MACKAY POTASH PROJECT

FLORA AND VEGETATION ENVIRONMENTAL MANAGEMENT PLAN

PREPARED FOR **AGRIMIN LIMITED**

September 2021

EPA Assessment No. 2193 (WA)

EPBC Act No. 2018/8834 (Commonwealth)

Stantec

This document has been prepared for the benefit of Agrimin Limited. No liability is accepted by this company or any employee or sub-consultant of this company with respect to its use by any other person.

This disclaimer shall apply notwithstanding that the report may be made available to other persons for an application for permission or approval to fulfil a legal requirement.

QUALITY STATEMENT

PROJECT MANAGER	PROJECT TECHNICAL LEAD
Tracy Schwinkowski	Matt Spence

PREPARED BY		
Courtney Kains and Matt Spence	.....	21/08/2021
CHECKED BY		
Paul Bolton, Alice Bott and Fiona Taukulis	.....	22/08/2021
REVIEWED BY		
Peter Tapsell	.....	31/08/2021
APPROVED FOR ISSUE BY		
Peter Tapsell	.....	31/08/2021

PERTH
Ground Floor, 226 Adelaide Terrace, PERTH, WA 6000
TEL +61 (08) 6222 7000

REVISION SCHEDULE

Rev No.	Date	Description	Signature or Typed Name (documentation on file)			
			Prepared by	Checked by	Reviewed by	Approved by
V0.1	26/11/2020	Draft for submission	MY/MS/CK/KB	SL	SO / PdSM	SO
V1.0	10/09/2021	Final Draft addressing DMA comments	MS/CK	PB/AB/FT	PT	PT

Table ES1: FVEMP Summary

Project Name	MacKay Sulphate of Potash Project
Proponent Name	Agrimin Limited
Ministerial Statement Number	N/A – Project is under assessment (Assessment Number 2193)
Purpose of FVEMP	The purpose of the FVEMP is to address the requirements of the Agrimin ESD and present a robust and implementable environmental management framework to protect the environmental values of the Project Area and demonstrate that the EPA's objectives are met during the operation of the Project in respect to flora and vegetation
Key Environmental Factors and objectives	**Flora and Vegetation:** • To ensure that operational activities of the Project avoid and minimise adverse impacts to riparian vegetation health in the Project area. • To ensure that operational impacts to flora and vegetation due to the introduction or spread of weeds are minimised. • To avoid and minimise the potential for the Project operations to cause altered fire regimes . • To ensure the likelihood of contaminated material entering the environment is minimised and remediated before environmental harm occurs to flora and vegetation • To avoid adverse impacts to flora and vegetation from fugitive dust emissions generated by the Project operations
Condition Clauses	N/A
Key components in the FVEMP	Key provisions are detailed in Section 3
Proposed Construction Date	TBD
EMP required pre-construction?	No

Corporate Endorsement

I hereby certify that to the best of my knowledge, the provisions within this Mackay Potash Project Flora and Vegeation Management Plan are true and correct.

Name: **Signed:**

Position: **Date:**

Abbreviations

Agrimin	Agrimin Limited
BC Act	Biodiversity Conservation Act 2016
CMCP	Conceptual Mine Closure Plan
Cwth	Commonwealth
DBCA	Department of Biodiversity, Conservation and Attractions
EP Act	*Environmental Protection Act 1986*
EPA	Environmental Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
ERD	Environmental Review Document
ESD	Environmental Scoping Document
ha	hectare
km	kilometre
m	meters
NIDE	Northern Infrastructure Development Envelope
NT	Northern Territory
NT	Northern Territory
Off-LDE	Off Lake Development Envelope
On-LDE	On Lake Development Envelope
PEC	Priority Ecological Community
SIDE	Southern Infrastructure Development Envelope
TEC	Threated Ecological Community
WA	Western Australian
WAH	Western Australian Herbarium
WC Act	*Wildlife Conservation Act 1950*

Agrimin Limited

Flora and Vegetation Environmental Management Plan

CONTENTS

LIST OF TABLES

LIST OF FIGURES

1. Context, Scope and Rationale

1.1 The Project

Agrimin will own and operate the greenfields potash fertiliser operation Project (the Project) located approximately 450 km south of Halls Creek and 790 km west of Alice Springs by road. The Project is located within the East Pilbara region of Western Australia (WA), adjacent to the WA and Northern Territory (NT) border (Figure 1-1).

The Project involves the extraction of brine from a network of shallow trenches established on the surface of Lake Mackay. The brine will be transferred into evaporation ponds for the precipitation of salt which will be harvested and then processed to produce a potash fertiliser product.

The Project is remote and extensive (263,675 hectares (ha)) and therefore four development envelopes have been defined. The following terms are used throughout the FVEMP:

- **Study Area** – refers to the boundary within which all investigations and field surveys were undertaken (443,985.37).
- **Development Envelopes (post approval terminology - Project Area)** – the boundary within which the elements of the Project are situated. The development envelopes occur entirely within the Study Area and comprise four components that make up the Project. The Project includes disturbance of up to 15,000 ha of the lake's surface and clearing of approximately 1,500 ha of native vegetation. The proposed extent of the physical and operational elements includes four development envelopes (Figure 1-1):
    - **On-lake Development Envelope (On-LDE):** On-lake development of trenches, extraction of up to 100 GL/a of brine, and solar evaporation and harvesting ponds for potash salts, including ground disturbance of approximately 15,000 ha within the 217,261 ha On-LDE.
    - **Off-Lake Development Envelopes (Off-LDE)**: Off-lake development of a processing plant and associated site infrastructure, including access roads, accommodation camp, airstrip and solar farm, including clearing of approximately 200 ha of native vegetation within the 688 ha Off-LDE.
    - **Southern Infrastructure Development Envelope (SIDE)**: Development of borefield, water pipeline and access tracks for abstracting up to 3.5 GL/a of processing water and off-lake access to Lake Mackay including clearing of approximately 300 ha of native vegetation within the 11,799 ha SIDE.
    - **Northern Infrastructure Development Envelope (NIDE)**: Haul road for transporting potash production to Wyndham Port, including clearing of approximately 1,000 ha of native vegetation within the 33,928 ha NIDE.
- **Indicative Footprints** – the proposed Indicative Footprints (IFs) occur entirely within the Project Area and refers to the area that is proposed to be directly disturbed by the Project (e.g. clearing of native vegetation). The layout of the IF may be subject to change, however, total disturbance will not exceed the maximum extent of disturbance for each Development Envelope as presented in the Environmental Review Document (ERD). Proponent-led avoidance and minimise measures has been implemented where possible to reduce and minimise potential impacting on areas of high ecological or heritage value through the detailed design of the indicative footprints.

1.2 Purpose and Objectives

The purpose of the FVEMP is to describe how the environmental impacts of activities related to the implementation of the Project will be adequately managed during the operational phases of the Project. This FVEMP demonstrates that the potential impact to flora and vegetation have been avoided and minimised to as low as practicable and that the Environmental Protection Authority (EPA's) Environmental Objective for Flora and Vegetation can be met.

The scope of the FVEMP applies specifically to operational activities within the Project Area. The clearing required within the Off-LDE, SIDE and NIDE includes 1,500 ha of native vegetation, and a further 15,000 ha of ground disturbance within the On-LDE.

The overarching objective of the FVEMP is to avoid and minimise direct and indirect impacts to listed flora species, vegetation communities and flora and vegetation that supports fauna and significant fauna species.

This FVEMP has been prepared in accordance with the '*Instructions on how to prepare Environmental Protection Act 1986 Part IV Environmental Management Plans*' (EPA 2020a).

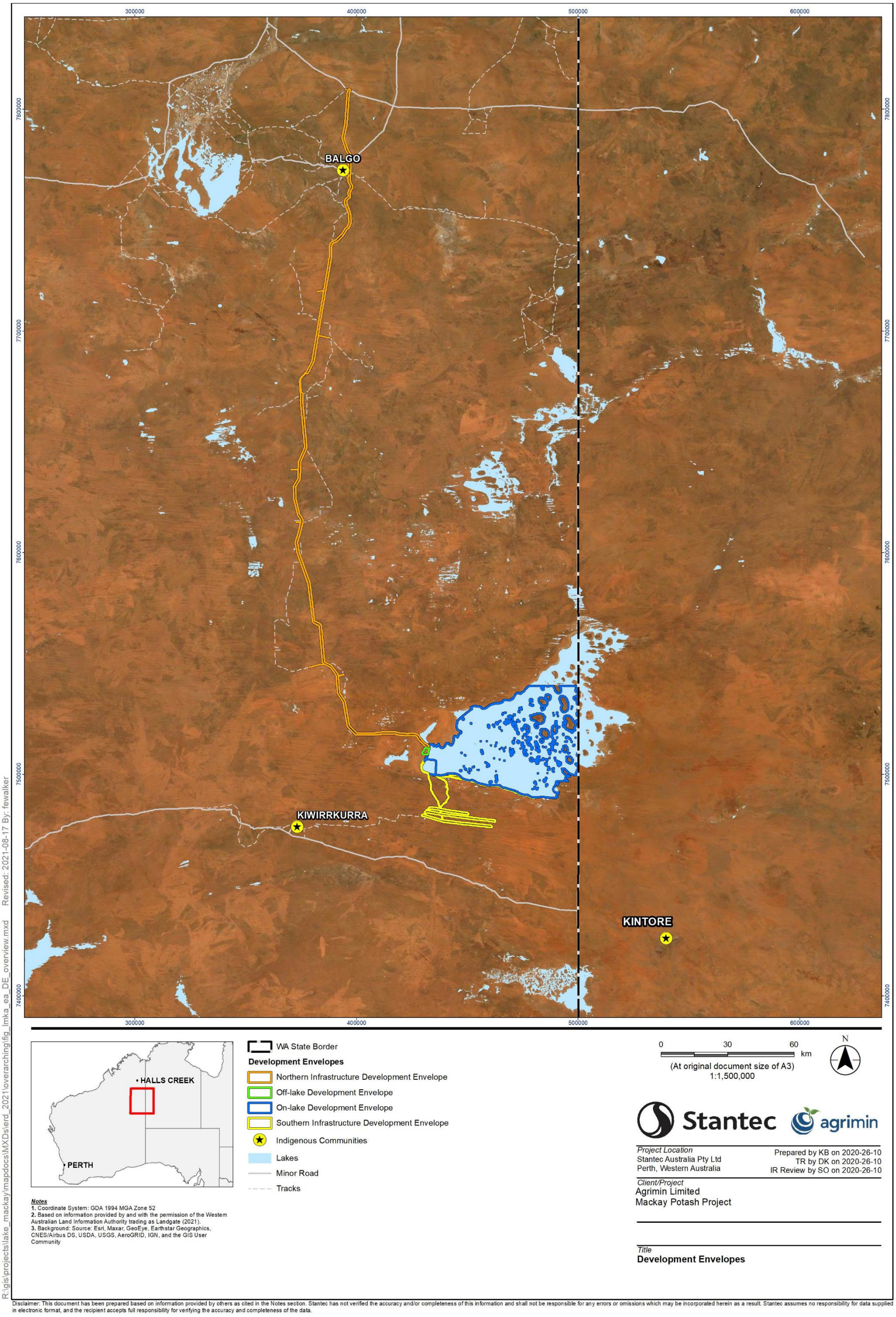


Figure 1-1: Mackay Potash Project Development Envelopes

1.3 Key Environmental Factor – Flora and Vegetation

The FVEMP has been prepared as part of the Project's management framework to address the EPA's Environmental Factor of 'Flora and Vegetation'. The EPA Objective for Flora and Vegetation is '*To protect flora and vegetation so that biological diversity and ecological integrity are maintained'* (EPA 2016a). This Plan aims to manage any potential impacts to flora and vegetation that may be caused as a result of operational activities for the Project, whereby, meeting the EPA Objective.

It should be noted that the On-LDE environment is characterised by high levels of salinity and is devoid of native vegetation that could provide an ecological function for significant flora species. Project related operational activities, particularly on the On-LDE, aim to minimise impacts to the extensive network of island outcrops (~2% of the lake) that comprise flora and vegetation and potential significant habitat types (i.e. rocky ridge, crevices). These island outcrops will be managed through exclusion zones and buffer areas to ensure the ecological function is maintained.

The potential impacts to flora and vegetation relating to the Project's operational activities include:

- decline in vegetation health;
- weed introduction and proliferation;
- altered fire regimes; and
- contaminants spills.

