662MIC0023-5530-SV-EN-0002

JULY 2016

Providing sustainable environmental strategies,
management and monitoring solutions
to industry and government.

ecologia
ENVIRONMENT

FMG IRON BRIDGE (AUST) PTY LTD
NORTH STAR WATER CORRIDOR
TARGETED SIGNIFICANT FLORA AND VEGETATION SURVEY

Document status					*ecologia* reference: 1669
Rev	**Author**	**Reviewer**	**Approved for issue**		
			Name	**Distributed to**	**Date**
0	Melissa Hay	Andrew Craigie Shaun Grein	Shaun Grein	Matthew Dowling	22/06/2016
1	Melissa hay	Andrew Craigie Shaun Grein	Shaun Grein	Matthew Dowling	8/07/2016

ecologia Environment
1/224 Lord Street
PERTH WA 6000
Phone: 08 6168 7200
Email: admin@ecologia.com.au

TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

EXECUTIVE SUMMARY

IB Operations Pty Ltd is developing the North Star Hematite Project (the Project), on behalf of the joint venture partners FMG Iron Bridge (Aust) Pty Ltd (FMGIB) and Formosa Steel IB Pty Ltd. The Project is located approximately 110 km south of Port Hedland in the Pilbara region of Western Australia. FMGIB is the proponent under the North Star Magnetite Project Ministerial Statement 993 (MS 993). As an approval condition of MS 993, FMGIB was required to develop a Conservation Significant Flora and Vegetation Survey Plan for the Linear Infrastructure and Borefield Alignment and conduct the associated targeted significant flora and vegetation survey prior to the commencement of any ground disturbing activities. This report constitutes the survey component of that condition. The NSWC connects the Project to a proposed water borefield in the Canning Basin, approximately 190 km north-east.

The primary purpose of this assessment was to identify and accurately record the location of any conservation significant flora species and/or vegetation communities, in particular, any Threatened flora, Priority 1 listed flora, and Threatened Ecological Communities (TECs) occurring within the NSWC, specifically along a proposed 50 m centreline located within the study area. In accordance with the approved survey plan, the NSWC was divided into 'High', 'Moderate' or 'Low' priority areas for occurrence of Priority 1 flora, with the survey focussing predominantly on the 'High' and 'Moderate' priority areas.

The field survey was conducted by two *ecologia* botanists over an eight day period from the 30 May to 6 June 2016. A survey effort equivalent to 14 person days was expended over the course of the field survey. Approximately 153 km of transects were traversed within the study area, comprising 40 km within 'High', 41 km within 'Moderate' and 7 km within 'Low' priority areas. Nine releves were surveyed within vegetation identified as representing Groundwater Dependent Ecosystems (GDEs).

FLORA

One WC Act (Endangered) Threatened Flora taxon, *Pityrodia* sp. Marble Bar (G. Woodman & D. Coultas GWDC Opp 4), was recorded within the NSWC representing two populations comprising a total of 33 plants.

No Priority 1 species were recorded within the NSWC, although *Heliotropium muticum* (P1) was opportunistically recorded 10 km west of the study area.

Additional Priority species recorded within the study area were: *Euphorbia clementii* (P2), *Acacia ?glaucocaesia* (P3), *Eragrostis crateriformis* (P3) and *Heliotropium murinum* (P3).

Parkinsonia aculeata* (WONS) was recorded at one location, comprising 65 plants on a floodplain of the De Grey River within the NSWC. **Calotropis procera* (Declared Weed) was extensively recorded within the NSWC along the Shaw, Coongan and De Grey Rivers at 94 locations, comprising 6,699 plants. Additionally, six environmental weeds (Aerva javanica, *Cenchrus ciliaris, *Cenchrus setiger, *Citrullus lanatus, *Cynodon dactylon* and **Vachellia farnesiana*) were recorded, with **Cenchrus ciliaris* the most extensively recorded across 65 locations, comprising 78,781 plants

VEGETATION

No EPBC Act or State listed TECs, PECs or vegetation units that correspond with these communities were recorded from the NSWC.

Two GDE communities were recorded within the study area, which are associated with the Shaw, Coongan and De Grey Rivers that intersect the NSWC.

- GDE1: *Melaleuca argentea* sparse to open low woodland, over *Cyperus vaginatus* sparse low sedgeland; and

- GDE2: *Eucalyptus camaldulensis* (+/- *Melaleuca argentea*) open low woodland, over *Acacia trachycarpa* sparse mid to tall shrubland, over **Cenchrus ciliaris* tussock grassland.

Vegetation condition within the NSWC mostly had some signs of disturbance caused by moderate grazing, occasional scattered weeds and some vehicle tracks. The hills in the southern section of the corridor had no obvious disturbance, probably due to the inaccessibility of the hills to cattle.

The banks and floodplains of the Coongan and De Grey Rivers were severely impacted, where **Calotropis procera* was often dominant in the mid to tall shrub stratum and **Cenchrus ciliaris* often dominant in the lower grass stratum. The Shaw River and other minor drainage lines in the south of the NSWC usually had high levels of grazing, dominant weed species (primarily **Cenchrus ciliaris*), and often lacked a native understorey.

1 INTRODUCTION

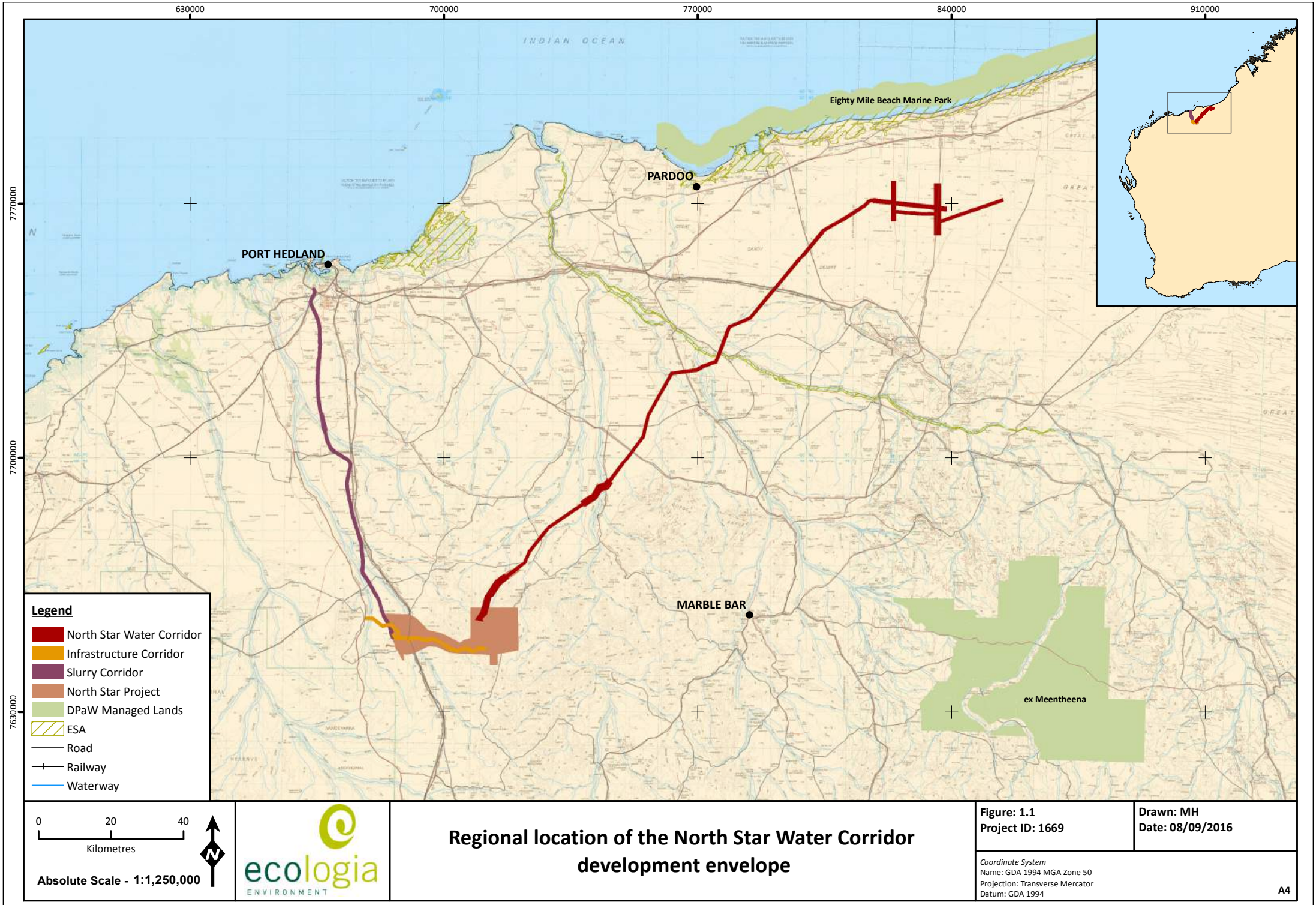
1.1 PROJECT OVERVIEW

IB Operations Pty Ltd (IBO) is developing the North Star Hematite Project (the Project), on behalf of the joint venture partners FMG Iron Bridge (Aust) Pty Ltd (FMGIB) and Formosa Steel IB Pty Ltd (Formosa). The Project is located approximately 110 km south of Port Hedland in the Pilbara region of Western Australia (Figure 1.1).

FMGIB is the nominated proponent under the North Star Magnetite Project Ministerial Statement 993 (MS 993) and under conditions of MS 993, FMGIB are required to undertake flora and vegetation surveys of all Project infrastructure corridors, which includes the slurry, infrastructure and water corridors, for conservation significant flora and vegetation prior to any disturbance (Figure 1.1).

FMGIB was required to undertake targeted significant flora and vegetation assessment of the proposed North Star Water Corridor (NSWC) development envelope (or the study area) which connects the Project to a proposed water borefield in the Canning Basin, approximately 190 km north-east (Figure 1.1).

The survey was undertaken in accordance with the *North Star Infrastructure Corridor Survey Plan (NS-PL-EN-0005)* which was approved by the Environmental Protection Authority (EPA) on advice from the Department of Parks and Wildlife (DPAW). According to the conditions of MS 993, the results of the survey must be considered when designing and constructing infrastructure within the corridors. Therefore the primary objective for the survey was to identify and accurately delineate any conservation significant flora species and/or vegetation communities, in particular, any Threatened flora (Declared Rare Flora), Priority 1 listed flora, and Threatened Ecological Communities (TECs) occurring within the NSWC. As the NSWC development envelope is approximately 190 km in length and 1 to 2 km in width, the field assessment focussed on a proposed 50 m centreline within the study area, based on the proposed alignment for the water pipeline.


