with the NVIS Vegetation Type (Level V) classification. Presence/absence data of taxa from sample sites were used to compile the representative floristic groups. The survey area was traversed by five people via 4WD, all-terrain vehicle, hovercraft, helicopter and on foot (Figure 9).

The LDP Project occurs within aboriginal land owned by the Martu People. Martu holds native title rights and interests to Martu country, including the right to control access. BC staff completed an induction for access to Martu country and have complied with the requirements outlined by the Martu people when accessing their land. This includes a number of exclusion zones which must be adhered to, such as being within 100m of any of the islands in Lake Disappointment. Exclusion areas may not be accessed even for the purpose of scientific surveys. The Martu People have been consulted regularly throughout the LDP Project, and BC obtained permission from the Martu People to access the survey area (excluding heritage exclusion zones).



Figure 9: Quadrat locations, survey area boundary and GPS tracks traversed throughout the Lake Disappointment Potash Project survey area

3.2.1 Sampling Quadrats

One hundred and seventeen 50m x 50m quadrats were established within the survey area (Figure 9). The objective was to have at least three quadrats per vegetation type to capture the floristic variations within the survey area. Where a community was insufficiently large to accommodate three quadrats, the maximum number of quadrats that would fit within that specific community was established. The quadrats were established by inserting metal pickets in each corner, and measuring the length of the resultant boundaries to verify the quadrats were 50m x 50m (square quadrats).

Following their establishment and boundary verification, the location of each quadrat was recorded by GPS (Appendix 4) photographed (Appendix 7) and all vascular plants within the quadrat were recorded (Appendix 6). This included recording of dominant taxa from the upper, middle and lower stratum, and sampling of all unknown taxa. Unknown taxa were identified using BC's own reference herbarium and relevant taxonomical keys or by a taxonomic consultant. Data on level of disturbance, presence of coarse fragments on surface, topographical position, elevation, aspect, percentage litter, percentage bare ground, percentage surface rock (bedrock and surface deposits), soil types (colour, profile, field texture and surface type), and vegetation structure were collected from each quadrat (Appendix 6). Methods of recording data from these quadrats largely follow those outlined in CSIRO's *Australian Soil and Land Survey Field Handbook* (McDonald *et al.* 1998) and in accordance with current DPaW/EPA Guidelines (2016).

3.2.2 Targeted Survey

In April 2013, BC established eighteen monitoring sites within riparian vegetation along the lake perimeter (avoiding Aboriginal Heritage exclusion zones)⁵. The objective of the monitoring programme was to assess the biodiversity and health of native riparian vegetation of Lake Disappointment. These sites have been assessed annually over a four-year period (from 2013 to 2016). Figure 11 provides a map of the monitoring site locations. The location of these sites was selected dependent on accessibility and vegetation present (i.e. Samphire). A R44 helicopter was used to access the monitoring sites as accessibility around the lake was poor due to the remoteness of the location and lack of access tracks. GPS coordinates for each transect are provided in Appendix 5.

At each site the following was established;

1. One 100m transect parallel to the shoreline;
2. One perpendicular transect of varied distance dependent on continuation of riparian vegetation perpendicular to the shoreline; and
3. One 100m² quadrat.

Each parallel and perpendicular transect was paired sharing a mutual starting point permanently marked with a fence dropper. The 100m² quadrat was bound by the pairs of parallel and perpendicular transects at their mutual starting point. An example of the monitoring site layout is provided in Figure 10.

⁵ The monitoring program was established in consultation with EPA and DEC as specified in the *Stage 2 LDP Project Environmental Impact Assessment and Monitoring Plan* (BC, 2013), assessed by EPA and DEC.

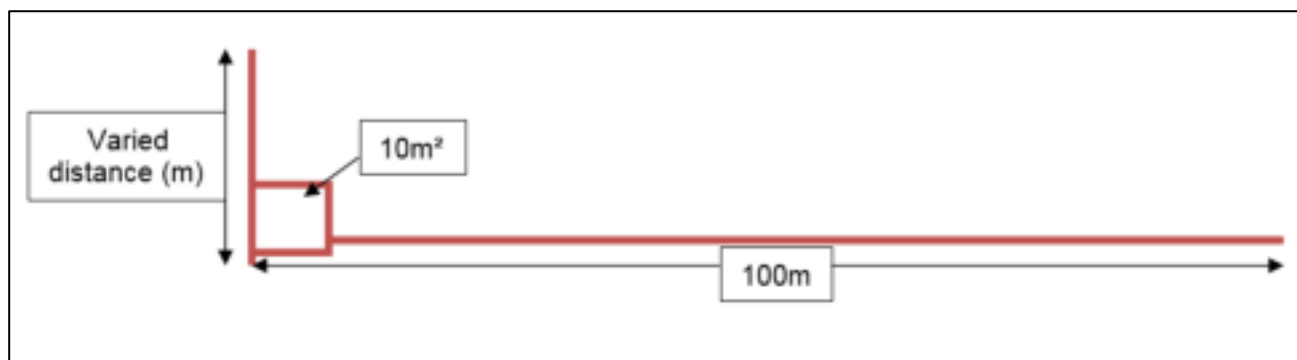


Figure 10: Diagram of riparian monitoring site layout

At each site the following parameters were measured:

- Identification of all species within the quadrat and along parallel/perpendicular transect
- No. plants of each species within the quadrat and along parallel/perpendicular transect
- % Cover of each species within the quadrat and along parallel/perpendicular transect
- Health Condition rated on a 1 to 5 scale, adapted from the Keighery (1994) health rating scale:
 - 1- Dead/no live vegetation
 - 2- Poor/Declining vegetation health
 - 3- Good/Improving vegetation health
 - 4- Very Good vegetation health/no change from previous monitoring if relevant
 - 5- Excellent health, new germinants

Findings of the riparian monitoring were included in total species list (Appendix 3) and records of flora of conservation significance (Appendix 4).

In addition to the riparian monitoring program, opportunistic records of flora of conservation significance were taken and targeted searches for flora of conservation significance were conducted

within samphire vegetation.

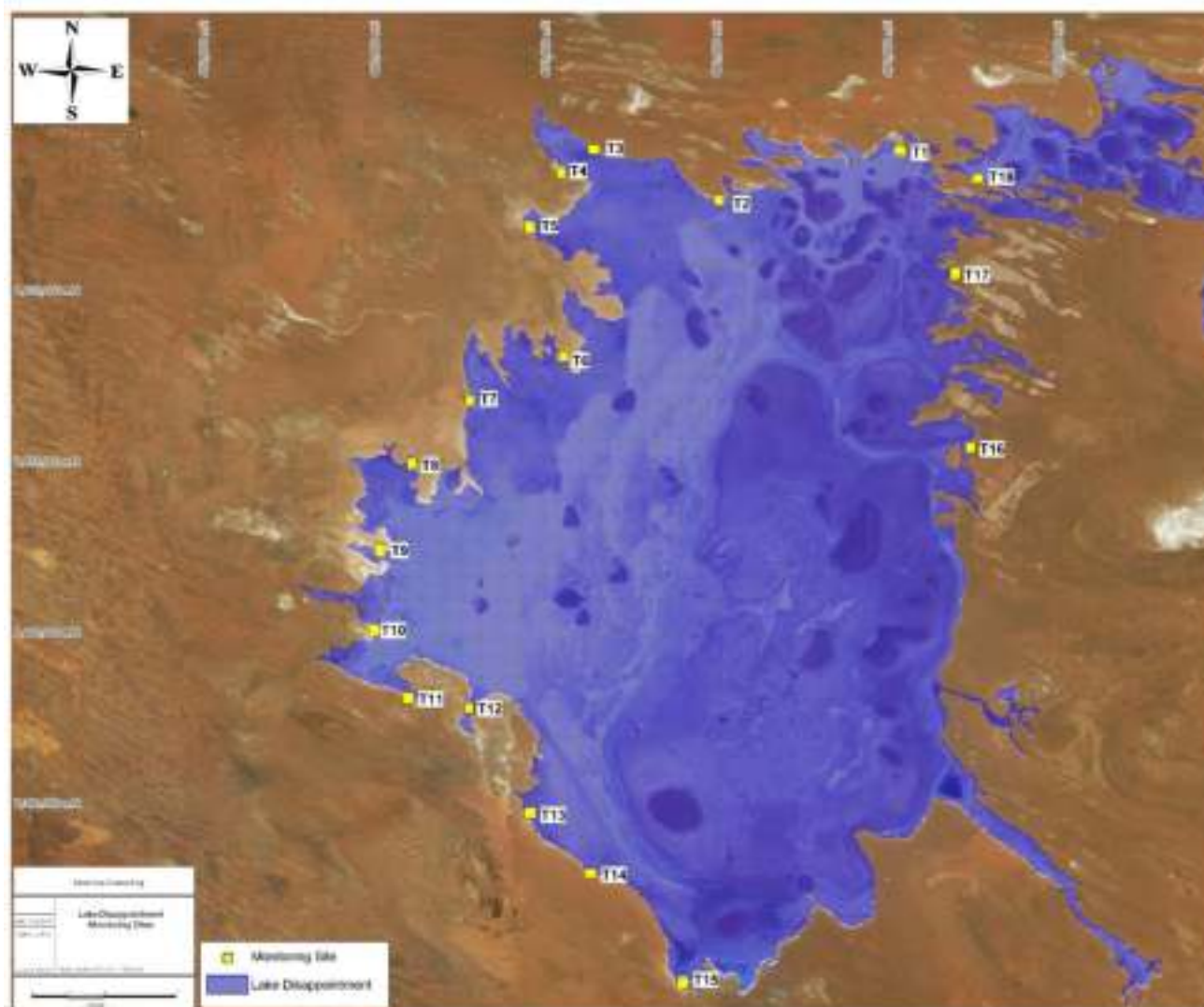


Figure 11: Riparian Vegetation Monitoring Program

3.2.3 Personnel involved

- Jim Williams - Environmental Consultant/ Director (Diploma of Horticulture)
- Andrea Williams - Environmental Consultant/ Director (BSc Hons Minerals Resources Management)
- Lauren Pick - Environmental Consultant (BSc Zoology & Conservation Biology)
- Samantha Stapleton - Environmental Consultant (BSc Ecology & Conservation Biology Hons)
- Aidan Williams - Environmental Technician (Undergraduate Environmental Science)
- Frank Obbens - Taxonomic Consultant
- Mike Hislop - WA Herbarium Taxonomic Consultant
- Kelly Shepherd - WA Herbarium Taxonomic Consultant (*Tecticornia* specialist)

3.2.4 Scientific licences

Table 5: Scientific Licences of Botanica Staff coordinating the survey

Licensed staff	Permit Number	Valid Until
Jim Williams	SL010574	21-05-2014

Licensed staff	Permit Number	Valid Until
	SL011001 SL011451 SL011826	21-05-2015 21-05-2016 21-05-2017
Lauren Pick	SL010573 SL011000 SL011452 SL011825	21-05-2014 21-05-2015 21-05-2016 21-05-2017
Andrea Williams	SL011002 SL011450 SL011824	21-05-2015 21-05-2016 21-05-2017
Samantha Stapleton	SL010575	21-05-2014

3.3 Data Analysis Tools

Once the survey was completed the data obtained was analysed to generate a vegetation map (Appendix 2). The statistical program PATN was used to assess species composition of the quadrats (Appendix 8).

3.3.1 PATN Analysis

The PATN software package was used to assess the similarities/ dissimilarities between quadrats based on presence/ absence of species. Annual taxa were removed from the data prior to analysis (total of 68 annual taxa). Species reconciliation eliminated those sterile taxa that could not be fully identified from the analysis (six taxa), and reconciled subsp. and/or variant taxa. Singleton taxa were excluded from the analysis (57 taxa). One quadrat (Q74) was excluded from the analysis as it represented an interzone between the dunefield and lake edge.

The analysis produced a quantitative estimate of the relationship between species composition of each quadrat. The classifications were based upon a Bray-Curtis association matrix using a flexible Unweighted Pair Group Arithmetic Mean (UPGMA) method (with a beta value of -0.1) which standardises the data enabling the analysis to be completed. Semi-strong hybrid (SSH) ordination of the quadrat is then undertaken to show spatial relationships between groups and to elucidate possible environmental correlates with the classification.

The analysis also produced a stress value which is a measure of the 'strength' of the analysis (i.e. how well the quadrats are grouped together into the appropriate floristic groups). The lower the stress value the greater the strength of the analysis with a value of less than 0.3 showing that the analysis appropriately grouped quadrats. A stress value greater than 0.3 suggests that the analysis was unable to group quadrats appropriately due to extraneous variables (i.e. other factors influencing differences in floristic groups other than species composition e.g. fire, clearing disturbance etc.).

3.3.2 EstimateS

EstimateS software was used to estimate species richness present using the Chao2 richness estimator. For any number of samples, the estimator uses the existing pattern of species accumulation to estimate the true number of species at a site. The estimators tend to under-estimate species number when sample size is small, hence the estimated number of true species can be seen to increase with sample size. This software was also used to compute Coleman rarefaction curves estimates which were used to calculate species accumulation curves.

3.4 Flora survey limitations and constraints

It is important to note that flora surveys will entail limitations notwithstanding careful planning and design. Potential limitations are listed in Table 6.

Table 6: Limitations and constraints associated with the flora and vegetation survey

Variable	Potential Impact on Survey	Details
Access problems	Minor constraint	The survey was conducted via 4WD, all-terrain vehicle and on foot. Majority of the survey was located within a dunefield which limited mobility. However, where possible BC staff accessed majority of the areas using cleared access tracks and on foot. Access around the lake was difficult and restricted to use of a R44 and R22 helicopter. Heritage exclusion zones prevented survey of the full boundary of Lake Disappointment (i.e. south-eastern region of Lake Disappointment located within exclusion zone). Islands within the playa were not able to be accessed due to heritage exclusion requirements.
Competency/ Experience	Not a constraint	The BC personnel that conducted the survey were regarded as suitably qualified and experienced. Coordinating Botanist: Jim Williams Field Staff: Jim Williams, Andrea Williams, Lauren Pick, Samantha Stapleton & Aidan Williams Data Interpretation: Jim Williams, Andrea Williams, Lauren Pick & Samantha Stapleton
Timing of survey, weather & season	Not a constraint	Following consultation with the EPA, initial survey work was planned to take place within 6-8 weeks of any high summer (cyclonic) rainfall. Such rainfall was received in February 2013 with the initial survey conducted in April 2013. In accordance with the Technical Guidelines for Level 2 surveys, the quadrats were re-surveyed in Spring during optimum flowering period for most taxa (October 2013) and post-wet season. Following extension of the survey area, additional surveys were conducted in September 2016 and December 2016 (during dry season). All 117 quadrats were revisited in March following the summer wet season. Rainfall data has shown that rainfall recorded in January-February 2017 exceeds mean annual.
Area disturbance	Minor constraint	The survey area has been subject to disturbance from camels and fire. Minimal human activities have occurred within the area.
Survey Effort/ Extent	Not a constraint	Survey intensity was high with a Level 2 quadrat based survey conducted over four survey periods and different seasons. Prior to the quadrats being established a reconnaissance of the survey area was conducted in order to identify vegetation communities and any Flora of Conservation Significance.
Availability of contextual information at a regional and local scale	Minor constraint	Threatened flora database search provided by the DPaW was used to identify any potential locations of Threatened/Priority Flora species. BOM, DoW, DAFWA, DPaW and DotEE databases were reviewed to obtain appropriate regional desktop information on the biophysical environment of the local region. Environmental assessments within the local region have been limited however BC was able to obtain information about the

Variable	Potential Impact on Survey	Details
		area from previous desktop assessments conducted within the area and reconnaissance surveys conducted by BC which provided context on the local environment.
Data Analysis	Minor constraint	BC staff conducting the PATN statistical analyses are not statistical analysts and have basic statistics training. These analyses are used to provide basic information on the relationships between vegetation communities delineated in the field.
Completeness	Not a constraint	<p>In the opinion of BC, the survey area was covered sufficiently in order to identify vegetation assemblages. Survey work was conducted in multiple seasons (Autumn, Spring and Summer) across multiple years (2013,2016 and 2017). Many of the plants during the survey were in flower and annual species were present. It is estimated that approximately 95% of the flora within the survey area were able to be fully identified.</p> <p>The vegetation types for this study were based on visual descriptions of locations in the field. The distribution of these vegetation types outside the study area is not known, however vegetation communities identified were categorised via comparison to vegetation distributions throughout WA specified in the NVIS Major Vegetation Groups (DotEE, 2016b).</p>

4 Results

4.1 Desktop Assessment

4.1.1 Literature Review

Flora and vegetation surveys, assessments and reviews have been undertaken in nearby areas in the past, though not all are publicly available and some could not be referenced. The most significant of those available have been used as the primary reference material for the current vegetation assessment (Table 7).

Table 7: Previous Flora and Vegetation Surveys within the Lake Disappointment Potash Project and surrounding area

Author & Year	Vegetation/Landforms	Flora of Conservation Significance
Department of Agriculture and Food WA, 2004	Within the entire Pilbara survey eleven broad site types were identified: 1. Hill hummock grassland; 2. Hill sclerophyll shrubland; 3. Upland plain tussock grassland; 4. Plain tussock grassland; 5. Stony plain and low rise sclerophyll shrubland; 6. Sheet flood hard plain sclerophyll shrubland or woodland; 7. Sandplain and dune grassland; 8. Alluvial plain hummock grassland; 9. Alluvial plain tussock grassland; 10. Alluvial plain halophytic shrubland; and 11. Drainage shrubland and woodland.	N/A
Actis Environmental and Alexander Holm & Associates, 2009	The dominant vegetation is hummock grassland of feathertop spinifex (<i>Triodia schinzii</i>) with scattered desert bloodwood (<i>Corymbia dichromophloia</i>) and mixed shrubs. Saline plains support Samphire (<i>Tecticornia</i> spp.) succulent steepe with tea tree (<i>Melaleuca</i> spp.) scrub surrounding the mostly bare Salt Lake.	N/A
Botanica Consulting, 2012	Twelve vegetation communities including a variety of Acacia scrubs, Corymbia woodlands, Eucalypt woodlands, Shrub Mallee, mixed scrub/herbs and Samphire heath.	No Threatened Flora or Priority Flora species were recorded within the survey area.

4.1.2 Flora of Conservation Significance

The results of the combined search of the DPaW's Flora of Conservation Significance databases and DotEE protected matters search recorded a total of thirteen Priority Flora taxa within the local region. These taxa were assessed and ranked for their likelihood of occurrence within the survey area (Table 8).