1.4 Condition Requirements

The Project is currently under assessment by the EPA (assessment number 2173). This FVEMP has been prepared for submission with the ERD and provides a draft condition framework for the EPA to consider as part of the ERD process. As the Project is still under assessment, a Ministerial Statement has not yet been issued.

1.5 Rationale and Approach

Agrimin is committed to avoiding and minimising potential impacts from Project related operational activities to ensure the biodiversity and ecological integrity of flora and vegetation are maintained.

The FVEMP proposes a combination of objective-based and outcome-based management provisions, which will ensure that a robust and implementable environmental management approach is achieved. The management provisions will be supported by clearly defined environmental management objectives to avoid and mitigate impacts relating to the Project.

Rationale for the proposed management approach is supported by baseline survey work and an in-depth understanding of the environmental values in the Project Area, ensuring that the environment outcomes are able to be reported against trigger and threshold levels. Where impacts are not measurable, and actions can be monitored, objective-based provisions have been applied.

1.5.1 Environmental Surveys

The rationale for the proposed management approach in this FVEMP is supported by the technical survey work undertaken to date, including extensive field surveys of the Development Envelopes since 2017, comprising desktop, reconnaissance, and targeted significant flora surveys and riparian vegetation sampling. The findings of the surveys have been used to inform the impact assessment in the ERD and used to develop management and mitigation measures.

1.5.2 Vegetation

1.5.2.1 Vegetation Types

Several broad landform types occur within the Study Area, the most common of which are sandplains, gravelly plains, sand dunes, swales, clay depressions and saline lake margins. The relatively restricted landforms included mesas, breakaways and gorges, gullies and minor creeks, and soaks and drainage basins, predominantly within the haul road corridor. The vegetation broadly consists of Triodia hummock grasslands, with some low height open woodlands comprising eucalypts and Acacia species and low height open samphires around saline flats and depressions. The vegetation generally represents comparable landforms in the Mackay subregion of the Great Sandy Desert and Tanami bioregions.

Vegetation type mapping from four of the previous surveys and the Stantec Survey was integrated into a single delineation and description of vegetation types for the Study Area. Fourteen broad floristic formations were described within the Study Area and 50 vegetation types were mapped, none of which represent Threatened or a Priority Ecological Communities, or groundwater dependent vegetation (Table 1-1.

All 50 of the of the vegetation types described and delineated in the Study Area occur within the Project Area. Of these 50 vegetation types, 39 occur in the NIDE, 15 in the SIDE, 11 within the On-LDE and five within the Off-LDE. These 50 vegetation types were aligned with 14 broad floristic formation, that describe the most dominant genus and its growth form, cover and height within a given mapping polygon. Table 1-1 provides the vegetation types that have been identified in the Study Area, while Figure 1-2, Figure 1-3 and Figure 1-4, depict their locations and extent.

1.5.2.2 Significant Vegetation

According to the EPA Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment (EPA 2016a), vegetation may be considered significant for a range of reasons, including:

- where vegetation is identified as threatened ecological communities (TECs) or priority ecological communities (PECs);
- where vegetation represents a restricted distribution; the degree of historical impact from threatening processes to vegetation;
- where vegetation provides important refuge; and
- where vegetation provides an important function required to maintain ecological integrity of a significant ecosystem.

No vegetation types identified and described within the Study Area were considered analogous to any State or Commonwealth listed Threatened Ecological Communities or Priority Ecological Communities. No Threatened Ecological Communities or Priority Ecological Communities have been previously mapped in close proximity to the Study Area.

1.5.2.2.1 Vegetation supporting Priority Flora

A total of 19 vegetation types support Priority flora within the Proposal area and are therefore considered to be locally significant . Of the 19, two support Priority 1 species and both are highly associated with the margins of Lake Mackay and dominated by chenopods including a number of Tecticornia species. However, given the broad vegetation type mapping and extrapolation required in relation to the extent of the significant flora, it is likely that the full extent of each of the 19 vegetation types are not locally significant. The vegetation types considered to be of highest local significance include:

- TsppEf –Stackhousia sp. Lake Mackay (P.K. Latz 12870) (P1) was recorded on the saline margins of Lake Mackay. This vegetation type typically represented riparian vegetation at the interface between the playa and terrestrial vegetation types , and dominated by a suite of Tecticornia spp.
- MlGcSdFcTspp(TsaTp) – a vegetation type supporting riparian flora, and mapped in close proximity to the margins of Lake Mackay, and on most islands. This vegetation type is dominated by a number of halophilic species, including Stackhousia sp. Lake Mackay (P.K. Latz 12870) (P1), Eragrostis lanicaulis (P3) and Stackhousia clementii (P3), and also supported a suite of Tecticornia spp.

1.5.2.2.2 Potential Groundwater-dependent Vegetation

There were no groundwater dependent vegetation types recorded within the Proposal area. No permanent or semi-permanent surface water features such as rivers or major creeks occur within the Proposal area. Claypans that temporarily hold freshwater following significant rainfall events are distributed within the southern and central portions of the Study Area.

Four species recorded within the Proposal area represent potential groundwater dependent species: *Allocasuarina decaisneana, Eucalyptus victrix, Melaleuca glomerata* and *Corymbia candida*. Other dominant and associated species in the vegetation types supporting the potential groundwater dependent species are not dependent on groundwater.

Eucalyptus victrix, Melaleuca glomerata and potentially *Corymbia candida*, are generally considered to be examples of vadophytes; species which have a lower reliance on groundwater and primarily use water held in the unsaturated zone above the watertable (Sommer and Froend 2010). *Eucalyptus victrix* can access groundwater in proximity to the surface (O'Grady 2009), and while they are relatively drought tolerant, individuals can decline in condition when groundwater is limited. Furthermore, *Allocasuarina decaisneana* is

known to develop a fast growing tap-root that can reach a depth of over 10 m, and can reach any sub-surface water source (ALA 2021).

Table 1-1: Summary of Vegetation Types.

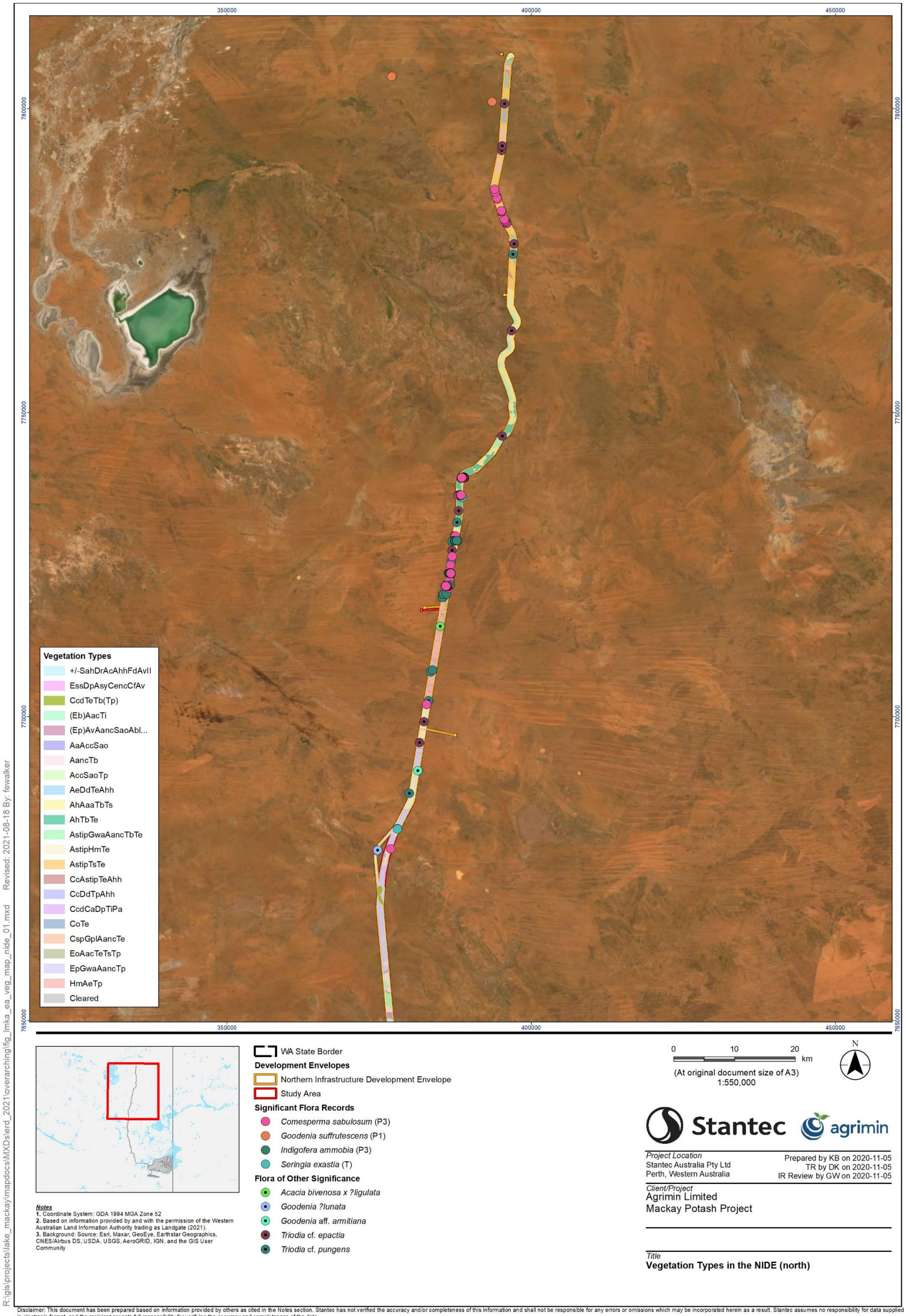
Broad Floristic Formation	Vegetation Type Code	Vegetation Type Description and Associated Species	Vegetation Condition	Extent in Study Area		Extent in Project Area		Extent in Indicative Footprint	
				(ha)	(%)	(ha)	(%)	(ha)	(%)
Triodia hummock grassland	EgEp(Co)AsppTb	*Eucalyptus pachyphylla* and/or *Eucalyptus gamophylla* (± *Corymbia opaca*) low open woodland over mixed *Acacia (Acacia adsurgens, Acacia elachantha, Acacia ancistrocarpa, Acacia ligulata*) over *Triodia basedowii* hummock grassland. Associated species: *Acacia cuthbertsonii, Acacia inaequilatera, Acacia tenuissima, Triodia salina* and *Triodia schinzii.*	Excellent	63,076.43	14.21	8,253.63	13.09	143.47	0.23
Triodia open hummock grassland	AstipGwaAancTbTe	*Acacia stipuligera*, *Grevillea wickhamii* subsp. *aprica* and *Acacia ancistrocarpa* tall open shrubland over *Triodia basedowii* (*Triodia epactia*) open hummock grassland. Associated species: *Acacia adsurgens, Acacia adoxa var. adoxa, Acacia elachantha, Acacia maitlandii, Acacia monticola, Corymbia candida subsp. ?dipsodes, Dampiera candicans, Dicrastylis doranii, Eucalyptus gamophylla, Eucalyptus pachyphylla, Gompholobium simplicifolium, Hakea macrocarpa* and *Triodia schinzii.*	Excellent	4,576.04	1.03	4,576.04	100.00	132.30	2.89
Triodia open hummock grassland	AhAaaTbTs	*Acacia hilliana* and *Acacia adoxa* var. *adoxa* low open shrubland over *Triodia basedowii* and *Triodia schinzii* open hummock grassland. Associated species: *Aristida holathera* var. *holathera, Calytrix carinata, Dampiera candicans, Fimbristylis oxystachya, Grevillea wickhamii* subsp. *aprica, Halgania solanacea* var. *solanacea, Hybanthus aurantiacus, Mirbelia viminalis, Ptilotus astrolasius* and *Triodia spicata.*	Very Good to Excellent	2,083.11	0.47	2,081.61	99.93	73.65	3.54
Triodia open hummock grassland	EpGwaAancTp	*Eucalyptus pachyphylla* scattered mallee over *Grevillea wickhamii* subsp. *aprica* and *Acacia ancistrocarpa* scattered tall shrubs over *Triodia pungens* open hummock grassland. Associated species: *Acacia elachantha, Acacia sericophylla, Dicrastylis doranii* and *Hakea lorea* subsp. *lorea.*	Excellent to Very Good	2,830.39	0.64	2,204.46	77.89	72.16	2.55
Triodia open hummock grassland	AdAlALMTs	*Allocasuarina decaisneana* open woodland over *Acacia ligulata* and *Acacia* sp. Lake Mackay (P.K. Latz 12836) open shrubland over *Triodia schinzii* open hummock grassland. Associated species: *Aristida holathera* var. *holathera, Dicrastylis doranii, Grevillea stenobotrya* and *Scaevola parvifolia* subsp. *parvifolia.*	Excellent	941.66	0.21	331.48	35.20	69.94	7.43
Triodia hummock grassland	AstipHmTe	*Acacia stipuligera* and/or *Hakea macrocarpa* tall open shrubland over *Triodia epactia* open hummock grassland. Associated species: *Acacia adsurgens, Acacia ancistrocarpa, Acacia melleodora, Acacia tenuissima, Aristida holathera var. holathera, Corymbia* sp., *Eucalyptus pachyphylla, Eragrostis eriopoda* and *Fimbristylis oxystachya.*	Excellent	2,319.05	0.52	2,262.76	97.57	65.84	2.84
Triodia open hummock grassland	GsAlALMMlNcTp	*Grevillea stenobotrya, Acacia ligulata, Acacia* sp. Lake Mackay (P.K. Latz 12836) tall open shrubland over *Melaleuca lasiandra* open shrubland over *Newcastelia cladotricha* low open shrubland over *Triodia pungens* open hummock grassland. Associated species: *Chrysocephalum eremaeum, Frankenia cordata, Pterocaulon sphacelatum* and *Stylobasium spathulatum.*	Excellent	6,413.68	1.44	404.61	6.31	62.94	0.98
Triodia hummock grassland	AancTb	*Acacia ?ancistrocarpa* tall shrubland over *Triodia basedowii* hummock grassland. Associated species: *Acacia eriopoda, Acacia hilliana, Stylobasium spathulatum, Triodia epactia and Hakea chordophylla.*	Excellent	2,122.25	0.48	2,015.24	94.96	62.92	2.96
Triodia open hummock grassland	AstipTsTe	*Acacia stipuligera* tall open shrubland over *Triodia schinzii* and/or *Triodia epactia* open hummock grassland. Associated species: *Acacia sericophylla, Comesperma sabulosum, Dicrastylis doranii, Dicrastylis exsuccosa, Eragrostis eriopoda, Jacksonia aculeata, Melaleuca lasiandra, Petalostylis cassioides, Triodia pungens* and *Yakirra australiensis* var. *australiensis.*	Excellent to Very Good (1.2 ha was mapped Poor)	2,176.92	0.49	2176.92	100.00	61.25	2.81
Triodia hummock grassland	(+/-Ev)EgAad(Sao)Tb	*Eucalyptus victrix* low open woodland and/or *Eucalyptus gamophylla* mallee over *Acacia adsurgens* and/or *Senna artemisioides* subsp. *oligophylla* open shrubland over *Triodia ?basedowii* and *Triodia pungens* hummock grassland. Associated species: *Acacia ?ligulata, Bonamia erecta, Indigofera ?georgei, Seringia elliptica* and *Stylobasium spathulatum.*	Excellent	2,104.25	0.47	2,104.25	100.00	57.31	2.72
Triodia hummock grassland	HmAeTp	*Hakea macrocarpa* and *Acacia eriopoda* tall open shrubland over *Triodia pungens* hummock grassland. Associated species: *Acacia melleodora, Acacia stipuligera, Aristida holathera* var. *holathera. Cassytha capillaris, Dicrastylis doranii* and *Scaevola parvifolia* subsp. *parvifolia.*	Excellent	1,818.27	0.41	1,808.83	99.48	54.98	3.02
Triodia hummock grassland	AhTbTe	*Acacia hilliana* low open shrubland over *Triodia basedowii* and *Triodia epactia* hummock grassland. Associated species: *Acacia monticola, Aristida holathera* var. *holathera, Calytrix carinata, Eriachne aristidea, Eucalyptus pachyphylla, Fimbristylis oxystachya, Grevillea wickhamii* subsp. *aprica, Senna notabilis* and *Sida Arenicola.*	Excellent	1,601.37	0.36	1,600.25	99.93	46.95	2.93
Triodia hummock grassland	EpAstipGwaCcarTb	*Eucalyptus pachyphylla* scattered mallee over *Acacia stipuligera* and *Grevillea wickhamii* subsp. *aprica* tall open shrubland over *Calytrix carinata* low scattered shrubs over *Triodia basedowii* hummock grassland. Associated species: *Acacia ancistrocarpa, Dicrastylis doranii* and *Grevillea eriostachya.*	Excellent	1,416.25	0.32	1,409.59	99.53	43.28	3.06