630000
700000
770000
840000
910000
7770000
7700000
7630000
INDIAN OCEAN
Eighty Mile Beach Marine Park
PARDOO
PORT HEDLAND
MARBLE BAR
ex Meentheena
Legend
North Star Water Corridor
Infrastructure Corridor
Slurry Corridor
North Star Project
DPaW Managed Lands
ESA
Road
Railway
Waterway
0
20
40
Kilometres
N
Absolute Scale - 1:1,250,000
ecologia
ENVIRONMENT
Regional location of the North Star Water Corridor development envelope
Figure: 1.1
Project ID: 1669
Drawn: MH
Date: 08/09/2016
Coordinate System
Name: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Datum: GDA 1994
A4

1.2 GUIDELINES

Survey methods accorded with guidelines for flora and vegetation assessments as described in the following documents:

- Fortescue's *North Star Infrastructure Corridor Survey Plan (NS-PL-EN-0005);*
- EPA and DPaW Technical Guide: Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment (EPA & DPaW 2015);
- DEC Threatened and Priority Flora Report Form: Field Manual (DEC 2010);
- EPA Position Statement No. 3: Terrestrial Biological Surveys as an Element of Biodiversity Protection (EPA 2002); and

Fortescue's internal Flora and Vegetation Assessment Guidelines (100-GU-EN-0005) were also considered during the development of survey plan and execution of the field assessment for this project.

1.3 DEFINITIONS

1.3.1 Significant Flora

As described in EPA Guidance Statement 51 (EPA 2004), plant species may be considered significant if they are:

- Declared Rare (Threatened, EPBC Act and/or WC Act, categories provided in Appendix A); or
- Priority Flora (categories are provided in Appendix A).

Other reasons that plant species may be significant include:

- Range extensions;
- Keystone species;
- Relic species;
- Potential novel or new species;
- Restricted species, subspecies, varieties or naturally occurring hybrids; and
- Local endemics.

1.3.2 Significant Vegetation

As described in EPA Guidance Statement 51 (EPA 2004), vegetation may be considered significant if it is:

- Listed as a Threatened Ecological Community (TEC, categories provided in Appendix A); or
- The known post-European extent is below a threshold level.

Other reasons that vegetation may be significant include:

- Scarcity (based on likely distribution and landform type);
- Unusual species (based on other surveys conducted in the area);
- Novel combination of species (based on other surveys conducted in the area);
- A role as refuge (based on if the vegetation provides refuge for flora during any stress i.e. drought, fire etc. and can include gorges, phreatophytic species (Groundwater Dependent Ecosystems) which in the Pilbara includes *Eucalyptus camaldulensis* and *Melaleuca argentea*);
- A role as a key habitat for threatened species or large populations representing a significant proportion of the local to regional total population of a species;
- Being representative of the range of a unit, at the extremes of range, recently discovered range extensions, outliers or isolated outliers of a main range; and

- A restricted distribution (based on other surveys conducted in the area).

In addition to that listed in Guidance Statement No. 51, vegetation is considered significant if it is:

- A state listed TEC or Priority Ecological Communities (PECs, categories provided in Appendix A); or
- Considered an ecosystem at risk for the IBRA sub-region (Kendrick and McKenzie 2001).

1.3.3 Populations

As outlined in the Threatened and Priority Flora Report Form (TPRF) Field Manual (DEC 2010) the guidelines for distinguishing between different populations include:

- Plants more than 500 m from a known population are considered a new population;
- Plants within 500 m of a known population are considered to be part of that population; and
- Within a recognised population, plants that occur on different land tenure parcels, or those that have considerable separation between them (i.e. plants that occur on either side of a river, or on close but distinct peaks and outcropping) are considered to be sub-populations.

1.3.4 Survey Type

Three levels of survey are listed in the TPRF Field Manual (DEC 2010) which include:

- Full survey: sufficient time and effort are spent determining the limits of the (sub) population, and details recorded on the TPRF apply to the whole extent of the (sub) population;
- Partial survey: part of the (sub) population is observed; and
- Edge survey: a quick visit to the site of the (sub) population, sufficient to confirm the ongoing presence of the taxon.

1.4 DESKTOP ASSESSMENT

1.4.1 Significant Flora

The survey plan identified one Threatened and four Priority 1 flora taxa with 'High' and one with 'Moderate' potential for occurrence within the NSWC including:

Threatened:

- *Pityrodia* sp. Marble Bar (G. Woodman & D. Coultas GWDC Opp 4) (High) recorded on steep ironstone slopes;

Priority 1:

- *Abutilon* sp. Pritzelianum (S. van Leeuwen 5095) (High) recorded on sand plains, creek beds and roadsides;
- *Heliotropium muticum* (High) recorded on sand plains, floodplains and rocky plains;
- *Heliotropium parviantrum* (High) recorded on flats, plains and rocky slopes;
- *Rothia indica* subsp. *australis* (High) recorded on sandy soils and sand flats; and
- *Tephrosia rosea* var. Port Hedland (A.S. George 1114) (Moderate) recorded on sandy plains.

Based on proximity to existing records, other significant plant species that may occur in the NSWC are:

- P1: *Acacia cyperophylla* var. *omearana*, *Acacia leeuweniana*, *Bonamia oblongifolia*, *Fimbristylis* sp. Shay Gap (K.R. Newbey 10293);
- P2: *Euphorbia clementii, Euphorbia inappendiculata* var. *inappendiculata*, *Stylidium weeliwolli*;
- P3: *Acacia glaucocaesia, Acacia levata, Acacia monticola* × *tumida* var. *kulparn*, *Croton aridus*, *Eragrostis crateriformis, Gymnanthera cunninghamii, Heliotropium murinum, Indigofera*

ammobia, Seringia katatona, Nicotiana umbratica, Phyllanthus hebecarpus, Terminalia supranitifolia;
- P4: *Bulbostylis burbidgeae, Goodenia nuda, Ptilotus mollis*; and
- Other (Range Extension – GS51): *Eriachne melicacea*.

Additionally, a desktop assessment incorporating new database searches (reference 38-0516FL) and records from surveys conducted in the area identified the following significant plant taxa as previously recorded in the vicinity of the NSWC:

- P1: *Acacia aphanoclada, Acacia* sp. Marble Bar (J.G. & M.H. Simmons 3499), *Acacia* sp. Nullagine (B.R. Maslin 4955), *Atriplex eremitis, Atriplex spinulosa, Corchorus* sp. Yarrie (J. Bull & D. Roberts CAL 01.05), *Eremophila maculata* subsp. *filifolia, Mimulus clementii* and *Tribulus minutus*;
- P2: *Indigofera ixocarpa*; and
- P3: *Acacia fecunda, Acacia* sp. Broome (B.R. Maslin 4918), *Gomphrena leptophylla, Goodenia* sp. East Pilbara (A.A. Mitchell PRP 727), *Phyllanthus eremicus, Terminalia kumpaja*.

None of the Priority 1 species were considered likely to occur within the NSWC. A map detailing the locations of significant flora recorded during the desktop assessment is provided in Figure 1.2.

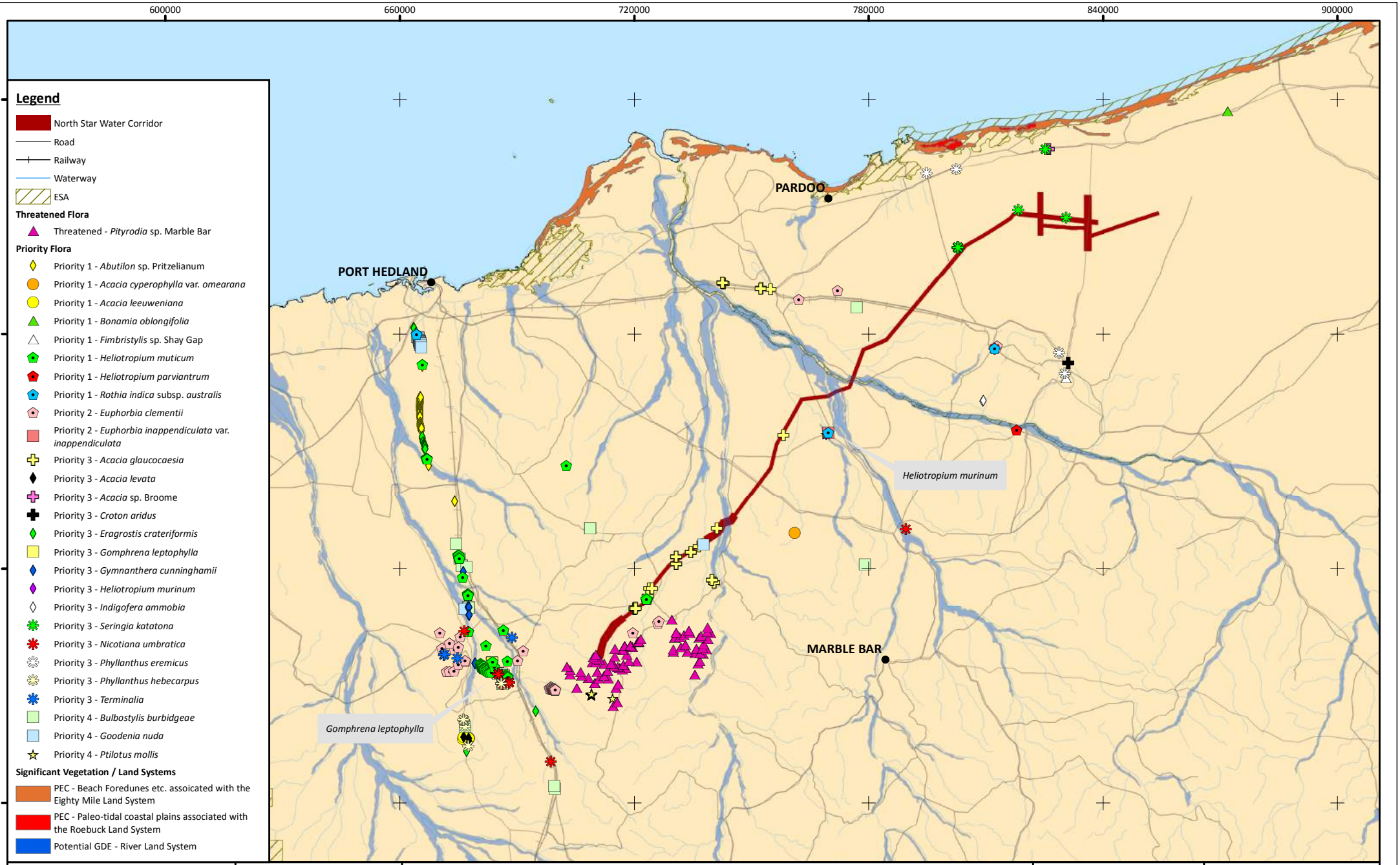
1.4.2 Significant Vegetation

No EPBC or state listed TECs are known to occur within the NSWC. Two Priority 3 PECs are known from approximately 16 km north of the NSWC, but are considered unlikely to occur within it as they are associated with coastal land systems including:

- Beach foredunes, longitudinal coastal dunes and sandy plains with tussock grasslands and spinifex grasslands associated with the Eighty Mile land system; and
- Paleo-tidal coastal plains and tidal flats with saline soil supporting salt-water couch grasslands, samphire low shrublands, melaleuca thickets and mangroves associated with the Roebuck land system.

