



Infinite Green Energy  
Fuelling The Future

# **ARROWSMITH HYDROGEN PROJECT**

**AHP1**

# **VEGETATION MANAGEMENT PLAN**

## Revision Control

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## Table of Contents

### List of Figures

Figure 1: AHP1 Hydrogen Project Plan .....	6
Figure 2: Ecoscape 2020 Vegetation Survey Area (Ecoscape 2021).....	7
Figure 3: Vegetation Clearing Plan.....	13
Figure 4: Flora and Vegetation Type .....	18
Figure 5: Project Layout .....	
.....	
.....	20

### List of Tables

Table 1: The Project Disturbance .....	4
Table 2: Vegetation System Associations within Proposal Area .....	8
Table 3: Results of PMST search .....	10
Table 4: Proposed Vegetation Communities Disturbance.....	20
Table 5: Vegetation Types.....	19
Table 6: Routine Site Inspections .....	30
Table 7: Environmental Auditing.....	30
Table 8: Weed, Dieback and Rehabilitation Monitoring.....	31
Table 9: AHP Thresholds and Triggers for Vegetation Management .....	32

### List of Appendices

Appendix A	Clearing Vegetation Record Form
Appendix B	Vegetation Condition Figure 14
Appendix C	Pre European Vegetation Figure 12
Appendix D	Flora and Vegetation Type Figure 13

## Terms & Abbreviations

Term or abbreviation	Definition
AHP1	Arrowsmith Hydrogen Project
ALARP	As Low As Reasonably Practicable
DAWE	Department of Agriculture, Water and the Environment
DBCAs	Department of Biodiversity, Conservation and Attractions (formerly Department of Parks and Wildlife (DPaW))
DPIRD	Department of Primary Industries and Regional Development
EPA	Environmental Protection Authority
<i>EPBC Act</i>	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
ERP	Emergency Response Plan
IGE	Infinite Green Energy
IBRA	Interim Biogeographic Regionalisation for Australia
LGA	Local Government Authority
PEC	Priority Ecological Community
PMST	Protected Matters Search Tool
TEC	Threatened Ecological Community
VMP	Vegetation Management Plan
WoNS	Weed of National Significance

## Related Documents

Document #	Document Name
ARW-ENV-PLN-IGE-0001-REV3	AHP1 Construction Environmental Management Plan
ARW-ENV-PLN-IGE-0002-REV3	AHP1 Weed and Dieback Hygiene Management Plan
ARW-ENV-PLN-IGE-0004-REV3	AHP1 Fauna Management Plan
ARW-ENV-PLN-IGE-0005-REV3	AHP1 Rehabilitation Plan
ARW-ENV-ADM-IGE-0001-REV3	AHP1 Section 38 Referral Supporting Documentation

## 1. Introduction

IGE propose to install the Arrowsmith wind and solar farms and construct a hydrogen plant within IGE owned freehold Lots 3, 4, 100 and 6110 in Arrowsmith, 30 km south of Dongara, within the Shire of Irwin, Western Australia (WA) (Appendix A). The proposed site is former agricultural land and has been grazed by sheep, cattle and goats. The AHP1 layout has been arranged to avoid wetlands, karst formations and Carnaby's Black Cockatoo (CBC) habitat on the property. The required clearing of vegetation for project construction is 139.31 ha from a property maximum extent area of 1,929.68 ha. Existing cleared area within the construction envelope is 102.96 ha and these areas incorporated into the project to minimise overall development footprint. (Table 1).

Construction is planned to commence in quarter 1 2023 for production operations commencing in quarter 3 2025, subject to approvals and availability of equipment.

The scope of this referral includes the construction of the Arrowsmith Hydrogen Plant and associated infrastructure including:

- solar farm (65MW minimum to 85MW maximum)
- wind turbines (22 minimum to 25 maximum x 6 MW)
- water supply (groundwater)
- processing plant 23 to 42 tonnes per day output
- storage and offloading

**Table 1: The Project Disturbance**

Aspect	Max Extent Proposal Area	Previously Disturbed	Vegetation Clearing	Rehabilitated
Wind Turbines	22.16	1.09	21.08	10.13
Solar Array	139.85	82.73 (paddock)	57.12	
Hydrogen Plant/access road	35.88	0.47	35.41	
Project /Fire Roads	27.53	12.45	15.09	
Electrical Routes	1.91	0.35	1.56	
Property Boundary	7.83	3.86	3.97	
Marl Pits	4.19	0.0	4.19	4.19
Met Mast Relocation area	0.91	0.01	0.90	
Met Mast & Ex Marl Pit cleared July 2021	2.0	2.0	0.00	
<b>TOTAL</b>	<b>242.28</b>	<b>102.96</b>	<b>139.31</b>	<b>14.32</b>

The following components are out of scope of the Proposal:

1. There is potential for the construction of a transmission link between Eneabba and the Proposal area, which will ensure continuous power supply and export excess power generated to the grid. The project is stand alone and will operate 'off grid' without the transmission line. The construction and operation of the substation and transmission line is outside of the scope of this proposal.
  - A service station development including hydrogen refuelling is proposed by a third-party, adjacent to the northern boundary of the property. Hydrogen will be delivered from the facility by road tanker to the service station.

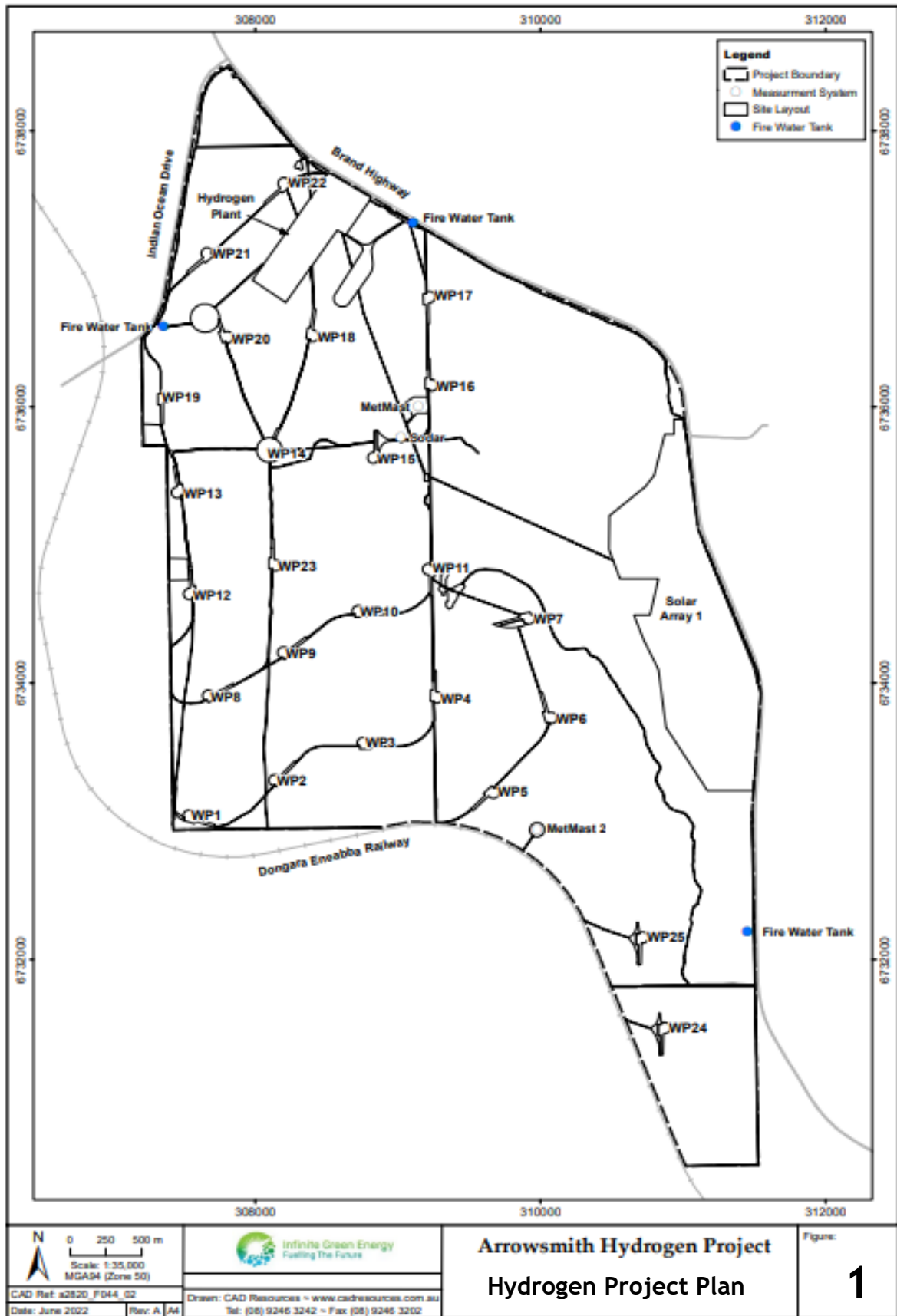
## 2. Vegetation Management Objective

The objective of this vegetation management plan (VMP) is to protect existing flora and vegetation so that biological diversity and ecological integrity are maintained.