Broad Floristic Formation	Vegetation Type Code	Vegetation Type Description and Associated Species	Vegetation Condition	Extent in Study Area		Extent in Project Area		Extent in Indicative Footprint	
				(ha)	(%)	(ha)	(%)	(ha)	(%)
Triodia hummock grassland	HdSeTsTsp.	*Hakea divaricata* scattered tall shrubs over *Seringia elliptica* scattered low shrubs over *Triodia schinzii* (*Triodia* sp.) hummock grassland. Associated species: *Acacia ligulata, Androcalva ?loxophylla, Bonamia erecta, Carissa lanceolata, Indigofera ?georgei, Leptosema chambersii, Petalostylis cassioides, Stylobasium spathulatum* and *Triodia ?basedowii.*	Excellent to Very Good	4,423.51	1.00	1,308.24	29.57	39.26	0.89
Triodia hummock grassland	(Ep)AvAancAblSaoTpTe	*Eucalyptus pachyphylla* scattered mallee over *Acacia victoriae* and *Acacia ancistrocarpa* open shrubland over *Acacia bivenosa* x *?ligulata* and *Senna artemisioides* subsp. oligophylla low scattered shrubs over *Triodia pungens* and *Triodia epactia* hummock grassland. Associated species: *Acacia elachantha, Acacia sericophylla, Aristida holathera* var. *holathera, Atalaya hemiglauca, Arivela viscosa, Corymbia chippendalei, Grevillea wickhamii subsp. aprica, Hakea macrocarpa, Indigofera monophylla, Senna artemisioides* subsp. *helmsii, Tephrosia rosea* s.lat (small cuneate leaflet form), *Tephrosia* sp. Northern (K.F. Kenneally 11950), and *Triodia brizoides.*	Excellent	1,468.82	0.33	1,464.45	99.70	39.22	2.67
Triodia hummock grassland	(Eg)AlALMTb(Ts)	(± *Eucalyptus gamophylla*) *Acacia ligulata* and *Acacia* sp. Lake Mackay (P.K. Latz 12836) open shrubland over *Triodia basedowii* (*Triodia schinzii*) hummock grassland. Associated species: *Stylobasium spathulatum, Trianthema pilosa, Triodia salina and Triodia pungens.*	Excellent	2,233.67	0.50	428.27	19.17	33.08	1.48
Triodia open hummock grassland	EoAacTeTsTp	*Eucalyptus odontocarpa* scattered mallee over *Acacia acradenia* tall open shrubland over *Triodia epactia*, *Triodia schinzii* and/or *Triodia pungens* open hummock grassland. Associated species: *Acacia elachantha, Acacia sericophylla, Dicrastylis exsuccosa, Fimbristylis oxystachya, Grevillea wickhamii* subsp. *aprica, Halgania solanacea* var. *solanacea, Jacksonia aculeata, Melaleuca lasiandra, Mirbelia ?ramulosa, Tribulopis angustifolia* and *Yakirra australiensis* var. *?australiensis.*	Excellent to Good	1,132.87	0.26	1,132.81	100.00	27.94	2.47
Triodia open hummock grassland	EpEgAblAancTbTe	*Eucalyptus pachyphylla* and *Eucalyptus gamophylla* very open mallee over *Acacia bivenosa* x *?ligulata* and *Acacia ancistrocarpa* scattered shrubs over *Triodia basedowii* and/or *Triodia epactia* open hummock grassland. Associated species: *Acacia hilliana, Acacia tenuissima, Acacia stipuligera, Bonamia erecta, Hakea chordophylla* and *Triodia brizoides.*	Excellent	1,009.37	0.23	1,009.37	100.00	27.15	2.69
Triodia open hummock grassland	AadAeAancTbTs	*Acacia adsurgens, Acacia elachantha* and/or *Acacia ancistrocarpa*) open shrubland over *Triodia basedowii* and/or *Triodia schinzii* open hummock grassland. Associated species: *Acacia ligulata, Carissa lanceolata, Eucalyptus gamophylla, Senna notabilis* and *Senna artemisioides.*	Excellent	5,804.73	1.31	360.15	6.20	21.76	0.37
Maireana/ Tecticornia low shrubland	MlGcSdFcTspp(TsaTp)	*Maireana luehmannii, Goodenia collaris, Surreya diandra, Frankenia cordata, Tecticornia calyptrata* and *Tecticornia indica* subsp. *leiostachya* low shrubland over *Triodia salina* (*Triodia pungens* on islands) very open hummock grassland. Associated species: *Aristida holathera* var. *holathera, Eragrostis falcata, Lawrencia viridigrisea* and *Sclerolaena crenata.*	Excellent	7,673.33	1.73	678.34	8.84	21.68	0.28
Triodia hummock grassland	Ad(Eg)TpTb	*Allocasuarina decaisneana (± E. gamophylla)* low open woodland over *Triodia basedowii* and/or *Triodia pungens* hummock grassland. Associated species: *Acacia adsurgens, Melaleuca lasiandra, Stylobasium spathulatum,* and *Triodia schinzii.*	Excellent	12,625.80	2.84	472.43	3.74	18.81	0.15
Triodia open hummock grassland	CspGplAancTe	*Corymbia* sp. scattered mallees over *Grevillea pyramidalis* subsp. *leucadendron* tall open shrubland over *Acacia ancistrocarpa* scattered shrubs over *Triodia epactia* open hummock grassland. Associated species: *Acacia acradenia, Acacia adoxa* var. *adoxa, Acacia bivenosa x?ligulata, Aristida holathera var. holathera, Arivela viscosa, Dicrastylis exsuccosa, Dolichandrone occidentalis, Eragrostis eriopoda, Eriachne obtusa, Fimbristylis dichotoma, Grevillea wickhamii* subsp. *aprica, Indigofera monophylla, Tribulopis angustifolia, Trigastrotheca molluginea* and *Yakirra australiensis* var. *?australiensis.*	Excellent	633.07	0.14	633.07	100.00	17.42	2.75
Aristida open tussock grassland	±SahDrAcAhhFdAvll	(±*Senna artemisioides* subsp. *helmsii* low scattered shrubs) *Dactyloctenium radulans*, *Aristida contorta* and/or *Aristida holathera* var. *holathera* open tussock grassland with *Fimbristylis dichotoma* scattered sedges and *Arivela viscosa* and *Indigofera linifolia* scattered herbs. Associated species: *Abutilon otocarpum, , Eragrostis eriopoda, Eragrostis xerophila, Evolvulus alsinoides* var. *villosicalyx, Marsilea hirsuta, Ptilotus exaltatus, Ptilotus xerophilus, Tephrosia* sp. Northern (K.F. Kenneally 11950), and *Tribulus hirsutus.*	Excellent to Very Good	382.92	0.09	382.92	100.00	16.80	4.39
Corymbia low open woodland	CcGsNsDdTpilTs	*Corymbia chippendalei* low open woodland over *Grevillea stenobotrya* scattered shrubs over *Newcastelia spodiotricha* and *Dicrastylis doranii* low open shrubland over *Trianthema pilosum* low scattered shrubs over *Triodia schinzii* very open hummock grassland. Associated species: *Acacia melleodora, Aristida holathera var. holathera, Eragrostis eriopoda, Paractaenum refractum, Thinicola incana* and *Triodia epactia.*	Excellent	563.46	0.13	562.26	99.79	15.59	2.77
Triodia open hummock grassland	CddEpAelAancTb	*Corymbia deserticola* subsp. *deserticola* scattered low trees and/or *Eucalyptus pachyphylla* very open mallee over *Acacia elachantha* tall open shrubland over *Acacia ancistrocarpa* scattered shrubs over *Triodia basedowii* open hummock grassland.	Excellent	545.77	0.12	545.77	100.00	15.26	2.80