The De Grey, Shaw and Coongan Rivers all intersect the NSWC. These are all associated with the River land system, which is characterised by fringing woodlands of *Eucalyptus camaldulensis, Melaleuca argentea* and *Eucalyptus victrix*. Both *Eucalyptus camaldulensis* and *Melaleuca argentea* are known phreatophytic species and *Eucalyptus victrix* is a facultative phreatophyte; therefore, these areas are classified as Groundwater Dependent Ecosystems (GDE), and are therefore considered significant. The De Grey River is also mapped as an Environmentally Sensitive Area (ESA).

The PECs (mapped as their associated land systems) and the potential GDEs (mapped as the River land system) are mapped on Figure 1.2.



Significant flora and vegetation recorded during the desktop assessment

Figure: 1.2
Project ID: 1669

Drawn: MH
Date: 08/06/2016

Coordinate System
Name: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Datum: GDA 1994

A4

2 METHODOLOGY

2.1 SURVEY TIMING

The field survey was conducted by two *ecologia* botanists over an eight day period between the 30 May and 6 June 2016. A survey effort equivalent to 14 person days was expended conducting the survey, excluding mobilisation and demobilisation from the survey area

2.1.1 Rainfall Prior to the Survey

Rainfall across the Pilbara has been seasonally low, with only one summer rainfall event occurring at the end of January associated with Tropical Cyclone Stan. This brought heavy rainfall to the north-east of the NSWC and resulted in major flooding to the upper areas of the De Grey River catchments, including the Oakover River, the Coongan River and the Nullagine River which are within or in the vicinity of the study area.

Rainfall was available for the Bureau of Meteorology (BoM) stations in the vicinity of the NSWC:

- Marble Bar (#4106, 1942-2016) 50 km south-east of the central area of the NSWC;
- Pardoo (#4028, 1904-2016) 34 km north-west of the northern area of the NSWC;
- Strelley (#4036, 1906-2016) 50 north-west of the central area of the NSWC; and
- Yarrie (#4046, 1898-2016) 54 km north-west of the northern area of the NSWC.

At the time of writing this report, no verified rainfall data were available from the above stations in the three months prior to the survey.

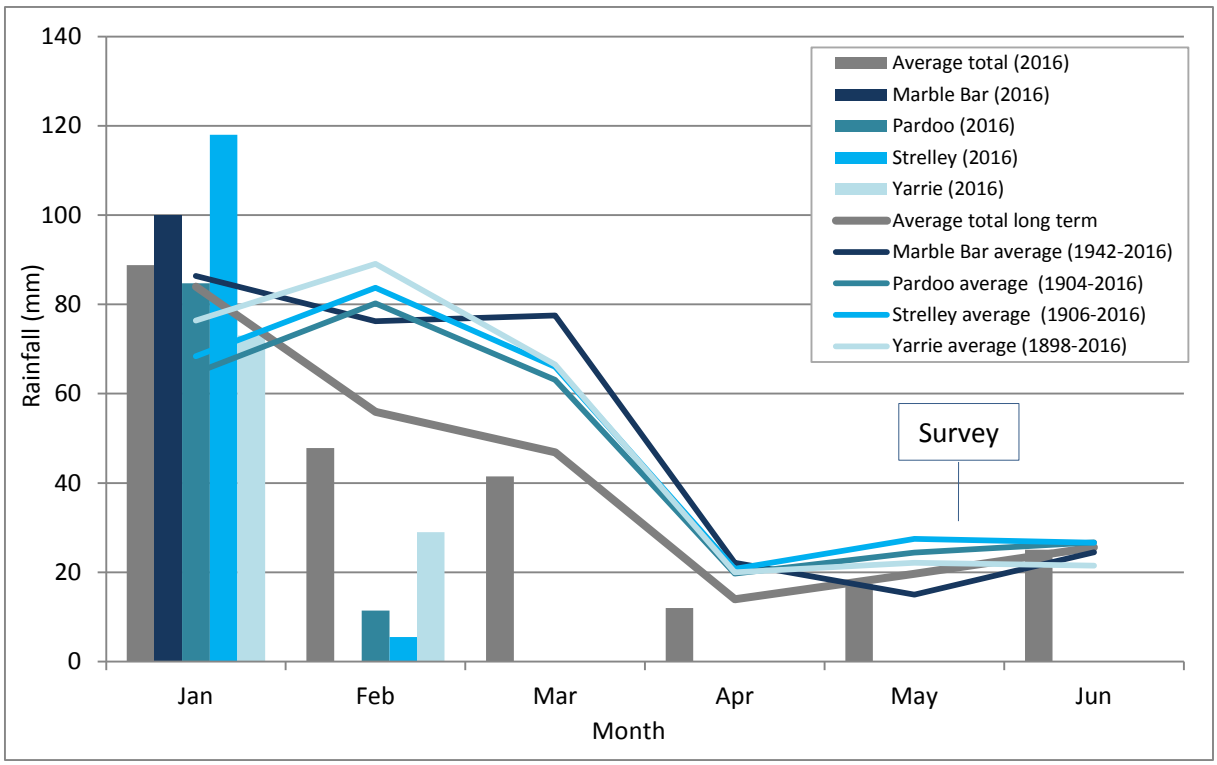


Figure 2.1: Rainfall data at areas surrounding the NSWC

2.2 SURVEY METHODOLOGY

On the basis of the methodology outlined in the *North Star Significant Flora and Vegetation Survey Plan (NS-PL-EN-005)* (Fortescue 2014), the 190 km long NSWC Development Envelope was divided into 40 km of 'High' priority, 54 km of 'Moderate' priority, and 96 km of 'Low' priority survey areas.

The proposed field methodology in the Survey Plan required only areas identified as 'High' potential for occurrence of Priority 1 (P1) flora to be surveyed. However *ecologia* also undertook additional transect-based surveys in 'Moderate' and 'Low' potential areas, particularly where access and time permitted. High, Moderate and Low priority areas are shown in Figure 2.2.

2.2.1 Transects

Transects were traversed on foot within the 50 m corridor that encompassed the proposed centreline (25 m either side) along 40 km of 'High' and 41 km of 'Moderate' survey areas. Additionally, 7 km of the centreline within 'Low' priority areas was also surveyed. Where visibility was low or suitable habitat was in proximity to the edge of the corridor, more than one transect was traversed. Where time permitted, transects were traversed in areas of the NSWC where it is possible that the centreline may be realigned (e.g. to avoid rivers, rocky outcrops etc.) and in habitats more likely to support significant flora and vegetation.

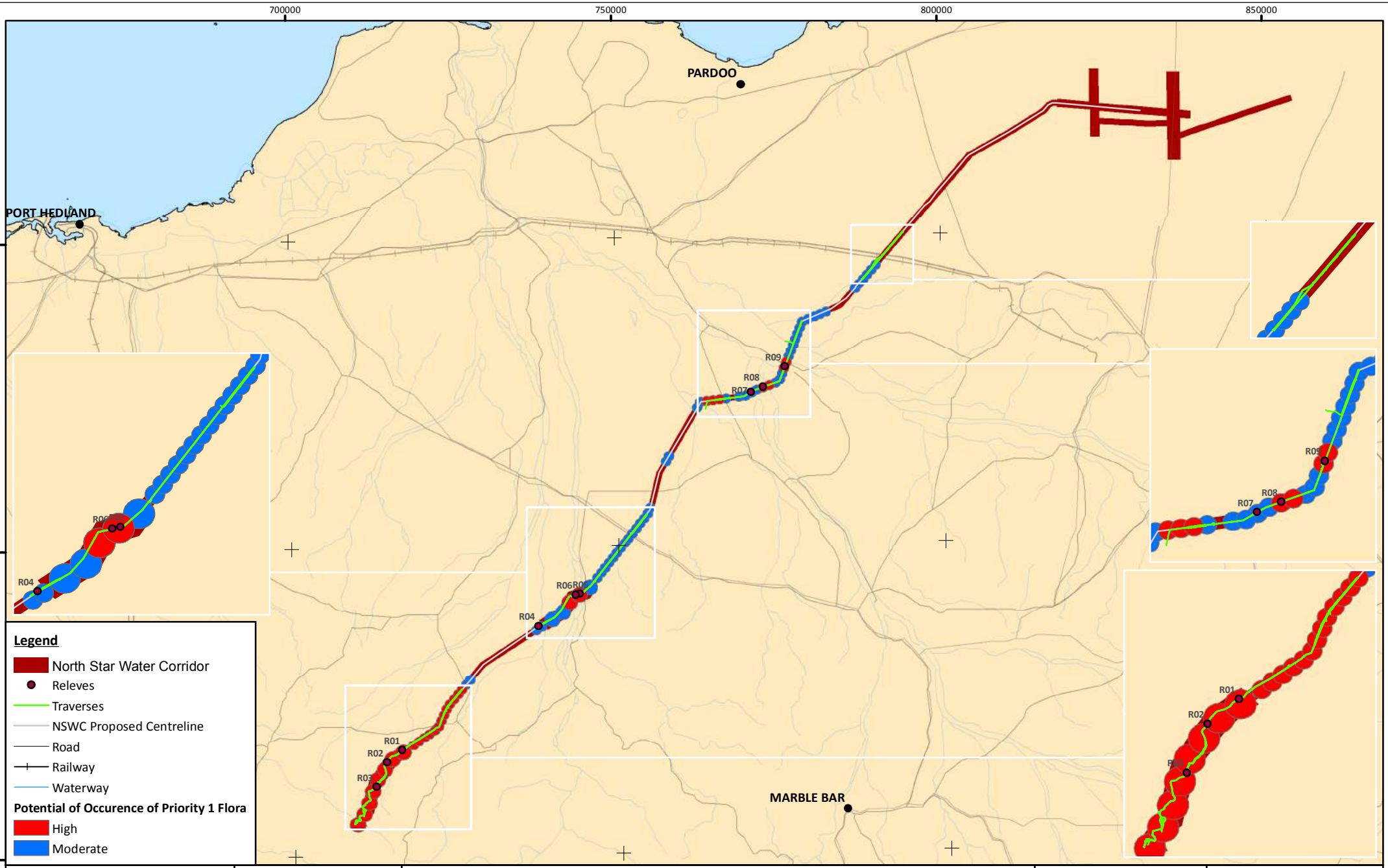
Approximately 153 km of transects were traversed within the NSWC (Figure 2.2).