Table 8: Likelihood of occurrence for Flora of Conservation Significance within the survey area

Taxon	Conservation Code	Description (WAHERB, 2017)	Likelihood of Occurrence
<i>Euphorbia parvicaruncula</i>	P1	Short-lived annual or perennial, herb, to 0.2 m high.	Possible
<i>Hibiscus</i> sp. Durba Hills (R. Davis 11193)	P1	No description available	Unlikely
<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al. KS 867)	P1	No description available	Known to occur
<i>Acacia auripila</i>	P2	Tree, to 3 m high, bark grey & fissured. Fl. yellow, Aug. Rocky quartz soils. Hillsides, gullies.	Possible
<i>Eremophila</i> sp. Rudall River (P.G. Wilson 10512)	P2	No description available	Possible
<i>Thysanotus</i> sp. Desert East of Newman (R.P. Hart 964)	P2	Self-supporting perennial, herb (with tuberous roots), distinguished by the long, equal anthers and pseudo-cymose branching. Fl. Aug to Oct. Red-brown loamy sand or red sand, sometimes silty. Sand plain, pisolitic buckshot plain.	Possible
<i>Acacia</i> sp. Broome (B.R. Maslin 4918)	P3	Open shrub, (0.7-)1.5-4 m high. Fl. Apr to Jun. Rocky clay, red sand. Coastal cliffs, low-lying areas.	Possible
<i>Dampiera atriplicina</i>	P3	Spreading, robust shrub, to 0.5(-1.2) m high. Fl. pink, May or Jul. Red sand. Sand ridges.	Possible
<i>Eragrostis lanicaulis</i>	P3	Knotty or bulbous rhizomatous, perennial, grass-like or herb, 0.45-0.5 m high. Fl. Mar to May or Aug to Oct. Red sandy clay. Flats.	Possible
<i>Goodenia purpurascens</i>	P3	Erect perennial or annual, herb, 0.1-0.3 m high. Fl. blue-purple/white/yellow, Jan or Apr or Jun or Sep or Dec. Clay, mud. Swamps & seasonally wet depressions.	Possible
<i>Goodenia</i> sp. East Pilbara (A.A. Mitchell PRP 727)	P3	Open, erect annual or biennial, herb, to 0.2 m high. Fl. yellow. Red-brown clay soil, calcrete pebbles. Low undulating plain, swampy plains.	Possible
<i>Sauropus arenosus</i>	P3	Spreading shrub, 0.5-1 m high. Fl. yellow-green/red-pink, May. Red sand dunes.	Possible
<i>Triodia</i> sp. Mt Ella (M.E. Trudgen 12739)	P3	Perennial, grass-like or herb, 0.4 m high. Light orange-brown, pebbly loam. Amongst rocks & outcrops, gully slopes.	Possible

4.1.3 Field Assessment

4.2 Flora of conservation significance

Flora of conservation significance identified in the desktop assessment as potentially occurring within the survey area were targeted during the field assessment. No Threatened Flora taxa pursuant to subsection (2) of section 23F of the WC Act and the EPBC Act were identified within the survey area. One Priority Flora taxon; *Tecticornia* sp. Sunshine Lake (K.A. Shepherd et al KS 867) (P1) as listed by DPaW was identified within the survey area. Two unrecognised taxa of *Tecticornia* (as identified by K.A Shepherd 867) (*Tecticornia* sp. nov A and *Tecticornia* sp. nov B) were also identified in the survey area. These are considered to be of Conservation Significance. A third *Tecticornia* specimen; *Tecticornia* aff. *calyptrata* is also provisionally considered to be of Conservation Significance, as it is presently undergoing further taxonomical work by the WAHERB to confirm if it is a distinct taxon. A map showing the locations of these flora taxa identified within the survey area is provided in Figure 12.

Locations provided by DPaW for *Dampiera atriplicina* and *Acacia* sp. Broome (B.R. Maslin 4918) were visited during the survey, however no plants matching the description were identified. The *Hibiscus* sp. Durba Hills (R. Davis 11193) location was also visited, however the plant, which is only known from one location, was found approximately 5 km from Durba Hills. No plants matching the description were found in Durba Hills.

4.2.1 *Tecticornia* sp. Sunshine Lake (K.A. Shepherd et al KS 867) (P1)

No description is available for this taxon (WAHERB, 2017). One DPaW known location of this taxon was confirmed within the survey area. BC identified an additional 169 locations of this taxon within the Heath of mixed *Tecticornia* spp. on Salt Lake edge community. Specimens of this plant were identified by taxonomic specialist Mike Hislop of the WAHERB, and later confirmed by *Tecticornia* specialist Kelly Shepherd. Locations of this taxon have been lodged with WAHERB on the 2nd May 2015. An estimated 46,445 plants of this taxa were identified during the survey. GPS locations are provided in Appendix 4. This taxon is not endemic to the area and is distributed within the Murchison and Little Sandy Desert Region.



Plate 1: *Tecticornia* sp. Sunshine Lake (K.A. Shepherd et. al KS 867) (P1)

4.2.2 *Tecticornia* sp. nov. A and *Tecticornia* sp. nov. B (unrecognised taxon, K.A. Shepherd 867) CS

Two previously undescribed *Tecticornia* taxa (unrecognised taxa, K.A. Shepherd 867), were identified in the survey area; *Tecticornia* sp. nov. A (related to the 'ovate seed aggregate' in the *T. halocnemoides* complex) and *Tecticornia* sp. nov. B (related to the 'round seed aggregate' in the *T. halocnemoides* complex), both of which are considered to be of Conservation Significance. BC identified nine locations of *Tecticornia* sp. nov. A with an estimated 1741 plants recorded. Three locations (estimated 1050 plants) of *Tecticornia* sp. nov. B have also been recorded. Both taxa were identified within the Heath of mixed *Tecticornia* spp. on Salt Lake edge vegetation type. These specimens were identified by *Tecticornia* specialist Kelly Shepherd with a specimen of each taxon lodged with WAHERB on the 19th July 2013. GPS locations of these taxa identified within the survey area are provided in Appendix 4.



Plate 2: *Tecticornia* sp. nov. A (unrecognised taxon, K.A. Shepherd 867) (CS)



Plate 3: *Tecticornia* sp. nov. B (unrecognised taxon, K.A. Shepherd 867) (CS)

4.2.3 *Tecticornia* aff. *calyptrata* (potentially distinct taxon, K.A. Shepherd 867) CS

The specimen collected has been identified by taxonomic specialist Mike Hislop of the WAHERB, and later confirmed by *Tecticornia* specialist Kelly Shepherd as a potentially distinct taxon related to *Tecticornia calyptrata*, however further taxonomic work is required to confirm if it should be supported as a distinct taxon. As this specimen is a potentially distinct taxon it is provisionally considered to be of Conservation Significance. BC identified 17 locations of this taxon within the Heath of mixed *Tecticornia* spp. on Salt Lake edge vegetation community. A specimen of this taxon has been lodged with WAHERB on the 19th July 2013. A total of 758 plants of this taxon were identified during the survey. GPS locations of this taxon identified within the survey area are provided in Appendix 4.



Plate 4: *Tecticornia* aff. *calyptrata* (CS)

A summary of all flora of conservation significance recorded during the riparian monitoring (detailed in Section 3.2.2) is provided in Appendix 4.

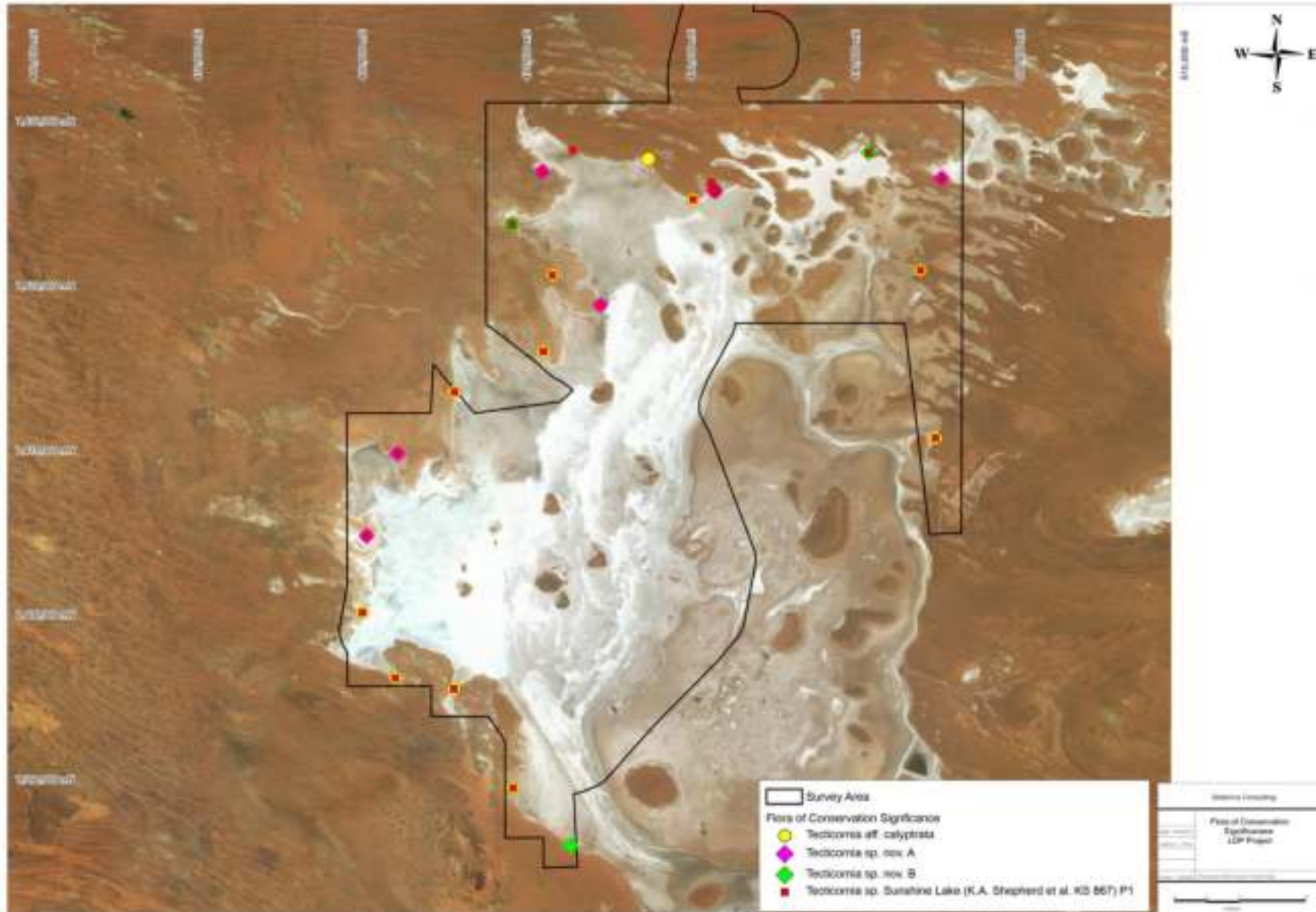


Figure 12: Flora of Conservation Significance identified within the LDP Project survey area

4.3 Floristic Communities

Fourteen vegetation types were identified within the survey area. These vegetation types were located within six different landform types and comprised eight major vegetation groups, and were represented by a total of 47 Families, 134 Genera and 327 Taxa (including 84 annual taxa) (Appendix 3). A map showing the vegetation types present in the survey area is located in Appendix 2 and a summary of vegetation types is presented in Table 9.

Table 9: Summary of vegetation types within the Lake Disappointment Potash Project survey area

Landform	Major Vegetation Group	Vegetation Type	Vegetation Code	Ha area within survey area	% area within survey area
Closed Depression	Chenopod Shrublands, Samphire Shrublands and Forblands (MVG22)	Heath of mixed <i>Tecticornia</i> spp. on Salt Lake edge	CD-CSSSF1	5984	4.4
	Not Vegetated	Salt Lake	CD-SL1	70,529	52.3
	Other Grasslands, Herblands, Sedgeland and Rushlands (MVG21)	Open mixed herbs in clay-loam depression	CD-OGHSR1	478	0.4
Dunefield	Casuarina Forests and Woodlands (MVG 8)	Low forest of <i>Allocasuarina decaisneana</i> over open scrub of <i>Acacia/ Grevillea</i> and mid-dense hummock grass of <i>Triodia basedowii</i> on sand dunes/ swales	D-CFW1	642	0.5
	Hummock Grasslands (MVG20)	Open low woodland of <i>Corymbia opaca</i> over low scrub of <i>Acacia/Grevillea</i> spp. and mid-dense hummock grass of <i>Triodia basedowii</i> on sand dunes/ swales	D-HG1	29,600	22
		Scrub of <i>Acacia/Eremophila/Grevillea</i> spp. over mid-dense hummock grass of <i>Triodia basedowii</i> on sand dunes/ swales	D-HG2	6518	4.8
Open Depression	Acacia Forests and Woodlands (MVG 6)	Low woodland of <i>Acacia</i> spp. over low scrub of <i>Senna artemisioides</i> and mixed dwarf scrub in drainage depression	OD-AFW1	516	0.4
	Eucalypt Woodland (MVG 5)	Open low woodland of <i>Eucalyptus camaldulensis/ Corymbia</i> spp. over mid-dense hummock grass of <i>Triodia</i> spp. in creekline	OD-EW1	3029	2.2
	Other Shrublands (MVG 17)	Low woodland of <i>Hakea lorea/ Melaleuca glomerata</i> over low heath of <i>Fimbristylis eremophila</i> in drainage depression	OD-OS1	698	0.5

Landform	Major Vegetation Group	Vegetation Type	Vegetation Code	Ha area within survey area	% area within survey area
Plain	Hummock Grasslands (MVG20)	Open low woodland of <i>Corymbia</i> spp./ <i>Hakea lorea</i> over low scrub of <i>Acacia</i> spp. and mid-dense hummock grass of <i>Triodia</i> spp. in sandplain	P-HG1	8720	6.5
		Open shrub mallee of <i>Eucalyptus gamophylla</i> / <i>E. kingsmillii</i> subsp. <i>kingsmillii</i> over low scrub of <i>Acacia bivenosa</i> and mid-dense hummock grass of <i>Triodia basedowii</i> in sandplain	P-HG2	2442	1.8
Rocky Hillslope	Acacia Forests and Woodlands (MVG 6)	Scrub of <i>Acacia</i> spp. over mixed low scrub and mid-dense hummock grass of <i>Triodia pungens</i> on rocky hillslope	RH-AFW1	1077	0.8
	Mallee Woodlands and Shrublands (MVG 14)	Open shrub mallee of <i>Eucalyptus gamophylla</i> / <i>E. kingsmillii</i> subsp. <i>kingsmillii</i> over low scrub of <i>Acacia</i> / <i>Grevillea</i> spp. and mid-dense hummock grass of <i>Triodia</i> spp. on rocky hillslope	RH-MWS1	1356	1.0
Rocky Plain	Acacia Forests and Woodlands (MVG 6)	Low woodland of <i>Acacia</i> spp. over low scrub of <i>Eremophila</i> / <i>Senna</i> spp. And mid-dense hummock grass of <i>Triodia basedowii</i> on rocky plain	RP-AFW1	1572	1.2
	Hummock Grasslands (MVG20)	Open low woodland of <i>Corymbia aspera</i> over low scrub of <i>Acacia</i> spp. and mid-dense hummock grass of <i>Triodia basedowii</i> on rocky plain	RP-HG1	1639	1.2
TOTAL				134800	100

Closed Depression: Chenopod Shrublands, Samphire Shrublands and Forblands

4.3.1 Heath of mixed *Tecticornia* spp. on Salt Lake edge (CD-CSSSF1)

The total flora recorded within this vegetation type was represented by a total of 11 Families, 19 Genera and 36 Taxa (Plate 5). No Threatened Flora taxa were identified within this community. One Priority Flora taxon was identified within this community; *Tecticornia* sp. Sunshine Lake (K.A. Shepherd et al KS 867) (P1). Two unrecognised taxa of *Tecticornia* (as identified by K.A Shepherd 867) (*Tecticornia* sp. nov A and *Tecticornia* sp. nov B) were identified in this floristic community, which are considered to be of Conservation Significance. A third *Tecticornia* specimen, *Tecticornia* aff. *calyptrata*, also considered to be of Conservation Significance was also identified in this floristic community. Dominant taxa from the vegetation assemblage are shown in Table 10. According to the NVIS, this community is best represented by the MVG22- Chenopod Shrublands, Samphire Shrublands and Forblands (DotEE, 2016b).

Table 10: Vegetation assemblage for Heath of mixed *Tecticornia* spp. on Salt Lake edge

Life Form/Height Class	Canopy Cover	Dominant species present
Samphire Shrub <0.5m	10-30%	<i>Tecticornia</i> aff. <i>calyptrata</i> (CS) <i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al KS 867) (P1)



Plate 5: Heath of mixed *Tecticornia* spp. on Salt Lake edge

Closed Depression: Other Grasslands, Herblands, Sedgeland and Rushlands

4.3.2 Open mixed herbs in clay-loam depression (CD-OGHSR1)

The total flora recorded within this vegetation type was represented by a total of 18 Families, 33 Genera and 39 Taxa (Plate 6). No Threatened Flora or Priority Flora taxa were identified within this community. Dominant taxa from the vegetation assemblage are shown in Table 11. According to the NVIS, this community is best represented by the MVG21- Other Grasslands, Herblands, Sedgeland and Rushlands (DotEE, 2016b).

Table 11: Vegetation assemblage for Open mixed herbs in clay-loam depression

Life Form/Height Class	Canopy Cover	Dominant species present
Shrub <0.5m	10-30%	<i>Glossostigma diandrum</i> <i>Lepidium pholidogynum</i> <i>Stylidium desertorum</i>



Plate 6: Open mixed herbs in clay-loam depression

Within this vegetation type there was a claypan sub-community (Plate 7). Species within the claypan included, *Alternanthera nodiflora*, *Tecticornia verrucosa*, *Lipocarpha microcephala*, *Drosera indica*, *Schenkia clementii*, *Calandrinia pleiopetala*, *?Levenhookia chippendalei* and *Stylidium desertorum*. No quadrats were established within this sub-community, due to the isolated/ limited distribution of this sub-community.



Plate 7: Claypan within Open mixed herbs in clay-loam depression

Dunefield: Casuarina Forests and Woodlands

4.3.3 Low forest of *Allocasuarina decaisneana* over open scrub of *Acacia/ Grevillea* and mid-dense hummock grass of *Triodia basedowii* on sand dunes/ swales (D-CFW1)

The total flora recorded within this vegetation type was represented by a total of 17 Families, 30 Genera and 38 Taxa (Plate 8). No Threatened Flora or Priority Flora taxa were identified within this community. Dominant taxa from the vegetation assemblage are shown in Table 12. According to the NVIS, this community is best represented by the MVG8- Casuarina Forests and Woodlands (DotEE, 2016b).