The VMP does this by:

- Describing and mapping existing vegetation communities in the project area, including their values and sensitivities
- Listing and describing threatened flora species in the project area
- Quantifying losses of native vegetation
- Adopting control measures to avoid, minimise and mitigate known impacts for both construction and operations
- Describing monitoring efforts to measure the success of the control measures

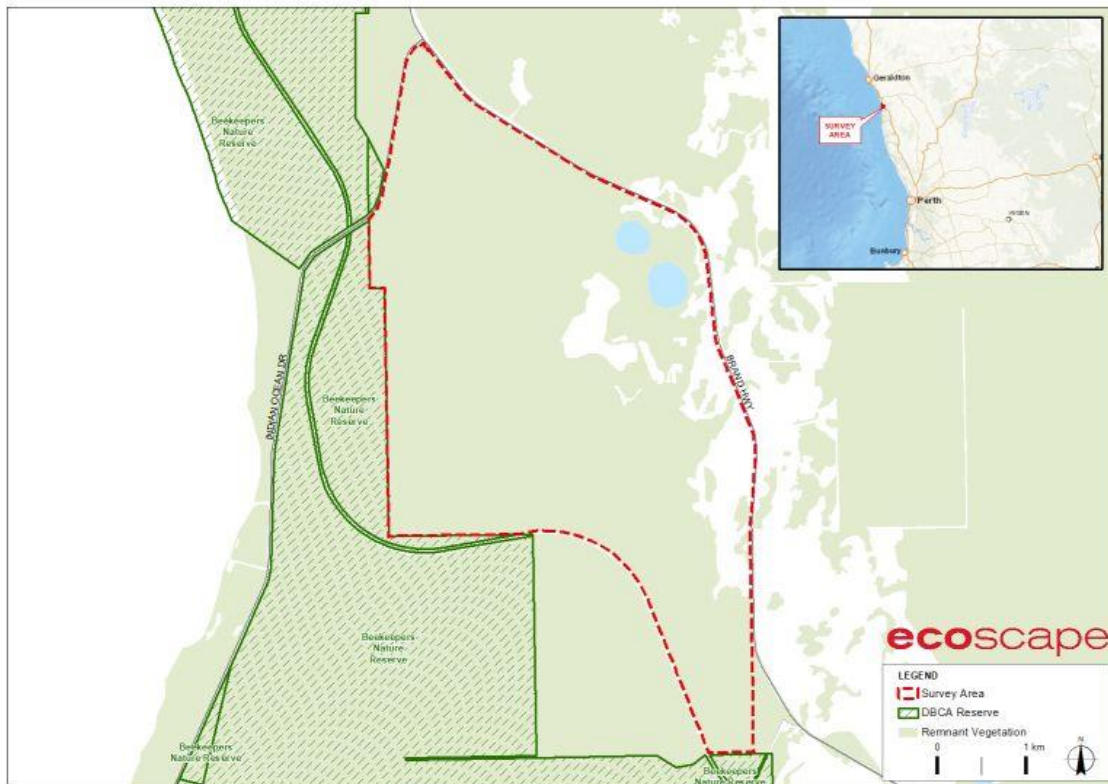
Figure 1: AHP1 Hydrogen Project Plan



### 3. Vegetation Studies

Ecoscape was appointed to undertake a Level 1 flora and vegetation (including reconnaissance) survey in October 2020 to identify the significant biological attributes of the development envelope which occupied 1,929.68 ha (Figure 2). The survey was done in accordance with the requirements of the Environmental Protection Authority (EPA) 2016 Flora and Vegetation Technical Guidance.

**Figure 2: Ecoscape 2020 Vegetation Survey Area (Ecoscape 2021)**



#### 3.1 Desktop

##### 3.1.1 Regional Biogeography

The project is located within the Geraldton Sandplains Interim Biogeographic Regionalisation for Australia (IBRA) bioregion that is composed mainly of proteaceous scrub-heaths, rich in endemics, on the sandy earths of an extensive, undulating, lateritic sandplain mantling Permian to Cretaceous strata. The bioregional area is 1,358,915 ha in size (Department of Parks and Wildlife 2013a) and has a Mediterranean climate (hot, dry summers and cool, wet winters).

##### 3.1.2 Pre-European Vegetation

During the 1970s, John Beard and associates conducted a systematic survey of native vegetation, describing the vegetation systems in Western Australia at a scale of 1:250 000 in the south-west and at a scale of 1:1 000 000 in less developed areas. Beard's vegetation maps attempted to depict the native vegetation as it was presumed to be at the time of settlement and is known as the pre-European vegetation type and extent. Beard's vegetation maps have since been digitised by Shepherd, Beeston & Hopkins (2002) and updated by DPIRD (2019). Vegetation unit extents are updated every two years by DBCA



(2019). This mapping indicates that the survey areas intersects four pre-European vegetation units:

- Association Cliff Head 255: Eucalypt shrubland; *Eucalyptus eremophila*, *E. redunca*, *E. spp.*
- Association Illyarrie 377: Mixed heath with scattered tall shrubs *Acacia spp.*, *Proteaceae* and *Myrtaceae*
- Association Illyarrie 433: Mosaic shrublands; *Acacia rostellifera* & *Melaleuca cardiophylla* thicket/sparse low woodland; Illyarrie
- Association Illyarrie 619: Wheatbelt; York gum, salmon gum etc. *Eucalyptus loxophleba*, *E. salmonophloia*. Goldfields; gimlet, redwood etc. *E. salubris*, *E. oleosa*. Riverine; rivergum *E. camaldulensis*. Tropical; messmate, woolybush.

The pre-European vegetation association/s identified from the survey area (DPIRD 2019) and their pre-European and current extents are listed in Table 2 (DBCA 2019).

Appendix C – European Vegetation Figure 12

**Table 2: Vegetation System Associations within Proposal Area**

Region	Vegetation Association	Original Extent (ha)	Current Extent (ha)	% Remaining
Western Australia	Cliff Head 255	3,176.54	2,933.27	92.34
	Illyarie 377	63,099.54	62,724.44	99.41
	Illyarie 433	32,460.48	14,746.34	45.43
	Illyarrie 619	119,373.78	118,205.01	99.02
IBRA biogeographic region (Geraldton Sandplains)	Cliff Head 255	3,064.34	2,933.06	95.72
	Illyarie 377	63,099.54	62,724.44	99.41
	Illyarie 433	32,460.48	14,746.34	45.43
	Illyarrie 619	154.54	50.80	32.87
IBRA biogeographic sub-region (Lesueur Sandplain)	Cliff Head 255	3,064.34	2,933.06	95.72
	Illyarie 377	63,099.54	62,724.44	99.41
	Illyarie 433	18,096.74	11,457.68	63.31
	Illyarrie 619	154.54	50.80	32.87
LGA (Shire of Irwin)	Cliff Head 255	3,176.54	2,933.27	92.34
	Illyarie 377	22,618.31	22,395.04	99.01
	Illyarie 433	32,141.03	14,640.90	45.55
	Illyarrie 619	53.96	48.20	89.32

### 3.1.3 EPBC Conservation Significant Vegetation

A Protected Matters Search Tool (PMST) search (DAWE 2020; search reference 6654IA) using a 30 km buffer around a point approximating the centre of the survey area identified one EPBC Act listed Threatened Ecological Community (TEC) within the buffer area:

Subtropical and Temperate Coastal Saltmarsh which is listed as vulnerable

As the survey area is not on the coast or an estuary, this TEC does not occur within the survey area.

The pre-European vegetation association/s identified from the survey area (DPIRD 2019) and their pre-European and current extents are listed in Table 11 (DBCA 2019).

### Vegetation System Associations within Proposal Area

Region	Vegetation Association	Original Extent (ha)	Current Extent (ha)	% Remaining
Western Australia	Cliff Head 255	3,176.54	2,933.27	92.34
	Illyarie 377	63,099.54	62,724.44	99.41
	Illyarie 433	32,460.48	14,746.34	45.43
	Illyarrie 619	119,373.78	118,205.01	99.02
IBRA biogeographic region (Geraldton Sandplains)	Cliff Head 255	3,064.34	2,933.06	95.72
	Illyarie 377	63,099.54	62,724.44	99.41
	Illyarie 433	32,460.48	14,746.34	45.43
	Illyarrie 619	154.54	50.80	32.87
IBRA biogeographic sub-region (Lesueur Sandplain)	Cliff Head 255	3,064.34	2,933.06	95.72
	Illyarie 377	63,099.54	62,724.44	99.41
	Illyarie 433	18,096.74	11,457.68	63.31
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LGA (Shire of Irwin)	Cliff Head 255	3,176.54	2,933.27	92.34
	Illyarie 377	22,618.31	22,395.04	99.01
	Illyarie 433	32,141.03	14,640.90	45.55
	Illyarrie 619	53.96	48.20	89.32

Vegetation System Association	Pre-European Vegetation (ha)	Current Regional Extent (ha)	Extent Remaining	Area to be impacted by Proposal (ha)
Cliff Head_255	3,064.34	2,933.06	95.72%	39.49
Illyarie_377	63,099.54	62,724.44	99.41%	3.82
Illyarie_433	32,460.48	14,746.34	45.43%	96.0
Illyarie_619	154.54	50.80	32.87%	0.00
<b>TOTAL</b>	<b>98,778.90</b>	<b>80,454.64</b>		<b>139.31</b>

### 3.1.4 DBCA Conservation Significant Vegetation

A Department of Biodiversity, Conservation and Attractions (DBCA) database search (search reference 24-0920EC) using a 30 km buffer around the survey area, identified no TECs and the following two Priority Ecological Communities (PECs) within the search area buffer:

1. Subtropical and Temperate Coastal Saltmarsh (P3) - the equivalent of the TEC listed in the PMST above.
2. Coastal sands dominated by *Acacia rostellifera*, *Eucalyptus oraria* and *Eucalyptus obtusiflora* (Geraldton area) (P1) described as:

“Floristically, this community is similar to other *Acacia rostellifera* communities but is differentiated on structure, being dominated by mallee eucalypts. The community occurs on limestone ridges, in some swales in the coastal dunes between Cape Burney and Dongara, on the Greenough Alluvial Flats on limestone soil and near Tarcoola Beach. Some very small occurrences have also been recorded on the limestone scarp north of the Buller River” (Species and Communities Program, DBCA 2020).

### 3.1.5 EPBC Act Threatened Flora

The PMST search identified one EPBC Act-listed threatened flora species that is known to occur within the 25 km search buffer area (*Paracaleana dixonii*), five as ‘species or habitat likely to occur within area’ and six ‘species or species habitat may occur within the area’. These are listed in Table 3.

**Table 3: Results of PMST search**

Scientific Name	Common Name	Status	Likelihood of Occurrence PMST	Likelihood of Occurrence post survey
<i>Conostylis dielsii</i> subsp. <i>teres</i>	Irwin's Conostylis	Endangered	Likely	Low
<i>Conostylis micrantha</i>	Small-flowered Conostylis	Endangered	May	Low
<i>Daviesia speciosa</i>	Beautiful Daviesia	Endangered	Likely	Medium
<i>Eucalyptus crispata</i>	Yandanooka Mallee	Vulnerable	May	Medium
<i>Eucalyptus impensa</i>	Eneabba Mallee	Endangered	May	Low
<i>Eucalyptus leprophloia</i>	Scaly-butt Mallee	Endangered	Likely	Low
<i>Hemiandra gardneri</i>	Red Snakebush	Endangered	May	Low
<i>Paracaleana dixonii</i>	Sandplain Duck Orchid	Endangered	Known	Low
<i>Styphelia obtecta</i> **	Hidden Beard-heath	Endangered	Likely	Medium
<i>Tetratheca nephelioides</i>	-	Critically Endangered	May	Low
<i>Thelymitra stellata</i>	Star Sun-orchid	Endangered	Likely	Medium
<i>Wurmbea tubulosa</i>	Long-flowered Nancy	Endangered	May	Low

\*\* renamed to *Leucopogon obtectus*

### 3.1.6 DBCA Threatened and Priority Flora

A search of the DBCA database (search reference 14-0920FL) was conducted with a 25 km buffer applied around the shapefiles. The results incorporated the TPFL List, taken from Threatened and Priority Flora Report Forms and DBCA surveys, and WA Herb, taken from vouchered specimens held in the Western Australian Herbarium. Threatened flora is flora specifically protected under the Biodiversity Conservation Act. Priority Flora is flora of conservation significance.