2.2.2 Releves

Releves are unbounded sampling points used to structurally define vegetation communities, and nine were conducted within the NSWC (Figure 2.2). The following parameters were recorded at each releve:

- Dominant plant species;
- Vegetation structure (National Vegetation Information System (NVIS) Level V (ESCAVI 2003);
- Vegetation condition scale (EPA & DPaW 2015), which is based on the criteria in Appendix A;
- Estimated time since fire;
- GPS co-ordinate;
- Digital image of the vegetation;
- The landform element (morphological type, position and element type);
- The presence of rock outcrops (type and abundance);
- Soil type (colour, profile, field texture and surface type); and
- Slope and aspect.

Site information for each releve is presented in Appendix B.



Traverses and releves surveyed

Figure: 2.2
Project ID: 1669

Drawn: MY
Date: 08/07/2016

Coordinate System
Name: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Datum: GDA 1994

A4

2.2.3 Significant Flora

Various levels of survey effort were expended depending on conservation status of flora species:

- For Threatened Flora (TF) and Priority 1 (P1) species, population sizes were estimated and population extent was delineated in order to apply buffers and/or estimate impact on populations. For each sub population (discrete group of plants) at least one GPS coordinate was taken along with a count or estimate of individual plants. Areas surrounding any Priority 1 species were assessed as an alternative route for the corridor (Partial survey, Section 1.3.4).
- For Priority 2, Priority 3, Priority 4 and other significant species, locations and population size estimates within the corridor recorded. Alternative routes were assessed around these locations as time permitted (edge survey, Section 1.3.4).

Where significant species were encountered, information sufficient for the completion of DPaW TPRF was collected in accordance with the *Threatened and Priority Flora Report Form – Field Manual* (DEC 2010). This included:

- Date of record;
- Botanist;
- Location (recorded by hand-held GPS) (GDA94);
- Abundance (estimate count of individuals);
- Vegetation and landform details;
- Associated species;
- Photographs; and
- Collection of a voucher specimen per population (500 m apart) as time permitted.

Aside from the Threatened *Pityrodia* sp. Marble, at least one representative voucher specimen of each significant flora species was collected and submitted to the Western Australian Herbarium.

2.2.4 Introduced Flora

Where introduced plant species were encountered opportunistically, the following parameters were recorded:

- Date of record;
- Recorder;
- Location (recorded by hand-held GPS); and
- Abundance (count of individuals).

2.2.5 Significant Vegetation and Condition

Any opportunistically encountered potentially significant vegetation units (see Section 1.3.2), or units that resembled any known TEC or PEC within the High and Moderate priority areas were recorded and described in sufficient detail to ensure accurate delineation and confirmation of significance status.

All watercourses encountered were assessed for groundwater dependent species, and releves were conducted at each potential GDE community for the purposes of vegetation description and mapping.

Notes on vegetation condition within the NSWC were taken opportunistically during traverses. The vegetation condition scale used is based on the criteria listed in Table 2.1 (EPA & DPaW 2015).

Table 2.1: Vegetation condition ratings

Vegetation condition rating	Criteria
2	Pristine or nearly so, no obvious sign of disturbance.
3	Some relatively slight signs of damage caused by human activities since settlement. For example, some signs of damage to tree trunks caused by repeated fire, the presence of some relatively non-aggressive weeds, or occasional vehicle tracks.
4	More obvious signs of damage caused by human activities since settlement including some obvious impact on the vegetation structure such as that caused by low levels of grazing or slightly aggressive weeds.
5	Still retains basic vegetation structure or ability to regenerate it after very obvious impacts of human activities since European settlement, such as grazing, partial clearing, frequent fires or aggressive weeds.
6	Severely impacted by grazing, very frequent fires, clearing or a combination of these activities. Scope for some regeneration but not to a state approaching good condition without intensive management. Usually with a number of weed species present including very aggressive species.
7	Areas that have been completely or almost completely without native species in the structure of the vegetation; i.e. areas that are cleared or 'parkland cleared' with their flora comprising weed or crop species with isolated native trees.

2.3 PROJECT TEAM AND LICENCES

This targeted flora assessment described in this document was planned, coordinated and executed by those summarised and under the following licences listed in Table 2.2.

Table 2.2: Project team and licences

Project Staff			
Name	**Qualification**	**Role**	**Project role**
Melissa Hay	BSc. (Hons)	Senior Botanist	Project management, field survey and reporting
Raimond Orifici	BSc. (Hons)	Senior Botanist	Field survey
Licences			
The targeted flora assessment described in this report was conducted under the authorisation of the following licences issued by DPaW:			
Name	**Licence Number**	**Licence**	
Melissa Hay	SL011414	Licence to take flora for scientific purposes	
Raimond Orifici	SL011815	Licence to take flora for scientific purposes	

This page has been left blank intentionally.

3 RESULTS

3.1 SIGNIFICANT FLORA

The WC Act (Endangered) listed Threatened Flora taxon *Pityrodia* sp. Marble Bar (G. Woodman & D. Coultas GWDC Opp 4) was recorded from the southern end of the study area from two populations comprising a total of 33 plants (Table 3.1; Figure 3.1).

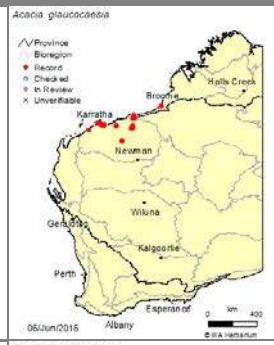
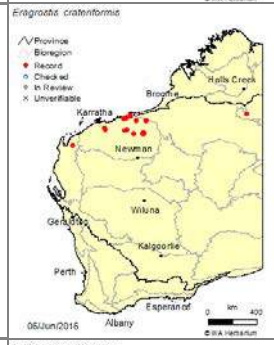
Four Priority Flora species, *Euphorbia clementii* (Priority 2), *Acacia glaucocaesia* (Priority 3), *Eragrostis crateriformis* (Priority 3), and *Heliotropium murinum* (Priority 3), were recorded within the study area (Figure 3.2). Details of locations, associated habitats, and population sizes are given in Table 3.1.

Heliotropium muticum (Priority 1) was recorded opportunistically approximately 10 km to the west of the NSWC (Table 3.1; Figure 3.2), but was not observed within NSWC.

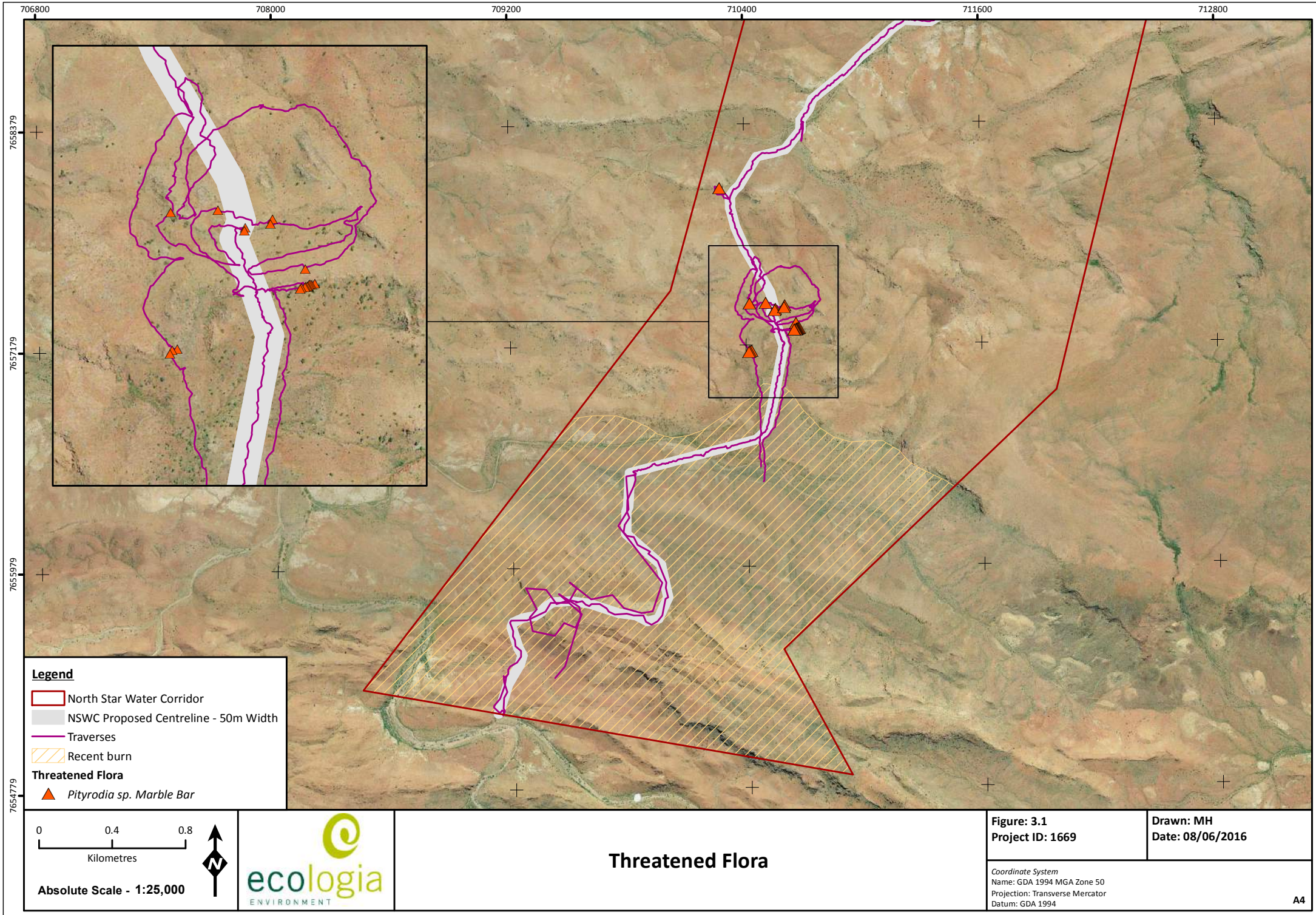
Individual flora records are provided in Appendix C, and TPRF forms for submission to the Western Australian Herbarium for the confirmed Priority species are provided in Appendix D.