Broad Floristic Formation	Vegetation Type Code	Vegetation Type Description and Associated Species	Vegetation Condition	Extent in Study Area		Extent in Project Area		Extent in Indicative Footprint	
				(ha)	(%)	(ha)	(%)	(ha)	(%)
		Associated species: *Acacia eriopoda, Acacia hilliana, Acacia sericophylla, Grevillea wickhamii* subsp. *aprica, Hakea lorea* subsp. *lorea, Stylobasium spathulatum* and *Triodia pungens.*							
Triodia hummock grassland	AlTp	*Acacia ligulata* tall shrubland over *Triodia pungens* hummock grassland. Associated species: *Acacia trachycarpa, Eucalyptus gamophylla* and *Grevillea stenobotrya.*	Excellent	377.95	0.09	377.95	100.00	14.46	3.83
Triodia hummock grassland	AlMgTb(TpTs)	*Acacia ligulata* and *Melaleuca glomerata* scattered low shrubs over *Triodia basedowii* (± *Triodia pungens,* or *Triodia schinzii*) hummock grassland. Associated species: *Corchorus sidoides, Heliotropium glanduliferum* and *Ptilotus obovatus.*	Excellent	5,885.48	1.33	340.64	5.79	13.87	0.24
Triodia hummock grassland	CcdTeTb(Tp)	*Corymbia candida* subsp. *?dipsodes* low open woodland over *Triodia epactia, Triodia basedowii* and/or *Triodia ?pungens* hummock grassland. Associated species: *Acacia adsurgens, Eucalyptus pachyphylla* and *Mirbelia viminalis.*	Excellent	393.58	0.09	393.58	100.00	12.17	3.09
Frankenia / Tecticornia low open shrubland	FcTsppEf(TsaTs)	*Frankenia cordata* and *Tecticornia* spp. low open shrubland over *Eragrostis falcata* scattered tussock grasses and/or *Triodia salina* and *Triodia schinzii* very open hummock grassland. Associated species: *Aristida holathera* var. *holathera, Calocephalus platycephalus, Fimbristylis dichotoma, Melaleuca glomerata, Osteocarpum salsuginosum* and *Sclerolaena crenata.*	Excellent	6,090.96	1.37	146.99	2.41	11.20	0.18
Triodia open hummock grassland	CcAstipTeAhh	*Corymbia chippendalei* scattered low trees over *Acacia stipuligera* scattered tall shrubs over *Triodia epactia* open hummock grassland with *Aristida holathera* var. *holathera* scattered tussock grasses. Associated species: *Acacia acradenia, Acacia ?sericophylla, Dicrastylis doranii, Eriachne obtusa , Hakea lorea, Indigofera monophylla* and *Yakirra australiensis* var. *?intermedia.*	Excellent to Very Good	391.77	0.09	391.77	100.00	11.20	2.86
Triodia open hummock grassland	CcAlALMAmNsDdTsTp	*Corymbia chippendalei* low open woodland over *Acacia (Acacia ligulata, Acacia* sp. Lake Mackay (P.K. Latz 12836*)* or *Acacia melleodora*) open shrubland over *Newcastelia spodiotricha* and *Dicrastylis doranii* low open shrubland over *Triodia schinzii* and/or *Triodia pungens* open hummock grassland. Associated species: *Aristida holathera* var. *holathera, Crotalaria cunninghamii* and *Eriachne aristidea.*	Excellent	16,060.89	3.62	1695.98	10.56	10.78	0.07
Triodia open hummock grassland	(Eb)AacTi	(*±Eucalyptus brevifolia* scattered mallee) *Acacia acradenia* open shrubland over *Triodia intermedia* open hummock grassland. Associated species: *Acacia adoxa* var. *adoxa, Acacia elachantha, Acacia eriopoda, Acacia tenuissima, Acacia hilliana, Dodonaea coriacea, Enneapogon polyphyllus, Grevillea wickhamii* subsp. *aprica, Ptilotus astrolasius* and *Ptilotus calostachyus.*	Excellent	785.60	0.18	785.60	100.00	10.11	1.29
Triodia open hummock grassland	AlSaoTbTp	*Acacia ligulata* and *Senna artemisioides* subsp. *oligophylla* open shrubland over *Triodia basedowii* and/or *Triodia pungens* open hummock grassland. Associated species: *Eucalyptus pachyphylla, Ptilotus obovatus, Senna artemisioides* subsp. *helmsii* and *Streptoglossa macrocephala.*	Excellent	208.91	0.05	208.91	100.00	9.25	4.43
Triodia open hummock grassland	AccSaoTp	*Acacia cuthbertsonii* subsp. *cuthbertsonii* high open shrubland over *Senna artemisioides* subsp. *oligophylla* scattered shrubs over *Triodia pungens* open hummock grassland. Associated species: *Aristida contorta, Arivela viscosa, Enneapogon polyphyllus, Eragrostis xerophila* and *Eucalyptus victrix.*	Excellent	378.43	0.09	315.01	83.24	9.11	2.41
Acacia open woodland	AaAccSao	*Acacia ?aneura* low open woodland over *Acacia cuthbertsonii* subsp. *cuthbertsonii* and *Senna artemisioides* subsp. *oligophylla* open shrubland. Associated species: *Capparis umbonata, Enteropogon ramosus, Eragrostis xerophila, Ptilotus obovatus* and *Triodia* sp.	Excellent	273.81	0.06	240.94	88.00	8.84	3.23
Triodia hummock grassland	AeDdTeAhh	*Acacia eriopoda* scattered tall shrubs over *Dicrastylis doranii* scattered low shrubs over *Triodia epactia* hummock grassland with *Aristida holathera* var. *holathera* scattered tussock grasses. Associated species: *Acacia melleodora, Calytrix carinata, Cassytha capillaris, Eragrostis eriopoda, Fimbristylis oxystachya, Grevillea stenobotrya* and *Paraneurachne muelleri.*	Excellent	329.65	0.07	329.65	100.00	7.88	2.39
Triodia hummock grassland	MgTbTsaTs	*Melaleuca glomerata* open shrubland over *Triodia basedowii, Triodia salina,* and/or *Triodia schinzii* hummock grassland. Associated species: *Aristida holathera, Dicrastylis doranii, Eriachne aristidea, Eragrostis falcata* and *Senna artemisioides* subsp. *oligophylla.*	Excellent	5,833.57	1.31	153.74	2.64	5.64	0.10
Grevillea tall shrubland	GsAtAlNsTsTp	*Grevillea stenobotrya* tall shrubland over *Acacia trachycarpa* and *Acacia ligulata* shrubland over *Newcastelia spodiotricha* low open shrubland over *Triodia ?schinzii* and/or *Triodia pungens* very open hummock grassland. Associated species: *Aristida holathera* var *holathera*, *Acacia ?melleodora, Corymbia ?chippendalei, Eucalyptus gamophylla* and *Stylobasium spathulatum.*	Very Good	458.73	0.10	458.73	100.00	4.60	1.00

Broad Floristic Formation	Vegetation Type Code	Vegetation Type Description and Associated Species	Vegetation Condition	Extent in Study Area		Extent in Project Area		Extent in Indicative Footprint	
				(ha)	(%)	(ha)	(%)	(ha)	(%)
Corymbia low open woodland	CcDdTpAhh	*Corymbia chippendalei* low open woodland over *Dicrastylis doranii* low scattered shrubs over *Triodia pungens* open hummock grassland with *Aristida holathera* var. *holathera* scattered tussock grasses. Associated species: *Acacia eriopoda, Acacia melleodora, Eremophila forrestii* subsp. *?forrestii, Grevillea stenobotrya, Hakea macrocarpa, Melaleuca lasiandra, Newcastelia spodiotricha* and *Setaria surgens.*	Excellent	119.54	0.03	118.59	99.20	3.09	2.59
Triodia hummock grassland	EvAvSaoTlTe	*Eucalyptus victrix* low open woodland over *Acacia ?victoriae* and *Senna artemisioides* subsp. *oligophylla* open shrubland over *Triodia longiceps* and/or *Triodia epactia* open hummock grassland. Associated species: *Atalaya hemiglauca, Acacia adsurgens, Acacia cuthbertsonii subsp. cuthbertsonii, Aristida holathera* var. *holathera, Arivela viscosa, Eragrostis lanicaulis* and *Evolvulus alsinoides* var. *villosicalyx.*	Excellent to Very Good	81.81	0.02	81.81	100.00	2.05	2.50
Corymbia low woodland	CoTe	*Corymbia opaca* low woodland over *Triodia epactia* open hummock grassland. Associated species: *Acacia melleodora, Androcalva loxophylla, Clerodendrum floribundum* var. *coriaceum, Corchorus sidoides* subsp. *vermicularis, Hakea lorea* subsp. *lorea, Hakea macrocarpa, Polycarpaea corymbosa, Sida ?*sp. Rabbit Flat (B.J. Carter 626), *Sida ?*sp. Western Sand Dunes (P.K. Latz 11980), *Solanum diversiflorum and Trichodesma zeylanicum* var. *zeylanicum.*	Excellent	36.99	0.01	36.99	100.00	0.85	2.30
Triodia hummock grassland	EvTb(TsaTs)	*Eucalyptus victrix* low open woodland over *Triodia basedowii* (±*Triodia salina* or *Triodia schinzii*) hummock grassland. Associated species: *Carissa lanceolata, Melaleuca glomerata* and *Pluchea ferdinandi-muelleri*	Excellent	544.14	0.12	28.19	5.18	0.84	0.15
Tecticornia low open shrubland	TsppEf	*Tecticornia* spp. low open shrubland over *Eragrostis falcata* scattered tussock grasses. Associated species: *Frankenia cordata, Maireana luehmannii, Lawrencia viridigrisea* and *Surreya diandra.*	Excellent	7,871.48	1.77	698.04	8.87	0.25	0.00
Senna low open shrubland	SaoFcTsa(Tb)	*Senna artemisioides* subsp. *oligophylla* and *Frankenia cordata* low open shrubland over *Triodia* (*Triodia basedowii* or *Triodia salina*) very open hummock grassland. Associated species: *Acacia ligulata, Aristida holathera, Euphorbia tannensis* subsp. *eremophila, Scaevola spinescens* and *Sclerolaena crenata.*	Excellent	5,972.17	1.35	70.51	1.18	0.20	0.00
Corymbia low woodland	CcdCaDpTiPa	*Corymbia candida* subsp. *dipsodes* and/or *Corymbia aspera* low woodland over *Dodonaea polyzyga* tall open shrubland over *Triodia intermedia* scattered hummock grasses and *Pseudochaetochloa australiensis* very open tussock grassland. Associated species: *Acacia monticola, Amaranthus undulatus, Boerhavia coccinea, Arivela viscosa, Cymbopogon obtectus* and *Eriachne mucronata.*	Excellent	46.38	0.01	46.38	100.00	0.09	0.20
Acacia low woodland	AaptAparSaoAhh	*Acacia aptaneura* and/or *Acacia paraneura* low woodland over *Senna artemisioides* subsp. *oligophylla* low open shrubland over *Aristida. holathera* var. *holathera* very open tussock grassland. Associated species: *Aristida contorta, Carissa lanceolata, Enchylaena tomentosa, Eucalyptus victrix, Rhagodia eremaea* and *Sida fibulifera.*	Very Good to Excellent	195.84	0.04	0.00	0.00	0.00	0.00
Acacia open shrubland	ALMNsTp	*Acacia* sp. Lake Mackay (P.K. Latz 12836) open shrubland over *Newcastelia spodiotricha* low open shrubland over *Triodia pungens* hummock grassland. Associated species: *Anthobolus leptomerioides, Aristida holathera* var. *holathera, Corynotheca micrantha, Grevillea stenobotrya, Leiocarpa semicalva, Paractaenum refractum, Ptilotus latifolius, Ptilotus polystachyus Sida* sp. sand dunes (A.A. Mitchell PRP1208), *Stylobasium spathulatum* and *Triumfetta winneckeana.*	Excellent	2,626.07	0.59	20.18	0.77	0.00	0.00
Chrysopogon open tussock grassland	EssDpAsyCencCfAv	*Ehretia saligna* var. *saligna* and/or *Dodonaea polyzyga* tall open shrubland over *Chrysopogon fallax* and **Cenchrus ciliaris* open tussock grassland with *Arivela viscosa* open herbland. Associated species: *Abutilon hannii, Acacia ?synchronicia, Amaranthus induratus, Atalaya hemiglauca, Boerhavia coccinea, Crotalaria medicaginea* var. *neglecta, Evolvulus alsinoides* var. *villosicalyx, Indigofera colutea* and *Triodia intermedia.*	Good to Very Good	6.95	<0.01	6.95	100.00	0.00	0.00
Triodia hummock grassland	MgAl(Fc)TpEf	*Melaleuca glomerata* and/or *Acacia ligulata* open shrubland (± *Frankenia cordata)* over *Triodia pungens* hummock grassland with *Eragrostis falcata* scattered tussock grasses. Associated species: *Aristida holathera* var. *holathera, Arivela viscosa* and *Euphorbia tannensis* subsp. *eremophila.*	Excellent	13,433.11	3.03	86.83	0.65	0.00	0.00
Triodia open hummock grassland	SggTbr	*Senna glutinosa* subsp. *glutinosa* scattered shrubs over *Triodia brizoides* open hummock grassland. Associated species: *Acacia ?ancistrocarpa, Indigofera monophylla* and *Tephrosia* sp. Northern (K.F. Kenneally 11950).	Excellent	27.21	0.01	27.21	100.00	0.00	0.00

± denotes intermittent dominance of species across the overall vegetation type



Disclaimer: This document has been prepared based on information provided by others as cited in the Notes section. Stantec has not verified the accuracy and/or completeness of this information and shall not be responsible for any errors or omissions which may be incorporated herein as a result. Stantec assumes no responsibility for data supplied in electronic format, and the recipient accepts full responsibility for verifying the accuracy and completeness of the data.