The combined PMST and DBCA database searches identified 89 species consisting of 14 threatened flora (eight from records known to occur within the database search buffer and six from the PMST where associated habitat is likely to / may occur), nine Priority 1, 13 Priority 2, 36 Priority 3 and 17 Priority 4 species.

## 3.2 Field Survey

A flora and vegetation survey of the project area was conducted by Ecoscape from the 12-16<sup>th</sup> of October 2020. A detailed methodology of the survey is outlined in Section 3 of the survey report (Ecoscape 2020). This section provides a summary of the results presented in the Ecoscape (2020) report. Figure 2 shows the areas surveyed within the project area.

### 3.2.1 Flora Presence

Although the survey was constrained by access, highly qualified personnel undertook the survey during a suitable period (October) and a total of 191 vascular flora taxa were recorded matching the Bootstrap estimate of species richness (187) for an area of this survey size.

#### **Threatened Flora**

No Commonwealth EPBC Act or Western Australian *Biodiversity Conservation Act 2016* listed Threatened Flora were recorded during the field survey.

### **Priority Flora**

Three Priority-listed flora from confirmed taxonomic identifications were recorded during the field survey (Table 4 and Figure 4).

### **Other Significant Flora**

According to the criteria outlined in the Flora and Vegetation Technical Guidance (EPA 2016), *Pelargonium littorale* may be considered as significant as a minor range infill, with the closest records approximately 90 km north and south of the survey area. However, this species has a wide distribution over most of near coastal parts of southern Australia (ALA 2021) thus its significance as a range infill is minor.

*Melaleuca strobophylla* is a minor range extension of approximately 30 km northwards (thus new range edge), and a new record for the local government area. However, taking this species' distribution over much of the southern parts of Western Australia, this range extension is of only minor significance.

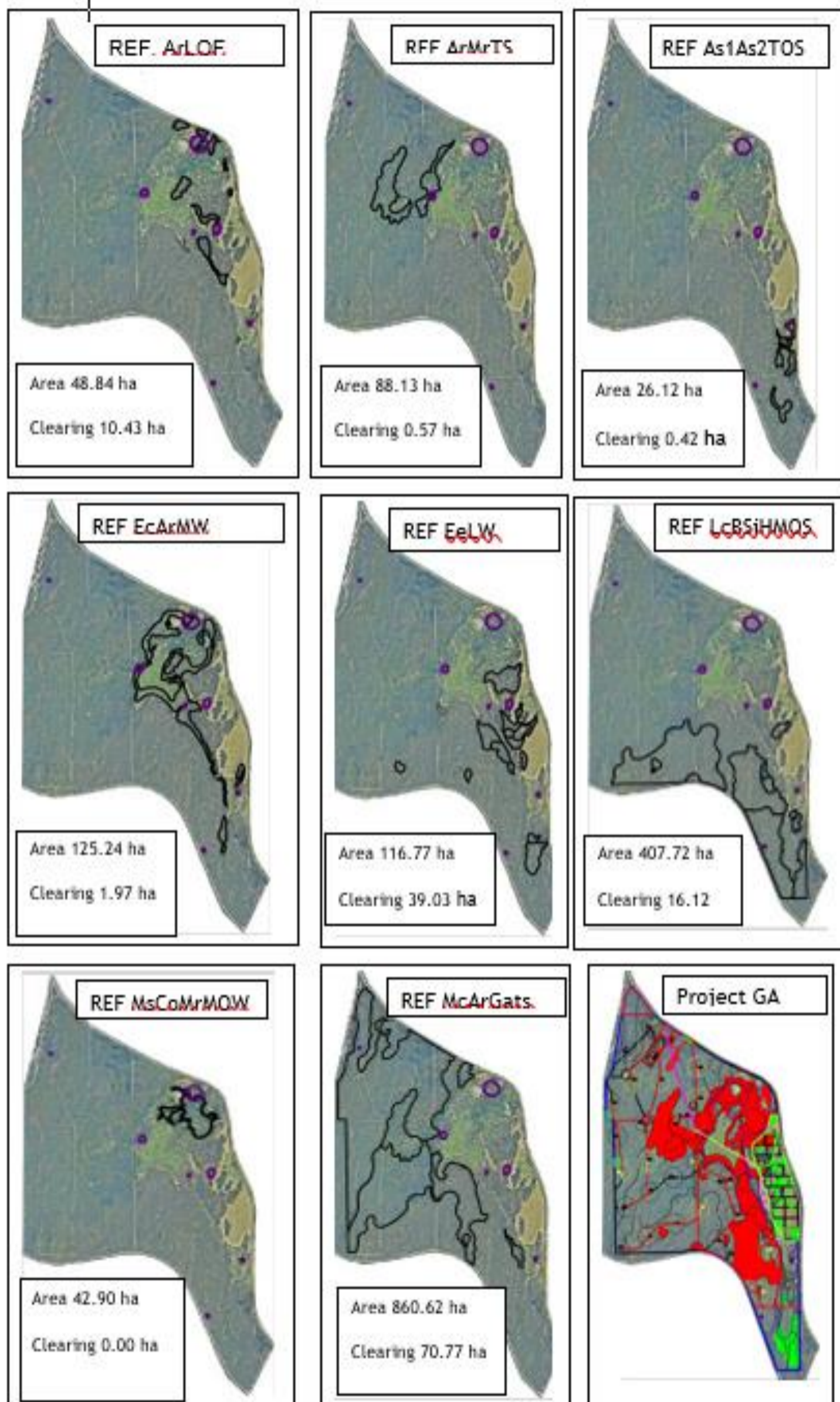
### **Introduced Flora**

Thirty-nine introduced flora species (weeds) were recorded during the field survey, representing 20.42% of the overall flora inventory. All are agricultural weeds or commonly occurring in the region.

- *Brassica tournefortii* (asian mustard), *Ehrharta longiflora* (annual veldtgrass) and *Vulpia myuros* (annual fescue) were all recorded commonly, including from within quadrats.
- *Echium plantagineum* (Patterson's Curse) is a Declared Pest plant in the Shire of Irwin. However, it is in the Exempt category and thus has no management requirements as a result of its presence. It was recorded from one previously grazed survey point and is a sparse occurrence in the previously grazed parts of the survey area.
- *Lycium ferocissimum* (African Boxthorn) is weed of national significance (WoNS) that was recorded from one survey point on karst limestone east of Arramall Lake. Although only observed in the one location it is likely to occur sparsely along the limestone ridge. There are no management requirements in relation to its listing as a WoNS.






Figure 3: Vegetation Clearing Plan





**Table 4: Priority flora recorded during the field survey**

<b>Anthocercis intricata (Priority 3)</b>	
<p><b>Description:</b>            Dense spinescent shrub to 3 m high, growing in sand or loam over limestone (WAH &amp; DBCA 2021).            Within the survey area this species was observed as an intricate, spinescent shrub although open and significantly smaller than the recorded size.</p> 	<p><b>Habitat:</b> in vegetation type <b>McArGaTS</b>; <i>Melaleuca cardiophylla</i>, <i>Acacia rostellifera</i> and <i>Grevillea argyrophylla</i> tall shrubland, on near-coastal limestone outcropping.  <b>Location:</b> Northwestern (more coastal) portion of the survey area.  <b>Survey results:</b> 3 records (&lt;10 plants) in survey area, although the species is anticipated to occur widely within the vegetation type.  <b>Populations:</b> 1 population, but likely sparsely distributed within the vegetation type.  <b>Known records and distribution:</b> According to NatureMap (DBCA 2007-2021) there are 37 records of this species from the Geraldton Sandplains, Yalgoo and (one record) Carnarvon bioregions, with an overall distribution of approximately 430 km (north-south), confined to near-coastal areas.            The survey area is located at the extreme southern range edge of the species' distribution.</p>
<b>Beyeria cinerea subsp. cinerea (Priority 3)</b>	
<p><b>Description:</b>            Prostrate, spreading or erect shrub to 50 cm high growing on coastal dunes and limestone (Barrett &amp; Tay 2016).            Within the survey area this species was observed as a low shrub that was a common, at times dominant, ground stratum species.</p>  <p>Photo from Ecoscape (2011)</p>	<p><b>Habitat:</b> in vegetation type <b>McArGaTS</b>; <i>Melaleuca cardiophylla</i>, <i>Acacia rostellifera</i> and <i>Grevillea argyrophylla</i> tall shrubland, on near-coastal limestone outcropping.  <b>Location:</b> Northwestern (more coastal) portion of the survey area.  <b>Survey results:</b> 1 record (individual plants not counted) in survey area where it was a dominant ground <b>stratum</b> species; it is anticipated to occur through much of this vegetation type.  <b>Populations:</b> 1 population, but likely distributed through much of the vegetation type.  <b>Known records and distribution:</b> According to NatureMap (DBCA 2007-2021) there are 63 records of this species from the Swan Coastal Plain, Geraldton Sandplains and (one record) Yalgoo bioregions, with an overall distribution of approximately 700 km (north-south), confined to coastal and near-coastal areas.            The survey area is at approximately the mid point of this species' distribution.</p>
<b>Eucalyptus zopherophloia (Priority 4)</b>	
<p><b>Description:</b>            Spreading mallee to 6 m high with rough, fibrous bark (WAH &amp; DBCA 2021).            Within the survey area this species was as described, forming occasional clumps or small stands.</p> 	<p><b>Habitat:</b> in vegetation type <b>McArGaTS</b>; <i>Melaleuca cardiophylla</i>, <i>Acacia rostellifera</i> and <i>Grevillea argyrophylla</i> tall shrubland, on near-coastal limestone outcropping, and vegetation type <b>ArLOF</b>; <i>Acacia rostellifera</i> low open forest, in disturbed upland areas.  <b>Location:</b> Northern and northwestern portions of the survey area. <b>Survey results:</b> 70+ individuals recorded in survey area.  <b>Populations:</b> 2 populations, although additional plants have been recorded (DBCA database search results) between records from this survey, thus this species is likely to constitute a single population within the survey area. <b>Known records and distribution:</b> According to NatureMap (DBCA 2007-2021) there are 76 records of this species largely from the Geraldton Sandplains bioregion, and also (one record each) Swan Coastal Plain and Carnarvon bioregions. Its overall distribution is approximately 530 km (north-south) and inland up to 65 km.</p>