Table 12: Vegetation assemblage for Low forest of *Allocasuarina decaisneana* over open scrub of *Acacia/ Grevillea* and mid-dense hummock grass of *Triodia basedowii* on sand dunes/ swales

Life Form/Height Class	Canopy Cover	Dominant species present
Tree <10m	30-70%	<i>Allocasuarina decaisneana</i>
Shrub 1-2m	5-10%	<i>Acacia ligulata</i> <i>Acacia melleodora</i> <i>Grevillea juncifolia</i> subsp. <i>juncifolia</i>
Hummock Grass <0.5m	30-70%	<i>Triodia basedowii</i>



Plate 8: Low forest of *Allocasuarina decaisneana* over open scrub of *Acacia/ Grevillea* and mid-dense hummock grass of *Triodia basedowii* on sand dunes/ swales

Dunefield: Hummock Grasslands

4.3.4 Open low woodland of *Corymbia opaca* over low scrub of *Acacia/Grevillea* spp. and mid-dense hummock grass of *Triodia basedowii* on sand dunes/swales (D-HG1)

The total flora recorded within this vegetation type was represented by a total of 30 Families, 77 Genera and 147 Taxa (Plate 9). No Threatened Flora or Priority Flora taxa were identified within this community. Dominant taxa from the vegetation assemblage are shown in Table 13. According to the NVIS, this community is best represented by the MVG20- Hummock grasslands (DotEE, 2016b).

Table 13: Vegetation assemblage for Open low woodland of *Corymbia opaca* over low scrub of *Acacia/Grevillea* spp. and mid-dense hummock grass of *Triodia basedowii* on sand dunes/swales

Life Form/Height Class	Canopy Cover	Dominant species present
Tree <10m	5-10%	<i>Corymbia opaca</i>
Shrub 1-2m	10-30%	<i>Acacia ligulata</i> <i>Grevillea juncifolia</i> subsp. <i>juncifolia</i>
Shrub <1m	10-30%	<i>Newcastelia spodiotricha</i>
Hummock Grass <0.5m	30-70%	<i>Triodia basedowii</i>



Plate 9: Open low woodland of *Corymbia opaca* over low scrub of *Acacia/Grevillea* spp. and mid-dense hummock grass of *Triodia basedowii* on sand dunes/swales

4.3.5 Scrub of *Acacia/Eremophila/Grevillea* spp. over mid-dense hummock grass of *Tridonia basedowii* on sand dunes/ swales (D-HG2)

The total flora recorded within this vegetation type was represented by a total of 34 Families, 78 Genera and 149 Taxa (Plate 10). No Threatened Flora or Priority Flora taxa were identified within this community. Dominant taxa from the vegetation assemblage are shown in Table 14. According to the NVIS, this community is best represented by the MVG20- Hummock grasslands (DotEE, 2016b).

Table 14: Vegetation assemblage for Scrub of *Acacia/Eremophila/Grevillea* spp. over mid-dense hummock grass of *Tridonia basedowii* on sand dunes/ swales

Life Form/Height Class	Canopy Cover	Dominant species present
Shrub >2m	10-30%	<i>Acacia cuthbertsonii</i> subsp. <i>cuthbertsonii</i>
Shrub 1-2m	10-30%	<i>Acacia ligulata</i> <i>Eremophila latrobei</i> subsp. <i>filiformis</i> <i>Grevillea juncifolia</i> subsp. <i>juncifolia</i> <i>Senna artemisioides</i> subsp. <i>oligophylla</i>
Hummock Grass <0.5m	30-70%	<i>Tridonia basedowii</i>



Plate 10: Scrub of *Acacia/Eremophila/Grevillea* spp. over mid-dense hummock grass of *Tridonia basedowii* on sand dunes/ swales

Open Depression: Eucalypt Woodlands

4.3.6 Low woodland of *Acacia* spp. over low scrub of *Senna artemisioides* and mixed dwarf scrub in drainage depression (OD-AFW1)

The total flora recorded within this vegetation type was represented by a total of 22 Families, 38 Genera and 55 Taxa (Plate 11). No Threatened Flora or Priority Flora taxa were identified within this community. Dominant taxa from the vegetation assemblage are shown in Table 15. According to the NVIS, this community is best represented by the MVG6- *Acacia* Forests and Woodlands (DotEE, 2016b). One introduced species; *Cenchrus ciliaris* (Buffalo Grass) was recorded in this vegetation community. According to the DAFWA this species is not listed as a Declared Plant under Section 22 of the *BAM Act 2007*.

Table 15: Vegetation assemblage for Low woodland of *Acacia* spp. over low scrub of *Senna artemisioides* and mixed dwarf scrub in drainage depression

Life Form/Height Class	Canopy Cover	Dominant species present
Tree <10m	10-30%	<i>Acacia aptaneura</i> <i>Acacia incurvaneura</i>
Shrub 1-2m	10-30%	<i>Senna artemisioides</i> subsp. <i>helmsii</i>
Shrub <1m	30-70%	<i>Sida brownii</i> <i>Solanum lasiophyllum</i>



Plate 11: Low woodland of *Acacia* spp. over low scrub of *Senna artemisioides* and mixed dwarf scrub in drainage depression

Open Depression: Eucalypt Woodlands

4.3.7 Open low woodland of *Eucalyptus camaldulensis*/ *Corymbia* spp. over mid-dense hummock grass of *Triodia* spp. in creekline (OD-EW1)

The total flora recorded within this vegetation type was represented by a total of 30 Families, 76 Genera and 134 Taxa (Plate 12). No Threatened Flora or Priority Flora taxa were identified within this community. Dominant taxa from the vegetation assemblage are shown in Table 16. According to the NVIS, this community is best represented by the MVG5- Eucalypt Woodlands (DotEE, 2016b). One introduced species; *Cenchrus ciliaris* (Buffalo Grass) was recorded in this vegetation community. According to the DAFWA this species is not listed as a Declared Plant under Section 22 of the *BAM Act 2007*.

Table 16: Vegetation assemblage for Open low woodland of *Eucalyptus camaldulensis*/ *Corymbia* spp. over mid-dense hummock grass of *Triodia* spp. in creekline

Life Form/Height Class	Canopy Cover	Dominant species present
Tree 10-30m	10-30%	<i>Eucalyptus camaldulensis</i>
Tree <10m	5-10%	<i>Corymbia aspera</i> <i>Corymbia opaca</i>
Shrub 1-2m	10-30%	<i>Acacia bivenosa</i> <i>Acacia melleodora</i> <i>Acacia pyrifolia</i> var. <i>pyrifolia</i> <i>Acacia victoriae</i> <i>Grevillea wickhamii</i> subsp. <i>aprica</i>
Hummock Grass <0.5m	30-70%	<i>Triodia basedowii</i> <i>Triodia pungens</i>



Plate 12: Open low woodland of *Eucalyptus camaldulensis*/ *Corymbia* spp. over mid-dense hummock grass of *Triodia* spp. in creekline

Open Depression: Other Shrublands

4.3.8 Low woodland of *Hakea lorea*/ *Melaleuca glomerata* over low heath of *Fimbristylis eremophila* in drainage depression (OD-OS1)

The total flora recorded within this vegetation type was represented by a total of 13 Families, 17 Genera and 22 Taxa (Plate 13). No Threatened Flora or Priority Flora taxa were identified within this community. Dominant taxa from the vegetation assemblage are shown in Table 17. According to the NVIS, this community is best represented by the MVG17- Other Shrublands (DotEE, 2016b).

Table 17: Vegetation assemblage for Low woodland of *Hakea lorea*/ *Melaleuca glomerata* over low heath of *Fimbristylis eremophila* in drainage depression

Life Form/Height Class	Canopy Cover	Dominant species present
Tree <10m	10-30%	<i>Hakea lorea</i> <i>Melaleuca glomerata</i>
Shrub 1-2m	10-30%	<i>Acacia bivenosa</i> <i>Dicrasyllis exsuccosa</i>
Shrub <1m	30-70%	<i>Fimbristylis eremophila</i>



Plate 13: Low woodland of *Hakea lorea*/ *Melaleuca glomerata* over low heath of *Fimbristylis eremophila* in drainage depression

Plain: Hummock Grassland

4.3.9 Open low woodland of *Corymbia* spp. over low scrub of *Acacia* spp. and mid-dense hummock grass of *Triodia* spp. in sandplain (P-HG1)

The total flora recorded within this vegetation type was represented by a total of 26 Families, 69 Genera and 124 Taxa (Plate 14). No Threatened Flora or Priority Flora taxa were identified within this community. Dominant taxa from the vegetation assemblage are shown in Table 18. According to the NVIS, this community is best represented by the MVG20- Hummock Grasslands (DotEE, 2016b). One introduced species; *Cenchrus ciliaris* (Buffalo Grass) was recorded in this vegetation community. According to the DAFWA this species is not listed as a Declared Plant under Section 22 of the *BAM Act 2007*.

Table 18: Vegetation assemblage for Open low woodland of *Corymbia* spp. over low scrub of *Acacia* spp. and mid-dense hummock grass of *Triodia* spp. in sandplain

Life Form/Height Class	Canopy Cover	Dominant species present
Tree <10m	5-10%	<i>Corymbia aspera</i> <i>Corymbia opaca</i>
Shrub 1-2m	5-10%	<i>Acacia melleodora</i> <i>Acacia pyrifolia</i> var. <i>pyrifolia</i> <i>Grevillea wickhamii</i> subsp. <i>aprica</i>
Hummock Grass <0.5m	30-70%	<i>Triodia basedowii</i> <i>Triodia pungens</i>



Plate 14: Open low woodland of *Corymbia* spp. over low scrub of *Acacia* spp. and mid-dense hummock grass of *Triodia* spp. in sandplain

4.3.10 Open shrub mallee of *Eucalyptus gamophylla*/ *E. kingsmillii* subsp. *kingsmillii* over low scrub of *Acacia bivenosa* and mid-dense hummock grass of *Triodia basedowii* in sandplain (P-HG2)

The total flora recorded within this vegetation type was represented by a total of 15 Families, 28 Genera and 35 Taxa (Plate 15). No Threatened Flora or Priority Flora taxa were identified within this community. Dominant taxa from the vegetation assemblage are shown in Table 19. According to the NVIS, this community is best represented by the MVG20- Hummock Grasslands (DotEE, 2016b).

Table 19: Vegetation assemblage for Open shrub mallee of *Eucalyptus gamophylla*/ *E. kingsmillii* subsp. *kingsmillii* over low scrub of *Acacia bivenosa* and mid-dense hummock grass of *Triodia basedowii* in sandplain

Life Form/Height Class	Canopy Cover	Dominant species present
Mallee Shrub	5-10%	<i>Eucalyptus gamophylla</i> <i>Eucalyptus kingsmillii</i> subsp. <i>kingsmillii</i>
Shrub 1-2m	10-30%	<i>Acacia bivenosa</i>
Hummock Grass <0.5m	30-70%	<i>Triodia basedowii</i>



Plate 15: Open shrub mallee of *Eucalyptus gamophylla*/ *E. kingsmillii* subsp. *kingsmillii* over low scrub of *Acacia bivenosa* and mid-dense hummock grass of *Triodia basedowii* in sandplain

Rocky Hillslope: Acacia Forests and Woodlands

4.3.11 Scrub of *Acacia* spp. over mixed low scrub and mid-dense hummock grass of *Triodia pungens* on rocky hillslope (RH-AFW1)

The total flora recorded within this vegetation type was represented by a total of 13 Families, 20 Genera and 24 Taxa (Plate 16). No Threatened Flora or Priority Flora taxa were identified within this community. Dominant taxa from the vegetation assemblage are shown in Table 20. According to the NVIS, this community is best represented by the MVG6- Acacia Forests and Woodlands (DotEE, 2016b).

Table 20: Vegetation assemblage for Scrub of *Acacia* spp. over mixed low scrub and mid-dense hummock grass of *Triodia pungens* on rocky hillslope

Life Form/Height Class	Canopy Cover	Dominant species present
Shrub >2m	10-30%	<i>Acacia balsamea</i> <i>Acacia pachyacra</i>
Shrub 1-2m	10-30%	<i>Acacia bivenosa</i> <i>Eremophila exilifolia</i>
Hummock Grass <0.5m	30-70%	<i>Triodia pungens</i>



Plate 16: Scrub of *Acacia* spp. over mixed low scrub and mid-dense hummock grass of *Triodia pungens* on rocky hillslope

Rocky Hillslope: Mallee Woodlands and Shrublands

4.3.12 Open shrub mallee of *Eucalyptus gamophylla*/ *E. kingsmillii* subsp. *kingsmillii* over low scrub of *Acacia*/ *Grevillea* spp. and mid-dense hummock grass of *Triodia* spp. on rocky hillslope (RH-MWS1)

The total flora recorded within this vegetation type was represented by a total of 16 Families, 28 Genera and 49 Taxa (Plate 17). No Threatened Flora or Priority Flora taxa were identified within this community. Dominant taxa from the vegetation assemblage are shown in Table 21. One introduced species; *Cenchrus ciliaris* (Buffalo Grass) was recorded in this vegetation community. According to the DAFWA this species is not listed as a Declared Plant under Section 22 of the *BAM Act 2007*. According to the NVIS, this community is best represented by the MVG14- Mallee Woodlands and Shrublands (DotEE, 2016b).

Table 21: Vegetation assemblage for Open shrub mallee of *Eucalyptus gamophylla*/ *E. kingsmillii* subsp. *kingsmillii* over low scrub of *Acacia*/ *Grevillea* spp. and mid-dense hummock grass of *Triodia* spp. on rocky hillslope

Life Form/Height Class	Canopy Cover	Dominant species present
Mallee Shrub	5-10%	<i>Eucalyptus gamophylla</i> <i>Eucalyptus kingsmillii</i> subsp. <i>kingsmillii</i>
Shrub 1-2m	10-30%	<i>Acacia balsamea</i> <i>Acacia bivenosa</i> <i>Acacia hilliana</i> <i>Acacia retivenea</i> subsp. <i>clandestina</i> <i>Grevillea wickhamii</i> subsp. <i>wickhamii</i>
Hummock Grass <0.5m	30-70%	<i>Triodia basedowii</i> <i>Triodia pungens</i>



Plate 17: Open shrub mallee of *Eucalyptus gamophylla*/ *E. kingsmillii* subsp. *kingsmillii* over low scrub of *Acacia*/ *Grevillea* spp. and mid-dense hummock grass of *Triodia* spp. on rocky hillslope

Rocky Plain: Acacia Forests and Woodlands

4.3.13 Low woodland of *Acacia* spp. over low scrub of *Eremophila/ Senna* spp. and mid-dense hummock grass of *Triodia basedowii* on rocky plain (RP-AFW1)

The total flora recorded within this vegetation type was represented by a total of 21 Families, 33 Genera and 56 Taxa (Plate 18). No Threatened Flora or Priority Flora taxa were identified within this community. Dominant taxa from the vegetation assemblage are shown in Table 22. One introduced species; *Cenchrus ciliaris* (Buffalo Grass) was recorded in this vegetation community. According to the DAFWA this species is not listed as a Declared Plant under Section 22 of the *BAM Act 2007*. According to the NVIS, this community is best represented by the MVG6- Acacia Forests and Woodlands (DotEE, 2016b).

Table 22: Vegetation assemblage for Low woodland of *Acacia* spp. over low scrub of *Eremophila/ Senna* spp. and mid-dense hummock grass of *Triodia basedowii* on rocky plain

Life Form/Height Class	Canopy Cover	Dominant species present
Tree <10m	10-30%	<i>Acacia aptaneura</i> <i>Acacia kempeana</i>
Shrub 1-2m	10-30%	<i>Eremophila compacta</i> <i>Eremophila exilifolia</i> <i>Senna glutinosa</i> subsp. <i>chatelainiana</i>
Hummock Grass <0.5m	30-70%	<i>Triodia basedowii</i>



Plate 18: Low woodland of *Acacia* spp. over low scrub of *Eremophila/ Senna* spp. and mid-dense hummock grass of *Triodia basedowii* on rocky plain

Rocky Plain: Hummock Grasslands

4.3.14 Open low woodland of *Corymbia aspera* over low scrub of *Acacia* spp. and mid-dense hummock grass of *Triodia basedowii* on rocky plain (RP-HG1)

The total flora recorded within this vegetation type was represented by a total of 19 Families, 34 Genera and 55 Taxa (Plate 19). No Threatened Flora or Priority Flora taxa were identified within this community. Dominant taxa from the vegetation assemblage are shown in Table 23. One introduced species; *Cenchrus ciliaris* (Buffalo Grass) was recorded in this vegetation community. According to the DAFWA this species is not listed as a Declared Plant under Section 22 of the *BAM Act 2007*. According to the NVIS, this community is best represented by the MVG20- Hummock Grasslands (DotEE, 2016b).

Table 23: Vegetation assemblage for Open low woodland of *Corymbia aspera* over low scrub of *Acacia* spp. and mid-dense hummock grass of *Triodia basedowii* on rocky plain

Life Form/Height Class	Canopy Cover	Dominant species present
Tree <10m	5-10%	<i>Corymbia aspera</i>
Shrub 1-2m	10-30%	<i>Acacia ancistrocarpa</i> <i>Acacia aptaneura</i> <i>Acacia melleodora</i>
Hummock Grass <0.5m	30-70%	<i>Triodia basedowii</i>



Plate 19: Open low woodland of *Corymbia aspera* over low scrub of *Acacia* spp. and mid-dense hummock grass of *Triodia basedowii* on rocky plain

4.4 Vegetation Condition

Based on the vegetation condition rating scale adapted from Keighery, 1994 and Trudgen, 1988 (Appendix 9), three vegetation types were rated as 'poor', one rated as 'good' and the remaining eleven vegetation types had a vegetation condition rating of 'very good' (Table 24). A map of the vegetation condition within the survey area is provided in Figure 13.

'Poor' condition indicates vegetation still retains its basic vegetation structure or has ability to regenerate it after very obvious impacts of human activities since European settlement, such as grazing, partial clearing, frequent fires or aggressive weeds (in this instance, vegetation was in poor condition as a result of access track development (Talawana track), high density presence of the introduced species *Cenchrus ciliaris* (Buffel Grass), recent and/ or frequent fires and disturbance (grazing/ tracks) from introduced fauna (camels).

'Good' condition depicts that vegetation has been impacted by more obvious signs of damage caused by human activity since European settlement, including some obvious impact on the vegetation structure such as that caused by low levels of grazing (donkeys and camels) or slightly aggressive weeds.

'Very Good' condition depicts that vegetation has some relatively slight signs of damage caused by human activities since European settlement. For example, some signs of damage to tree trunks caused by repeated fire, the presence of some relatively non-aggressive weeds, or occasional vehicle tracks.