Figure 1-2 Map of Vegetation Types in the NIDE and significant flora locations(north)

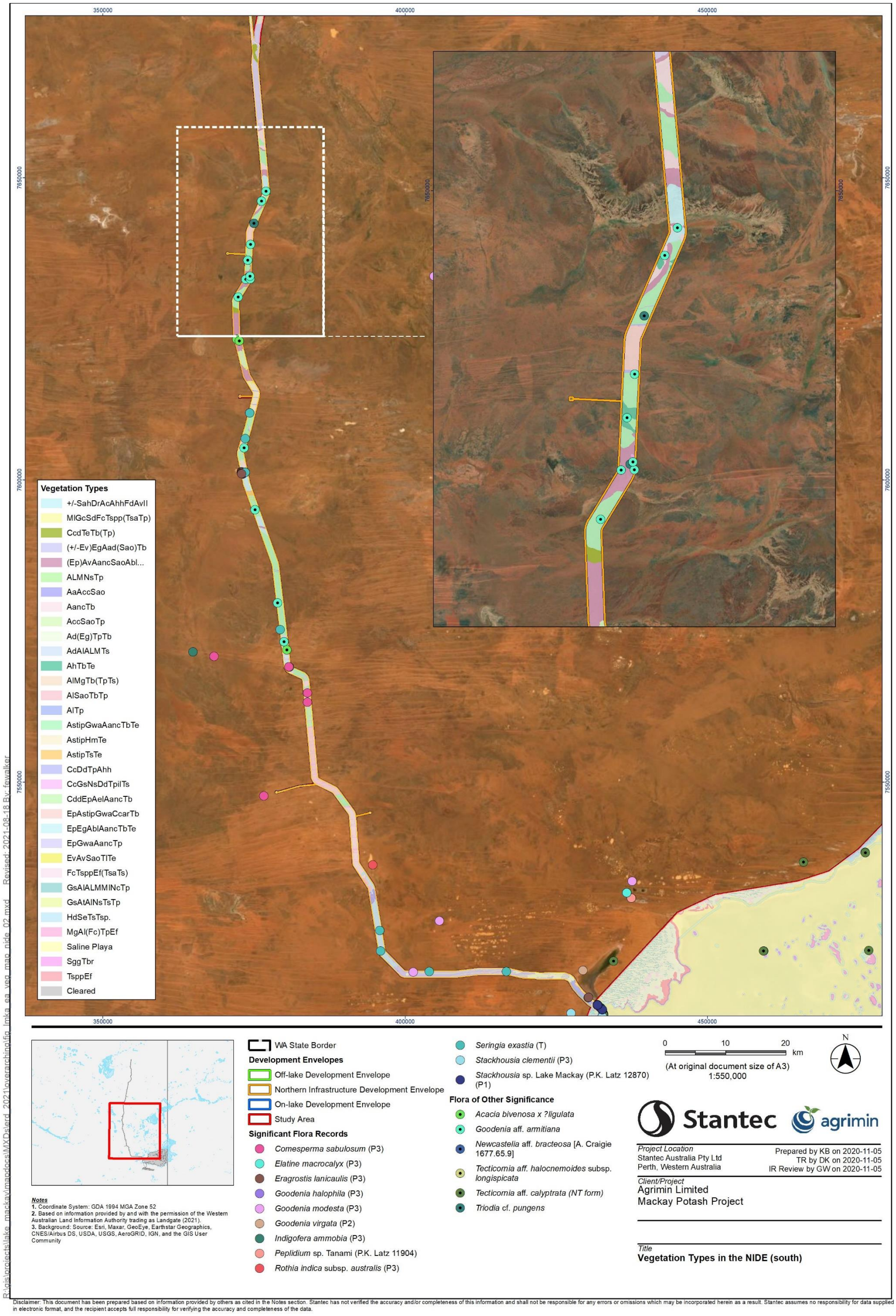


Figure 1-3 Map of Vegetation Types in the NIDE and significant flora locations (south)

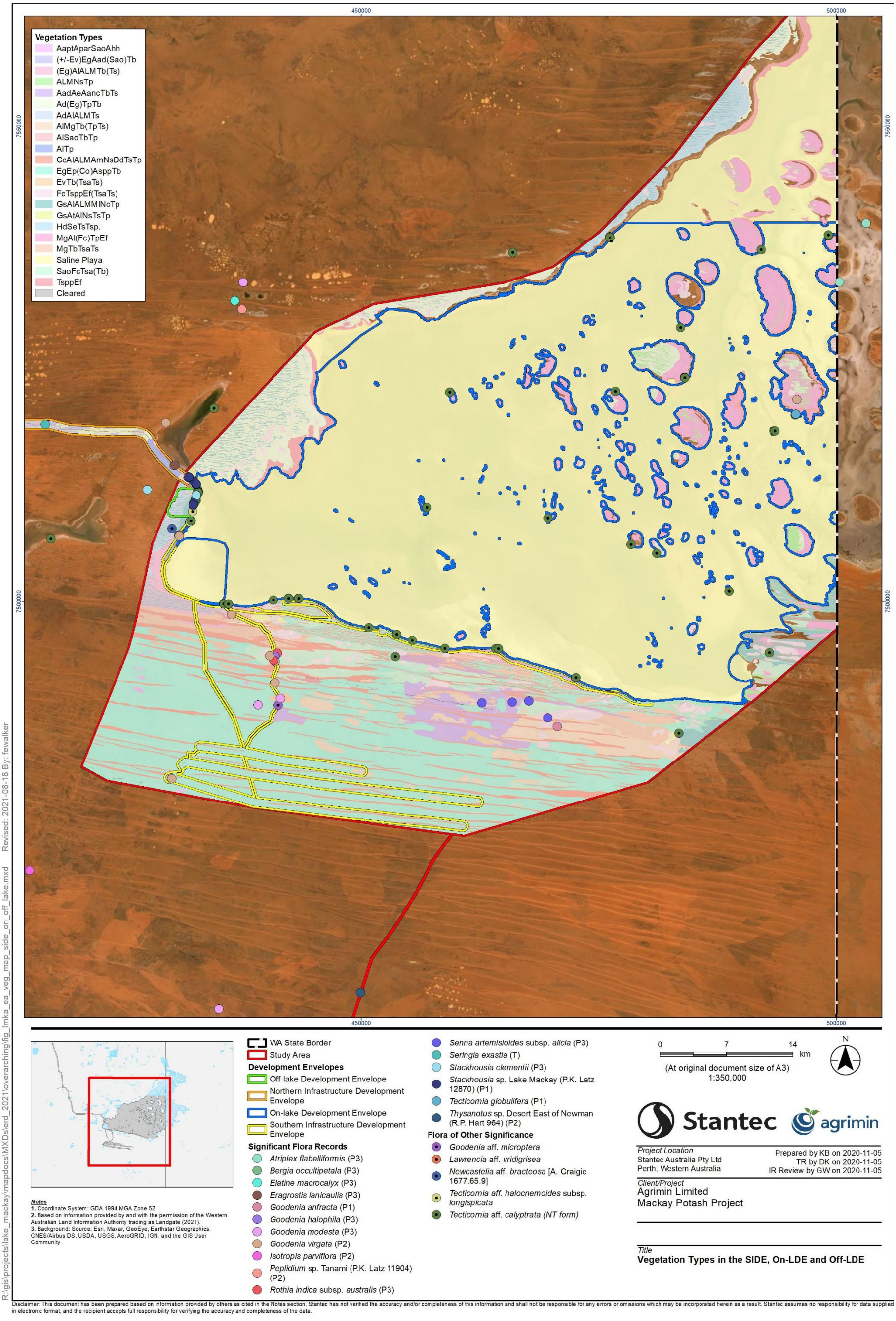


Figure 1-4 Map of Vegetation Types in the SIDE, On-LDE and Off-LDE and significant flora locations

1.5.2.2.3 Riparian Vegetation (*Tecticornia*-dominated habitat)

Riparian zone vegetation occurs within the Study Area, primarily in association with Lake Mackay and its islands. Chenopod shrublands, dominated by Tecticornia fringe the lake and islands, typically occurring between the playa and hummock grassland communities.

The *Tecticornia* genus (Samphires) are members of the Chenopodiaceae family and are renowned for being drought and salt tolerant. *Tecticornia* species are known to dominate the vegetation adjacent to salt lake margins, however they require freshwater to germinate, and have varying requirements in regards to salinity (Datson 2005). Samphire shrublands adjacent to the saline playa of Lake Mackay can be temporarily submerged following infrequent major flooding events. Zonation of *Tecticornia* spp. is common within riparian vegetation which may relate to differing submergence tolerances; some species are more susceptible to prolonged waterlogging than others (Konnerup *et al.* 2015)..

The root systems of *Tecticornia* growing in association with a large WA salt lake have been found to grow no deeper than 30 cm in the soil profile (Botanica Consulting 2018). It is unlikely that *Tecticornia* at Lake Mackay will be accessing saline groundwater given the depths to groundwater are greater than 0.3 m (typically at least 0.5 m on the playa and can range between 3 m and up to 10 m in terrestrial habitats). *Tecticornia* in the vicinity of Lake Mackay are therefore most likely to opportunistically access stored water within the capillary fringe of the vadose zone. This capillary fringe is low in salinity and is recharged by rainfall. Water is subsequently bound and stored in pore spaces, supporting the shallow root systems of samphire vegetation during dry conditions, independent of the lakebed sediments. In addition, the salinity of hypersaline groundwater (>200,000 mg/L) is likely outside the tolerance limits of *Tecticornia*. *Tecticornia* are therefore unlikely to represent GDV.

The Samphire dominated vegetation types listed in Table 1-2 are not considered to be dependent on groundwater, however they are considered to be representative of vegetation in association with the riparian zone and were recorded in the following habitats:

- hypersaline lake margins and smaller islands of Lake Mackay, dominated by halophytic taxa such as *Tecticornia*, *Frankenia*,*Eragrostis falcata* and *Triodia salina*; and
- saline flats and small depressions consisting of similar species to the lake margins.

Table 1-2 Riparian zone vegetation types dominated by Tecticornia species within the Project area

Vegetation Type	Habitat	Study Area		Project area		Project area extent as a proportion of representation in the Study Area (%)
		Extent (ha)	Proportion (%)	Extent (ha)	Proportion (%)	
TsppEf	Riparian zone (lake margin)	7,871.48	1.77	698.04	0.26	8.87
MlGcSdFcTspp(TsaTp)	Riparian zone (lake margin)	7,673.33	1.73	678.34	0.26	8.84
FcTsppEf(TsaTs)	Saline clay pans	6,090.96	1.37	146.99	0.06	2.41
Total		**21,635.77**	**4.87**	**1,523.37**	**0.58**	**n/a**

1.5.2.2.4 Island Outcropping

Lake Mackay is host to more than 270 islands within the On-LDE. These range from small unvegetated formations to large formations that host extensive sand dunes and vegetation communities. The islands range from less than 1 m in height to more than 13.5 m, with the larger islands providing the greatest topographic relief. Drilling investigations completed on six of the lake islands confirmed that they are surficial features of variable thickness underlain by lakebed sediments and are not linked to another subsurface geologic feature.

The lake islands are composed of unconsolidated aeolian sand at surface which is underlain by calcrete and gypsiferous sand. Clay content increases with depth and typically marks the transition from island

sediments to the lakebed sediments. The thickness of the island sequences varies depending on the size of the island and topographical elevation.