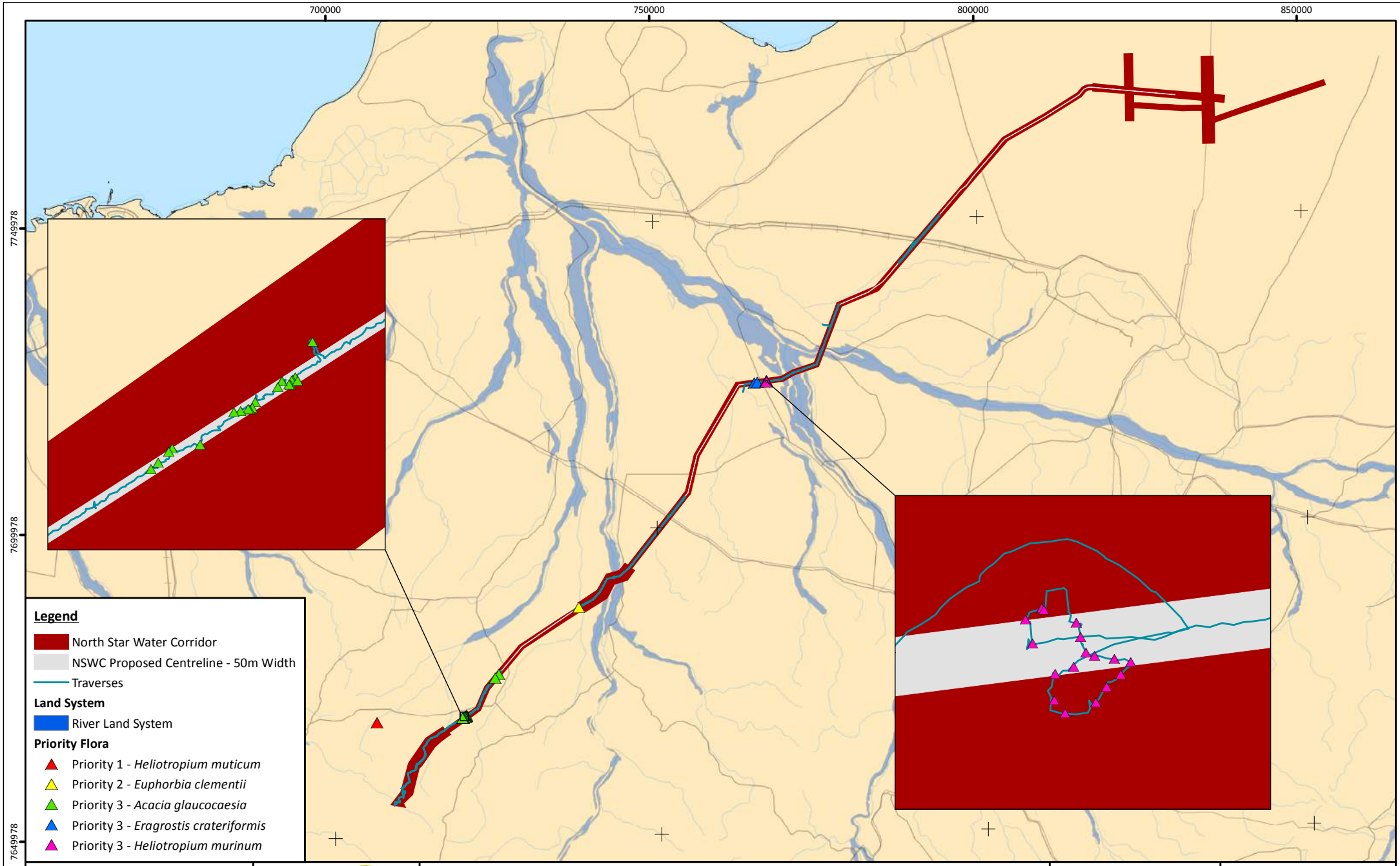
Table 3.1: Significant flora recorded during the survey

Taxa (status)	Number & description of habitat at the study area	Description, known habitat and distribution	Known distribution	Photograph
Pityrodia sp. Marble Bar (G. Woodman & D. Coultas GWDC Opp 4) (Threatened)	Two populations (33 plants) of *P.* Marble Bar were recorded within the NSWC. One was on the side of a steep hill slope and one was on a rocky outcrop. No plants were flowering at the time of the survey.	*P.* sp. Marble Bar is greyish erect shrub to 1 m. Recorded from steep ironstone slopes and is only known from the Pilbara IBRA region.		
Heliotropium muticum (Priority 1)	*H. muticum* (1 plant) was recorded on a recently burnt, stony plain 10 km west of the NSWC.	*H. muticum* is an ascending to spreading perennial herb growing to 0.3 m. Recorded from sand plains, floodplains and rocky plains and is known from the Pilbara IBRA region.		
Euphorbia clementii (Priority 2)	*E. clementii* was recorded at one location (2 plants) on a sandy plain that had been recently burnt adjacent to a branch of the Shaw river.	*E. clementii* is a yellowish erect herb, growing to 0.6 m high. Recorded from gravelly hillsides and stony grounds and is known from the Pilbara IBRA region.		

Taxa (status)	Number & description of habitat at the study area	Description, known habitat and distribution	Known distribution	Photograph
Acacia ?glaucocaesia (Priority 3)	*A.?glaucocaesia* was recorded on a flat red sandy-clay plain at 23 locations within the NSWC (97 plants). It could not been unambiguously confirmed as *A. glaucocaesia* here as plants were not flowering at the time of the survey, and therefore difficult to distinguish from some variants of *A. synchronicia*. It is very likely to occur in the study area as confirmed locations were recorded by *ecologia* (2012).	*A. glaucocaesia* is a dense, glabrous shrub or tree growing to 1.8-6 m high. Flowers are yellow and occur from July to September. Recorded from red loam, sandy loam, clay and floodplains and is known from the Pilbara, Dampierland and Great Sandy Desert IBRA regions.		
Eragrostis crateriformis (Priority 3)	*E. crateriformis* was recorded from one population (6 plants) on a depression area on a flat clay plain at two locations.	*E. crateriformis* is an annual, grass, growing to 0.4 m high. Flowers occur from January to May or July. Recorded from clay loams, creek banks and depressions and is known from the Carnarvon, Pilbara and Tanami IBRA regions.		
Heliotropium murinum (Priority 3)	*H. murinum* was recorded from one population (130 plants) on a flat red-sandy-clay plain.	*H. murinum* is a short lived perennial herb, growing to 0.4 m high. Flowers occur in May or September. It has been recorded on red sand and plains and is known from the Pilbara IBRA region.		

Note: Images of maps and photographs used with the permission of the Western Australian Herbarium, Department of Parks and Wildlife (https://florabase.dpaw.wa.gov.au/help/copyright). Accessed on Thursday, 9 June 2016 and descriptions by the Western Australian Herbarium, Department of Parks and Wildlife. Text used with permission (https://florabase.dpaw.wa.gov.au/help/copyright). Accessed on Thursday, 9 June 2016.


706800
708000
709200
710400
711600
712800
7658379
7657179
7655979
7654779
Legend
North Star Water Corridor
NSWC Proposed Centreline - 50m Width
Traverses
Recent burn
Threatened Flora
Pityrodia sp. Marble Bar
0
0.4
0.8
Kilometres
N
Absolute Scale - 1:25,000
ecologia
ENVIRONMENT
Threatened Flora
Figure: 3.1
Project ID: 1669
Drawn: MH
Date: 08/06/2016
Coordinate System
Name: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Datum: GDA 1994
A4


700000
750000
800000
850000
7749978
7699978
7649978
Legend
North Star Water Corridor
NSWC Proposed Centreline - 50m Width
Traverses
Land System
River Land System
Priority Flora
Priority 1 - Heliotropium muticum
Priority 2 - Euphorbia clementii
Priority 3 - Acacia glaucocaesia
Priority 3 - Eragrostis crateriformis
Priority 3 - Heliotropium murinum
0
10
20
Kilometres
N
Absolute Scale - 1:800,000
ecologia
ENVIRONMENT
Priority Flora
Figure: 3.2
Project ID: 1669
Drawn: MH
Date: 08/06/2016
Coordinate System
Name: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Datum: GDA 1994
A4

3.2 INTRODUCED FLORA

Eight introduced plant species were recorded within the NSWC including one Weed of National Significance (WONS) (**Parkinsonia aculeata*), one Declared Weed (**Calotropis procera*) and six environmental weeds (**Aerva javanica, *Cenchrus ciliaris, *Cenchrus setiger, *Citrullus lanatus, *Cynon dactylon* and **Vachellia farnesiana*).

3.2.1 Weeds of National Significance

One population of **Parkinsonia aculeata* was recorded within the NSWC. Approximately 65 plants were recorded in one area on a very degraded floodplain of the De Grey River (Figure 3.3). Locations are provided in Appendix E and are mapped in Figure 3.5.

Figure 3.3: *Parkinsonia aculeata* recorded within the NSWC

3.2.2 Declared Weeds

**Calotropis procera* was recorded within the NSWC along the Shaw, Coongan and De Grey Rivers at 94 locations (6,699 plants). The largest population was recorded on the river banks and floodplains of the De Grey and Coongan Rivers, where it was often dominant (Figure 3.4). **C. procera* is a Declared Pest requiring C3 management in the East Pilbara (See Appendix A). Locations are provided in Appendix E and are shown mapped in Figure 3.5.