Table 24: Vegetation Condition Rating for Vegetation types of the Lake Disappointment Potash Project survey area

Landform	Major Vegetation Group	Floristic Community	Vegetation Code	Condition Rating
Closed Depression	Chenopod Shrublands, Samphire Shrublands and Forblands (MVG22)	Heath of mixed <i>Tecticornia</i> spp. on Salt Lake edge	CD-CSSSF1	Very Good
	N/A	Salt Lake	CD-SL1	N/A
	Other Grasslands, Herblands, Sedgelands and Rushlands (MVG21)	Open mixed herbs in clay-loam depression	CD-OGHSR1	Very Good
Dunefield	Casuarina Forests and Woodlands (MVG 8)	Low forest of <i>Allocasuarina decaisneana</i> over open scrub of <i>Acacia/ Grevillea</i> and mid-dense hummock grass of <i>Triodia basedowii</i> on sand dunes/ swales	D-CFW1	Very Good
	Hummock Grasslands (MVG20)	Open low woodland of <i>Corymbia opaca</i> over low scrub of <i>Acacia/Grevillea</i> spp. and mid-dense hummock grass of <i>Triodia basedowii</i> on sand dunes/ swales	D-HG1	Very Good

Landform	Major Vegetation Group	Floristic Community	Vegetation Code	Condition Rating
		Scrub of <i>Acacia/Eremophila/Grevillea</i> spp. over mid-dense hummock grass of <i>Triodia basedowii</i> on sand dunes/swales	D-HG2	Very Good
Open Depression	Acacia Forests and Woodlands (MVG 6)	Low woodland of <i>Acacia</i> spp. over low scrub of <i>Senna artemisioides</i> and mixed dwarf scrub in drainage depression	OD-AFW1	Good
	Eucalypt Woodland (MVG 5)	Open low woodland of <i>Eucalyptus camaldulensis/ Corymbia</i> spp. over mid-dense hummock grass of <i>Triodia</i> spp. in creekline	OD-EW1	Poor
	Other Shrublands (MVG 17)	Low woodland of <i>Hakea lorea/ Melaleuca glomerata</i> over low heath of <i>Fimbristylis eremophila</i> in drainage depression	OD-OS1	Very Good
Plain	Hummock Grasslands (MVG20)	Open low woodland of <i>Corymbia</i> spp./ <i>Hakea lorea</i> over low scrub of <i>Acacia</i> spp. and mid-dense hummock grass of <i>Triodia</i> spp. in sandplain	P-HG1	Poor
		Open shrub mallee of <i>Eucalyptus gamophylla/ E. kingsmillii</i> subsp. <i>kingsmillii</i> over low scrub of <i>Acacia bivenosa</i> and mid-dense hummock grass of <i>Triodia basedowii</i> in sandplain	P-HG2	Very Good
Rocky Hillslope	Acacia Forests and Woodlands (MVG 6)	Scrub of <i>Acacia</i> spp. over mixed low scrub and mid-dense hummock grass of <i>Triodia pungens</i> on rocky hillslope	RH-AFW1	Very Good
	Mallee Woodlands and Shrublands (MVG 14)	Open shrub mallee of <i>Eucalyptus gamophylla/ E. kingsmillii</i> subsp. <i>kingsmillii</i> over low scrub of <i>Acacia/ Grevillea</i> spp. and mid-dense hummock grass of <i>Triodia</i> spp. on rocky hillslope	RH-MWS1	Very Good
Rocky Plain	Acacia Forests and Woodlands (MVG 6)	Low woodland of <i>Acacia</i> spp. over low scrub of <i>Eremophila/ Senna</i> spp. and mid-dense hummock grass of <i>Triodia basedowii</i> on rocky plain	RP-AFW1	Poor
	Hummock Grasslands (MVG20)	Open low woodland of <i>Corymbia aspera</i> over low scrub of <i>Acacia</i> spp. and mid-dense hummock grass of <i>Triodia basedowii</i> on rocky plain	RP-HG1	Very Good



Figure 13: Vegetation Condition Rating of the Lake Disappointment Potash Project survey area

4.5 Introduced Plant Species

One introduced species was identified within the survey area; *Cenchrus ciliaris* (Buffel grass). According to the DAFWA this species is not listed as a Declared Plant under Section 22 of the *BAM Act 2007*.

4.5.1 *Cenchrus ciliaris* (Buffel Grass)

This species is described as a tufted or sometimes stoloniferous perennial, grass-like or herbaceous plant that grows 0.2-1.5m high (Plate 20). It produces purple flowers from February to October. Its preferred habitat is white, red or brown sand, stony red loam and black cracking clay (WAHERB, 2017). *Cenchrus ciliaris* was identified in six vegetation types:

1. OD-AFW1;
2. OD-EW1;
3. P-HG1;
4. RH-MWS1;
5. RP-AFW1; and
6. RP-HG1



Plate 20: *Cenchrus ciliaris* (Buffel grass)

4.6 Floristic Composition of the Lake Disappointment Potash Project Quadrats

This analysis was used to determine the similarities or differences between vegetation types. Appendix 8 provides the dendrogram and ordination graph for all generated from the PATN statistical analysis. A list of the 117 quadrats and their respective vegetation communities are provided in Table 25 below. The PATN analysis produced a stress value of 0.2306.

Table 25: Vegetation communities with corresponding quadrats

Landform	Major Vegetation Group	Floristic Community	Vegetation Code	Quadrats
Closed Depression	Chenopod Shrublands, Samphire Shrublands and Forblands (MVG22)	Heath of mixed <i>Tecticornia</i> spp. on Salt Lake edge	CD-CSSSF1	Q9, Q16, Q17, Q30, Q31, Q32, Q33, Q34, Q35, Q37, Q38, Q39, Q40, Q41, Q42, Q43, Q73
	N/A	Salt Lake	CD-SL1	N/A
	Other Grasslands, Herblands, Sedgeland and Rushlands (MVG21)	Open mixed herbs in clay-loam depression	CD-OGHSR1	Q11, Q12, Q22, Q44
Dunefield	Casuarina Forests and Woodlands (MVG 8)	Low forest of <i>Allocasuarina decaisneana</i> over open scrub of <i>Acacia/Grevillea</i> and mid-dense hummock grass of <i>Triodia basedowii</i> on sand dunes/ swales	D-CFW1	Q77, Q78, Q102, Q106, Q109
	Hummock Grasslands (MVG20)	Open low woodland of <i>Corymbia opaca</i> over low scrub of <i>Acacia/Grevillea</i> spp. and mid-dense hummock grass of <i>Triodia basedowii</i> on sand dunes/ swales	D-HG1	Q3, Q4, Q5, Q6, Q7, Q8, Q14, Q15, Q18, Q19, Q36, Q45, Q47, Q48, Q51, Q59, Q72, Q74 ⁶ , Q75, Q92, Q93, Q105, Q107
		Scrub of <i>Acacia/Eremophila/Grevillea</i> spp. over mid-dense hummock grass of <i>Triodia basedowii</i> on sand dunes/ swales	D-HG2	Q1, Q2, Q10, Q13, Q20, Q21, Q29, Q46, Q49, Q50, Q52, Q62, Q76, Q91, Q101, Q108, Q110
Open Depression	Acacia Forests and Woodlands (MVG 6)	Low woodland of <i>Acacia</i> spp. over low scrub of <i>Senna artemisioides</i> and mixed dwarf scrub in drainage depression	OD-AFW1	Q63, Q65, Q66, Q67, Q88, Q97
	Eucalypt Woodland (MVG 5)	Open low woodland of <i>Eucalyptus camaldulensis/ Corymbia</i> spp. over mid-dense hummock grass of <i>Triodia</i> spp. in creekline	OD-EW1	Q23, Q26, Q27, Q28, Q57, Q68, Q69, Q89, Q96, Q115
	Other Shrublands (MVG 17)	Low woodland of <i>Hakea lorea/ Melaleuca glomerata</i> over low heath of <i>Fimbristylis eremophila</i> in drainage depression	OD-OS1	Q60, Q61

⁶ Removed from PATN analysis-located within interzone between D-HG1 and CD-CSSSF1

Landform	Major Vegetation Group	Floristic Community	Vegetation Code	Quadrats
Plain	Hummock Grasslands (MVG20)	Open low woodland of <i>Corymbia</i> spp./ <i>Hakea lorea</i> over low scrub of <i>Acacia</i> spp. and mid-dense hummock grass of <i>Triodia</i> spp. in sandplain	P-HG1	Q24, Q25, Q53, Q58, Q64, Q70, Q71, Q79, Q82, Q84, Q86, Q87, Q90, Q98
		Open shrub mallee of <i>Eucalyptus gamophylla</i> / <i>E. kingsmillii</i> subsp. <i>kingsmillii</i> over low scrub of <i>Acacia bivenosa</i> and mid-dense hummock grass of <i>Triodia basedowii</i> in sandplain	P-HG2	Q81, Q85, Q100, Q103
Rocky Hillslope	Acacia Forests and Woodlands (MVG 6)	Scrub of <i>Acacia</i> spp. over mixed low scrub and mid-dense hummock grass of <i>Triodia pungens</i> on rocky hillslope	RH-AFW1	Q80, Q83, Q99
	Mallee Woodlands and Shrublands (MVG 14)	Open shrub mallee of <i>Eucalyptus gamophylla</i> / <i>E. kingsmillii</i> subsp. <i>kingsmillii</i> over low scrub of <i>Acacia</i> / <i>Grevillea</i> spp. and mid-dense hummock grass of <i>Triodia</i> spp. on rocky hillslope	RH-MWS1	Q54, Q55, Q56, Q94, Q95, Q104
Rocky Plain	Acacia Forests and Woodlands (MVG 6)	Low woodland of <i>Acacia</i> spp. over low scrub of <i>Eremophila</i> / <i>Senna</i> spp. and mid-dense hummock grass of <i>Triodia basedowii</i> on rocky plain	RP-AFW1	Q112, Q114, Q117
	Hummock Grasslands (MVG20)	Open low woodland of <i>Corymbia aspera</i> over low scrub of <i>Acacia</i> spp. and mid-dense hummock grass of <i>Triodia basedowii</i> on rocky plain	RP-HG1	Q111, Q113, Q116
TOTAL				117

Three 'supergroups' were identified in the PATN analysis:

1. Mixed group (Dunefield, Open Depression, Plain, Rocky Hillslope & Rocky Plain);
2. Open Depression Group; and
3. Closed Depression Group.

The 'Mixed' supergroup was divided into ten floristic groups, comprising of quadrats from each of the different landform types (excluding closed depression) and major vegetation groups. The dunefield communities were divided into a total of seven floristic groups (D-CFW1 community into four groups, D-HG1 into four groups, D-HG2 into seven groups). Two of the OD-AFW1 quadrats within this supergroup were separated into two floristic groups. The OD-EW1 quadrats were separated into two floristic groups. The remaining OD-AFW1 quadrats were separated into the second supergroup. The two sandplain communities (P-HG1 and P-HG2) were divided into two floristic groups respectively. The three RH-AFW1 quadrats were grouped together (Group 10) along with one RH-MWS1 quadrat (Q104), one D-HG2 quadrat (Q108) and one RP-HG1 (Q111). Four of the RH-MWS1 quadrats were grouped together (Group 5) with four of the OD-EW1 quadrats, four of the P-HG1 quadrats and one P-H2 quadrat.

The three RP-AFW1 quadrats were divided into three floristic groups (Group 7-9) and RP-HG1 quadrats were divided into two floristic groups (Group 8-9).

The 'Open Depression' supergroup was divided into one floristic group (Group 11) comprised of four of the six OD-AFW1 quadrats, all of which were located in the same isolated patch of OD-AFW1 located on the eastern edge of Mackay creek.

The 'Closed Depression' supergroup was divided into three floristic groups; one group (Group 12) comprising 16 of the CD-CSSSF1 quadrats and the second group (Group 13) comprising the one remaining CD-CSSSF1 quadrat (Q35). These two floristic groups were closely related to one another with the main distinction between these quadrats a result of the low diversity within Q35 and the absence of *Tecticornia* Sunshine Lake (K.A. Shepherd et al KS 867). The third floristic group (Group 14) comprised all four of the Open mixed herbs in clay-loam depression (CD-OGHSR1) quadrats, which were grouped together into one distinct group. This vegetation type was predominantly found within a low-lying clay drainage depression. Flora species characteristic of this community (though not necessarily restricted to it) included *Maireana tomentosa*, *Atriplex vesicaria*, *Surreya diandra* and *Frankenia cinerea*.

Based on the results of the PATN analysis, there was minimal heterogeneity in species composition across the survey area, with majority of vegetation types intermixed into floristic groups despite differences in both dominant stratum taxa and landform; however, three distinct supergroups were identified. The first supergroup comprised of a mix of vegetation types identified in the field including quadrats from the dunefields, sandplains, open depressions (including Eucalypt quadrats associated with Mackay creek), rocky hillslopes and rocky plains. The second supergroup comprised quadrats from the Acacia Forests and Woodlands open depression (OD-AFW1) located in an isolated patch on the eastern edge of Mackay creek. The third supergroup comprised closed depression quadrats from the lake edge (CD-CSSSF1) and open herb community in low-lying depressions (CD-OGHSR1). Species composition of the riparian vegetation (CD-CSSSF1) showed little variation along the entire boundary of the lake, and was more closely related to low lying drainage depressions of the open herb community (CD-OGHSR1) than the dunefield/ sandplain, open depression and rocky communities; however, both communities were delineated into distinct floristic groups.

4.6.1 Species Richness and accumulation estimates

The Chaos 2 richness estimator provided an estimated species richness of 269 species in 117 sample sites (quadrats). Species richness recorded for the 117 quadrats surveyed was 284 species (including annuals) which indicates survey intensity was adequate.

A species accumulation curve was created to display the rate of species accumulation. The R^2 value (0.97) suggests that the data "fits" the species accumulation curve shown in Figure 14. The rate of species accumulation for the first 20 quadrats ranged from nine to three species per quadrat. The rate of species accumulation between 20-50 quadrats was two-four species per quadrat. Species accumulation reduced to ≤ 1 species per quadrat as quadrat number increased above 70. BC has determined that according to this data a sufficient number of quadrats were established in the survey area to adequately assess the floristic composition of the area.

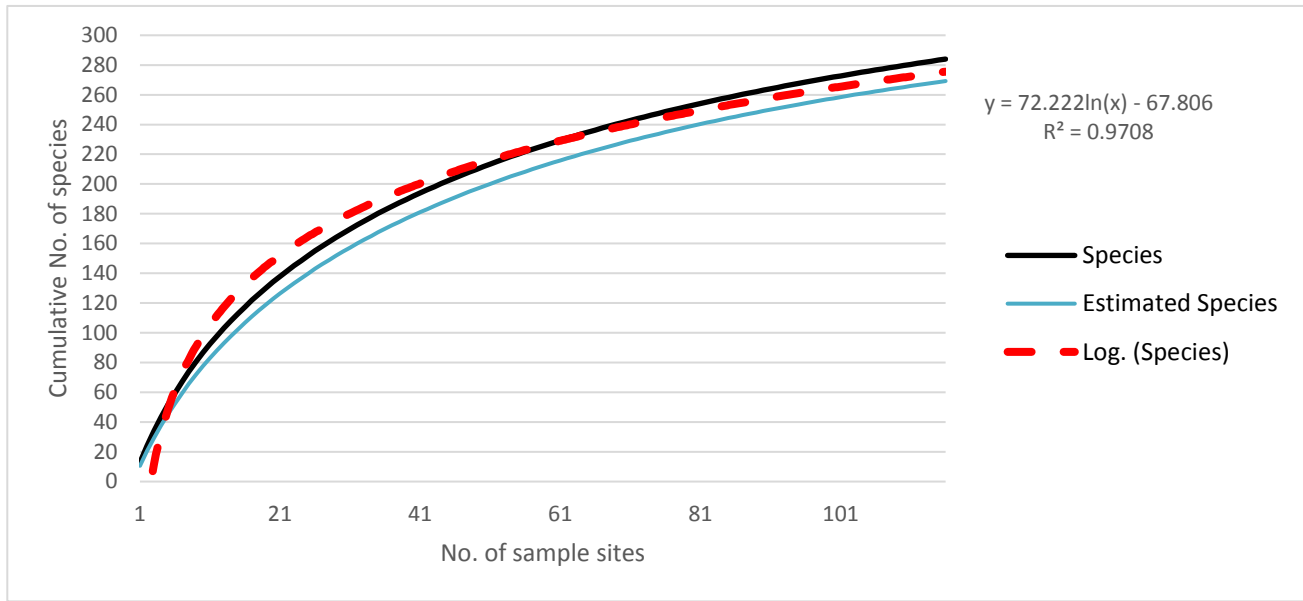


Figure 14: Species accumulation curve

4.7 Vegetation of Conservation Significance

4.7.1 Matters of National Environmental Significance

None of the following matters of national environmental significance as defined by the Commonwealth *EPBC Act 1999* were identified within the survey area:

- world heritage properties
- national heritage places
- wetlands of international importance (often called 'Ramsar' wetlands after the international treaty under which such wetlands are listed)
- nationally threatened species and ecological communities
- Commonwealth marine areas
- the Great Barrier Reef Marine Park
- nuclear actions (including uranium mining) a water resource, in relation to coal seam gas development and large coal mining development.

4.7.2 Matters of State Environmental Significance

Lake Disappointment is listed by the DotEE and ANCA as a Nationally Important Wetland of Western Australia; however, it is not listed as a Ramsar Wetland (Internationally Important Wetland) under Commonwealth legislation.

The survey area does not contain any TEC or Threatened Flora listed under the Western Australian *Environmental Protection Act 1986* and *Wildlife Conservation Act 1950*.

No PECs as listed by the DPaW were recorded within the survey area. The nearest PEC is the Priority 3 Ecological Community '*Riparian vegetation including phreatophytic species associated with creek lines and watercourses of Rudall River*' (described as semi-permanent pools along courses of Rudall River (DPaW, 2016b)), which is located approximately 20 km north of the survey area. No ecosystems listed under the IUCN Red list of Ecosystems occur within the survey area.

One Priority Flora taxon; *Tecticornia* sp. Sunshine Lake (K.A. Shepherd et al KS 867) (P1) was identified within the survey area. Two unrecognised taxa of *Tecticornia* (as identified by K.A Shepherd 867) (*Tecticornia* sp. nov A and *Tecticornia* sp. nov B) were also identified in the survey area. These are considered to be of Conservation Significance. A third *Tecticornia* specimen, *Tecticornia* aff. *calyptrata* is also provisionally considered to be of Conservation Significance, as it is presently undergoing further taxonomical work by the WAHERB to confirm if it is a distinct taxon. All four taxa of conservation significance were identified within the Heath of mixed *Tecticornia* spp. on Salt Lake edge vegetation type.

Approximately 16,550 ha of the southern extremity of the survey area (including approximately 7.018ha of the development envelope as specified in *Lake Disappointment Potash Project-Flora and Vegetation Impact Assessment*, is located within the proposed Lake Disappointment Nature Reserve (listed under the EPA Red Book recommendations for Conservation Reserves 1975-1993) which covers an area of 366,700 ha. The Lake Disappointment Nature Reserve was first listed in the EPA Red Book as an area of proposed conservation and proposed in the DPaW Goldfields, Regional Management Plan 1994-2004 however the recommendation was for the proposal to be deferred and addressed in the Pilbara Regional Management Plan. To date this proposed reserve has not been gazetted.