### 3.2.2 Significant Flora Risk Assessment

The likelihood of conservation significant flora occurring in the survey area was revised following the field survey. The following five taxa were identified as having a High likelihood of occurring at desktop stage, and retain this likelihood following field survey despite not being identified on site during survey:

- *Acacia vittata* (Priority 2)
- *Scholtzia calcicola* (Priority 2)
- *Haloragis foliosa* (Priority 3)
- *Thryptomene sp. Lancelin* (M.E. Trudgen 14000) (Priority 3)
- *Stawellia dimorphantha* (Priority 4)

### 3.2.3 Vegetation Communities

Eight broad structural vegetation types were recorded from within the survey area based on field observations (Table 5). Whilst floristic analysis was conducted, the results of the analysis indicated vegetation condition had a significant effect on the results, and floristic groups were not clear-cut. The vegetation type with the greatest coverage in the project area is the limestone uplands (near coastal) (45.2%), followed by sandplain (with limestone pavement) (21.2%). Cleared land (pasture) accounts for 10.2% of the project area.

### 3.2.4 Conservation Significant Vegetation

No vegetation recorded from the field survey area was assessed as being representative of any currently described TEC or PEC.

### 3.2.5 Vegetation Condition

Approximately 10% of the survey area (196.65 ha) has been cleared for farming and does not have native vegetation.

Over one quarter of the survey area (540.93 ha; 28.03%) has vegetation in 'Degraded' or 'Completely Degraded' condition, largely adjacent to the cleared areas. Livestock grazing that has led to weed invasion and lack of diversity in ground and mid strata species is the main threatening process, although some clearing that has now naturally regenerated is possible in some *Acacia*-dominated vegetation types.



Livestock grazing has now ceased, however, feral goats, feral cattle and rabbits are present on the site and are likely to continue the grazing pressure that reduces the prospect of natural regeneration in some vegetation types (e.g. in vegetation type **MsCoMrMOW** (*Melaleuca strobophylla*, *Casuarina obesa* and *Melaleuca raphiophylla* mid open woodland) associated with the ephemeral lakes and floodplain) and is likely to be insufficient to keep the weed cover low to permit natural regeneration.

The remainder of the survey area, largely in the west, south and southeast, is in Good to Excellent condition (1,192.10 ha; 61.78% of the survey area). The better (Excellent) condition vegetation was largely in vegetation type **LcBsJhMOS** (*Labichea cassioides*, *Banksia sessilis* var. *cygnorum* and *Jacksonia hakeoides* mid open shrubland) that over most of its extent has been fenced off from grazing by farm livestock.




Appendix B -Vegetation Condition Figure 14





**Table 5: Vegetation Types**

Landform	Mapping unit	Vegetation type	Floristic quadrats/ relevés	Representative photograph	Other characteristic species	Area (ha) and extent (%)
Limestone uplands (near coastal)	<b>McArGaTS</b>	<p><i>Melaleuca cardiophylla</i>, <i>Acacia rostellifera</i> and <i>Grevillea argyrophylla</i> tall shrubland over <i>Beyeria cinerea</i> subsp. <i>cinerea</i>, <i>Acanthocarpus canaliculatus</i> and <i>Diplolaena leemaniana</i> low open shrubland with <i>Eucalyptus oraria</i> and <i>Eucalyptus erythrocorys</i> isolated clumps of low trees/mallee shrubs</p> <p><b>NVIS:</b>            U+ ^<i>Eucalyptus oraria</i>,<i>Eucalyptus erythrocorys</i>^tree,mallee shrub\6\bc;M+ ^^<i>Melaleuca cardiophylla</i>,<i>Acacia rostellifera</i>,<i>Grevillea argyrophylla</i>^shrub\4\c;G ^^<i>Beyeria cinerea</i> subsp. <i>cinerea</i>,<i>Acanthocarpus canaliculatus</i>,<i>Diplolaena leemaniana</i>^shrub\2\i</p> <p>Survey at Detailed level would result in further breakdown of this vegetation type, including into portions dominated by mallees, likely including additional species.</p>	D20Q01 D20Q02 D20R13 D20R14 D20R15		<p><i>Alyogyne hakeifolia</i>  <i>Anthocercis intricata</i>  <i>Austrostipa flavescens</i>            *<i>Avellinia michelii</i>            *<i>Avena barbata</i>            *<i>Brassica tournefortii</i>  <i>Calandrinia</i> sp.            Shark Bay (A. Markey 1405)  <i>Commersonia a borealis</i>  <i>Conostylis prolifera</i>  <i>Desmocladas asper</i>  <i>Dioscorea hastifolia</i>            *<i>Ehrharta longiflora</i>            *<i>Erodium botrys</i>  <i>Guichenotia ledifolia</i>  <i>Hibbertia subvaginata</i>            *<i>Hypochoeris glabra</i>  <i>Labichea cassioides</i>            *<i>Lysimachia arvensis</i>  <i>Melaleuca huegelii</i>  <i>Melaleuca trichophylla</i>  <i>Olearia axillaris</i>            *<i>Reichardia tingitana</i>  <i>Scholtzia umbellifera</i>  <i>Trachymene pilosa</i>            *<i>Trifolium campestre</i>            *<i>Vulpia myuros</i>  <i>Waitzia suaveolens</i> var. <i>suaveolens</i></p>	860.62 ha 44.60%
Sandplain (with limestone pavement)	<b>LcBsJhMOS</b>	<p><i>Labichea cassioides</i>, <i>Banksia sessilis</i> var. <i>cygnorum</i> and <i>Jacksonia hakeoides</i> mid open shrubland over <i>Hibbertia hypericoides</i> subsp. <i>septentrionalis</i>, <i>Ecdeiocolea monostachya</i> and <i>Desmocladas asper</i> low open shrubland/rushland with <i>Eucalyptus erythrocorys</i> and <i>Banksia prionotes</i> isolated clumps of low trees</p> <p><b>NVIS:</b>            U+ ^<i>Eucalyptus erythrocorys</i>,<i>Banksia prionotes</i>^tree\6\bc;M+ ^^<i>Labichea cassioides</i>,<i>Banksia sessilis</i> var. <i>cygnorum</i>,<i>Jacksonia hakeoides</i>^shrub\3\i;G ^^<i>Hibbertia hypericoides</i> subsp. <i>septentrionalis</i>,<i>Ecdeiocolea monostachya</i>,<i>Desmocladas asper</i>^shrub,rush\1\i</p> <p>Survey at Detailed level would likely result in refinement of vegetation into several additional units, including patches of <i>Banksia prionotes</i> woodland and differentiation of types on deeper sands vs. types on more defined limestone</p>	D20Q03 D20Q04 D20R10		<p><i>Acacia scirpifolia</i>  <i>Acanthocarpus canaliculatus</i>  <i>Austrostipa flavescens</i>  <i>Austrostipa macalpinei</i>  <i>Banksia prionotes</i>  <i>Conostylis candicans</i> subsp. <i>calcicola</i>  <i>Grevillea leucopteris</i>  <i>Hyalosperma cotula</i>  <i>Lepidobolus chaetocephalus</i>  <i>Melaleuca carrii</i>  <i>Neurachne alopecuroidea</i>  <i>Thysanotus manglesianus</i>  <i>Trachymene</i></p>	407.72 ha 21.13 %



Landform	Mapping unit	Vegetation type	Floristic quadrats/ relevés	Representative photograph	Other characteristic species	Area (ha) and extent (%)
		pavement.			<i>pilosa</i> * <i>Ursinia anthemoides</i> * <i>Vulpia myuros</i> <i>Waitzia suaveolens</i> var. <i>suaveolens</i>	
Riparian areas (drainage lines and floodplain)	EcArMW	<p><i>Eucalyptus camaldulensis</i> subsp. <i>obtusa</i> and <i>Acacia rostellifera</i> mid woodland over <i>Acacia scirpifolia</i> and <i>Rhagodia preissii</i> subsp. <i>obovata</i> tall shrubland/chenopod shrubland over *<i>Ehrharta longiflora</i>, *<i>Avena barbata</i> and *<i>Lysimachia arvensis</i> low open grassland/forbland</p> <p><b>NVIS:</b> U+ ^<i>Eucalyptus camaldulensis</i> subsp. <i>obtusa</i>,<i>Acacia rostellifera</i>^tree\7i;M ^<i>Acacia scirpifolia</i>,<i>Rhagodia preissii</i> subsp. <i>obovata</i>^shrub,chenopod shrub\4c;G ^<i>Ehrharta longiflora</i>,<i>Avena barbata</i>,<i>Lysimachia arvensis</i>^other grass,forb\1i</p> <p>All relevés were in Degraded or Completely Degraded condition. DR20R09 is somewhat anomalous as it was upslope; it may be more similar to vegetation on the karst formation (vegetation type ArMrTS).</p>	D20R01 D20R07 D20R09 D20R11		* <i>Arctotheca calendula</i> * <i>Brassica tournefortii</i> * <i>Bromus diandrus</i> <i>Crassula</i> sp. * <i>Hordeum leporinum</i> * <i>Hypochaeris glabra</i> * <i>Lolium multiflorum</i> <i>Melaleuca raphiophylla</i> <i>Muehlenbeckia adpressa</i> * <i>Petrorhagia dubia</i> <i>Rytidosperma setaceum</i> <i>Trachymene pilosa</i> * <i>Trifolium campestre</i> * <i>Ursinia anthemoides</i> * <i>Vulpia myuros</i>	125.24 ha 6.49 %
Limestone uplands	EeLW	<p><i>Eucalyptus erythrocorys</i> low woodland over <i>Acacia scirpifolia</i>, <i>Rhagodia preissii</i> subsp. <i>preissii</i> and <i>Guichenotia ledifolia</i> mid open shrubland/chenopod shrubland over <i>Acanthocarpus canaliculatus</i>, <i>Hibbertia hypericoides</i> subsp. <i>septentrionalis</i> and <i>Desmocladus asper</i> mid open forbland/shrubland/rushland</p> <p><b>NVIS:</b> U+ ^<i>Eucalyptus erythrocorys</i>^tree\6i;M ^<i>Acacia scirpifolia</i>,^<i>Rhagodia preissii</i> subsp. <i>preissii</i>,<i>Guichenotia ledifolia</i>^shrub,^chenopod shrub\3i;G ^<i>Acanthocarpus canaliculatus</i>,<i>Hibbertia hypericoides</i> subsp. <i>septentrionalis</i>,<i>Desmocladus asper</i>^forb,shrub,rush\2i ; Vegetation type description is taken from quadrats/relevés in 'better' (less weedy) condition. Vegetation type occurs on limestone outcropping.</p>	D20Q05 D20R04 D20R06 D20R12		<i>Acacia rostellifera</i> <i>Austrostipa elegantissima</i> <i>Austrostipa flavescens</i> <i>Austrostipa macalpinei</i> * <i>Brassica tournefortii</i> <i>Calandrinia</i> sp. Shark Bay (A. Markey 1405) <i>Conostylis candicans</i> subsp. <i>Calcicole</i> * <i>Ehrharta longiflora</i> <i>Hybanthus floribundus</i> subsp. <i>floribundus</i> * <i>Hypochaeris glabra</i> * <i>Lysimachia arvensis</i> <i>Macrozamia fraseri</i> <i>Muehlenbeckia adpressa</i> <i>Thysanotus manglesianus</i> <i>Trachymene pilosa</i> <i>Trymalium ledifolium</i> * <i>Ursinia anthemoides</i> * <i>Vulpia myuros</i> <i>Waitzia suaveolens</i>	116.77 ha 6.05%