1.5.3 Flora

A cumulative total of 541 confirmed vascular flora species from 58 families and 189 genera have been recorded in the Study Area. The most represented families and genera were Fabaceae and Acacia, respectively. No Threatened flora were recorded during the surveys and based on the results of the desktop assessment; no Threatened flora are expected to occur within the Study Area.

1.5.3.1 Significant Flora

The EPA (2016a) advises that flora species, subspecies, varieties, hybrids and ecotypes may be considered significant for reasons other than listing as a threatened or priority flora species, and include the following:

- a keystone role in a habitat for Threatened species, or supporting large populations representing a significant proportion of the local regional population of a species;
- relic status;
- anomalous features that indicate a potential new discovery;
- being representative of the range of a species (particularly at the extremes of range, recently discovered range extensions, or isolated outliers of the main range);
- the presence of restricted subspecies, varieties, or naturally occurring hybrids;
- local endemism/a restricted distribution; and/or
- being poorly reserved.

Fourteen State-listed Priority Flora have been identified within the Study Area, comprising three Priority 1, two Priority 2 and nine Priority 3 species, none of these are listed under the EPBC Act. Of the 14 recorded in the Study Area, only 7 of these were recorded within the Project Area (Table 1-3). No Priority flora have been recorded within the On-LDE during surveys completed for the Project.

1.5.3.1.1 Affinity species, potential hybrids, and anomalous records

A number of flora records from the surveys which were recorded within the Proposal area are particularly noteworthy**.** This includes where specimens displayed an affinity ('aff.') to a recognised species, however also had characteristics that separate it from the known species. In each instance, the species it most closely resembles has been applied with the application of 'aff.'. Further taxonomic work would be required to determine these as distinct taxa, and until resolved, these should be considered as flora of significance:

- specimens tentatively identified as *Acacia bivenosa ?x ligulata* (NIDE);
- one specimen tentatively identified as *Goodenia ?lunata* (P1)(NIDE);
- specimens identified as *Goodenia* aff. *armitiana* (NIDE);
- one specimen identified as *Goodenia* aff. *microptera* (SIDE);
- one specimen identified as *Lawrencia* aff *viridigrisea*; (Off-LDE)
- one specimen identified as *Newcastelia* aff. *bracteosa* (NIDE);
- one unknown and potentially new taxa, *Tecticornia* aff. *calyptrata* (N.T. form) (On-LDE, Off-LDE NIDE & SIDE);
- specimens identified as *Tecticornia* aff. *halocnemoides subsp. longispicata* (On-LDE, Off-LDE & SIDE); and
- a potential hybrid or presently undescribed *Triodia* species (NIDE).

Figure 1-2, Figure 1-3 and Figure 1-4 show the location of significant flora species within their respective vegetation types found in the Study Area.

Table 1-3 Priority flora within the Project area

Taxon	Number of Records Within Project Area	Number of Vouchered Records (FloraBase) (WAH 2020)		Number of Records as listed by the Atlas of Living Australia	Number of records within Development Envelopes				Vegetation types supporting the species within the Project Area
		Total	Within Study Area		NIDE	SIDE	On-Lake	Off-Lake	Vegetation type code
Stackhousia sp. Lake Mackay (P.K. Latz 12870) P1	16	5	2#	8	9		-	7	TsppEf MlGcSdFcTspp(TsaTp)
Goodenia virgata P2	6	7	1	49	2	4	-	-	AlTp, EgEp(Co)AsppTb MgAl(Fc)TpEf, SaoFcTsa(Tb), TsppEf
Comesperma sabulosum P3	105	14	0	30	105	-	-	-	AhTbTe, AstipHmTe, AstipTsTe, CcAstipTeAhh, CcDdTpAhh, CcdTeTb(Tp), CcGsNsDdTpilTs, CddEpAelAancTb, CoTe, EpEgAblAancTbTe, HmAeTp
Eragrostis lanicaulis P3	15	12	0	91	14	-	-	1	EvAvSaoTlTe, MlGcSdFcTspp(TsaTp), TsppEf
Goodenia modesta P3	44	27	2	30	44	-	-	-	EgEp(Co)AsppTb
Indigofera ammobia P3	1	15	0	220	2	2	-	1	AeDdTeAhh, AstipHmTe, CcAstipTeAhh, CcdTeTb(Tp), CcGsNsDdTpilTs, HmAeTp
Stackhousia clementii P3	44	21	1						TsppEf

#One record on an island of the Lake Mackay playa

1.5.3.2 Introduced Flora

Introduced flora (weeds) have a detrimental effect on ecological values of communities in which they invade. Weeds outcompete native flora, alter the structure of vegetation, have an impact on fire regimes and change habitat characteristics for fauna; often leading to a decline in the quality of fauna habitat.

Six introduced flora species have been recorded within the Project Area, all of which occur within the NIDE. One of these weed species, **Tribulus terrestris,* also has been recorded on an island, in close proximity to the On-LDE. None of the introduced flora species represent WoNS or are listed under the *Biosecurity and Agriculture Management Act 2007* as declared pests for either the Tanami or Great Sandy Desert bioregions. However, **Cenchrus* spp. and **Aerva javanica* are generally considered to be serious environmental weeds with the potential to proliferate and become dominant in their preferred habitats. The record of **Flaveria trinervia* within the NIDE also represented a bioregional range extension. The ecological impact and invasiveness classifications [(DPaW 2013;2015)] for these weed species are provided in Table 1-4.

Table 1-4: Introduced flora recorded within the Project area and the DPaW Weed Prioirtisation Process

Weed species (common name)	Development Envelope	Number of records	DPaW Classification^	
			Ecological impact	Invasiveness
**Aerva javanica* (Kapok Bush)	NIDE	1	High	Rapid
**Cenchrus ciliaris* (Buffel Grass)	NIDE	19	High	Rapid
**Cenchrus setiger* (Birdwood Grass)	NIDE	3	High	Rapid
**Flaveria trinervia* (Speedy Weed)	NIDE	1	n/a	n/a
**Malvastrum americanum* (Spiked Malvastrum)	NIDE	46	High	Rapid
**Tribulus terrestris* (Caltrop)	NIDE	1	Unknown	Moderate
	Island of Lake Mackay	2		

^In the absence of DPaW classifications for the Tanami and Great Sandy Desert bioregions, the Pilbara classifications are presented. No classification information is available for **Flaveria trinervia*

1.6 Key Assumptions and Uncertainties

There are a number of potential limitations and constraints that can affect the adequacy of flora and vegetation surveys. Key limitations and constraints summarised below:

Timing, weather, and season: The Project is located in the Great Sandy Desert and Tanami Bioregions where the occurrence and detectability of ephemeral flora species is strongly influenced by climatic conditions, in particular, rainfall events. Surveys for the Project have covered multiple years and seasons, however due to the infrequency of rainfall events, not all surveys were able to be conducted in optimal conditions. Furthermore, the large expanse of the NIDE (approximately 350 km in length) can result in significant differences in rainfall at the northern extent compared to the southern extent.

Overall, seasonal conditions were considered adequate to achieve the aims and objectives of EPA Technical Guidance for Flora and Vegetation Surveys for Environmental Impact Assessment (EPA 2016a, b). Seasonal conditions were considered either average or above average for the majority of the surveys commissioned for the Project.

Remoteness / access constraints: The Study area is large (443,985.37 ha); crosses two bioregions and includes a proposed haul road corridor that is approximately 350 km long and 1 km wide. The Study Area is located in a remote region of WA, with very few established roads, tracks, and other infrastructure; dunes and thick vegetation slowed the progress of travelling the NIDE. The remoteness of the Project area limited access to many portions of the Survey Area and challenging terrain constrained the intensity and completeness of the surveys. For portions of the Project area that could not be accessed due to time or logistical constraints, vegetation type and condition mapping was inferred and extrapolated from high-quality aerial imagery, undertaken by experienced senior botanists.

Access to three of the islands of Lake Mackay was possible during two of the surveys (ecologia (2017) and 360 Environmental (2017)), however no islands will be directly impacted by the Project as all have been excluded from the Development Envelope.

The survey intensity is considered adequate to define the flora and vegetation values of the Study Area and survey effort was focused on areas proposed to be impacted.

Adequacy of the survey intensity and proportion of survey achieved: A total of 216 quadrats, 42 relevés and 30 transects were sampled across all surveys within the Study Area. This is considered adequate within the Great Sandy Desert and Tanami Bioregions and to meet the aims and objectives of EPA Technical Guidance for Flora and Vegetation Surveys for Environmental Impact Assessment (EPA 2016a, b.).

Due to the size of the Project area, extrapolation of the vegetation types was required in areas where there was an absence of quadrat, relevé or mapping note information and/or the local area was not traversed. For most broad regions of the Project area, there was adequate information to infer the broad floristic formation and vegetation present. Targeted searchers were not possible in all locations considered likely to support significant flora; the populations recorded should be considered indicative rather than comprehensive.

During March 2020, the COVID-19 pandemic escalated, and due to travel and regional movement restrictions, Phase 2 of the Stantec (2020) Survey was reduced by three days.

Targeted searches were not conducted in all locations considered likely to support significant flora; the populations recorded should be considered indicative rather than exhaustive. Therefore, the proportion of species recorded may not be a complete representation of the suite of flora in the Study Area and therefore represents a minor limitation to the outcomes of this report.

Burnt vegetation: A large portion of the Project area has been subject to repeated fires. This constrained the installation of quadrats in unburnt vegetation and therefore the vegetation type mapping. Some extrapolation was applied when mapping recently burnt areas. Therefore, this mapping should be considered somewhat indicative rather than an exact representation of the climax vegetation type.

2. Operational Phase Environmental Management Approach

The FVEMP's management approach is based on a combination of objective-based and outcome based management provisions (management objectives / actions / targets, as well as trigger and threshold values), aimed to avoid and minimise impacts to Flora and Vegetation within the Project Area. This approach has been informed by best practice and experience on similar potash infrastructure projects in Western Australia, that were provided with approval under Part IV of the EP Act.

The following project specific management objectives are proposed to ensure the outlined environmental objectives can be met and demonstrate compliance with the EPA's Environmental Objectives. The management objectives, as detailed below, are supported by appropriate management actions, management targets and a monitoring program that includes clear performance indicators, contingency actions, and adaptive management and reporting protocols.

2.1 Outcome-based Approach

An outcome-based management approach has been established to maintain vegetation health and weed control. This approach outlines appropriate indicators for trigger criteria, which provide early warning of potential impacts and threshold criteria, which determine the limit of acceptable impact as well as defining response actions for trigger levels and contingency actions in the unlikely event that the threshold level is reached.

2.1.1 Vegetation Health

The operational activities of the Project are expected to have a negligible potential to impact riparian vegetation health in and around the Project Area. Agrimin is committed to ensuring that this potential is avoided and mitigated through management actions.

Monitoring for vegetation health will focus on density, cover and condition of representative populations of vegetation types containing riparian vegetation to assess any changes in vegetation health. Particular focus has been given to the following impact pathways that may impact riparian vegetation.

2.1.1.1 Altered Hydrology

The operations of the Project may cause changes to surface hydrology and water flows during inundation with a potential to result in disturbance and decline of flora and vegetation health.

This will be managed through the design and location of the On-LDE infrastructure which will avoid impacts on Lake Islands, including pond embankments and liners. The design will also avoid clearing drainage features and lines to ensure that natural flows are maintained.

2.2 Objective-Based Approach

For the management of the two following impact pathways, an objective based approach has been taken as they are not measurable and thus, trigger and threshold values are not appropriate. Targets have been defined and management actions outlined in order to achieve these objectives.

2.2.1 Weed Management

An increase in the abundance of weeds may result from operational activities through transportation and movement of weed propagules, and vehicle movement around the Project Area. The occurrence and establishment of weed species in the Project Area could potentially Increase competition for native species, causing a decline in significant flora, as well as the loss/alteration of health of significant vegetation.

The primary management approach is focused on avoiding and minimising the spread of invasive weed species through the application of strict weed hygiene practices to identify and eradicate the spread of across the Project Area. Agrimin proposes to incorporate strict hygiene obligations into contractor contracts.

2.2.2 Altered Fire Regime

Altered fire regimes could lead to increased fires, presenting impact pathways for weeds and introduced species and impacting upon flora of significance and vegetation communities. Risks of fire occur from Anthropogenic sources as a result of operational activities (i.e. vehicle exhausts, generators, power plant, ERT grounds).