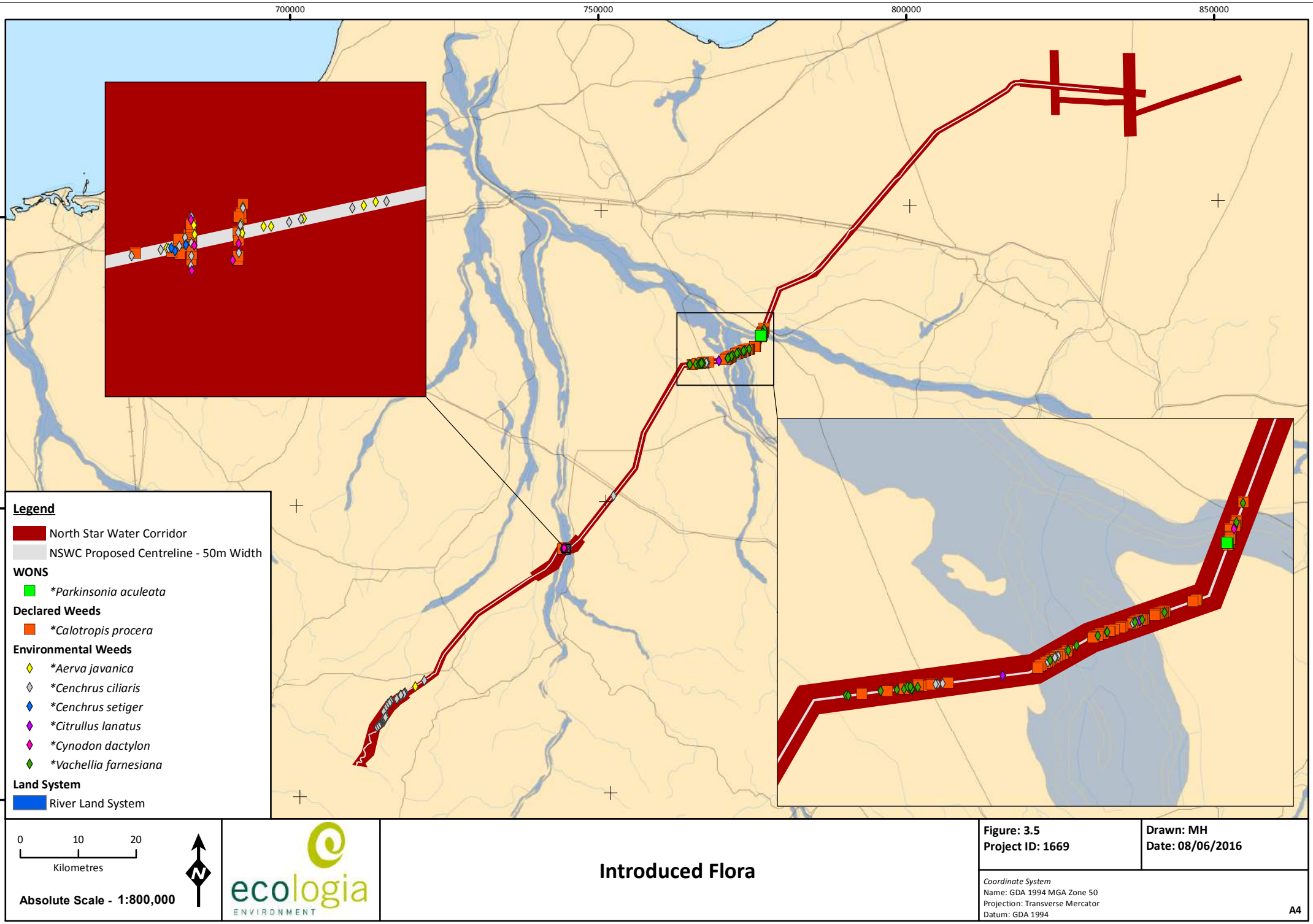
Figure 3.4: *Calotropis procera* recorded within the NSWC

3.2.3 Environmental Weeds

Six environmental weed species were recorded within the NSWC. A summary of plants recorded and habitat associations for each is provided in Table 3.2, and locations are mapped in Figure 3.3. Individual locations are provided in Appendix E.

Table 3.2: Introduced Flora recorded within the NSWC

Species	Description at the study area	Number of plants	Number of records	Photograph
**Aerva javanica*	**A. javanica* was recorded as scattered individuals or small groups mostly on creeklines and floodplains within the NSWC.	404	22	
**Cenchrus ciliaris*	**C. ciliaris* was very widespread, with 78,781 individuals recorded across the NSWC. It was associated with the main rivers and creeks, but also recorded on the minor drainage lines and disturbed areas, often as the dominant species in the grass stratum.	78,781	65	
**Cenchrus setiger*	**C. setiger* was recorded from three locations, with 6,000 individuals recorded. It was recorded on floodplains of the Shaw River, often in association with **C. ciliaris.*	6,000	3	
**Citrullus lanatus*	**C. lanatus* was recorded as scattered plants (14 individuals) on the floodplain of the De Grey and Coongan Rivers.	14	5	
**Cynon dactylon*	**C. dactylon* was recorded mostly along the banks of the Shaw River with one location along the De Grey River, where it typically grew at high densities.	5,050	6	
**Vachellia farnesiana*	**V. farnesiana* was recorded as scattered plants or groups of plants on the degraded floodplains of the De Grey and Coongan Rivers.	129	22	


700000
750000
800000
850000
7749978
7699978
7649978
Legend
North Star Water Corridor
NSWC Proposed Centreline - 50m Width
WONS
*Parkinsonia aculeata
Declared Weeds
*Calotropis procera
Environmental Weeds
*Aerva javanica
*Cenchrus ciliaris
*Cenchrus setiger
*Citrullus lanatus
*Cynodon dactylon
*Vachellia farnesiana
Land System
River Land System
0
10
20
Kilometres
N
Absolute Scale - 1:800,000
ecologia
ENVIRONMENT
Introduced Flora
Figure: 3.5
Project ID: 1669
Drawn: MH
Date: 08/06/2016
Coordinate System
Name: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Datum: GDA 1994
A4

3.3 SIGNIFICANT VEGETATION

No EPBC or state listed TEC/PECs or vegetation units resembling TEC/PECs were recorded within the study area.

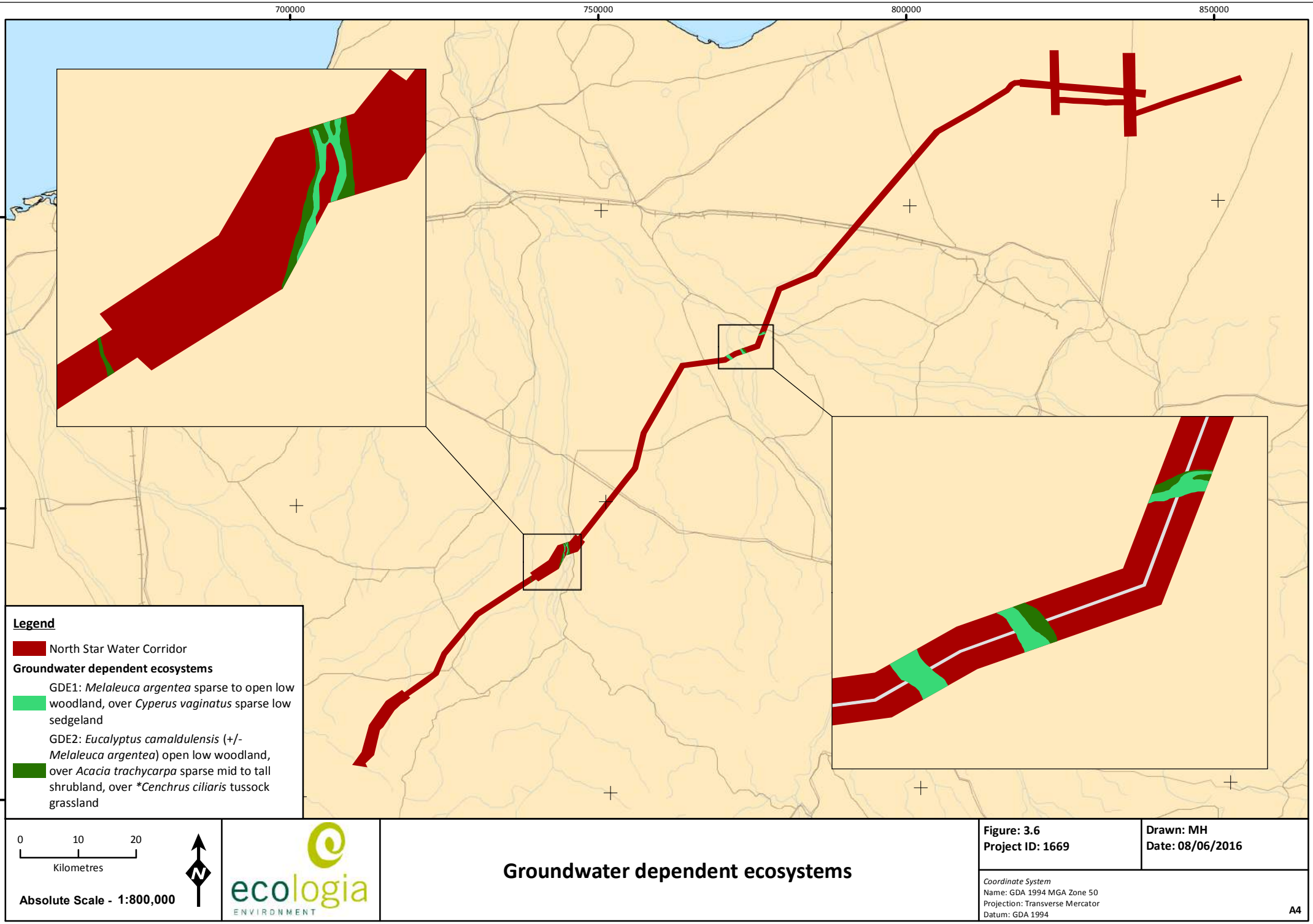
The vegetation units associated with the three rivers (the Shaw, Coongan and De Grey Rivers) that intersect the NSWC are considered significant GDE communities due to the presence of phreatophytic species (*Eucalyptus camaldulensis* and *Melaleuca argentea*). Two GDE communities are described in Table 3.2 and mapped in Figure 3.6.