Landform	Mapping unit	Vegetation type	Floristic quadrats/ relevés	Representative photograph	Other characteristic species	Area (ha) and extent (%)				
Karst (limestone upland)	ArMrTS	<p><i>Acacia rostellifera</i> and <i>Melaleuca raphiophylla</i> tall shrubland over <i>*Bromus diandrus</i>, <i>*Brassica tournefortii</i> and <i>*Hordeum leporinum</i> low closed grassland/forbland with <i>Eucalyptus camaldulensis</i> subsp. <i>obtusa</i> mid scattered trees</p> <p><b>NVIS:</b>            U+ ^<i>Eucalyptus camaldulensis</i> subsp. <i>obtusa</i>^tree\7\bi;M+ ^<i>Acacia rostellifera</i>,^<i>Melaleuca raphiophylla</i>^shrub\4c;G            ^<i>Bromus diandrus</i>,<i>Brassica tournefortii</i>,<i>Hordeum leporinum</i>^other grass,forb\1\ d</p> <p>Quadrat on limestone ridge on karst formation, notable for having wetland flora species present (<i>Eucalyptus camaldulensis</i> and <i>Melaleuca raphiophylla</i> – although this identification requires confirmation). Relevé and patch with relevé in Completely Degraded condition (very weedy).</p> <p>The majority of this vegetation type has been mapped using interpretation of aerial imagery and known karst locations due to lack of accessibility in this part of the survey area. It is likely that the larger, western patch is smaller than as is mapped and may not have <i>Eucalyptus camaldulensis</i>.</p>	D20R08		<p><i>Crassula</i> sp.  <i>*Ehrharta longiflora</i>  <i>*Lycium ferocissimum</i>  <i>*Lysimachia arvensis</i>  <i>*Petrohragia dubia</i>  <i>Rhagodia preissii</i> subsp. <i>obovata</i></p>	88.13 ha 4.57%				
		<p><i>Acacia rostellifera</i> low open forest over <i>*Hordeum leporinum</i>, <i>*Ehrharta longiflora</i> and <i>*Bromus diandrus</i> low closed grassland</p> <p><b>NVIS:</b>            U+ ^<i>Acacia rostellifera</i>^tree\6\c;G            ^<i>Hordeum leporinum</i>,^<i>Ehrharta longiflora</i>,<i>Bromus diandrus</i>^other grass\1\ d</p> <p>Completely Degraded condition, grazed relevé. This vegetation type is adjacent to cleared areas and represents a disturbed vegetation as a result of grazing, and possibly also regenerating vegetation following clearing.</p>					DR20R02		<p><i>*Arctotheca calendula</i>  <i>Austrostipa elegantissima</i>  <i>*Ehrharta brevifolia</i>  <i>*Hypochaeris glabra</i>  <i>*Reichardia tingitana</i></p>	48.84 ha 2.22%
		<p><i>Melaleuca strobophylla</i>, <i>Casuarina obesa</i> and <i>Melaleuca raphiophylla</i> mid open woodland over <i>*Vulpia myuros</i>, <i>*Plantago coronopus</i> and <i>*Hordeum leporinum</i> low dense grassland/forbland</p> <p><b>NVIS:</b>            U+ ^<i>Melaleuca strobophylla</i>,^<i>Casuarina obesa</i>,  <i>Melaleuca raphiophylla</i>^tree\7r;G            ^<i>Vulpia myuros</i>, <i>Plantago coronopus</i>,  <i>Hordeum leporinum</i>^other grass, forb\1\ d</p> <p>This vegetation type occurs in the historical floodplain (low-lying) portion of the survey area, towards the northeast, and includes ephemeral lakes and modified structures (dams). It is unlikely that</p>								



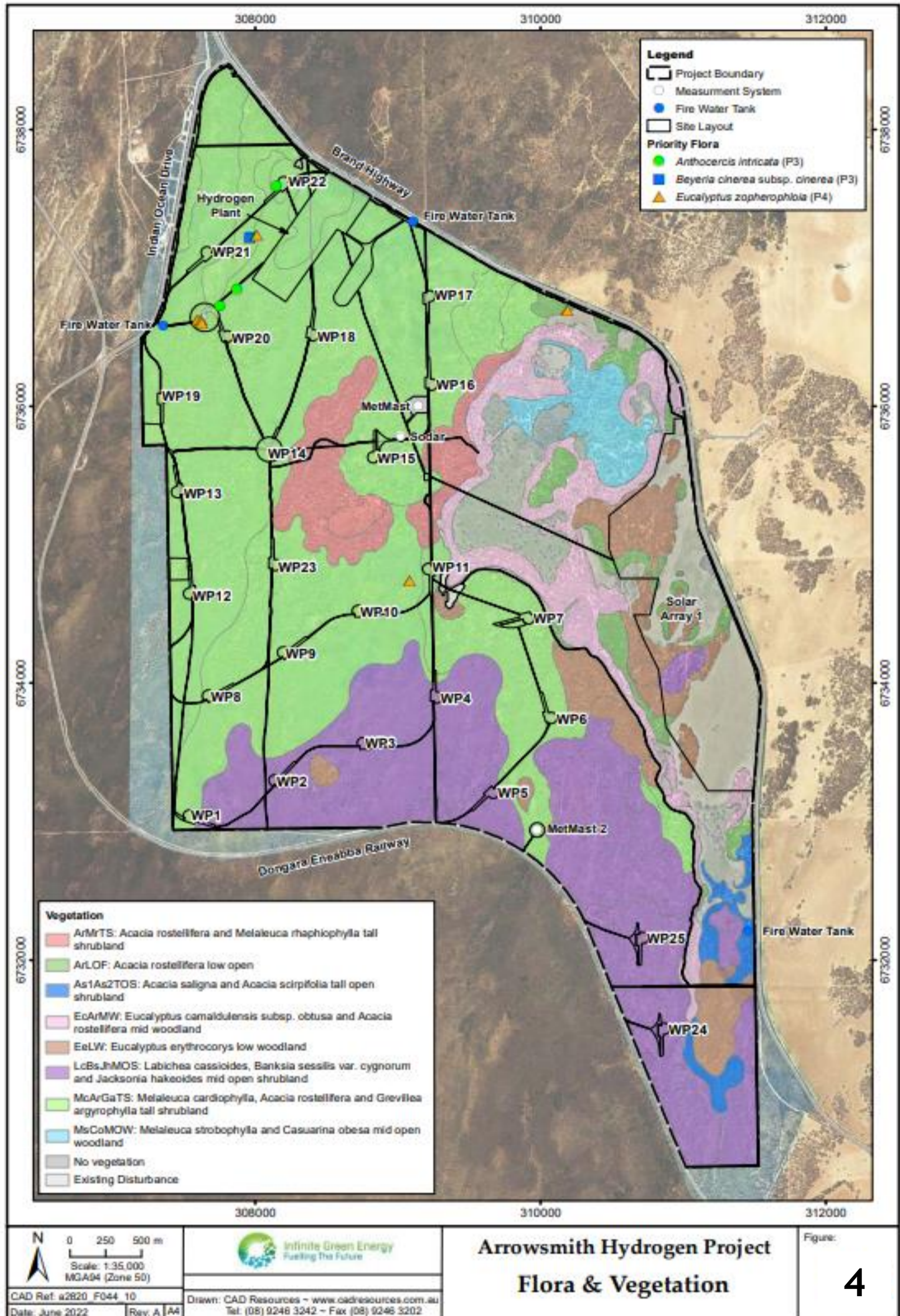
Landform	Mapping unit	Vegetation type	Floristic quadrats/ relevés	Representative photograph	Other characteristic species	Area (ha) and extent (%)
		the area now floods, except perhaps during cyclonic events, due to long-term changes to the climate, with surface water flow changes perhaps exacerbated by landscape modifications for roads and agriculture.				
Upland (disturbed)	As1As2TOS	<i>Acacia saligna</i> and <i>Acacia scirpifolia</i> tall open shrubland over <i>Vulpia myuros</i> , <i>Pentameris airoides</i> and <i>Hypochaeris glabra</i> low closed grassland/forbland  <b>NVIS:</b> M+ ^ <i>Acacia saligna</i> , ^ <i>Acacia scirpifolia</i> ^shrub\4i;G ^^ <i>Vulpia myuros</i> , <i>Pentameris airoides</i> , <i>Hypochaeris glabra</i> ^other grass, forb\1d	D20R03		<i>Acacia rostellifera</i> <i>Amyema preissii</i> * <i>Arctotheca calendula</i> * <i>Brassica tournefortii</i> * <i>Bromus diandrus</i> <i>Crassula</i> sp. * <i>Ehrharta longiflora</i> * <i>Petrorhagia dubia</i> * <i>Trifolium arvense</i>	26.12 ha 1.35%
		Previously Disturbed Area			192.7 ha	9.99 %
		Existing Cleared Roads			20.64 ha	1.07 %
		<b>TOTAL</b>			<b>1,929.68 ha</b>	<b>100%</b>



Figure 4 Flora and Vegetation Type





#### 4. Potential Impacts to Vegetation

The potential direct impact of the project is loss of native vegetation due to clearing (Table 6).