Agrimin are committed to avoiding Project related occurrence, intensity, extent, and duration of bush fires in their Project Area. Management actions include ensuring fire response equipment is maintained at site and in vehicles and machinery, strategically placed fire breaks are located around high-risk areas.

2.2.3 Contaminant spills - Flora and Vegetation Degradation

Unauthorised discharge or seepage of untreated wastewater is an impact pathway of the Project operations. If this were to occur, contamination of the landscape could inhibit root growth and subsequently cause a decline in vegetation health. To mitigate this risk, Agrimin plans to ensure that the processing plant and associated infrastructure are maintained to a high standard and operated according to the O&M Manual such that avoids any accidental or uncontrolled discharge. Wastewater best practice, health and environmental legislation and ANZECC Guidelines for treated wastewater will be adhered to in order to mitigate the risk.

Hazardous substances (such as hydrocarbon and chemicals) storage / handling provides a risk pathway for spills and contamination to occur. All hazardous substances on site will be appropriately stored such that they do not pose a threat to the health and safety of personnel or the environment. All necessary material for mitigation of accidental spillage of hydrocarbons will be kept onsite at all times. All site Contractors and personnel will be required to follow and implementation standard spill response procedures and protocols. In the event of accidental spillage, the Contractor should cease work immediately and ensure contamination is cleaned up prior to recommencing. A comprehensive environmental incident report will then be completed.

2.2.4 Fugitive dust emissions

For a short period during operations, the haul road will be unsealed, presenting a potential impact pathway to flora and vegetation as haul trucks traverse the road and generate fugitive dust which could be deposited on surrounding vegetation. This potential impact will be avoided by sealing the haul road soon after operations commence which will prevent fugitive dust emissions.

3. EMP Provisions

This FVEMP presents an impact mitigation approach that is a combination of outcomes-based and objective-based management provisions (management actions/targets), to avoid and protect known priority flora species, vegetation health, and island outcrops within the Project Area.

This approach has been informed by best practice and recent experience on similar infrastructure projects in Western Australia. The hierarchical approach taken focuses on management aims to minimise indirect impacts to flora and vegetation.

This FVEMP outlines the requirements to avoid, minimise, manage, monitor, and rehabilitate potential impacts as per the EPA's mitigation hierarchy. No significant residual impacts are predicted to remain, post the implementation of this FVEMP therefore meeting EPA guidance for Flora and Vegetation, and offset strategies are not required (Table 3-1).

Table 3-1: Flora and Vegetation Management Provisions

EPA Factor/s and Objective/s	Flora and Vegetation: *to protect flora and vegetation so that biological diversity and ecological integrity are maintained.*
Environmental Values	Three vegetation types support riparian vegetation within the Project Area and are therefore considered to be locally significant. No flora listed as Threatened under the EPBC Act have been recorded within the Study Area. Seven Priority flora species have been recorded within the Proposal area, including • Stackhousia sp. Lake Mackay (P.K. Latz 12870) P1 • Goodenia virgata P2 • Comesperma sabulosum P3 • Eragrostis lanicaulis P3 • Goodenia modesta P3 • Indigofera ammobia P3 • Stackhousia clementii P3
Environmental Aspects	**FV1:** Decline in vegetation health **FV2:** Weed introduction and proliferation **FV3:** Altered fire regime **FV4:** Contaminant Spills **FV5:** Fugitive dust emissions
Project Objectives	The proponent shall manage the implementation of the Project to meet the following environmental objectives: **FV1 Outcome:** To ensure that operational activities of the Project avoid and minimise adverse impacts to riparian vegetation health in the Project area. **FV2 Objective:** To ensure that operational impacts to flora and vegetation due to the introduction or spread of weeds are minimised. **FV3 Objective:** To avoid and minimise the potential for the Project operations to cause altered fire regimes . **FV4 Objective:** To ensure the likelihood of contaminated material entering the environment is minimised and remediated before environmental harm occurs to flora and vegetation **FV5 Objective:** To avoid adverse impacts to flora and vegetation from fugitive dust emissions generated by the Project operations

Outcome-Based

ID	• Trigger Criteria • Threshold Criteria	Response Actions • Trigger level Actions • Threshold Contingency Actions	Monitoring	Timing/Frequency of Monitoring	Reporting
FV1	There is not expected to be any impacts to Riparian Vegetation, however, monitoring against the following criteria will serve as confirmation **Trigger Criteria:** 1. Average health of plants per transect in vegetation supporting riparian vegetation (three described in Section 1.5.2.2.3) declines more than four standard deviations from baseline **Threshold Criteria:** 1. Average health of plants per transect in vegetation supporting riparian vegetation (three described in Section 1.5.2.2.3) declines more than four standard deviations from baseline for two consecutive years	**Preliminary Management Actions:** • Determine a baseline level of vegetation health to measure against during annual monitoring • Develop Annual Riparian Vegetation Monitoring Program • Develop an Incident reporting procedure • Maintain high standard of housekeeping around processing plant and associated infrastructure **Trigger Level Actions:** In the event of vegetation health decline reaching the trigger criteria, report the incident and investigate the cause. Implement adaptive management actions for applicable cause of the vegetation health decline. **Threshold Contingency Actions:** In the event of vegetation health decline reaching the threshold criteria despite trigger level actions being implemented, report the incident and investigate the cause. Implement adaptive management actions for applicable cause of the vegetation health decline.	Monitor riparian vegetation health in accordance with guidance and industry best practice, aligning with the IWEMP. Monitor groundwater drawdown according to IWEMP	Annual	Annual Compliance Assessment Report (CAR) Internal incident reporting and investigation process

Objective-Based

ID	Management Targets	Management Actions	Monitoring	Timing	Contingency	Reporting
FV2	1. No new weed species introduced into the development envelopes by operational activities. 2. No new occurrences of existing weeds caused by operational activities	• Develop a Weed Management Plan prior to operations • Include hygiene obligations into contracts with any contractors entering the site • Limit vehicle and personnel movements outside of approved access and disturbance envelopes • Training for personnel to identify weed species and process for reporting weed locations • Incident reporting of new weed species and new locations	Inspections of cleared and rehabilitated areas to detect presence of new weed species and new occurrences to determine success of management actions.	Biannual	• Investigate cause or source of infestation • Inspect surrounding area to assess extent of infestation • Review weed hygiene measures for efficacy • Review training and implementation of, weed hygiene measures • Implement control measures (e.g. spraying, removal)	Biannual weed monitoring reporting Incident Reporting Annual Compliance Assessment Report (CAR)

Objective-Based						
ID	Management Targets	Management Actions	Monitoring	Timing	Contingency	Reporting
	into the development envelopes.				• Monitor success of control actions. • Weed control to be undertaken at the most appropriate time for the weed species to be controlled • Weed mapping, and increased frequency of weed control measures. • Adaptive management	
FV3	1. No human induced fires in the area as a result of implementing the Project 2. To ensure that operational impacts to flora and vegetation from fire are minimised as far as practicable.	• Avoid hot works in fire sensitive vegetation • Liaise with Traditional Owners about the management of local fire regimes and fire management practices • Establish Emergency Response Plan and Emergency Response Team (ERT) • Require all personnel to complete a site induction that will include information on prevention of fires, including designated smoking areas, no fires permitted in workplace, use of extinguishers, hot works procedures • All fuel stored on site to be in a secure bund • Implement a hot works permit system for high ignition risk work activities • If hot works adjacent to vegetation can't be avoided, the area immediately surrounding 'hot work' to be dampened with water if vegetated and vegetation is not already naturally damp • Fire response equipment maintained at site and in vehicles and machinery and Haul Trucks • Water trucks to have fire management capabilities (pumps/hoses) • Develop education programs for haul road users (including Traditional Owners)	• Monitor daily wind conditions will be taken into consideration when clearing activities are proposed • Record Bushfire occurrence within Development Envelope.	Ongoing	• Alert Emergency Response Team • Implement Emergency Response Plan • Undertake post-fire weed control in the areas affected by the fire.	Annual Compliance Assessment Report (CAR) Internal incident reporting and investigation process
FV4	1. Any wastewater produced as a result of operational activities will be treated to meet relevant ANZ Guidelines and be disposed of in a controlled manner 2. No contamination or spills as a result of operating the Project 3. Avoid uncontrolled discharge of saline water	**Wastewater:** • WWTP and irrigation infrastructure to be operated and maintained in accordance with design specifications • Obtain all required environmental approvals for construction and operation of the WWTP (Part 5 and local council/ DoH approvals) • Maintain high standard of housekeeping around processing plant and associated infrastructure • Adhere to wastewater best practice health and environmental legislation and guidelines for irrigation of treated wastewater **Contaminant Spills:** • Avoid fuel/chemical storage and transfer from occurring outside of designated bunded areas (i.e. dedicated workshop for maintenance) • Ensure spill response equipment available • Spill response training for all personnel and contractors • Maintain high standard of housekeeping around construction activities • Develop an Emergency Spill Response Plan and ensure all personnel and contractors are trained in the correct response. • Develop an Incident Reporting Procedure and ensure all personnel are aware of the procedure. **Uncontrolled Discharge of Saline Water:** • Pipelines to be installed in earthen bunded culverts to prevent spills from discharging into the surrounding environment	• If required, sampling of soils to ensure all contaminated material has been removed and in-situ soils sediments have been remediated • If required, monitoring vegetation health in affected areas and adjacent areas. • Routine testing of treated wastewater to ensure discharged wastewater meets minimum compliance discharge criteria • Regular pipeline inspections and maintenance	As required	• In the event of accidental spillage, the Contractor will cease work immediately and ensure contamination is cleaned up prior to recommencing. A comprehensive environmental incident report will then be completed. • Implement Emergency Spill Response Plan to ensure adequate preparedness for haul road spill response following mitigation hierarchy. • Contain any contaminant spills to prevent seeping to groundwater or becoming runoff to surface water bodies.	Annual Compliance Assessment Report (CAR) Internal incident reporting and investigation process
FV5	1. No significant residual risks to flora and vegetation from dust deposition	• Haul road will be sealed in the early stages of the Project, avoiding dust emissions that would otherwise be likely from an unsealed haul road • Implement Dust Management Plan specific to the Balgo Community (see Social Surroundings Provisions and Appendix B)	• Daily wind conditions will be taken into consideration when clearing activities are proposed until haul road is sealed. • Incident reports of excessive dust	Daily Ongoing	• Investigate cause or source of excessive dust • Review dust management measures for efficacy and revise as necessary • Use of dust suppression (water carts) along haul road in areas that have the potential to generate fugitive dust emissions	Internal incident reporting

4. Reporting Provisions

4.1.1 Annual Reporting

Agrimin will prepare Annual Environmental Reports (AERs) to be submitted to regulatory authorities. The format of these reports will be consistent with requirements stipulated by individual regulatory authorities.

Annual Compliance Assessment Report (CAR) will also be submitted to regulatory authorities. The report will document compliance with conditions of approval including assessment of compliance with management plan requirements where management plans form part of approval conditions.

4.1.2 Exceedance Reporting

In the event that a management threshold level is exceeded, the DWER and DBCA will be notified within 7 days of identification of the exceedance.

4.1.3 Incident Reporting

All environmental incidents regardless of the scale and nature of the incident will be required to be reported to the Environment and Heritage Manager as soon as practicable.

All environmental near misses and incidents will be recorded within an incident management system that will be developed by Agrimin. Incidents will be recorded by the person/s who cause or identify the event, within 24 hours of the incident occurring.

Incidents will be investigated, and root causes determined and recorded within the incident investigation, within 2 weeks of the incident occurring, or as instructed by the Registered Mine Manager. Where applicable, environmental incidents will be reported to the relevant government agencies by the Environment and Heritage Manager.

In the event of a non-compliance, the cause of the non-compliance will be investigated and reported as an incident. Corrective actions will be developed and recorded, and outcomes monitored. Non-compliance and incident reports will be closed out by the Environment and Heritage Manager and/or the Registered Mine Manager.

Table 4-1 is an example of how incidents might be reported and maintained in a register.

Table 4-1: Incident Reporting Register

Management Targets	Status report: Management target achieved Management actions implemented

5. Adaptive Management and Review of EMP

5.1 Adaptive Management

It is recognised that there is a level of scientific uncertainty and current knowledge gaps relating to a number of significant flora species and vegetation communities protected by the FVEMP, particularly in relation to abundance and distribution. This makes determination of residual impacts from implementing the Project on local or regional scales difficult to determine with any degree of certainty. Given the long life of the Project, it is reasonable to expect that additional information and knowledge will be gained on the species, and effectiveness of the management actions, that may influence the development of future management approaches.