Approximately 350 ha of the survey area (mid-section of the Talawana track) is located within the Rudall River National Park which is listed as a Class A National Park managed by the DPaW (as specified in *Lake Disappointment Potash Project-Flora and Vegetation Impact Assessment*, only 7.12 ha of the development envelope for the LDP Project (required for widening of existing Talawana track) is located within the most southern boundary of the Rudall River National Park). A description of the Rudall River National Park according to the DotEE (2016a) is provided below:

The Rudall River National Park is significant for maintaining on-going geomorphic and ecological processes within a tropical desert environment. It contains an entire landscape sequence which includes extensive dunefields, tablelands, an entire river/creek system, alluvial formations, saline lakes and palaeodrainage lines.

*The place is a significant transition zone for flora and fauna between the Great Sandy Desert to the north, the Little Sandy Desert to the south and the semi-arid Pilbara to the west. A number of species are at their southern or northern limits of distribution are found in the place. The place is particularly important to the southern Eremaean bird population associated with low Mulga woodland. The place has a large number of habitats resulting in a diverse flora of over 400 species, over half of the known flora of the Great Sandy Desert. The Rudall River system is particularly important as it maintains significant communities of *Eucalyptus camaldulensis*, *E. aff. microtheca* and *Melaleuca leucadendra* riparian woodlands which are not represented extensively in other sites in the Great Sandy Desert.*

Within the north-eastern region of this National Park (approximately 89 km north of the northern boundary of the survey area and located well outside of the development envelope as shown in Appendix 10) is Lake Dora (Rudall River) System which is listed as a Nationally Important Wetland of Western Australia.

Approximately 70,567 ha of the survey area is located in an ESA (declared as an ESA under the EP Act as a 'defined wetland and the area within 50 metres of the wetland. Defined wetlands include Ramsar wetlands, conservation category wetlands and nationally important wetlands) which encompasses the entire boundary of Lake Disappointment. An additional 350 ha of the survey area (mid-section of the Talawana track) is also located within an ESA which encompasses the entire Rudall River National Park (declared as an ESA under the EP Act as 'an area that is included on the Register of the National Estate, because of its natural heritage value, under the Australian Heritage Council Act 2003 of the Commonwealth⁷).

A map showing areas of conservation significance in relation to the survey area is provided in Appendix 1.

⁷ The Register of the National Estate was closed in 2007 and is no longer a statutory list. All references to the Register of the National Estate were removed from the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) on 19 February 2012.

5 Summary

Fourteen vegetation types were identified within the survey area. These vegetation types were located within six different landform types and comprised eight major vegetation groups, which were represented by a total of 47 Families, 134 Genera and 327 Taxa (including 84 annual taxa). Species composition assessments indicate there was minimal heterogeneity in species composition across the survey area, with majority of vegetation types intermixed into floristic groups despite differences in both dominant stratum taxa and landform; however, three distinct supergroups were identified. The first supergroup comprised of a mix of vegetation types identified in the field including quadrats from the dunefields, sandplains, open depressions (including Eucalypt quadrats associated with Mackay creek), rocky hillslopes and rocky plains. The second supergroup comprised quadrats from the Acacia Forests and Woodlands open depression (OD-AFW1) located in an isolated patch on the eastern edge of Mackay creek. The third supergroup comprised closed depression quadrats from the lake edge (CD-CSSSF1) and open herb community in low-lying depressions (CD-OGHSR1). Species composition of the riparian vegetation (CD-CSSSF1) showed little variation along the entire boundary of the lake, and was more closely related to low lying drainage depressions of the open herb community (CD-OGHSR1) than the dunefield/ sandplain, open depression and rocky communities; however, both communities were delineated into distinct floristic groups. The Chaos 2 richness estimator provided an estimated species richness of 269 species in 117 sample sites (quadrats). Species richness recorded for the 117 quadrats surveyed was 284 species (including annuals) which indicates survey intensity was adequate.

No Threatened Flora taxa listed under State or Commonwealth legislation were recorded within the survey area. One Priority 1 Flora taxon (*Tecticornia* sp. Sunshine Lake (K.A. Shepherd et al KS 867)) and three *Tecticornia* taxa considered to be of conservation significance (unrecognised taxa/potentially distinct taxa) were identified within the Heath of mixed *Tecticornia* spp. on Salt Lake edge vegetation type.

No TEC pursuant to State or Commonwealth legislation were identified within the survey area. No PEC as listed by DPaW were identified within the survey area. The survey area does not contain any world or national heritage places, wetlands of international importance (Ramsar Wetlands). Lake Disappointment is however listed as a Nationally Important Wetland of Western Australia.

Approximately 16,550 ha of the southern extremity of the survey area is located within the proposed Lake Disappointment Nature Reserve. To date this proposed reserve has not been approved. Approximately 350 ha of the survey area (mid-section of the Talawana track) is located within the Rudall River National Park which is listed as a Class A National Park managed by the DPaW.

Approximately 70,567 ha of the survey area is located in an ESA which encompasses Lake Disappointment. An additional 350 ha of the survey area (mid-section of the Talawana track) is also located within an ESA which encompasses the entire Rudall River National Park.

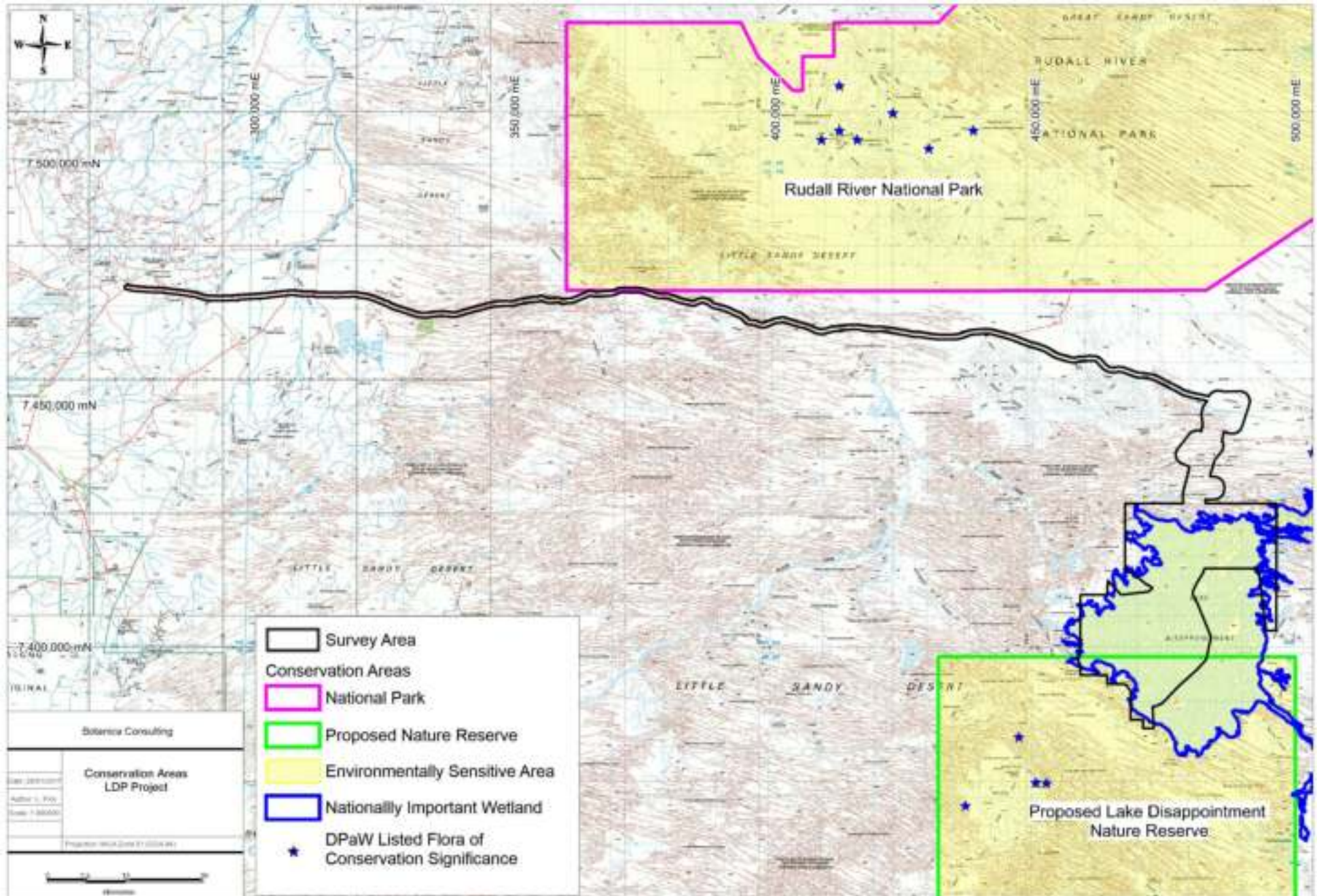
Vegetation condition in the survey area ranged from 'poor' to 'very good'. One introduced species was identified within the survey area; *Cenchrus ciliaris* (Buffel grass) which is not listed as a Declared Plant under the BAM Act.

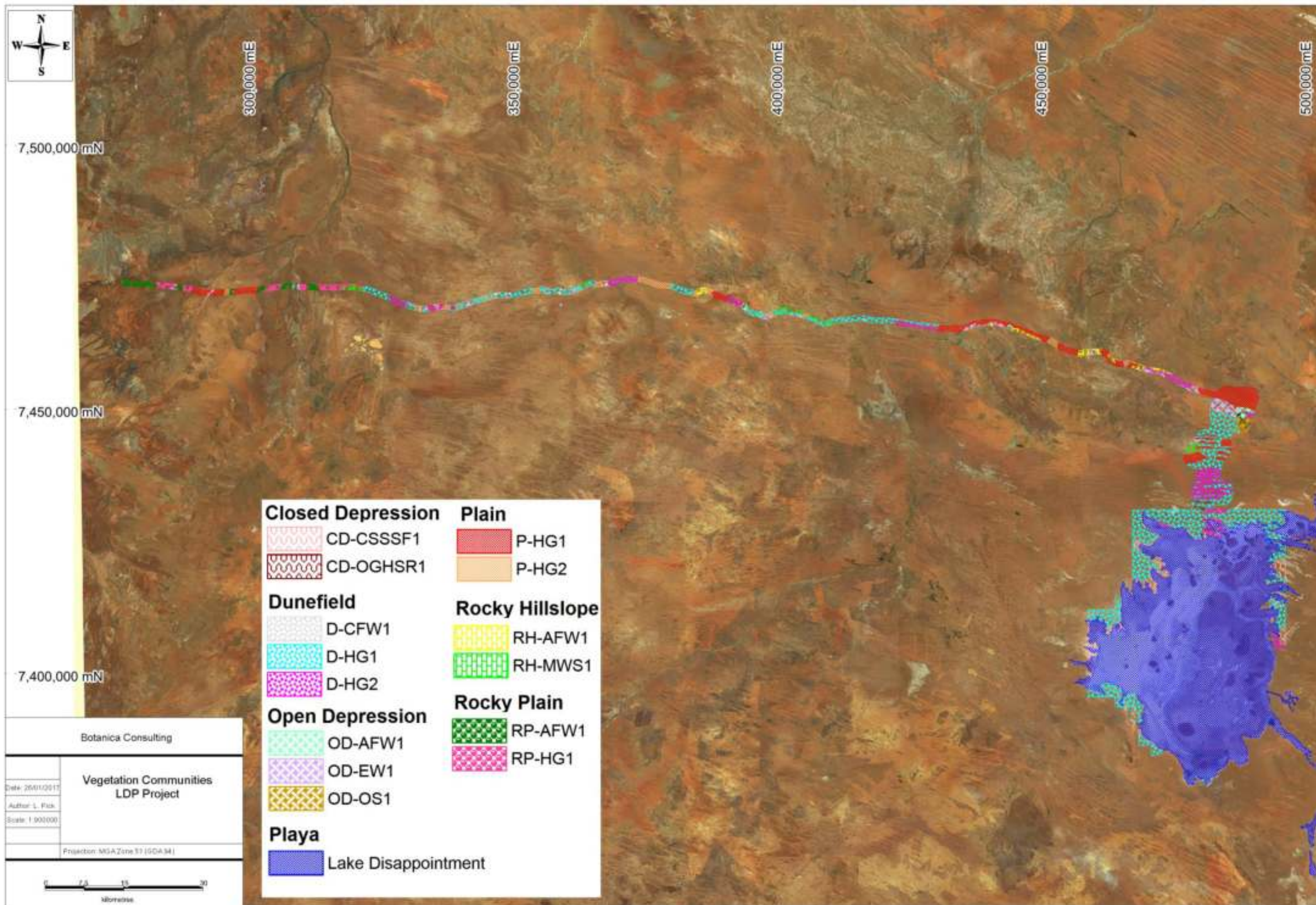
6 Bibliography

- Actis Environmental and Alexander Holm & Associates (2009), *Lake Disappointment Potash Project Environmental Review and Program of Works*.
- ASRIS (2014), *Atlas of Australian Soils Database*, Australian Soil Resource Information System.
- BC (2012) *Level 1 Flora and Vegetation Survey of the Lake Disappointment Exploration Program*, November 2012. Prepared by Botanica Consulting for Reward Minerals Limited.
- BC (2013), *Stage 2 Lake Disappointment Potash Project Environmental Impact Assessment and Monitoring Plan*. Prepared by Botanica Consulting for Reward Minerals Limited.
- Beard, J.S., (1990), *Plant Life of Western Australia*, Kangaroo Press Pty Ltd, NSW.
- BoM, (2017a), *Telfer Aero rainfall station (#13030) 1974-2017*, Bureau of Meteorology
<http://www.bom.gov.au/climate/data/>
Accessed: 25/05/2017
- Campbell, R., Billing, N., Northcote, K., Hubble, G., Isbell, R., Thompson, C., and Bettenay, E., (1975), *A description of Australian Soils*, Canberra: C.S.I.R.O. Division of Soils.
- Chinnock, R.J., (2007), *Eremophila and allied Genera – A Monograph of the Myoporaceae*, Rosenberg Publishing Pty. Ltd. NSW.
- Cousens, R.D., Dodd, J., Lloyd, S.G., Hussey, B.M.J., and Keighery, G.J. (1997), *Western Weeds – A guide to weeds of Western Australia*, The Plant Protection society of Western Australia, Victoria Park
- Cowan, M. & Kendrick, P., (2001), *A Biodiversity Audit of Western Australia's 53 Biogeographical Region in 2001- Little Sandy Desert 2 (LSD2 – Trainor subregion)*, Department of Conservation and Land Management.
- DAFWA (2011), *Pre-European Vegetation - Western Australia (NVIS Compliant Version GIS file)*, Department of Agriculture and Food Western Australia.
- DAFWA (2014), *Soil Landscape System of Western Australia*, Department of Agriculture and Food Western Australia.
- DAFWA (2017), *Declared Organism-database search*, Department of Agriculture and Food Western Australia.
<http://www.biosecurity.wa.gov.au/>
Accessed: 25/01/2017
- DotEE, (2012), *Interim Biogeographic Regionalisation for Australia (IBRA)*, Version 7, Department of the Environment and Energy
- DotEE, (2016a), *Protected Matters Search Tool, Environment Protection and Biodiversity Conservation Act 1999*, Department of the Environment
- DotEE, (2016b), *National Vegetation Information System (NVIS) Major Vegetation Groups, Version 4.2*, Department of the Environment and Energy
- DPaW, (2012a), *Threatened and Priority Flora Database search results*, Department of Parks and Wildlife
- DPaW, (2012b), *Threatened Ecological Community and Priority Ecological Community database search*, Department of Parks and Wildlife
- DPaW (2015a), *2015 Statewide Vegetation Statistics (formerly the CAR Reserve Analysis)*. Department of Parks and Wildlife
- DPaW (2016a), *NatureMap Database search*, Department of Parks and Wildlife.

- DPaW (2016b), *Priority Ecological Communities for Western Australia Version 26*. Species and Communities Branch, Department of Parks and Wildlife (released 30th November 2016).
- DPaW & EPA (2016), *Technical Guide - Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment – December 2016*. Department of Parks and Wildlife & Environmental Protection Authority.
- IUCN (2016a), *The IUCN Red List of Threatened Species. Version 2016-3*. International Union for Conservation of Nature.
- IUCN, (2016b), *The IUCN Red List of Ecosystems*. International Union for Conservation of Nature
- Kendrick, P., (2001a), *A Biodiversity Audit of Western Australia's 53 Biogeographical Region in 2001- Little Sandy Desert 1 (LSD1 –Rudall subregion)*, Department of Conservation and Land Management
- Kendrick, P., (2001b), *A Biodiversity Audit of Western Australia's 53 Biogeographical Region in 2001- Pilbara 2 (PIL2 –Fortescue Plains subregion)*, Department of Conservation and Land Management
- Kendrick, P. & McKenzie, N, (2001), *A Biodiversity Audit of Western Australia's 53 Biogeographical Region in 2001- Pilbara 1 (PIL1 –Chichester subregion)*, Department of Conservation and Land Management
- Lynch, R. J (1995), *Directory of Important Wetlands in Australia - Information sheet Lake Disappointment (Savory Creek) System - WA052*. c/- Department of Conservation and Land Management, Busselton. July- October 1995.
- McKenzie, N.L., May J.E. and McKenna, S, (2002) *Bioregional Summary of the 2002 Biodiversity Audit for Western Australia*.
- Mc Donald, R.C, Isbell, R.F & Speight, J.G (1998), *Australian Soil and Land Survey Field Handbook* (3rd edn). CSIRO Publishing: Melbourne.
- Tille, P. (2006), *Soil Landscapes of Western Australia's Rangelands and Arid Interior*, Department of Agriculture and Food Western Australia.
- WAHERB, (2017), *Florabase – Information on the Western Australian Flora*, Department of Parks and Wildlife
- <http://florabase.dpaw.wa.gov.au>
Accessed 31/05/2017

Appendix 1: Regional map of the Lake Disappointment Potash Project survey area including DPaW Flora of Conservation Significance and areas of Conservation Significance