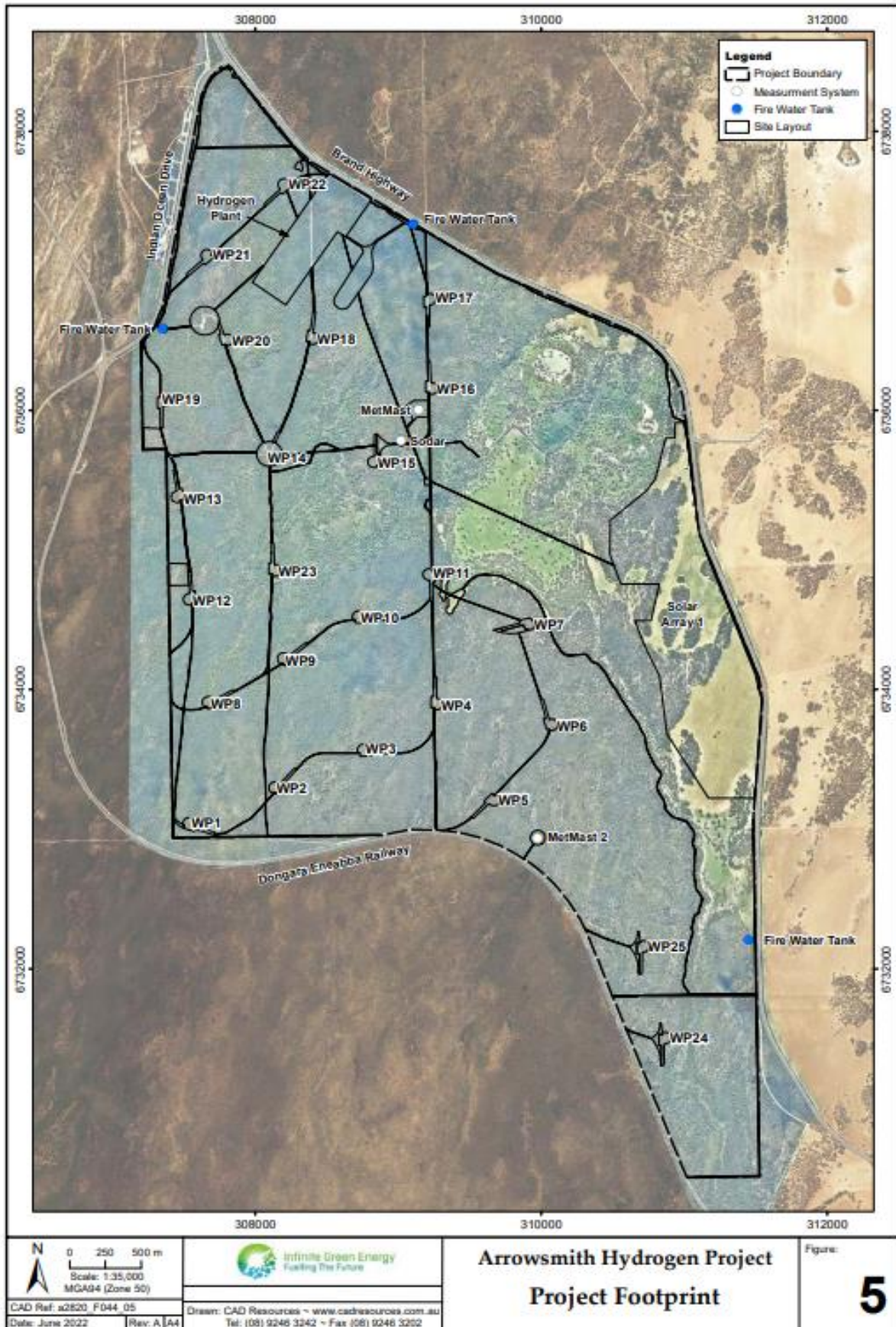
In addition to direct impacts to vegetation arising from the project, the following indirect impacts to vegetation and flora may arise:

- Introduction or spread of non-indigenous species (weed / pathogens)
- Accidental clearing of areas outside of the proposed development envelope

**Table 4: Proposed Vegetation Communities Disturbance**

<b>Vegetation Community</b>	<b>Area of Community recorded on IGE Property</b>	<b>Area to be impacted by Proposal</b>	<b>Area to be rehabilitated under this Rehabilitation Plan</b>
EeLW	116.77ha	39.03 ha	1.0 ha
McArGaTS	860.62 ha	70.77 ha	5.8 ha
ArMrTS	88.13 ha	0.57 ha	1.40 ha
LcBsJhMOS	407.72 ha	16.12 ha	4.3 ha
EcArMW	125.24 ha	1.97 ha	2.0 ha
MsCoMrMOW	42.9 ha	0.00 ha	
ArLOF	48.84 ha	10.43 ha	
As1As2TOS	26.12 ha	0.42 ha	
Previous Disturbed Area	192.70 ha		
Existing Cleared Fire Roads	20.64 ha		
<b>TOTAL</b>	<b>1,929.68 ha</b>	<b>139.31 ha</b>	<b>14.32 ha</b>

Figure 5: Project Layout



#### 4. Environmental Risk Assessment

IGE has assessed the risks of their AHP construction and operations activities and has developed measures to avoid and mitigate environmental impacts on vegetation. This process involved:

2. Prioritising locating infrastructure on cleared areas / areas of completely degraded vegetation
3. Avoiding clearing areas of sensitive flora and vegetation
4. Identifying the potential direct and indirect impacts on sensitive flora and vegetation
5. Establishing management strategies to minimise the potential impacts on sensitive flora and vegetation
6. Developing and implementing a vegetation monitoring program (Rehabilitation Plan to detect impacts on sensitive flora and vegetation

The adequacy of these measures was assessed to determine whether they met ALARP and acceptability criteria.

## 5. Avoidance and Mitigation

### 5.1 Land Clearing

Commitment #	Commitment	Responsibility	Timing
1.	The area of land disturbance for the AHP will be kept to the minimum practicable	Project Manager	Land Clearing
2.	Cleared areas no longer required for the project will be progressively rehabilitated.	Project Manager	At all stages of the AHP Project
<b>Planning - Site Preparation Plan</b>			
3.	<p>A Construction Environmental Management Plan is prepared and approved by the Project Manager to specify all details of site preparation requirements, including:</p> <ul style="list-style-type: none"> <li>• Areas to be cleared are clearly demarcated</li> <li>• Sensitivities identified in the flora and vegetation survey have been avoided.</li> <li>• Clearing activities occur during daylight hours only</li> <li>• Cleared vegetation is stockpiled in windrows less than 2 m high and separately stockpiled topsoil is lightly compacted in windrows to a height of no more than 2 m and covered in brush</li> <li>• All Crew have undertaken the site preparation induction</li> <li>• Vehicles and equipment to be used only within approved project footprint (Figure 6)</li> <li>• Vehicles must be inspected and cleaned down off site prior to mobilisation to the project area</li> <li>• Construction refuelling vehicle to have refuelling drip tray, spill kit and contaminated soil bunding tarp (for segregation of material if a spill occurs and requires storage prior to disposal)</li> <li>• Construction vehicles are left locked when unattended</li> </ul>	Project Manager	Prior to Site Preparation



Commitment #	Commitment	Responsibility	Timing
	<ul style="list-style-type: none"> <li>Sheeting materials will be sourced from an onsite marl borrow pit that has all top soil excluded</li> </ul>		
<b>Planning - Approvals and Permits</b>			
4.	No clearing will be undertaken until the Project Manager has approved and issued the Construction Management Plan	Construction Manager	Prior to Clearing Activity
6.	The Construction Management Plan cannot be issued until EPA Services has approved the project	Project Manager	Prior to Clearing Activity
<b>Planning - Awareness</b>			
7.	All construction personnel will receive instructions on the areas approved for clearing in the form of the AHP1 Construction Induction and toolbox meetings	Construction Manager	Prior to Clearing Activity
<b>Planning – Schedule</b>			
8.	All vegetation clearing is to occur in daylight hours only	Construction Manager	During Clearing Activity
<b>Minimisation of Land Clearing</b>			

<b>Commitment #</b>	<b>Commitment</b>	<b>Responsibility</b>	<b>Timing</b>
9.	Clearing is undertaken to the extent necessary for the activity only	Project Manager	Prior to Clearing Activity
		Construction Manager	During Clearing Activity
<b>Clearing Methodology</b>			
10.	Sensitivities identified in the flora and vegetation survey have been avoided.	Construction Manager	Clearing Activities
11.	Areas to be cleared are clearly demarcated	Construction Manager	Clearing Activities
12.	Cleared vegetation is stockpiled in windrows less than 2 m high and separately stockpiled topsoil is lightly compacted in windrows to a height of no more than 2 m and covered in brush	Construction Manager	Clearing Activities
13.	All Crew have undertaken the AHP construction induction	Construction Manager	Clearing Activities
14.	Vehicles and equipment to be used only within approved project footprint (Figure 6)	Construction Manager	Clearing Activities
<b>Documentation</b>			
15.	The person undertaking clearing is required to fill in a Clearing Vegetation Record Form (Appendix A) for clearing activities to provide a record of all clearing undertaken for the Project	Person Undertaking Clearing	Post Clearing Activities
16.	The Construction Manager is required to submit the completed Clearing Vegetation Record Forms (Appendix A) for all clearing activities undertaken for the Project	Construction Manager	Post Clearing Activities
<b>Vegetation Survey</b>			
17.	If there were to be any additional vegetation clearing required, the VMP would require review and the identification of the requirement for any additional flora and fauna survey / EPA approvals made well in advance of operations	Project Manager	Prior to Clearing Activities