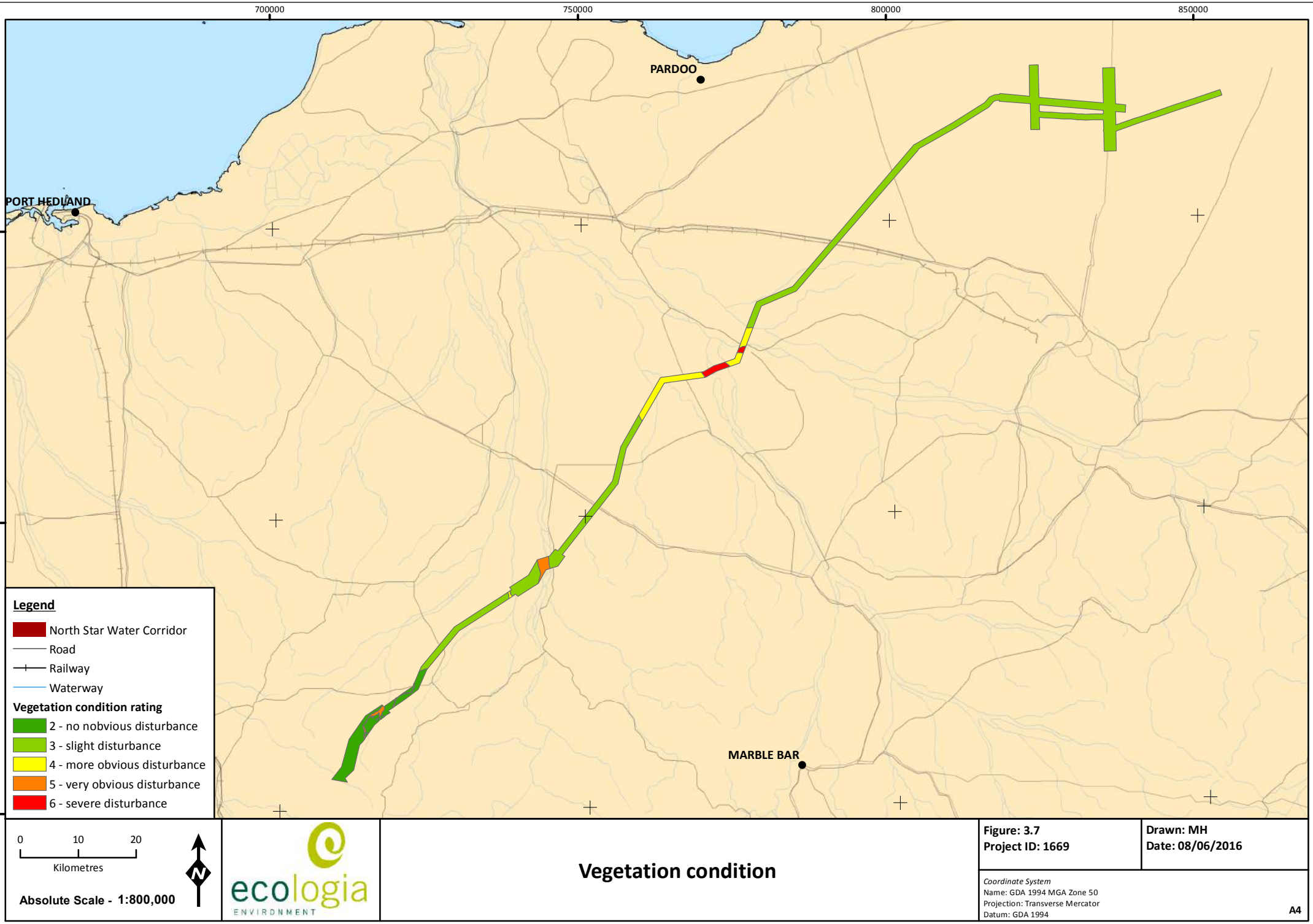
Table 3.3: Groundwater Dependent Ecosystems recorded within the NSWC

Unit	Vegetation description	Associated species and habitat	Releves	Photograph
GDE1	*Melaleuca argentea* sparse to open low woodland, over *Cyperus vaginatus* sparse low sedgeland.	Associated with the orange sandy river beds and characterised by scattered to clumps of *Melaleuca argentea* sometimes with a very scattered understorey of *Acacia trachycarpa* and *Melaleuca glomerata.*	R006 R007 R008	
GDE2	*Eucalyptus camaldulensis* (+/- *Melaleuca argentea*) open low woodland, over *Acacia trachycarpa* sparse mid to tall shrubland, over **Cenchrus ciliaris* tussock grassland.	Associated with the brown sandy-clay river banks and sometimes in the orange sandy beds and often is associated with *Atalaya hemiglauca, Eucalyptus victrix, Cyperus vaginatus, *Calotropis procera* and *Eulalia aurea.*	R004 R005 R009	

3.4 VEGETATION CONDITION

Vegetation condition within the NSWC is shown in Figure 3.7. The majority of the survey area exhibited signs of disturbance as a result of moderate grazing, occasional scattered weeds and some vehicle tracks (condition category 3). The hills in the southern portion of the corridor had no obvious signs of disturbance (condition category 2). The banks and floodplains of the Coongan and De Grey Rivers were assessed as severely degraded (condition category 6), and the floodplains adjacent to the major rivers also exhibited obvious signs of disturbance (condition category 4). Banks of the Shaw River were comparatively less degraded than the Coongan and De Grey systems (condition category 5). Minor drainage lines in the south of the NSWC showed signs of very obvious disturbance (condition category 5).


700000
750000
800000
850000
7749978
7699978
7649978
Legend
North Star Water Corridor
Groundwater dependent ecosystems
GDE1: Melaleuca argentea sparse to open low woodland, over Cyperus vaginatus sparse low sedgeland
GDE2: Eucalyptus camaldulensis (+/- Melaleuca argentea) open low woodland, over Acacia trachycarpa sparse mid to tall shrubland, over *Cenchrus ciliaris tussock grassland
0
10
20
Kilometres
N
Absolute Scale - 1:800,000
ecologia
ENVIRONMENT
Groundwater dependent ecosystems
Figure: 3.6
Project ID: 1669
Drawn: MH
Date: 08/06/2016
Coordinate System
Name: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Datum: GDA 1994
A4


700000
750000
800000
850000
7749978
7699978
7649978
PARDOO
PORT HEDLAND
MARBLE BAR
Legend
North Star Water Corridor
Road
Railway
Waterway
Vegetation condition rating
2 - no nobvious disturbance
3 - slight disturbance
4 - more obvious disturbance
5 - very obvious disturbance
6 - severe disturbance
0
10
20
Kilometres
N
Absolute Scale - 1:800,000
ecologia
ENVIRONMENT
Vegetation condition
Figure: 3.7
Project ID: 1669
Drawn: MH
Date: 08/06/2016
Coordinate System
Name: GDA 1994 MGA Zone 50
Projection: Transverse Mercator
Datum: GDA 1994
A4

3.6 SURVEY LIMITATIONS AND CONSTRAINTS

Potential constraints and limitations are discussed in Table 3.4 below.

Table 3.4: Summary of potential survey constraints and limitations

Constraint	Comment
Sources of information	Many recent surveys have been conducted in the vicinity of the study area including a Level 2 flora and vegetation survey of the majority of the proposed NSWC, a Level 2 flora and vegetation survey of the adjacent North Star project area and a targeted flora survey for the infrastructure and slurry corridors. New database searches were conducted and incorporated into the survey planning. Aerial imagery was available to determine habitat types of target species and vegetation.
Timing/weather/ season/cycle	The survey was conducted during a period where the majority of the target P1 species were flowering. Rainfall in the Pilbara in the three months prior to the survey was lower than average. However, the target Threatened and Priority 1 species are all perennial shrubs (with the exception of *Rothia indica* subsp. *australis*) and were identifiable if present.
Disturbances	The section at the southern end of the proposed 50 m corridor was very recently burnt. Almost no regrowth was seen in these areas, so any significant plant species present could not be recorded. A previous baseline Level 1 flora and vegetation survey of the NSWC was undertaken by *ecologia i*n 2012
Intensity	The intensity is considered adequate to target species across the 50 m proposed centreline corridor. Additional transects were conducted in areas where the target species were recorded, had previously been recorded, have habitat where they could be recorded, and areas where the proposed centreline could be deviated (e.g. through rivers, rocky outcrops etc.).
Resources	A total of 14 person days was spent conducting the survey which is considered sufficient to carry out the survey at the planned intensity.
Access issues	All sections of the 'High' priority areas were accessible from pastoral station tracks. Some of the 'Moderate' and 'Low' were as accessible, although no P1 flora modelled as potentially occurring in these areas..
Experience levels	The senior botanist, Melissa Hay, who is responsible for planning, reporting and conducting the survey, has over ten years' of experience conducting botanical surveys and has significant experience in the area including conducting targeted flora surveys for other North Star Infrastructure corridors and a level 2 survey for the North Star airstrip. The accompanying botanist, Raimond Orifici, is also a Senior Botanist with over 14 years of experience in botanical surveys and has significant Pilbara experience which includes the level 2 flora surveys of the FMG rail line.

4 CONCLUSIONS

4.1 SIGNIFICANT FLORA

Pityrodia sp. Marble Bar (G. Woodman & D. Coultas GWDC Opp 4)

Pityrodia sp. Marble Bar (G. Woodman & D. Coultas GWDC Opp 4) (Threatened Flora) is restricted to the Pilbara and has been recorded mainly from the Capricorn land system, occurring primarily on steep ironstone slopes. Within the NSWC it was recorded from two populations, one on a steep hillslope and another on a rocky outcrop, comprising a total of 33 individual plants (Figure 3.1). These plants were located at the southern section of the NSWC and within the known distribution of the taxon. It is possible that some *Pityrodia* sp. Marble Bar individuals may be present in suitable habitat to the south of the recorded populations within an area that was recently burnt and were not identifiable at the time of the survey .

Heliotropium muticum

Heliotropium muticum (Priority 1) typically occurs in flat hummock grasslands, and although it was previously recorded in the vicinity of the NSWC by *ecologia* (2012), it was not recorded from the NSWC during the current survey. *Heliotropium muticum* was recorded opportunistically from approximately 10 km west of the NSWC (Figure 3.2).

Euphorbia clementii

Euphorbia clementii (Priority 2) is restricted to the Pilbara, usually occurring in *Triodia* dominated grasslands on gravelly loam soils on hillslopes, or sandy soils on plains, and is noted as occurring in recently burned areas (Halford and Harris 2012). During the current survey it was recorded at one location (two individuals) on a sandy plan near the Shaw River that had been recently burned.

Acacia ?glaucocaesia

Acacia glaucocaesia (Priority 3) is restricted to western and northern parts of the Pilbara, typically growing on low undulating hills and on alluvial plains of major water courses. Due to the absence of flowering material, specimens collected during this survey could not be definitively distinguished from variants of *A. synchronicia*, which are vegetatively similar. Regardless, these specimens show a strong affinity to *A. glaucocaesia*, and this species has been previously confirmed within the study area by *ecologia* (2012). *Acacia ?glaucocaesia* was recorded from 23 locations (97 individuals) in the southern NSWC (Figure 3.2).