For the above reasons, Agrimin are committed to ensuring the management approach for flora and vegetation is adaptive and responsive to changes in the scientific understanding, advancements in best management practices, and changes in the natural environments (e.g. future climatic changes), which will enable adjustments to the mitigation measures and monitoring protocols to meet the Project's outcome and objective, over the long-term.

Through this FVEMP, Agrimin are committed to preparing their adaptive management approach through the identification and application of early response indicators to provide information on changes that are precursors to an environmental impact and supports improved understanding and identification of trends in environmental systems. The FVEMP's early response indicators will be developed in the first three years of the Project's life span and will be informed by the analysis of additional data sets and monitoring results collected over this time.

Review processes for the FVEMP's will be based on formalised dates during the operational stages of the Project, and will include:

- **Periodic reviews and evaluation of monitoring data or methodology**: Aimed to determine whether site specific monitoring program results indicate that management targets are not being achieved.
- **Increased understanding of the ecological system**: If additional information about the species use of the Project Area or region is received that would better inform management approaches.
- **External changes during the life of the project (e.g. Project design changes, technical advances or innovation):** The relevance and effectiveness of management measures would be considered and reviewed and/or revised following any significant changes to the Project.

Over the first three years of implementing the Project, the baseline data available is considered adequate for Agrimin to commence a review of the effectiveness of the FVEMP management approach. Agrimin is committed to working closely with State and Commonwealth regulatory and conservation agencies over this period to determine the effectiveness of the management plans management actions and targets.

5.2 Auditing

The implementation of this plan will be audited by Agrimin, including audit of compliance and performance against all elements of this FVEMP's. The review and audit process will:

- identify issues and proposed changes to the FVEMP's;
- monitor and evaluate performance against outcome and management provisions and environmental criteria; and
- determine if management, mitigation and monitoring is effective or is required to be adjusted.

5.3 Corrective Actions

All environmental incidents regardless of the scale and nature of the incident will be required to be reported to the Environment and Heritage Manager as soon as practicable.

All environmental near misses and incidents will be recorded within an incident management system that will be developed by Agrimin. Incidents will be recorded by the person/s who cause or identify the event, within 24 hours of the incident occurring.

Incidents will be investigated, and root causes determined and recorded within the incident investigation, within 2 weeks of the incident occurring, or as instructed by the Registered Mine Manager. Where applicable, environmental incidents will be reported to the relevant government agencies by the Environment and Heritage Manager.

In the event of a non-compliance, the cause of the non-compliance will be investigated and reported as an incident. Corrective actions will be developed and recorded, and outcomes monitored. Non-compliance and incident reports will be closed out by the Environment and Heritage Manager and/or the Registered Mine Manager.

5.4 Review

The FVEMP will be reviewed every three years throughout the operational phases of the Project and updated if required. Other triggers for a review of this FVEMP include trigger of early warning indicators, addressing items identified during incident investigations, audits or inspections; and new or revised information becomes available

Ongoing monitoring programs will be reviewed on a regular basis, as required, likely to be annual during the initial phases of the Project and as operations begin.

The Project is subject to further environmental approvals under other legislation, including assessment and approval by DWER and DMIRS. Agrimin will review this FVEMP (and update if required) to ensure it achieves all identified environmental outcomes and objectives.

6. Stakeholder Consultation

Agrimin is committed to ongoing stakeholder communication, engagement and consultation through the planning and approvals phase, as well as the construction, operational and closure phases of the Project. This FVEMP is submitted as a draft for comment and consultation with the EPA.

6.1 Stakeholder Engagement

Agrimin has undertaken extensive community and stakeholder consultation as part of the design and feasibility assessments of the Project. These including presentations and briefings to stakeholder groups including representatives from environment, heritage, community, and Indigenous groups, local, State and Commonwealth Government agencies.

Agrimin maintains a Stakeholder Engagement Register that includes specific consultation with stakeholders and a detailed response to issues is provided. Stakeholder engagement will continue through the construction and operation of the Project and reported through revisions of Environmental Management Plans. Stakeholder consultation will continue to be monitored and reported following revision of the FVEMP as the document is finalised and implemented.

6.2 Key Stakeholders

Key stakeholders have been outlined in Table 6-1.

Table 6-1 Key Project Stakeholders

Group	Stakeholders
Commonwealth Government Agencies	• Commonwealth Department of the Environment and Energy (DoEE).
State Government Agencies	• Environmental Protection Authority (EPA); • Department of Mines, Industry Regulation and Safety (DMIRS); • Department of Water and Environmental Regulation (EPAS); • Department of Water and Environmental Regulation (DWER); • Department of Water and Environmental Regulation (DWER – Regulation); • Department of Biodiversity, Conservation and Attractions (DBCA); • Department of Planning, Lands and Heritage (DPLH); • Main Roads Western Australia (MRWA); • Department of Jobs, Tourism, Science, and Innovation (DJTSI); • Department of Fire and Emergency Services (DFES); • Civil Aviation Safety Authority (CASA); and • Members of Parliament.
Local Government Authorities	• Shire of East Pilbara; • Shire of Halls Creek; and • Shire of Wyndham-East Kimberley.
Native Title Representative Bodies	• Central Desert Native Title Services; and • Kimberley Land Council.
Indigenous Groups	• Tjamu Aboriginal Corporation and Kiwirrkurra People; • Parna Ngururrpa Aboriginal Corporation and Ngururrpa People; and • Tjurabalan Native Title Land Aboriginal Corporation.
Environmental Interest Groups	• Conservation Council of Western Australia (CCWA); • Night Parrot Recovery Team; and • Water bird Conservation Group.
Industry Groups	• Chamber of Commerce and Industry.

7. References

360 Environmental. (2017). Lake Mackay Sulphate of Potash Project: Detailed Flora and Vegetation Assessment at Lake Mackay.

ALA, Atlas of Living Australia (2021) Atlas of Living Australia; Occurrence Search (custom search). Atlas of Living Australia. Available online at http://www.ala.org.au/.

Botanica Consulting. (2018). Soil characterisation and assessment of Tectcornia root structure of the Lake Disappointment riparian zone.

Datson, B. (2005). Understanding Zonation of Samphires (Salicorniaeae) in the Goldfields of Western Australia. actis Environmental, Unpublished Report.

DPaW, Department of Parks and Wildlife. (2013). Weed Prioritisation Process for DPaW (formerly DEC) – "An integrated approach to Weed Management on DPaW-managed lands in WA".

DPaW, Department of Parks and Wildlife. (2015). How does Parks and Wildlife manage weeds? Species-led ranking summary results by region. Available online at http://www.dpaw.wa.gov.au/plants-and-animals/plants/weeds/156-how-does-dpaw-manage-weeds. Accessed on 23 February 2016.

ecologia, ecologia Environment, . (2017). Agrimin Mackay Project: Level 1 Fauna and Single Phase Level 2 Flora Assessment.

EPA. (2020). Instructions on how to prepare *Environmental Protection Act 1986* Part IV Environmental Management Plans. Environmental Protection Authority (EPA), Western Australia.

EPA. (2016a). Environmental Factor Guideline: Flora and Vegetation. Environmental Protection Authority (EPA), Western Australia.

EPA, Environmental Protection Authority. (2016b). Technical Guidance - Flora and Vegetation Surveys for Environmental Impact Assessment. Environmental Protection Authority, Western Australia.

Konnerup, D., Moir-Barnetson, L., Pedersen, O., Veneklaas, E. J. and Colmer, T. (2015). Contrasting submergence tolerance in two species of stem-succulent halophytes is not determined by differences in stem internal oxygen dynamics. *Annals of Botany* 115: 409-418.

O'Grady, A. P. C., P.G.; Eamus, D.; Duguid, A; Wischusen, J.D.H.; Fass, T.; Worldege, D. (2009) Convergence of tree water use within an arid-zone woodland. Oecologia 160(4): 643-655.

Sommer, B. and Froend, R. (2010) Gnagara mound ecohydrological study (RFT 0037-2008). Edith Cowan University, Joodalup, Centre for Ecosystem Management.

WAH, W. A. H. (2020). FloraBase: the Western Australian Flora. Department of Biodiversity Conservation and Attractions. Available online at. Accessed on.

Appendices

Appendix A Key Regulatory Obligations

Legislation relevant to the scope of this EMP, included, but are not limited to, the following legislation:

- *Aboriginal Heritage Act 1972*
- *Australian Heritage Council Act 2003*
- *Biodiversity and Agricultural Management Act 2007*
- *Biodiversity Conservation Act 2016*
- *Biosecurity Act 2015*
- *Bush Fires Act 1954*
- *Conservation and Land Management Act 1984*
- *Contaminated Sites Act 2003*
- *Dangerous Goods (Transport) Act 1998*
- *Dangerous Goods Safety Act 2004*
- *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)* (Commonwealth)
- *Environmental Protection Act 1986*
- *Health Act 2016*
- *Heritage of Western Australia Act 1990*
- *Land Administration Act 1997*
- *Local Government Act 1995*
- *Main Roads Act 1930*
- *Mines Safety and Inspection Act 1994*
- *Mining Act 1978*
- *National Greenhouse and Energy Reporting Act 2007*
- *Native Title Act 1993*
- *Occupational Safety and Health Act 1984*
- *Planning and Development Act 2005*
- *Rights in Water and Irrigation Act 1914*
- *Soil and Land Conservation Act 1945*
- *Waste Avoidance and Resource Recovery Act 2007*
- *Water Services Act 2012*
- *Waters and Rivers Commission Act 1995*
- *Waterways Conservation Act 1976*

A.1 Regaultory Approval Requirements

Table A-7-1: Regaultory approvals relevant to the Mackay Potash Project* (this list is indicative and subject to change throughout the life of mine)

Proposal Activities	Type of Approval	Legislation Regulating the Activity	Responsible Government Agency	Additional Information
Mackay Proposal Development (including infrastructure corridors)	Grant of Mining Lease	*Mining Act 1978*	DMIRS	Grant of mining lease required for mining activities, processing, and mining infrastructure such waste landforms.
	Grant of Miscellaneous Licences	*Mining Act 1978*	DMIRS	Grant of tenure required for infrastructure.
	Native Title Agreement	NT Act	Attorney-General's Department (Cwth) DPLH	Required prior to access and works.
	Land Access Agreement		DPLH	Required prior to access of Proposal, clearing and mining activities.
	Aboriginal Heritage Sites	AH Act	DPLH	If the disturbance of any Aboriginal Heritage Sites site is required
Mining and Processing	Mining Proposal and Mine Closure Plan	Division 3 of Part IV of the *Mining Act 1978*	DMIRS	Required prior for mining and processing activities and supporting infrastructure.
	Dangerous Goods Licence	*Dangerous Goods Safety Act 2004* (DGS Act)	DMIRS	Required for the storage, transport and use of Dangerous Goods.
	Project Management Plan	*Mines Safety and Inspection Act 1994* (MSI Act) Mining Safety & Inspection Regulations 1995	DMIRS	Required prior to construction or mining operations commencing.
Clearing of native vegetation	Native Vegetation Clearing Permit	Part V of the EP Act	DMIRS (via administrative agreement with DWER)	Not required if flora and vegetation is formally assessed as a key environmental factor under s38 of the EP Act.

Proposal Activities	Type of Approval	Legislation Regulating the Activity	Responsible Government Agency	Additional Information
Processing plant construction and operations	Works Approval	Part V of the EP Act Environmental Protection Regulations 1987	DWER - Regulation	Required prior to construction of processing and other associated prescribed premises activities
	Operating Licence	Part V of the EP Act	DWER - Regulation	Required prior to the commencement of official production and shipment.
Construction of trenches, bores for process water supply	Application for 26D Licence	Section 26D RIWI Act	DWER - Water	Required prior to construction of trenches and bores.
Groundwater abstraction – brine and process water	Application for a 5C Licence	Section 5C RIWI Act	DWER - Water	Required for groundwater abstraction.
Support infrastructure (wastewater treatment)	Application to Construct or Install an Apparatus for the Treatment of Sewage	*Health Act 1911* Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulations of 1974	Shire of East Pilbara Department of Health DWER - Regulation	Requirement is dependent upon size and treatments options.

Perth
Ground Floor, 226 Adelaide Terrace,
PERTH, WA 6000
Tel +61 (08) 6222 7000

Please visit **www.stantec.com** to learn more about how Stantec design with community in mind.