230,000 mE

250,000 mE

300,000 mE

310,000 mE

320,000 mE

330,000 mE

340,000 mE

350,000 mE

7,430,000 mN

7,480,000 mN

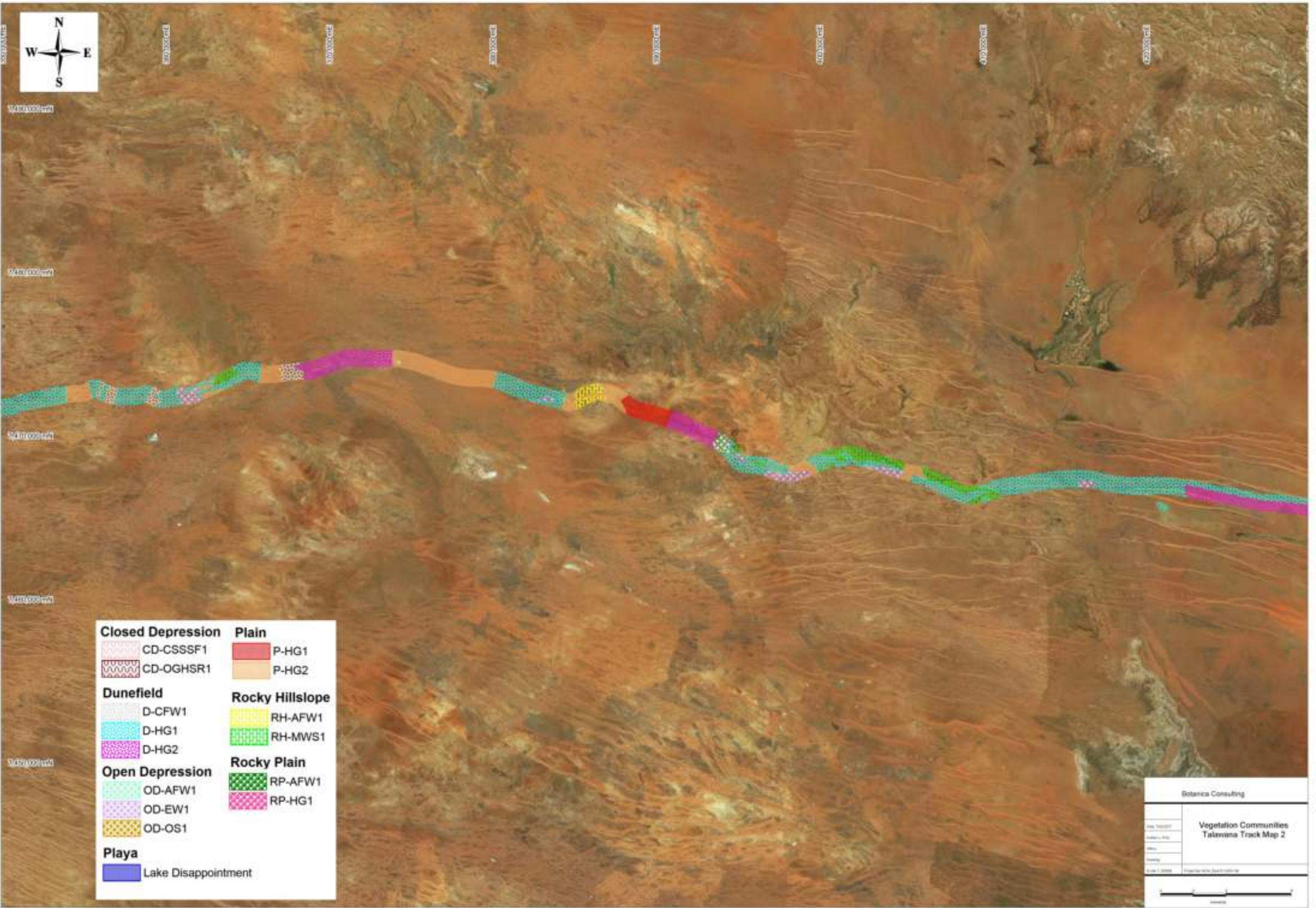
7,470,000 mN

7,460,000 mN

7,450,000 mN

Closed Depression		Plain	
	CD-CSSSF1		P-HG1
	CD-OGHSR1		P-HG2
Dunefield		Rocky Hillslope	
	D-CFW1		RH-AFW1
	D-HG1		RH-MWS1
	D-HG2		RP-AFW1
Open Depression		Rocky Plain	
	OD-AFW1		RP-HG1
	OD-EW1		
	OD-OS1		
Playa			
	Lake Disappointment		

Botanica Consulting	
Vegetation Communities Talawana Track Map 1	
Scale	1:50,000
Author	Pauline 2010
Date	2010
Project	Vegetation Communities Talawana Track
Client	Department of Environment and Heritage



Closed Depression		Plain	
	CD-CSSSF1		P-HG1
	CD-OGHSR1		P-HG2
Dunefield		Rocky Hillslope	
	D-CFW1		RH-AFW1
	D-HG1		RH-MWS1
	D-HG2		
Open Depression		Rocky Plain	
	OD-AFW1		RP-AFW1
	OD-EW1		RP-HG1
	OD-OS1		
Playa			
	Lake Disappointment		

Botanica Consulting	
Area: 1000000	Vegetation Communities Talarana Track Map 2
Author: [Name]	
Date:	
Scale:	
Scale: 1:2000	Project: [Name]



7470000 mE

7460000 mE

7450000 mE

7440000 mE

4490000 mN

4500000 mN

4510000 mN

4520000 mN

4530000 mN

4540000 mN

4550000 mN

Closed Depression	Plain
CD-CSSSF1	P-HG1
CD-OGHSR1	P-HG2
Dunefield	Rocky Hillslope
D-CFW1	RH-AFW1
D-HG1	RH-MWS1
D-HG2	Rocky Plain
Open Depression	RP-AFW1
OD-AFW1	RP-HG1
OD-EW1	
OD-OS1	
Playa	
Lake Disappointment	

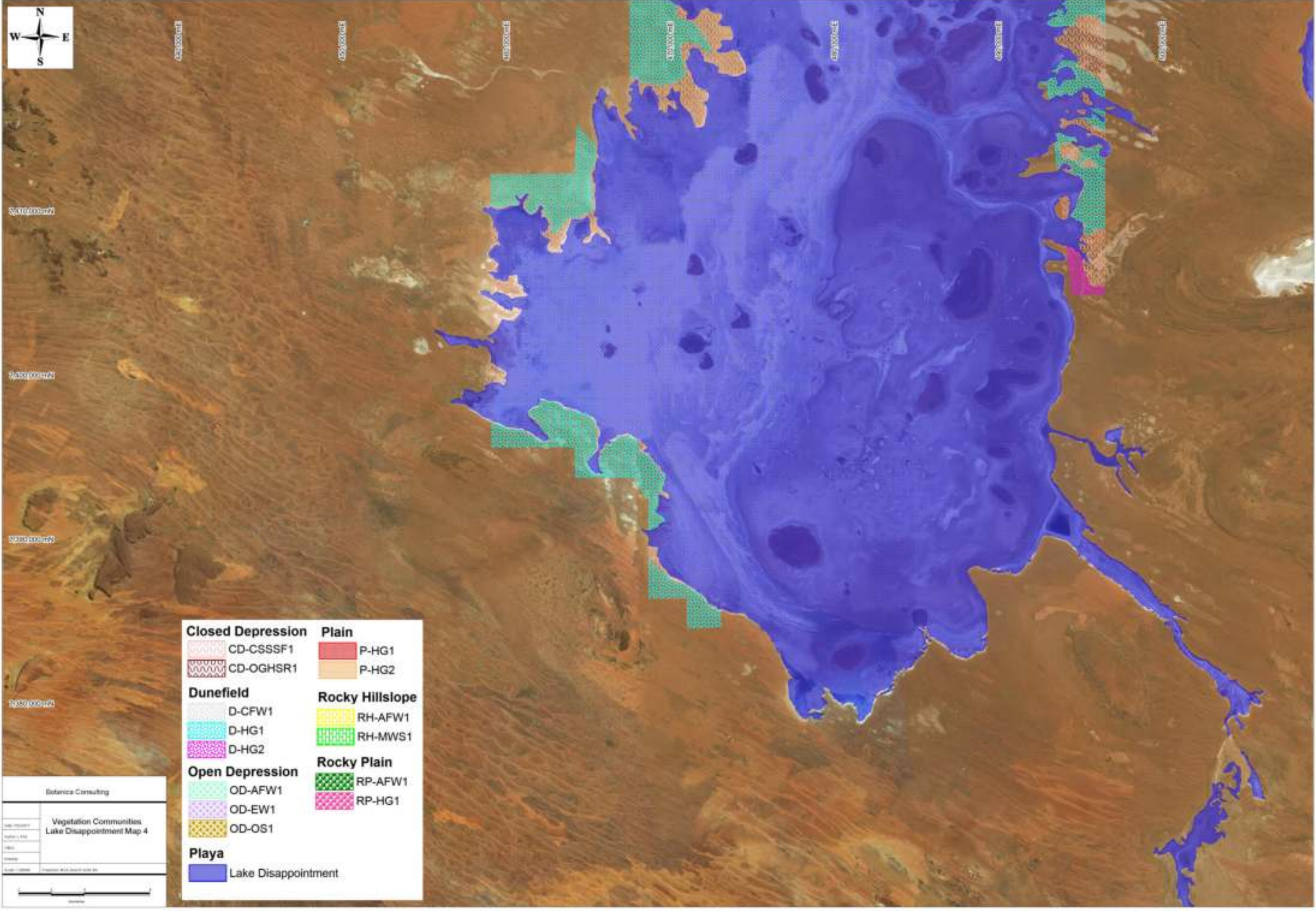
Botanica Consulting

Vegetation Communities
Talaiana Track Map 3

Date: 15/11/14
Author: J. Hill

Scale: 1:20000
Projection: UTM Zone 51G (EPSG:31451)





4250000E
 4300000E
 4350000E
 4400000E
 4450000E
 4500000E
 4550000E
 4600000E
 4650000E
 4700000E
 4750000E
 4800000E
 4850000E
 4900000E
 4950000E
 5000000E
 5050000E
 5100000E
 5150000E
 5200000E
 5250000E
 5300000E
 5350000E
 5400000E
 5450000E
 5500000E
 5550000E
 5600000E
 5650000E
 5700000E
 5750000E
 5800000E
 5850000E
 5900000E
 5950000E
 6000000E
 6050000E
 6100000E
 6150000E
 6200000E
 6250000E
 6300000E
 6350000E
 6400000E
 6450000E
 6500000E
 6550000E
 6600000E
 6650000E
 6700000E
 6750000E
 6800000E
 6850000E
 6900000E
 6950000E
 7000000E
 7050000E
 7100000E
 7150000E
 7200000E
 7250000E
 7300000E
 7350000E
 7400000E
 7450000E
 7500000E
 7550000E
 7600000E
 7650000E
 7700000E
 7750000E
 7800000E
 7850000E
 7900000E
 7950000E
 8000000E
 8050000E
 8100000E
 8150000E
 8200000E
 8250000E
 8300000E
 8350000E
 8400000E
 8450000E
 8500000E
 8550000E
 8600000E
 8650000E
 8700000E
 8750000E
 8800000E
 8850000E
 8900000E
 8950000E
 9000000E
 9050000E
 9100000E
 9150000E
 9200000E
 9250000E
 9300000E
 9350000E
 9400000E
 9450000E
 9500000E
 9550000E
 9600000E
 9650000E
 9700000E
 9750000E
 9800000E
 9850000E
 9900000E
 9950000E
 10000000E

Closed Depression		Plain	
	CD-CSSSF1		P-HG1
	CD-OGHSR1		P-HG2
Dunefield		Rocky Hillslope	
	D-CFW1		RH-AFW1
	D-HG1		RH-MWS1
	D-HG2	Rocky Plain	
Open Depression			RP-AFW1
	OD-AFW1		RP-HG1
	OD-EW1	Playa	
	OD-OS1		Lake Disappointment

Botanica Consulting

Vegetation Communities
Lake Disappointment Map 4

Scale: 1:50,000

Family	Genus	Taxon	CD-CSSF1	CD-OGHSR1	D-CFW1	D-HG1	D-HG2	OD-AFW1	OD-EW1	OD-OS1	P-HG1	P-HG2	RH-AFW1	RH-MWS1	RP-AFW1	RP-HG1
Chenopodiaceae	<i>Maireana</i>	<i>triptera</i>	*										*			
Chenopodiaceae	<i>Rhagodia</i>	<i>eremaea</i>							*		*					
Chenopodiaceae	<i>Salsola</i>	<i>australis</i> (A)				*	*	*								
Chenopodiaceae	<i>Sclerolaena</i>	<i>cornishiana</i> (A)				*	*								*	
Chenopodiaceae	<i>Sclerolaena</i>	<i>cuneata</i>	*	*			*								*	
Chenopodiaceae	<i>Sclerolaena</i>	<i>densiflora</i>		*			*									
Chenopodiaceae	<i>Sclerolaena</i>	<i>diacantha</i>		*												
Chenopodiaceae	<i>Sclerolaena</i>	<i>eriacantha</i>					*									
Chenopodiaceae	<i>Sclerolaena</i>	<i>fimbriolata</i>	*													
Chenopodiaceae	<i>Tecticornia</i>	<i>aff. calyptata</i> (CS)	*													
Chenopodiaceae	<i>Tecticornia</i>	<i>auriculata</i>	*													
Chenopodiaceae	<i>Tecticornia</i>	<i>indica</i> subsp. <i>bidens</i>	*													
Chenopodiaceae	<i>Tecticornia</i>	sp. (sterile) 1	*													
Chenopodiaceae	<i>Tecticornia</i>	sp. (sterile) 2	*													
Chenopodiaceae	<i>Tecticornia</i>	sp. (sterile) 3	*													
Chenopodiaceae	<i>Tecticornia</i>	sp. (sterile) 4	*													
Chenopodiaceae	<i>Tecticornia</i>	sp. nov. A (CS)	*													
Chenopodiaceae	<i>Tecticornia</i>	sp. nov. B (CS)	*													
Chenopodiaceae	<i>Tecticornia</i>	sp. Sunshine Lake (K.A. Shepherd et al KS 867) (P1)	*													
Chenopodiaceae	<i>Tecticornia</i>	<i>verrucosa</i> (A)		*												
Cleomaceae	<i>Cleome</i>	<i>uncifera</i> subsp. <i>microphylla</i>				*	*		*							
Cleomaceae	<i>Cleome</i>	<i>uncifera</i> subsp. <i>uncifera</i>				*			*		*					
Cleomaceae	<i>Cleome</i>	<i>viscosa</i> (A)				*		*	*		*					*
Convolvulaceae	<i>Bonamia</i>	<i>erecta</i>	*		*	*	*	*	*	*	*	*	*	*		
Convolvulaceae	<i>Evolvulus</i>	<i>alsinoides</i> var. <i>villosicalyx</i>				*	*	*	*		*					*
Convolvulaceae	<i>Ipomoea</i>	<i>muelleri</i>							*							
Cucurbitaceae	<i>Cucumis</i>	<i>variabilis</i> (A)			*	*			*		*					
Cyperaceae	<i>Bulbostylis</i>	<i>barbata</i> (A)						*	*						*	*
Cyperaceae	<i>Bulbostylis</i>	<i>turbinata</i> (A)		*		*	*		*		*	*			*	

Family	Genus	Taxon	CD-CSSF1	CD-OGHSR1	D-CFW1	D-HG1	D-HG2	OD-AFW1	OD-EW1	OD-OS1	P-HG1	P-HG2	RH-AFW1	RH-MWS1	RP-AFW1	RP-HG1
Cyperaceae	<i>Cyperus</i>	<i>blakeanus</i>								*						
Cyperaceae	<i>Cyperus</i>	<i>bulbosus</i>				*										
Cyperaceae	<i>Cyperus</i>	<i>cunninghamii</i> subsp. <i>cunninghamii</i>							*		*					
Cyperaceae	<i>Cyperus</i>	<i>iria</i> (A)						*	*							
Cyperaceae	<i>Cyperus</i>	<i>squarrosus</i> (A)				*										
Cyperaceae	<i>Fimbristylis</i>	<i>dichotoma</i>							*	*						
Cyperaceae	<i>Fimbristylis</i>	<i>eremophila</i>				*	*		*	*	*		*			
Cyperaceae	<i>Lipocarpha</i>	<i>microcephala</i> (A)		*												
Droseraceae	<i>Drosera</i>	<i>indica</i> (A)		*												
Euphorbiaceae	<i>Euphorbia</i>	<i>australis</i> (A)							*							
Euphorbiaceae	<i>Euphorbia</i>	<i>drummondii</i> (A)				*	*		*		*				*	
Euphorbiaceae	<i>Euphorbia</i>	<i>tannensis</i> (A)				*					*					*
Euphorbiaceae	<i>Euphorbia</i>	<i>tannensis</i> subsp. <i>eremophila</i> (A)			*	*										
Fabaceae	<i>Acacia</i>	<i>abrupta</i>							*		*					
Fabaceae	<i>Acacia</i>	<i>adsurgens</i>				*			*		*					
Fabaceae	<i>Acacia</i>	<i>ancistrocarpa</i>			*	*	*	*	*		*			*	*	*
Fabaceae	<i>Acacia</i>	<i>aptaneura</i>				*	*	*	*		*				*	*
Fabaceae	<i>Acacia</i>	<i>balsamea</i>											*	*		*
Fabaceae	<i>Acacia</i>	<i>bivenosa</i>			*	*	*		*	*	*	*	*	*	*	*
Fabaceae	<i>Acacia</i>	<i>colei</i>							*						*	
Fabaceae	<i>Acacia</i>	<i>cuthbertsonii</i> subsp. <i>cuthbertsonii</i>	*				*								*	
Fabaceae	<i>Acacia</i>	<i>dictyophleba</i>				*					*					
Fabaceae	<i>Acacia</i>	<i>eriopoda</i>				*	*		*		*					
Fabaceae	<i>Acacia</i>	<i>hilliana</i>					*					*	*	*		
Fabaceae	<i>Acacia</i>	<i>inaequilatera</i>					*							*		
Fabaceae	<i>Acacia</i>	<i>incurvaneura</i>					*	*								
Fabaceae	<i>Acacia</i>	<i>kempeana</i>													*	
Fabaceae	<i>Acacia</i>	<i>ligulata</i>			*	*	*	*	*		*	*		*	*	
Fabaceae	<i>Acacia</i>	<i>maitlandii</i>				*	*		*		*					*
Fabaceae	<i>Acacia</i>	<i>melleodora</i>			*	*	*		*		*			*		*