## 5.2 Hygiene Management

<b>Commitment #</b>	<b>Commitment</b>	<b>Responsibility</b>	<b>Timing</b>
<b>Awareness</b>			
18.	Induction of personnel outlines the Project hygiene requirements	Project Manager	Prior to Clearing Activities
<b>Hygiene Methodology</b>			
19.	Sheeting materials will be sourced from an onsite marl borrow pit.	Construction Manager	Site Preparation
20.	Borrow pit is managed to minimise the risk of weed transfer (topsoil exclusion during out loading)	Construction Manager	Site Preparation
21.	Vehicles must be inspected and cleaned down (off site prior to mobilisation). Offsite clean down must ensure vehicle is free of all soil and plant matter as per requirements of AHP Hygiene Procedure	Construction Manager	Prior to Mobilisation to Site
22.	A hygiene station will be established specifically for entry into non sealed site roads. This station will be commissioned pre commencement of site construction activities. Washdown water will be discharged to approved recoverable sump (including lined pad brushes/brooms and weatherproof container for hygiene inspection.	Construction Manager	Site Preparation
23.	Vehicles and equipment are to arrive on site in a clean state and conduct inspection on site at the sessilis station in accordance with the Hygiene Procedure including sign off on the hygiene inspection log	Construction Manager	At all stages of the AHP Project
24.	Personnel are required to complete the induction which outlines weed and dieback hygiene requirements	Construction Manager	Prior to Mobilisation to Site

### 5.3 Fire Management

Commitment #	Commitment	Responsibility	Timing
25.	Firebreaks shall be maintained and constructed in compliance with statutory requirements to provide protection to surrounding vegetation from a potential fire from the Project i.e vegetation cleared to 100 mm height to the edge of the shoulder on either side of access tracks as per Bushfire Management Plan.	Project Manager	At all stages of the AHP Project
26.	Smoking is permitted in designated areas only	All Personnel	At all stages of the AHP Project
27.	All site vehicles have serviceable fire extinguishers	Project Manager	At all stages of the AHP Project
28.	A mobile water cart is on site at the times specified in the ERP	Project Manager	At all stages of the AHP Project

### 5.4 Other Commitments

Commitment #	Commitment	Responsibility	Timing
<b>Access Tracks and Off-Road Travel</b>			
29.	To prevent impact on native vegetation outside the project footprint, all personnel shall only drive on existing tracks, access roads, firebreaks, and service corridors. No travel outside designated access routes shall occur without the approval of the Project Manager	Project Manager	At all stages of the AHP Project
<b>Dust</b>			
30.	All personnel shall adhere to vehicle speed limits as sign posted and outlined in the induction to prevent dust from accumulating on vegetation	All Personnel	At all stages of the AHP Project
31.	Should concerns of dust be raised, suppression measures will be investigated	Project Manager	At all stages of the AHP Project
<b>Surface Water Drainage</b>			

Commitment #	Commitment	Responsibility	Timing
32.	Where surface water drainage requires diversion away from operational areas, roads and other areas, the diversion shall be managed such that surrounding vegetation is protected from long-term inundation	Project Manager	At all stages of the AHP Project

## 6. Responsibility and Accountability

### 6.1 Responsibilities

The IGE Project Manager has overall responsibility for the safe and environmentally acceptable management of the operation. The Project Manager must ensure that the commitments and requirements of this VMP are implemented. All personnel, contractors and visitors must adhere to the requirements of this VMP.

### 6.2 Training/Site Inductions

All personnel to review the relevant IGE site inductions prior to access to site. All personnel and contractors are required to undertake the AHP induction. Visitors accompanied by an inducted person are not required to complete the induction for the purposes of this VMP.

Commitment #	Commitment	Responsibility	Timing
1.	All personnel and contractors undertake the AHP Induction and the records are included in the training log	Project Manager	At all stages of the AHP Project

## 7. Rehabilitation Management

Details of the rehabilitation program are included in the AHP Rehabilitation Plan. The Rehabilitation Plan outlines the following aspects:

- Current Conditions and Issues
- Earthworks and Site Preparation to be undertaken
- Propagule Introduction and Fertilising
- Rehabilitation Objectives
- Supervision & Schedule
- Monitoring and Maintenance

Rehabilitated areas will be monitored to ensure the success of the rehabilitation program. Monitoring will be carried out on a regular basis to assess:

- The physical stability of the landform of rehabilitated areas
- The establishment of the vegetation in rehabilitated areas

Monitoring will cease when the rehabilitation objectives have been achieved.

## 8. Monitoring

### 8.1 Inspections

#### *Routine Site Inspection*

Routine site inspections are undertaken as per Table 7.

**Table 6: Routine Site Inspections**

#	Stage	Frequency	Inspection Descriptor
9.1.1	Construction	Daily	Ground Condition Checks as part of Daily Vehicle Checks
9.1.2	End of Construction	Once	Construction Management Plan Check
9.1.3	Operations	Daily	Site Visual Inspection
9.1.4	Construction / Operations	Daily	Daily inspections of unfenced excavations
9.1.5	Construction / Operations	Weekly	Weekly inspections of artificial water bodies
9.1.6	Construction / Operations	Weekly	Weekly inspections of fenced excavations
9.1.7	Operations	Monthly	Monthly Workplace Inspections
9.1.8	Rehabilitation Works	Daily	Ground Condition Checks as part of Daily Vehicle Checks
9.1.9	Rehabilitation Monitoring	Monthly	Monthly Rehabilitation Inspections

### 8.2 Compliance Auditing

Auditing of the environmental management measures outlined in this VMP shall be undertaken by a suitably qualified person. Where audit findings show that environmental management actions are not effective, the audit may recommend changes to procedures. The Environmental Audits will be undertaken as per the schedule in Table 8.

**Table 7: Environmental Auditing**

#	Timing	Frequency
8.2.1	During or immediately post construction	Once
8.2.2	During operation activities	Annually
8.2.3	During rehabilitation activities	Each Campaign

### 8.3 Monitoring

Weed, dieback and (when applicable) rehabilitation monitoring is conducted on an annual basis commencing within one year following the commissioning of the Arrowsmith Hydrogen Project. The requirements of the monitoring are presented in Table 9.

**Table 8: Weed, Dieback and Rehabilitation Monitoring**

Aspect	Objective	Scope
Photographs at Monitoring Points		
Weed	Ensure weeds are managed to prevent the spread of weeds	<ul style="list-style-type: none"> <li>Observe weed cover (opportunistic and upon rehabilitation to include quadrats and relieves)</li> <li>Recommend weed management</li> </ul>
Dieback	Ensure if dieback is introduced it is identified	<ul style="list-style-type: none"> <li>Observe suspicious vegetation deaths (across project area)</li> <li>Make recommendations on requirement for dieback survey</li> </ul>
Rehabilitation	Ensure rehabilitation is progressing towards completion criteria	<ul style="list-style-type: none"> <li>Assess rehabilitation against completion criteria and methods described in Rehabilitation Plan</li> <li>Make recommendations to encourage rehabilitation success</li> </ul>

Should the monitoring results indicate the rehabilitation is not progressing adequately, an assessment will be made to determine rectification requirements.

Monitoring will continue until monitoring objectives have been met.



## 9. Thresholds and Triggers

Table 9 presents the threshold criteria that provide a limit beyond which the vegetation outcomes are deemed not to have been achieved. It provides the trigger criteria that will provide an early warning that the vegetation outcomes are not likely to be met, how the criteria will be monitored and contingency measures that will be implemented if threshold or trigger criteria are met.

**Table 9: AHP Thresholds and Triggers for Vegetation Management**

#	Threshold Criteria	Trigger Criteria	Monitoring	Contingency Measures
1.	Disturbance of 139.68 ha of native vegetation	Disturbance of 139.68 ha of native vegetation	<ul style="list-style-type: none"> <li>Survey prior to ground disturbing activities demarcating areas to be cleared</li> <li>Daily inspections compare cleared areas with survey markers</li> <li>Post clearing survey</li> </ul>	<ul style="list-style-type: none"> <li>Clearing outside permitted area is reported to DWER</li> <li>Rehabilitation of non-permitted cleared area immediately</li> </ul>
2.	No fire entering native vegetation originating from AHP Activity	Fire any location, any size at AHP Activity	<ul style="list-style-type: none"> <li>Prior to clearing activities ensure fire response equipment is in place, ignition sources are not left unattended, vehicles are parked in cleared areas and good housekeeping is in place</li> <li>Vehicle and equipment logbooks show that vehicles and equipment are maintained in accordance with service schedule to minimise risk of fire</li> <li>Audit ensures that all vehicles and equipment is maintained in accordance with service schedules to minimise risk of fire</li> <li>Site Supervisor monitors the DFES fire alerts</li> <li>Training records show that all required personnel have completed training at the required intervals; basic firefighting, site induction, emergency exercises</li> </ul>	<ul style="list-style-type: none"> <li>Implement Emergency Response Plan</li> <li>Contact Emergency Services and DBCA</li> <li>All fires are reported as per AHP1 Construction Environmental Management Plan</li> </ul>

#	Threshold Criteria	Trigger Criteria	Monitoring	Contingency Measures
3.	No introduction of dieback	Hygiene Procedure violation	<ul style="list-style-type: none"> <li>• Daily inspection of construction hygiene station including hygiene register</li> <li>• Audit of hygiene records against vehicle movements</li> <li>• Annual rehabilitation dieback site assessment</li> </ul>	<ul style="list-style-type: none"> <li>• Hygiene procedure review</li> <li>• Dieback interpreter engaged</li> <li>• Consultation with DBCA (Beekeepers Nature Reserve)</li> <li>• Reporting as per Construction Environmental Management Plan</li> </ul>

## **10. Reporting and Review**

### **10.1 Non-Compliance Reporting**

Environmental incidents shall be reported and investigated as soon as practicable following identification, enabling effective actions to be implemented without delay. Environmental incidents are defined as events that cause or could potentially cause harm to the environment.

### **10.2 Clearing Recording**

The person undertaking clearing is required to submit completed Clearing Vegetation Record Form (Appendix A) for clearing activities to provide a record of all clearing undertaken for the Project.

### **10.3 Management Plan Review**

The VMP is to be revised when there is a significant change to site preparation or operational activities.