Eragrostis crateriformis

Eragrostis crateriformis (Priority 3) typically occurs in clay loam soils on creek banks and depressions. This species was recorded at two locations (six plants) in a depression on a flat clay floodplain of the Coongan River (Figure 3.2).

Heliotropium murinum

Heliotropium murinum (Priority 3) is restricted to the Pilbara, and typically occurs on red sands and plains. It was recorded at one location (130 individuals) on a flat red sandy-clay plain (Figure 3.2).

4.2 INTRODUCED FLORA

Parkinsonia aculeata* (WONS) was recorded at a single location, comprising 65 plants on a floodplain of the De Grey River within the NSWC. **Calotropis procera* (Declared Weed) was extensively recorded within the NSWC along the Shaw, Coongan and De Grey Rivers at 94 locations, comprising 6,699 plants. Additionally, six environmental weeds (Aerva javanica, *Cenchrus ciliaris, *Cenchrus setiger, *Citrullus lanatus, *Cynon dactylon* and **Vachellia farnesiana*) were recorded, with **Cenchrus ciliaris* the most extensively recorded across 65 locations, comprising 78,781 plants.

4.3 SIGNIFICANT VEGETATION

No EPBC Act or State listed TECs, PECs or vegetation units that correspond with these TEC or PEC communities were recorded from the NSWC. Additional significant vegetation units recorded within the study area include two GDE communities which are associated with the Shaw, Coongan and De Grey Rivers that intersect the NSWC.

4.4 VEGETATION CONDITION

Vegetation within the NSWC generally exhibited some signs of disturbance caused by a moderate grazing, occasional scattered weeds and some vehicle tracks (condition category 3). The hills in the south of the corridor, however, had no obvious signs of disturbance (condition category 2), likely due to the inaccessibility of the hills to cattle (Figure 3.7).

The banks and floodplains of the Coongan and De Grey Rivers were severely degraded (condition category 6), where the Declared Weed **Calotropis procera* was often dominant in the mid to tall shrub stratum, and **Cenchrus ciliaris* was dominant in the lower grass stratum, with little intact native understorey present. Floodplains adjacent to the major rivers also had obvious signs of damage (condition category 4), with considerable grazing and scattered weeds. Vegetation degradation along the Shaw River was primarily confined to the banks and was comparatively less degraded than the Coongan and De Grey systems, and retained some native vegetation structure considered to have the ability to recover (condition category 5) (Figure 3.7).

Minor drainage lines in the south of the NSWC were generally associated with high levels of grazing, dominated by weed species (primarily **Cenchrus ciliaris*), often lacking a native understorey (condition category 5). There were, however, scattered areas supporting native perennial hummock grasses and shrubs with the opportunity for regeneration (Figure 3.7).

This page has been left blank intentionally.

5 REFERENCES

DEC. 2010. Threatened and Priority Flora Report Form - Field Manual. Significant Species and Communities Resource Condition Monitoring Project, Department of Environment and Conservation, Government of Western Australia.

ecologia Environment. 2012. Canning Basin Flora and Vegetation Survey. Unpublished report for Fortescue Metals Group Ltd.

EPA. 2002. Position Statement No. 3: Terrestrial Biological Surveys as an Element of Biodiversity Protection. . Environmental Protection Authority, Western Australia.

EPA. 2004. Guidance for the Assessment of Environmental Factors. Guidance Statement 51: Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia. Environmental Protection Authority, Western Australia.

EPA & DPaW. 2015. Technical Guide - Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment (eds. K Freeman, G Stack, S Thomas and N Woolfrey). Perth, Western Australia.

ESCAVI. 2003. Australian Vegetation Attribute Manual: National Vegetation Information System (NVIS), Version 6.0. Department of the Environment and Heritage, Canberra.

Fortescue. 2014. North Star Significant Flora and Vegetation Survey Plan (NS-PL-EN-005). Fortescue Metals Group Ltd, 27/10/2014.

Halford, D. A. and Harris, W. K. 2012. A taxonomic revision of Euphorbia section Anisophyllum Roeper (Euphorbiaceae) in Australia. Austrobaileya. 84:441-600.

Kendrick, P. and McKenzie, N. 2001. Pilbara 1 (PIL1 - Chichester subregion). A Biodiversity Audit of Western Australia's 53 Biogeographic Subregions. Department of Conservation and Land Management, Perth, Western Australia.

This page has been left blank intentionally.

APPENDIX A DEFINITIONS AND CONSERVATION CODES

Definition of codes for Threatened and Priority Flora (DPaW)	
Code	**Definition**
T	**Threatened Flora – (Declared Rare Flora – Extant)** Taxa which have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection and have been gazetted as such (Schedule 1 under the *Wildlife Conservation Act 1950*).
X	**Presumed Extinct Flora (Declared Rare Flora - Extinct)** Taxa which have been adequately searched for and there is no reasonable doubt that the last individual has died, and have been gazetted as such Schedule 2 under the *Wildlife Conservation Act 1950*).
Priority 1	**Priority One – Poorly Known Species** Species that are known from one or a few collections or sight records (generally less than five), all on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, Shire, Westrail and Main Roads WA road, gravel and soil reserves, and active mineral leases and under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes.
Priority 2	**Priority Two – Poorly Known Species** Species that are known from one or a few collections or sight records, some of which are on lands not under imminent threat of habitat destruction or degradation, e.g. national parks, conservation parks, nature reserves, State forest, vacant Crown land, water reserves, etc. Species may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes.
Priority 3	**Priority Three – Poorly Known Species** Species that are known from collections or sight records from several localities not under imminent threat, or from few but widespread localities with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and known threatening processes exist that could affect them.
Priority 4	**Priority Four – Rare, Near Threatened and other species in need of monitoring** (a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These species are usually represented on conservation lands. (b) Near Threatened. Species that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable. (c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.
Priority 5	**Priority Five - Conservation Dependent species** Species that are not threatened but are subject to a specific conservation program, the cessation of which would result in the species becoming threatened within five years.

Definition of codes for Commonwealth Listed Threatened Flora	
Code	**Definition**
Ex	**Extinct** Taxa which at a particular time if, at that time, there is no reasonable doubt that the last member of the species has died.
ExW	**Extinct in the Wild** Taxa which is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
CE	**Critically Endangered** Taxa which at a particular time if, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
E	**Endangered** Taxa which is not critically endangered and it is facing a very high risk of extinction in the wild in the immediate or near future, as determined in accordance with the prescribed criteria.
V	**Vulnerable** Taxa which is not critically endangered or endangered and is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.
CD	**Conservation Dependent** Taxa which at a particular time if, at that time, the species is the focus of a specific conservation programme, the cessation of which would result in the species becoming vulnerable, endangered or critically endangered within a period of 5 years.

Definition of codes for Threatened Ecological Communities	
Code	**Definition**
PD: Presumed Totally Destroyed	An ecological community that has been adequately searched for but for which no representative occurrences have been located. The community has been found to be totally destroyed or so extensively modified throughout its range that no occurrence of it is likely to recover its species composition and/or structure in the foreseeable future. An ecological community will be listed as presumed totally destroyed if there are no recent records of the community being extant.
CR: Critically Endangered	An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or that was originally of limited distribution and is facing severe modification or destruction throughout its range in the immediate future, or is already severely degraded throughout its range but capable of being substantially restored or rehabilitated. An ecological community will be listed as Critically Endangered when it has been adequately surveyed and is found to be facing an extremely high risk of total destruction in the immediate future.
EN: Endangered	An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or was originally of limited distribution and is in danger of significant modification throughout its range or severe modification or destruction over most of its range in the near future. An ecological community will be listed as Endangered when it has been adequately surveyed and is not Critically Endangered but is facing a very high risk of total destruction in the near future.
VU: Vulnerable	An ecological community that has been adequately surveyed and is found to be declining and/or has declined in distribution and/or condition and whose ultimate security has not yet been assured and/or a community that is still widespread but is believed likely to move into a category of higher threat in the near future if threatening processes continue or begin operating throughout its range. An ecological community will be listed as Vulnerable when it has been adequately surveyed and is not Critically Endangered or Endangered but is facing a high risk of total destruction or significant modification in the medium to long-term future.

Definition of codes for Priority Ecological Communities	
Code	**Definition**
P1: Priority 1	Ecological communities with apparently few, small occurrences, all or most not actively managed for conservation (e.g. within agricultural or Pastoral lands, urban areas, active mineral leases) and for which current threats exist. Communities may be included if they are comparatively well-known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under immediate threat from known threatening processes across their range.
P2: Priority 2	Communities that are known from few small occurrences, all or most of which are actively managed for conservation (e.g. within national parks, conservation parks, nature reserves, State forest, unallocated Crown land, water reserves, etc.) and not under imminent threat of destruction or degradation. Communities may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under threat from known threatening processes.
P3: Priority 3	(i) Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or: (ii) Communities known from a few widespread occurrences, which are either large or within significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat, or; (iii) Communities made up of large, and/or widespread occurrences that may or not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, and inappropriate fire regimes. Communities may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and/or are not well defined, and known threatening processes exist that could affect them.
P4: Priority 4	Ecological communities that are adequately known, Rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list. These communities require regular monitoring. (a) Rare. Ecological communities known from few occurrences that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These communities are usually represented on conservation lands. (b) Near Threatened. Ecological communities that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable. (c) Ecological communities that have been removed from the list of threatened communities during the past five years. P5: Priority Five Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.
P5: Priority 5	Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.

Control categories for Declared Pests	
Category	**Description**
C1 - Exclusion	Pests assigned to this category are not established in Western Australia and control measures are to be taken, including border checks, in order to prevent them entering and establishing in the State
C2 - Eradication	Pests assigned to this category are present in WA in low enough numbers or in sufficiently limited areas that their eradication is still a possibility
C3 - Management	Pests assigned to this category are established in WA but it is feasible, or desirable, to manage them in order to limit their damage. Control measures can prevent a C3 pest from increasing in population size or density or moving from an area in which it is established into an area which currently is free of that pest

This page has been left blank intentionally.

APPENDIX B RELEVE DESCRIPTIONS

APPENDIX C SIGNIFICANT FLORA LOCATIONS

APPENDIX D TPRF FORMS

Page 6

Page 7

Page 8

Page 9

Page 10

Page 11

Page 12

This page has been left blank intentionally.

APPENDIX E INTRODUCED FLORA LOCATIONS

This page has been left blank intentionally.