Family	Genus	Taxon	CD-CSSF1	CD-OGHSR1	D-CFW1	D-HG1	D-HG2	OD-AFW1	OD-EW1	OD-OS1	P-HG1	P-HG2	RH-AFW1	RH-MWS1	RP-AFW1	RP-HG1
Fabaceae	<i>Acacia</i>	<i>monticola</i>							*		*					
Fabaceae	<i>Acacia</i>	<i>pachycarpa</i>						*	*				*		*	
Fabaceae	<i>Acacia</i>	<i>paraneura</i>													*	
Fabaceae	<i>Acacia</i>	<i>prainii</i>				*	*									*
Fabaceae	<i>Acacia</i>	<i>pruinocarpa</i>					*		*		*				*	*
Fabaceae	<i>Acacia</i>	<i>pyrifolia</i> var. <i>pyrifolia</i>					*		*		*					
Fabaceae	<i>Acacia</i>	<i>retivenea</i> subsp. <i>clandestina</i>												*		
Fabaceae	<i>Acacia</i>	<i>sabulosa</i>				*	*									
Fabaceae	<i>Acacia</i>	<i>sclerosperma</i> subsp. <i>sclerosperma</i>							*							
Fabaceae	<i>Acacia</i>	<i>spondylophylla</i>							*		*			*		
Fabaceae	<i>Acacia</i>	<i>tetragonophylla</i>					*									*
Fabaceae	<i>Acacia</i>	<i>victoriae</i>		*		*	*		*						*	
Fabaceae	<i>Cullen</i>	<i>martinii</i>							*		*					
Fabaceae	<i>Cullen</i>	<i>stipulaceum</i>							*		*	*				
Fabaceae	<i>Gompholobium</i>	<i>polyzygum</i>				*	*				*	*				*
Fabaceae	<i>Gompholobium</i>	<i>simplicifolium</i>				*										*
Fabaceae	<i>Gompholobium</i>	<i>simplicifolium</i>				*	*									
Fabaceae	<i>Indigofera</i>	<i>colutea</i> (A)							*							
Fabaceae	<i>Indigofera</i>	<i>georgei</i>					*		*		*				*	
Fabaceae	<i>Indigofera</i>	<i>monophylla</i>							*							
Fabaceae	<i>Isotropis</i>	<i>atropurpurea</i>							*		*					
Fabaceae	<i>Jacksonia</i>	<i>aculeata</i>			*	*	*		*		*	*		*		
Fabaceae	<i>Kennedia</i>	<i>prorepens</i>			*											
Fabaceae	<i>Leptosema</i>	<i>chambersii</i>			*	*			*	*	*	*				
Fabaceae	<i>Petalostylis</i>	<i>cassioides</i>				*	*				*	*		*		*
Fabaceae	<i>Petalostylis</i>	<i>labicheoides</i>				*	*				*			*		*
Fabaceae	<i>Senna</i>	<i>artemisioides</i> subsp. <i>helmsii</i>			*	*	*	*	*					*	*	*
Fabaceae	<i>Senna</i>	<i>artemisioides</i> subsp. <i>oligophylla</i>					*		*		*					*
Fabaceae	<i>Senna</i>	<i>artemisioides</i> subsp. <i>sturtii</i>		*			*		*		*					
Fabaceae	<i>Senna</i>	<i>artemisioides</i> subsp. <i>x artemisioides</i>											*			

Family	Genus	Taxon	CD-CSSF1	CD-OGHSR1	D-CFW1	D-HG1	D-HG2	OD-AFW1	OD-EW1	OD-OS1	P-HG1	P-HG2	RH-AFW1	RH-MWS1	RP-AFW1	RP-HG1
Fabaceae	<i>Senna</i>	<i>artemisioides</i> subsp. <i>x coriacea</i>									*			*		
Fabaceae	<i>Senna</i>	<i>glutinosa</i> subsp. <i>chatelainiana</i>												*	*	*
Fabaceae	<i>Senna</i>	<i>notabilis</i>				*	*		*		*				*	
Fabaceae	<i>Senna</i>	<i>sericea</i>							*					*		
Fabaceae	<i>Senna</i>	<i>stricta</i>							*					*		*
Fabaceae	<i>Sesbania</i>	<i>cannabina</i> (A)													*	
Fabaceae	<i>Swainsona</i>	<i>aff. microphylla</i>							*							
Fabaceae	<i>Swainsona</i>	<i>microphylla</i>				*	*									
Fabaceae	<i>Tephrosia</i>	<i>rosea</i>				*	*		*		*					
Fabaceae	<i>Thinicola</i>	<i>incana</i>				*	*									
Frankeniaceae	<i>Frankenia</i>	<i>cinerea</i>	*	*		*	*									
Gentianaceae	<i>Schenkia</i>	<i>clementii</i>	*	*			*									
Goodeniaceae	<i>Brunonia</i>	<i>australis</i>				*	*		*		*					
Goodeniaceae	<i>Dampiera</i>	<i>candicans</i>							*		*					
Goodeniaceae	<i>Dampiera</i>	<i>cinerea</i>				*										
Goodeniaceae	<i>Goodenia</i>	<i>armitiana</i>	*		*		*		*		*	*				
Goodeniaceae	<i>Goodenia</i>	<i>microptera</i> (A)				*	*					*				*
Goodeniaceae	<i>Goodenia</i>	<i>prostrata</i> (A)				*									*	*
Goodeniaceae	<i>Scaevola</i>	<i>basedowii</i>					*				*					
Goodeniaceae	<i>Scaevola</i>	<i>collaris</i>	*		*	*	*		*		*					
Goodeniaceae	<i>Scaevola</i>	<i>parvifolia</i> subsp. <i>parvifolia</i>			*	*	*		*		*	*				
Goodeniaceae	<i>Scaevola</i>	<i>sericophylla</i>	*			*	*									
Goodeniaceae	<i>Scaevola</i>	<i>spinescens</i>											*	*	*	
Goodeniaceae	<i>Velleia</i>	<i>discophora</i>			*	*			*		*			*		
Goodeniaceae	<i>Velleia</i>	<i>panduriformis</i>				*	*									
Gyrostemonaceae	<i>Codonocarpus</i>	<i>cotinifolius</i>					*									
Gyrostemonaceae	<i>Gyrostemon</i>	<i>tepperi</i>			*	*										
Haloragaceae	<i>Glischrocaryon</i>	<i>angustifolium</i>				*	*									
Haloragaceae	<i>Haloragis</i>	<i>gossei</i> (A)							*			*				
Hemerocallidaceae	<i>Corynotheca</i>	<i>micrantha</i> var. <i>divaricata</i>				*	*				*					

Family	Genus	Taxon	CD-CSSF1	CD-OGHSR1	D-CFW1	D-HG1	D-HG2	OD-AFW1	OD-EW1	OD-OS1	P-HG1	P-HG2	RH-AFW1	RH-MWS1	RP-AFW1	RP-HG1
Malvaceae	<i>Lawrenzia</i>	<i>glomerata</i>	*													
Malvaceae	<i>Seringia</i>	<i>elliptica</i>							*	*	*	*	*	*		
Malvaceae	<i>Sida</i>	? <i>cardiophylla</i>				*	*		*		*					
Malvaceae	<i>Sida</i>	<i>brownii</i>				*		*	*		*					
Malvaceae	<i>Sida</i>	<i>calyxhymenia</i>							*		*			*		
Malvaceae	<i>Sida</i>	<i>cardiophylla</i>				*	*				*					
Malvaceae	<i>Sida</i>	<i>fibulifera</i>									*			*		
Malvaceae	<i>Sida</i>	<i>platycalyx (A)</i>						*		*						*
Malvaceae	<i>Sida</i>	sp. (sterile)									*					
Malvaceae	<i>Sida</i>	sp. Excedentifolia (J.L. Egan 1925)							*		*	*	*	*		
Malvaceae	<i>Sida</i>	sp. Golden calyces glabrous (H.N. Foote 32)			*		*									*
Malvaceae	<i>Sida</i>	sp. sand dunes (A.A. Mitchell PRP1208)			*	*	*		*	*	*					
Malvaceae	<i>Sida</i>	sp. spiciform panicles (E. Leyland s.n. 14/8/90)				*										
Malvaceae	<i>Sida</i>	sp. tiny glabrous fruit (A.A. Mitchell PRP 1208)							*							
Malvaceae	<i>Sida</i>	sp. verrucose glands (F.H. Mollemans 2423)						*								
Malvaceae	<i>Triumfetta</i>	<i>chaetocarpa</i>							*		*					
Malvaceae	<i>Triumfetta</i>	<i>maconochieana</i>					*		*		*					*
Malvaceae	<i>Waltheria</i>	<i>virgata</i>							*		*					
Marsileaceae	<i>Marsilea</i>	<i>hirsuta</i>						*								
Molluginaceae	<i>Trigastrotheca</i>	<i>molluginea (A)</i>							*							*
Myrtaceae	<i>Aluta</i>	<i>maisonneuvei</i> subsp. <i>maisonneuvei</i>			*	*	*									
Myrtaceae	<i>Calytrix</i>	<i>carinata</i>			*	*	*		*		*	*	*	*		*
Myrtaceae	<i>Corymbia</i>	<i>aspera</i>				*			*		*				*	*
Myrtaceae	<i>Corymbia</i>	<i>opaca</i>				*			*		*				*	
Myrtaceae	<i>Corymbia</i>	sp. (sterile)				*	*									
Myrtaceae	<i>Eucalyptus</i>	<i>camaldulensis</i>						*	*							

Family	Genus	Taxon	CD-CSSF1	CD-OGHSR1	D-CFW1	D-HG1	D-HG2	OD-AFW1	OD-EW1	OD-OS1	P-HG1	P-HG2	RH-AFW1	RH-MWS1	RP-AFW1	RP-HG1
Rubiaceae	<i>Oldenlandia</i>	<i>pterospora</i>				*										
Rubiaceae	<i>Pomax</i>	sp. desert (A.S. George 11968)					*									
Rubiaceae	<i>Psydrax</i>	<i>latifolia</i>						*	*		*				*	*
Santalaceae	<i>Anthobolus</i>	<i>leptomerioides</i>				*			*		*	*	*		*	*
Santalaceae	<i>Exocarpos</i>	<i>sparteus</i>			*											
Santalaceae	<i>Santalum</i>	<i>lanceolatum</i>							*							
Sapindaceae	<i>Diplopeltis</i>	<i>stuartii</i> var. <i>stuartii</i>				*			*		*	*				
Sapindaceae	<i>Dodoniaea</i>	<i>coriacea</i>					*									
Scrophulariaceae	<i>Eremophila</i>	<i>compacta</i>													*	*
Scrophulariaceae	<i>Eremophila</i>	<i>exilifolia</i>											*		*	*
Scrophulariaceae	<i>Eremophila</i>	<i>forrestii</i> subsp. <i>forrestii</i>				*	*		*		*					
Scrophulariaceae	<i>Eremophila</i>	<i>glesii</i> subsp. <i>variabilis</i>													*	
Scrophulariaceae	<i>Eremophila</i>	<i>glutinosa</i>												*		
Scrophulariaceae	<i>Eremophila</i>	<i>lanceolata</i>						*								
Scrophulariaceae	<i>Eremophila</i>	<i>latrobei</i> subsp. <i>filiformis</i>				*	*		*		*					
Scrophulariaceae	<i>Eremophila</i>	<i>latrobei</i> subsp. <i>glabra</i>													*	
Scrophulariaceae	<i>Eremophila</i>	<i>latrobei</i> subsp. <i>latrobei</i>						*								*
Scrophulariaceae	<i>Eremophila</i>	<i>phyllopoda</i> subsp. <i>phyllopoda</i>												*		
Scrophulariaceae	<i>Eremophila</i>	<i>platycalyx</i> subsp. <i>platycalyx</i>									*					
Scrophulariaceae	<i>Eremophila</i>	<i>platythamnus</i> subsp. <i>exotrachys</i>				*	*									
Scrophulariaceae	<i>Eremophila</i>	<i>tietkensii</i>			*	*	*									
Solanaceae	<i>Anthotroche</i>	<i>pannosa</i>				*										
Solanaceae	<i>Solanum</i>	<i>centrale</i>				*	*	*			*			*		
Solanaceae	<i>Solanum</i>	<i>chippendalei</i>				*	*		*		*					
Solanaceae	<i>Solanum</i>	<i>diversiflorum</i>		*			*		*		*					
Solanaceae	<i>Solanum</i>	<i>lasiophyllum</i>				*		*	*		*				*	*
Stylidiaceae	? <i>Levenhookia</i>	<i>chippendalei</i> (A)		*												
Stylidiaceae	<i>Stylidium</i>	<i>desertorum</i> (A)		*			*									
Surianaceae	<i>Stylobasium</i>	<i>spathulatum</i>			*		*		*		*	*				
Violaceae	<i>Hybanthus</i>	<i>aurantiacus</i>							*		*					

Family	Genus	Taxon	CD-CSSF1	CD-OGHSR1	D-CFW1	D-HG1	D-HG2	OD-AFW1	OD-EW1	OD-OS1	P-HG1	P-HG2	RH-AFW1	RH-MWS1	RP-AFW1	RP-HG1
Zygophyllaceae	<i>Tribulus</i>	<i>hirsutus</i>									*					
Zygophyllaceae	<i>Tribulus</i>	<i>macrocarpus (A)</i>													*	
Zygophyllaceae	<i>Tribulus</i>	<i>occidentalis</i>				*	*	*			*					
Zygophyllaceae	<i>Tribulus</i>	<i>platypterus</i>				*	*		*		*			*		
Zygophyllaceae	<i>Tribulus</i>	<i>suberosus</i>												*		

**Appendix 4: GPS coordinates of Flora of Conservation Significance locations within Lake
Disappointment Potash Project survey area (GDA94)**

Taxon	Zone	Easting	Northing	Estimated No. plants
<i>Tecticornia</i> aff. <i>calyptrata</i>	51K	471030	7426837	1
<i>Tecticornia</i> aff. <i>calyptrata</i>	51K	481449	7425674	1
<i>Tecticornia</i> aff. <i>calyptrata</i>	51K	460087	7400035	32
<i>Tecticornia</i> aff. <i>calyptrata</i>	51K	462090	7396055	48
<i>Tecticornia</i> aff. <i>calyptrata</i>	51K	465641	7395379	60
<i>Tecticornia</i> aff. <i>calyptrata</i>	51K	472752	7385855	141
<i>Tecticornia</i> aff. <i>calyptrata</i>	51K	469195	7423628	40
<i>Tecticornia</i> aff. <i>calyptrata</i>	51K	471096	7415895	76
<i>Tecticornia</i> aff. <i>calyptrata</i>	51K	465665	7413430	100
<i>Tecticornia</i> aff. <i>calyptrata</i>	51K	494020	7420833	1
<i>Tecticornia</i> aff. <i>calyptrata</i>	51K	494020	7420833	2
<i>Tecticornia</i> aff. <i>calyptrata</i>	51K	462229	7409696	11
<i>Tecticornia</i> aff. <i>calyptrata</i>	51 K	471635	7420533	1
<i>Tecticornia</i> aff. <i>calyptrata</i>	51 K	477487	7427605	2
<i>Tecticornia</i> aff. <i>calyptrata</i>	51K	469260	7389353	54
<i>Tecticornia</i> aff. <i>calyptrata</i>	51K	494933	7410651	132
<i>Tecticornia</i> aff. <i>calyptrata</i>	51K	480196	7425142	56
TOTAL				758
<i>Tecticornia</i> sp. nov. A	51K	481449	7425674	1000
<i>Tecticornia</i> sp. nov. A	51K	495316	7426429	500
<i>Tecticornia</i> sp. nov. A	51K	462229	7409696	100
<i>Tecticornia</i> sp. nov. A	51 K	474575	7418716	100
<i>Tecticornia</i> sp. nov. A	51 K	471030	7426837	5
<i>Tecticornia</i> sp. nov. A	51 K	462229	7409696	19
<i>Tecticornia</i> sp. nov. A	51 K	460345	7404680	14
<i>Tecticornia</i> sp. nov. A	51 K	495316	7426429	2
<i>Tecticornia</i> sp. nov. A	51 K	481551	7425640	1
TOTAL				1741
<i>Tecticornia</i> sp. nov. B	51K	472752	7385855	50
<i>Tecticornia</i> sp. nov. B	51K	490874	7427988	500
<i>Tecticornia</i> sp. nov. B	51K	469195	7423628	500
TOTAL				1050
<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al. KS 867) P1	51K	471030	7426837	1000
<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al. KS 867) P1	51K	481449	7425674	10000
<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al. KS 867) P1	51K	481305	7426165	2000
<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al. KS 867) P1	51K	460087	7400035	10000
<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al. KS 867) P1	51K	462090	7396055	5000
<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al. KS 867) P1	51K	460345	7404680	1000
<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al. KS 867) P1	51K	465641	7395379	1000
<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al. KS 867) P1	51K	469260	7389353	1000
<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al. KS 867) P1	51K	490874	7427988	2000
<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al. KS 867) P1	51K	469195	7423628	76
<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al. KS 867) P1	51K	471096	7415895	10000
<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al. KS 867) P1	51K	494020	7420833	1000
<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al. KS 867) P1	51K	495316	7426429	1000
<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al. KS 867) P1	51K	462229	7409696	500
<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al. KS 867) P1	51K	465686	7413435	91
<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al. KS 867) P1	51K	494933	7410651	28
<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al. KS 867) P1	51 K	474575	7418716	500
<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al. KS 867) P1	51 K	471635	7420533	1
<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al. KS 867) P1	51K	480196	7425142	36
<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al. KS 867) P1	51K	472885	7428119	17

Taxon	Zone	Easting	Northing	Estimated No. plants
<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al. KS 867) P1	51 K	481556	7425597	1
<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al. KS 867) P1	51 K	481556	7425597	1
<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al. KS 867) P1	51 K	481556	7425596	1
<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al. KS 867) P1	51 K	481557	7425596	1
<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al. KS 867) P1	51 K	481557	7425596	1
<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al. KS 867) P1	51 K	481558	7425595	1
<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al. KS 867) P1	51 K	481558	7425594	1
<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al. KS 867) P1	51 K	481558	7425592	1
<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al. KS 867) P1	51 K	481560	7425591	1
<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al. KS 867) P1	51 K	481561	7425591	1
<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al. KS 867) P1	51 K	481561	7425590	1
<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al. KS 867) P1	51 K	481562	7425589	1
<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al. KS 867) P1	51 K	481562	7425588	1
<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al. KS 867) P1	51 K	481561	7425588	1
<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al. KS 867) P1	51 K	481561	7425588	1
<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al. KS 867) P1	51 K	481560	7425588	1
<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al. KS 867) P1	51 K	481560	7425588	1
<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al. KS 867) P1	51 K	481560	7425588	1
<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al. KS 867) P1	51 K	481559	7425587	1
<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al. KS 867) P1	51 K	481560	7425588	1
<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al. KS 867) P1	51 K	481560	7425588	1
<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al. KS 867) P1	51 K	481548	7425598	1
<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al. KS 867) P1	51 K	481548	7425598	1
<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al. KS 867) P1	51 K	481549	7425598	1
<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al. KS 867) P1	51 K	481549	7425598	1
<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al. KS 867) P1	51 K	481549	7425599	1
<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al. KS 867) P1	51 K	481548	7425600	1
<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al. KS 867) P1	51 K	481548	7425602	1
<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al. KS 867) P1	51 K	481548	7425603	1
<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al. KS 867) P1	51 K	481549	7425603	1
<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al. KS 867) P1	51 K	481548	7425604	1
<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al. KS 867) P1	51 K	481548	7425605	1
<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al. KS 867) P1	51 K	481548	7425605	1
<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al. KS 867) P1	51 K	481549	7425606	1
<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al. KS 867) P1	51 K	481549	7425607	1
<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al. KS 867) P1	51 K	481549	7425608	1
<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al. KS 867) P1	51 K	481548	7425610	1
<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al. KS 867) P1	51 K	481548	7425612	1
<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al. KS 867) P1	51 K	481555	7425596	1
TOTAL				46,445