## 11. References

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Department of Primary Industries and Rural Development (2019) Pre-European Vegetation (DPIRD-006). Available from: <https://catalogue.data.wa.gov.au/dataset/pre-european-dpird-006>

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Shepherd, DP, Beeston, GR & Hopkins, AJM (2002) 'Native Vegetation in Western Australia: Extent, Type and Status'. Resource Management Technical Report 249.

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## Appendix A Clearing Vegetation Record Form



### Clearing Vegetation Record Form

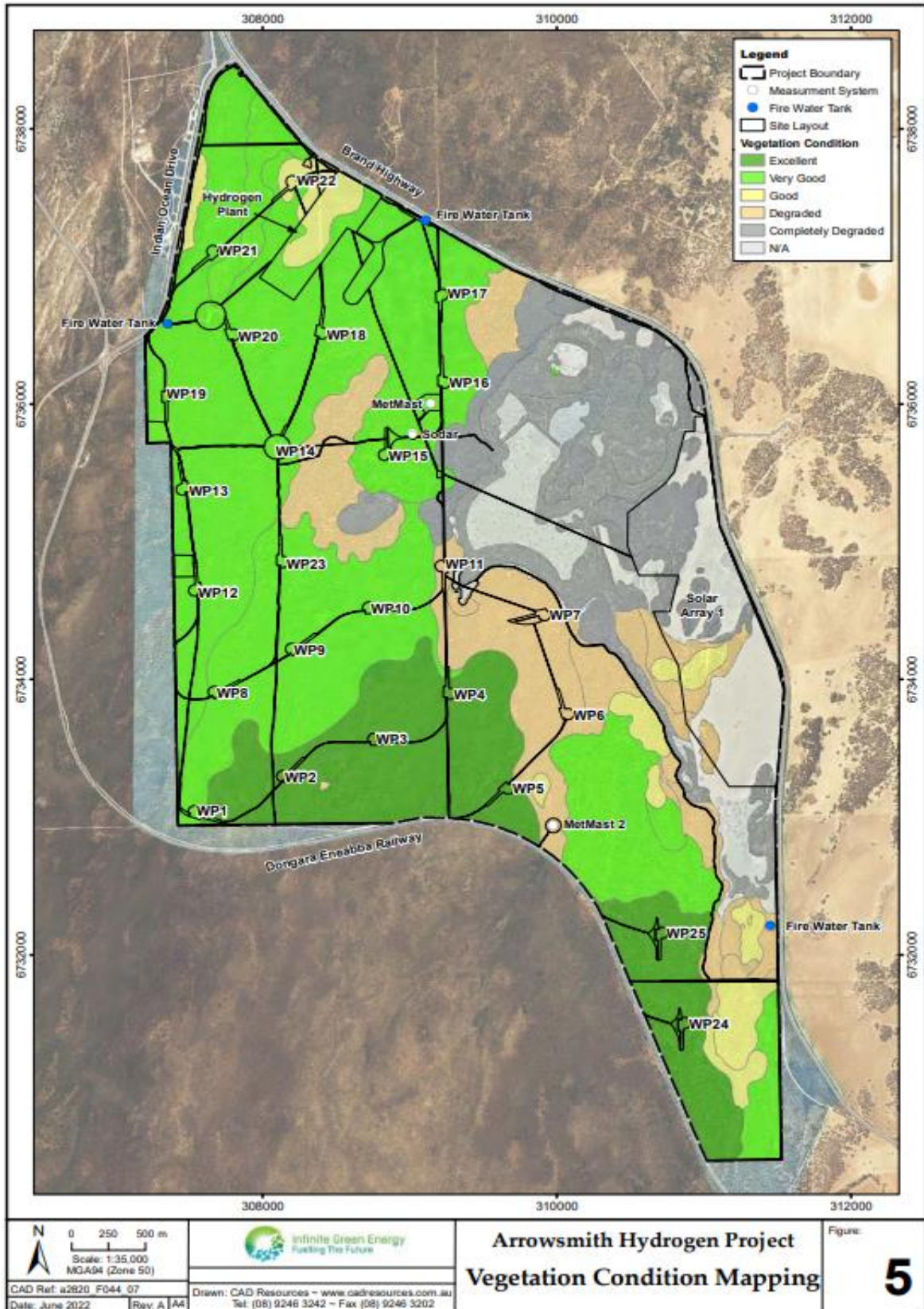


Section 1 (Applicant to complete)		
Company:	Date:	Permit No:
Requested By:	Signature:	
Permit Holder:		
Location of Work (Attach plan/map)		
Description of Work:		
Proposed Duration Dates:		
Area to be Cleared (m2):		
Co-ordinates of Clearing Location(s):		
Excavation Permit No:		
Are other Trades involved with or affected by the work process and have they been informed <input type="checkbox"/> Yes <input type="checkbox"/> No if yes, specify names of the other subcontractor/s involved:		
<p><b>Under no circumstances shall any clearing of vegetation take place without consent from Regulatory Authorities and without the approval of the IBE's Environment Manager. The original Clearing Permit and supporting documentation shall be kept with the IBE and copies to be kept by the Contractor undertaking land clearing.</b></p>		
<b>Standard Conditions</b>		
1. Clearly mark the area to be cleared. 2. Clear and stockpile vegetation in designated area. 3. Excavation permit must be obtained and attached.		
Section 2 (Subcontractor to complete)		
Environment	Description	
Work method/JSA submitted?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Dieback management <u>incorporated</u> ?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	
Conservation areas acknowledged?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Heritage management <u>incorporated</u> ?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Fire management <u>incorporated</u> ?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Spill management measures in place?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Dust management <u>incorporated</u> ?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Equipment	Description	
Weed and seed inspection reports?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Plant inspections <u>undertaken</u> ?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Section 3 (IBE to complete)		
<b>IBE Environment Manager</b>		
Clearing permit number?		
Pre-clearing activities undertaken?		
<b>Name</b>	<b>Signature</b>	<b>Date</b>
Permission to conduct clearing work is granted, subject to special conditions (in addition to the above) noted below:		
Section 4 Close -Out (IBE)		
Works completion date (permit close out):		
Name	Signature:	Date:
Heritage Third Party Sign Off:		
Name	Signature:	Date:

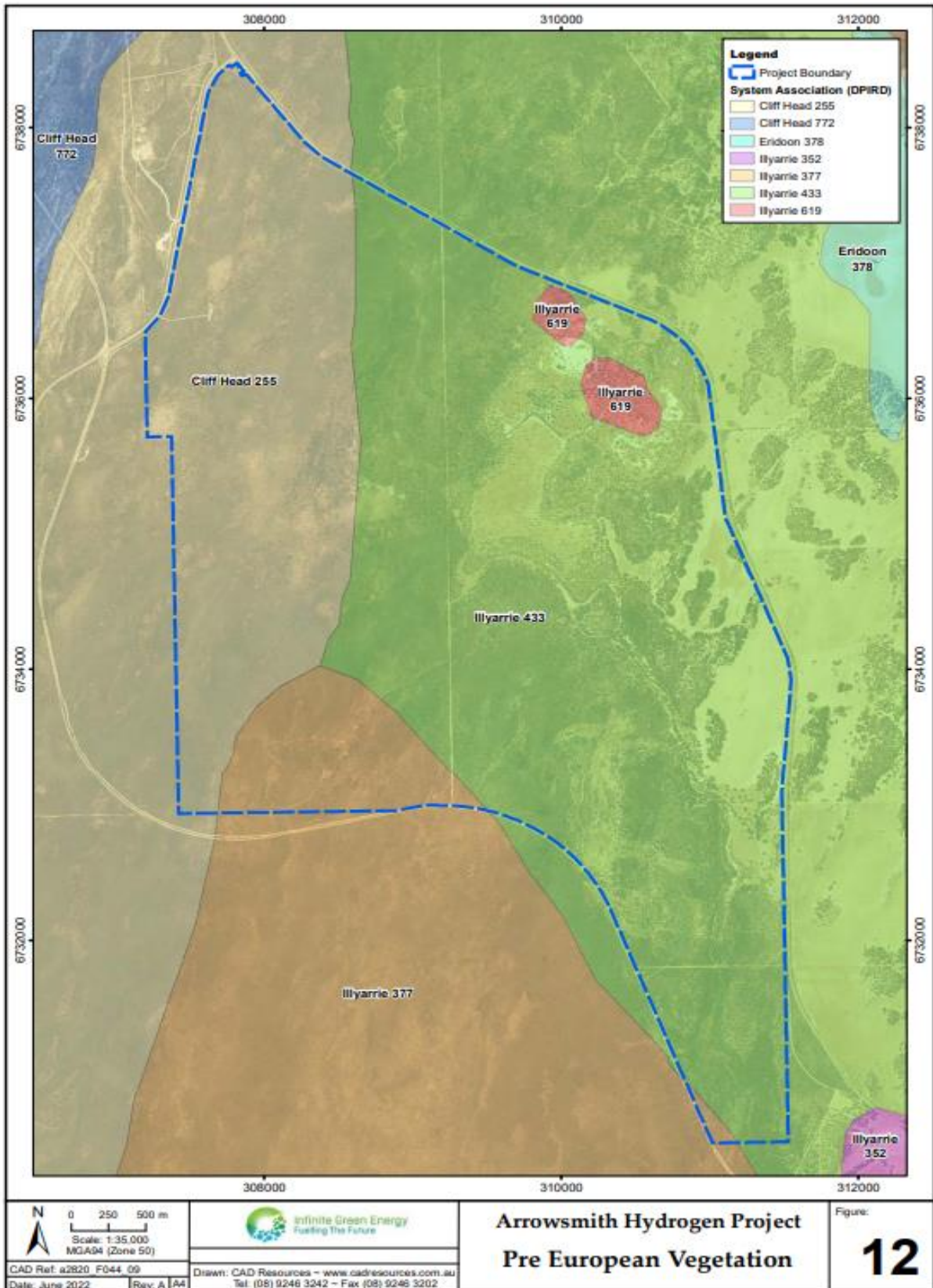
**Permit To Be Kept With the Operator at All Times** All holders of permits are to stay with that particular activity for the duration of the work, the permit holder has to leave for any reason, the work stops until the permit holder returns, additionally if the work type changes the permit also stops and a new permit generated by the contractor and BM.



Appendix B Vegetation Condition Figure 14



Appendix C Pre European Vegetation Figure 12





Appendix D Flora and Vegetation Type Figure 13