Flora of Conservation Significance recorded within the riparian monitoring sites

<i>Tecticornia</i> sp. Sunshine Lake (K.A. Shepherd et al KS 867) (P3)												
Transect	No. plants per 100m ² quadrat				No plants along transect (excluding first 10m)				Total			
	2013	2014	2015	2016	2013	2014	2015	2016	2013	2014	2015	2016
T1	72	72	72	72	28	28	28	28	100	100	100	100
T2	32	35	34	34	2	2	2	2	34	37	36	36
T3	0	0	0	0	17	17	17	17	17	17	17	17
T4	46	46	46	42	63	63	63	63	109	109	109	105
T5	40	40	40	37	30	36	36	36	70	76	76	73
T6	40	40	47	70	48	48	48	48	88	88	95	118

Appendix 5: GPS coordinates of Quadrat locations and Riparian Monitoring Transects (GDA94)

Quadrat	Coordinates	Elevation	Precision (m)	Vegetation Type
Q1	51K 480212 7425161	426 m	1	D-HG2
Q2	51K 472900 7428159	430 m	1	D-HG2
Q3	51K 480940 7433494	401 m	1	D-HG1
Q4	51K 482886 7441336	471 m	1	D-HG1
Q5	51K 484430 7448510	408 m	2	D-HG1
Q6	51K 484527 7448010	408 m	1	D-HG1
Q7	51K 484148 7444920	388 m	1	D-HG1
Q8	51K 482493 7439908	377 m	1	D-HG1
Q9	51K 471030 7426837	394 m	3	CD-CSSSF1
Q10	51K 481005 7433944	363 m	2	D-HG2
Q11	51K 480746 7432682	373 m	2	CD-OGHSR1
Q12	51K 480759 7431610	365 m	2	CD-OGHSR1
Q13	51K 481125 7430352	372 m	1	D-HG2
Q14	51K 481202 7429728	352 m	1	D-HG1
Q15	51K 481151 7427926	418 m	1	D-HG1
Q16	51K 481449 7425674	412 m	1	CD-CSSSF1
Q17	51K 481305 7426165	373 m	3	CD-CSSSF1
Q18	51K 477761 7430655	400 m	2	D-HG1
Q19	51K 478664 7427329	398 m	3	D-HG1
Q20	51K 480889 7434121	403 m	1	D-HG2
Q21	51K 481710 7433960	397 m	1	D-HG2
Q22	51K 481008 7431215	396 m	1	CD-OGHSR1
Q23	51K 484061 7450543	403 m	1	OD-EW1
Q24	51K 485308 7451970	428 m	1	P-HG1
Q25	51K 485900 7451484	441 m	1	P-HG1
Q26	51K 485732 7451067	427 m	1	OD-EW1
Q27	51K 484602 7450318	420 m	1	OD-EW1
Q28	51K 484985 7450272	432 m	1	OD-EW1
Q29	51K 483760 7434377	470 m	2	D-HG2
Q30	51K 460087 7400035	456 m	2	CD-CSSSF1
Q31	51K 462090 7396055	473 m	2	CD-CSSSF1
Q32	51K 460345 7404680	473 m	1	CD-CSSSF1
Q33	51K 465641 7395379	459 m	2	CD-CSSSF1
Q34	51K 469260 7389353	454 m	1	CD-CSSSF1
Q35	51K 472752 7385855	480 m	1	CD-CSSSF1
Q36	51K 494940 7410627	477 m	1	D-HG1
Q37	51K 490874 7427988	493 m	1	CD-CSSSF1
Q38	51K 469195 7423628	496 m	1	CD-CSSSF1
Q39	51K 471096 7415895	335 m	1	CD-CSSSF1
Q40	51K 465665 7413430	332 m	2	CD-CSSSF1
Q41	51K 494020 7420833	319 m	2	CD-CSSSF1
Q42	51K 495316 7426429	328 m	2	CD-CSSSF1
Q43	51K 462229 7409696	330 m	2	CD-CSSSF1
Q44	51 K 479392 7431468	333 m	1	CD-OGHSR1
Q45	51 K 484201 7432359	344 m	1	D-HG1
Q46	51 K 479251 7434048	339 m	1	D-HG2
Q47	51 K 479039 7434344	349 m	1	D-HG1
Q48	51 K 479973 7436233	349 m	1	D-HG1
Q49	51 K 480173 7436997	333 m	1	D-HG2
Q50	51 K 483310 7436231	330 m	1	D-HG2
Q51	51 K 485805 7435241	345 m	2	D-HG1
Q52	51 K 485170 7434956	332 m	1	D-HG2
Q53	51 K 479404 7440180	347 m	1	P-HG1
Q54	51 K 478853 7442047	372 m	1	RH-MWS1
Q55	51 K 478192 7442158	372 m	1	RH-MWS1

Quadrat	Coordinates	Elevation	Precision (m)	Vegetation Type
Q56	51 K 479729 7443185	360 m	2	RH-MWS1
Q57	51 K 479766 7444126	357 m	1	OD-EW1
Q58	51 K 482542 7443592	355 m	1	P-HG1
Q59	51 K 486487 7448278	365 m	1	D-HG1
Q60	51 K 488747 7446620	348 m	2	OD-OS1
Q61	51 K 489605 7448344	349 m	2	OD-OS1
Q62	51 K 489687 7449397	369 m	2	D-HG2
Q63	51 K 489728 7449697	352 m	1	OD-AFW1
Q64	51 K 489219 7452291	364 m	2	P-HG1
Q65	51 K 488489 7450064	355 m	2	OD-AFW1
Q66	51 K 487883 7449091	357 m	2	OD-AFW1
Q67	51 K 487622 7448783	339 m	1	OD-AFW1
Q68	51 K 486538 7448930	359 m	1	OD-EW1
Q69	51 K 485585 7449719	368 m	1	OD-EW1
Q70	51 K 486196 7453478	370 m	3	P-HG1
Q71	51 K 484667 7453427	373 m	2	P-HG1
Q72	51 K 483108 7447960	367 m	2	D-HG1
Q73	51 K 474575 7418716	334 m	2	CD-CSSSF1
Q74	51 K 471635 7420533	330 m	2	D-HG1
Q75	51 K 470423 7425745	327 m	2	D-HG1
Q76	51 K 477487 7427605	326 m	2	D-HG2
Q77	51 K 479774 7426212	355 m	2	D-CFW1
Q78	51 K 479163 7425717	336 m	1	D-CFW1
Q79	51 K 481881 7453191	366 m	1	P-HG1
Q80	51 K 469463 7457967	426 m	1	RH-AFW1
Q81	51 K 466189 7458645	430 m	1	P-HG2
Q82	51 K 462021 7460906	401 m	1	P-HG1
Q83	51 K 458721 7460337	471 m	1	RH-AFW1
Q84	51 K 456171 7461097	408 m	1	P-HG1
Q85	51 K 452276 7462789	408 m	1	P-HG2
Q86	51 K 450784 7463538	388 m	1	P-HG1
Q87	51 K 445361 7465825	377 m	1	P-HG1
Q88	51 K 444048 7465810	394 m	1	OD-AFW1
Q89	51 K 437127 7465782	363 m	1	OD-EW1
Q90	51 K 433771 7465258	373 m	1	P-HG1
Q91	51 K 427026 7465796	365 m	2	D-HG2
Q92	51 K 427070 7466004	372 m	2	D-HG1
Q93	51 K 413415 7466988	352 m	2	D-HG1
Q94	51 K 402836 7468521	418 m	2	RH-MWS1
Q95	51 K 402251 7468890	412 m	1	RH-MWS1
Q96	51 K 397615 7467534	373 m	1	OD-EW1
Q97	51 K 394187 7469167	400 m	1	OD-AFW1
Q98	51 K 390119 7471122	398 m	1	P-HG1
Q99	51 K 385849 7472069	403 m	2	RH-AFW1
Q100	51 K 376603 7474075	397 m	1	P-HG2
Q101	51 K 369226 7473901	396 m	1	D-HG2
Q102	51 K 367622 7473662	403 m	1	D-CFW1
Q103	51 K 362824 7473058	428 m	1	P-HG2
Q104	51 K 364022 7473940	441 m	2	RH-MWS1
Q105	51 K 358695 7472497	427 m	2	D-HG1
Q106	51 K 356663 7472445	420 m	1	D-CFW1
Q107	51 K 350895 7471756	432 m	1	D-HG1
Q108	51 K 338824 7469286	470 m	1	D-HG2
Q109	51 K 333967 7469289	456 m	1	D-CFW1
Q110	51 K 327189 7470754	473 m	1	D-HG2
Q111	51 K 316058 7473100	473 m	1	RP-HG1

Quadrat	Coordinates	Elevation	Precision (m)	Vegetation Type
Q112	51 K 312042 7473435	459 m	1	RP-AFW1
Q113	51 K 304945 7472962	454 m	1	RP-HG1
Q114	51 K 296645 7472339	480 m	1	RP-AFW1
Q115	51 K 293005 7472026	477 m	1	OD-EW1
Q116	51 K 283981 7473418	493 m	1	RP-HG1
Q117	51 K 278813 7473927	496 m	1	RP-AFW1

Transect	Easting	Northing	Transect Point
T1	490874	7427988	Mutual Starting point
	490797	7428049	Parallel end point
	490957	7428047	Perpendicular end point
T2	480196	7425142	Mutual Starting point
	480286	7425100	Parallel end point
	480211	7425163	Perpendicular end point
T3	472885	7428119	Mutual Starting point
	472985	7428113	Parallel end point
	472888	7428126	Perpendicular end point
T4	471030	7426837	Mutual Starting point
	470933	7426867	Parallel end point
	470996	7426746	Perpendicular end point
T5	469195	7423628	Mutual Starting point
	469111	7423666	Parallel end point
	469150	7423545	Perpendicular end point
T6	471096	7415895	Mutual Starting point
	471014	7415940	Parallel end point
	471149	7415977	Perpendicular end point
T7	465686	7413435	Mutual Starting point
	465681	7413532	Parallel end point
	465665	7413430	Perpendicular end point
T8	462229	7409696	Mutual Starting point
	462256	7409791	Parallel end point
	462322	7409658	Perpendicular end point
T9	460345	7404680	Mutual Starting point
	460406	7404601	Parallel end point
	460425	7404740	Perpendicular end point
T10	460091	7400034	Mutual Starting point
	460004	7400086	Parallel end point
	460033	7399950	Perpendicular end point
T11	462091	7396054	Mutual Starting point
	462007	7396107	Parallel end point
	462045	7395993	Perpendicular end point
T12	465641	7395379	Mutual Starting point
	465653	7395477	Parallel end point
	465603	7395401	Perpendicular end point
T13	469260	7389353	Mutual Starting point
	469258	7389253	Parallel end point

Transect	Easting	Northing	Transect Point
	469158	7389358	Perpendicular end point
T14	472752	7385855	Mutual Starting point
	472702	7385766	Parallel end point
	472789	7385795	Perpendicular end point
T15	478172	7379427	Mutual Starting point
	478083	7379476	Parallel end point
	478137	7379336	Perpendicular end point
T16	494933	7410651	Mutual Starting point
	494992	7410726	Parallel end point
	494940	7410627	Perpendicular end point
T17	494020	7420833	Mutual Starting point
	494056	7420744	Parallel end point
	494091	7420904	Perpendicular end point
T18	495316	7426429	Mutual Starting point
	495319	7426327	Parallel end point
	495411	7426431	Perpendicular end point

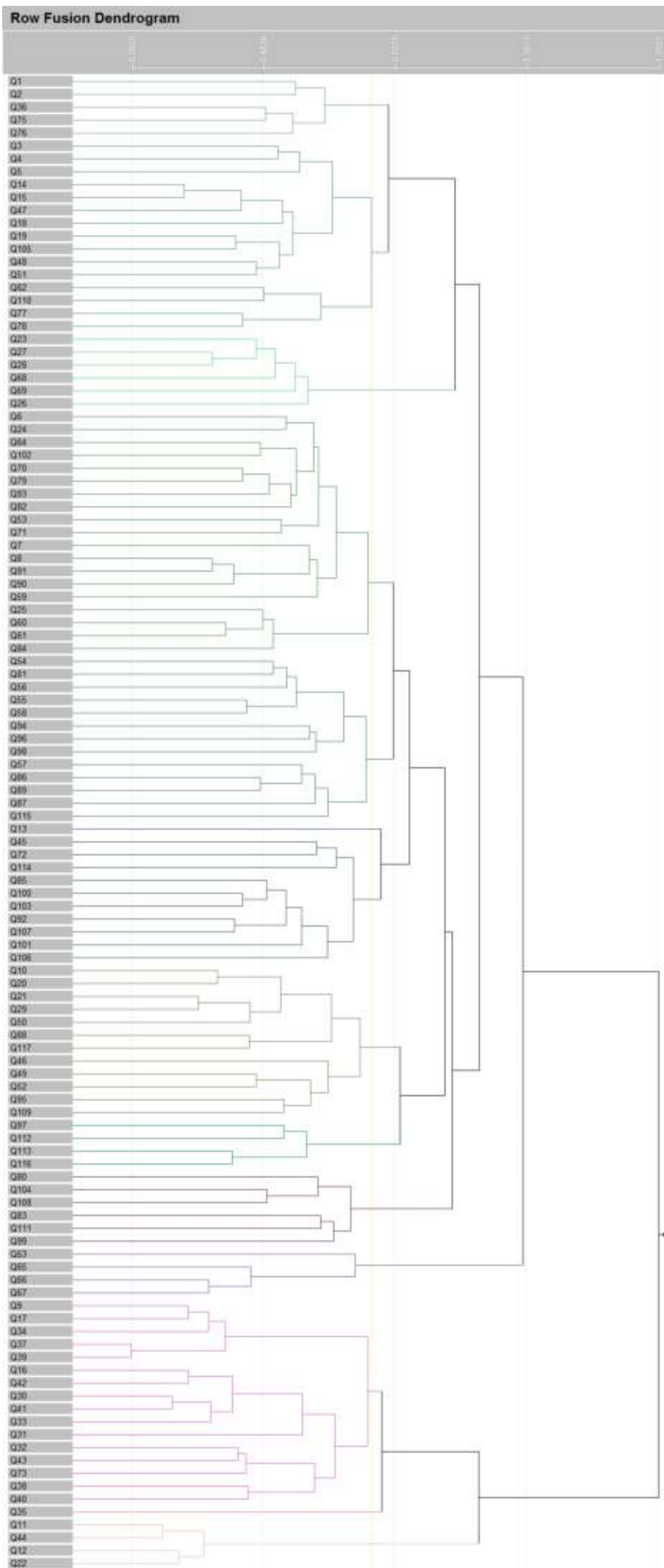
Appendix 6: Quadrat Datasheets

Provided as a separate document

Appendix 7: Quadrat Photographs

Provided as a separate document

Appendix 8: PATN Analysis results

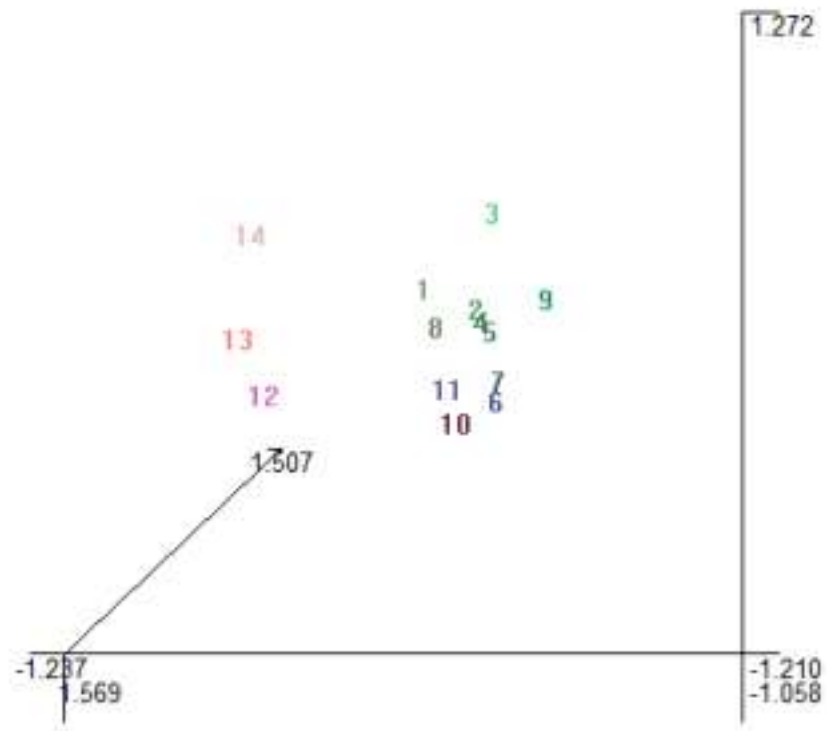


Stress: 0.2306

LEGEND

- Group 1
- Group 2
- Group 3
- Group 4
- Group 5
- Group 6
- Group 7
- Group 8
- Group 9
- Group 10
- Group 11
- Group 12
- Group 13
- Group 14

PATN groups



Appendix 9: Vegetation Condition Rating

Vegetation Condition Rating	South West and Interzone Botanical Provinces	Eremaean and Northern Botanical Provinces
Pristine	Pristine or nearly so, no obvious signs of disturbance or damage caused by human activities since European settlement.	
Excellent	Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species. Damage to trees caused by fire, the presence of non-aggressive weeds and occasional vehicle tracks.	Pristine or nearly so, no obvious signs of damage caused by human activities since European settlement.
Very Good	Vegetation structure altered, obvious signs of disturbance. Disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing.	Some relatively slight signs of damage caused by human activities since European settlement. For example, some signs of damage to tree trunks caused by repeated fire, the presence of some relatively non-aggressive weeds, or occasional vehicle tracks.
Good	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. Disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing.	More obvious signs of damage caused by human activity since European settlement, including some obvious impact on the vegetation structure such as that caused by low levels of grazing or slightly aggressive weeds.
Poor		Still retains basic vegetation structure or ability to regenerate it after very obvious impacts of human activities since European settlement, such as grazing, partial clearing, frequent fires or aggressive weeds.
Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. Disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds at high density, partial clearing, dieback and grazing.	Severely impacted by grazing, very frequent fires, clearing or a combination of these activities. Scope for some regeneration but not to a state approaching good condition without intensive management. Usually with a number of weed species present including very aggressive species.
Completely Degraded	The structure of the vegetation is no longer intact and the area is completely or almost completely without native species. These areas are often described as 'parkland cleared' with the flora comprising weed or crop species with isolated native trees and shrubs.	Areas that are completely or almost completely without native species in the structure of their vegetation; i.e. areas that are cleared or 'parkland cleared' with their flora comprising weed or crop species with isolated native trees or shrubs.