FLORA & VEGETATION ASSESSMENT

NORSEMAN GOLD PROJECT, NORSEMAN, WA

Prepared By

Mattiske Consulting Pty Ltd

Prepared For

Pantoro Ltd

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Photo Cover: Vegetation in the Scotia survey area at the western edge of Lake Dundas, Autumn 2020

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LIST OF ABBREVIATIONS

BAM Act:	*Biosecurity and Agriculture Management Act 2007* (WA)
BC Act:	*Biodiversity Conservation Act 2016* (WA)
BOM:	Bureau of Meteorology
CLUSTER:	Hierarchical clustering
DAWE	Department of Agriculture, Water and the Environment
DEC:	Department of Environment and Conservation
DBCA:	Department of Biodiversity, Conservation and Attractions
DPaW:	Department of Parks and Wildlife (now under DBCA)
DPIRD:	Department of Primary Industries and Regional Development (includes Agriculture and Food)
EP Act:	*Environmental Protection Act 1986* (WA)
EPA:	Environmental Protection Authority
EPBC Act:	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
IBRA:	Interim Biogeographical Regionalisation for Australia
MCPL:	Mattiske Consulting Pty Ltd
NVIS:	National Vegetation Information System
Pantoro:	Pantoro Limited
PEC:	Priority Ecological Community
PRIMER:	Plymouth Routines in Multivariate Ecological Research
SIMPER:	Similarity percentages
SIMPROF:	Similarity profile
TEC:	Threatened Ecological Community
WAH:	Western Australian Herbarium (PERTH)

EXECUTIVE SUMMARY

Mattiske Consulting Pty Ltd (Mattiske) was commissioned in March 2020 by Pantoro Limited (Pantoro) to undertake a flora and vegetation assessment of the Norseman Gold Project areas located around Norseman, WA. This report outlines the methodology and results from a desktop assessment of flora and vegetation of the entire Norseman Gold Project area, performed in March 2020. A detailed flora and vegetation field survey of five smaller survey areas (Gladstone, North Royal, Gladstone-North Royal Haul Roads, Jimberlana Pipeline and Scotia) was carried out from 29th March to 3rd April 2020. This report describes the methodology and results of that survey, and discusses their significance.

The main findings of the desktop study were:

- The Norseman Gold Project area lies within the *Coolgardie 3 – Eastern Goldfields* Subregion of the Coolgardie Bioregion, and more specifically, falls within the Great Western Woodlands.
- The majority of the vegetation in the area comprises *Eucalyptus* woodlands, often over *Eremophila* species and/or chenopod shrublands, and *Triodia* species grasslands with mallees in some places.
- A total of 804 vascular plant taxa, representative of 260 genera and 115 families, were found to have the potential to occur within the study areas, with the most common families being Myrtaceae, Fabaceae and Asteraceae, and the most common genera being *Eucalyptus*, *Acacia* and *Eremophila*. Forty-two introduced species had the potential to occur within the Norseman Gold Project area, four of which are Declared Pest species.
- Three Threatened flora species had the possibility of occurring in the Norseman Gold Project area. *Daviesia microcarpa* (T) and *Eucalyptus platydisca* (T) were assessed as having a High likelihood of occurrence in the North study areas. One Priority ecological ('*Allocasuarina globosa* assemblages on greenstone rock'), supporting the other Threatened flora species *Allocasuarina globosa* (T) is known to occur south of Norseman, and has a potential to occur in the Scotia survey area.
- A total of 37 Priority flora species, including eleven Priority 1, five Priority 2, seventeen Priority 3 and four Priority 4 flora species, were assessed as having the potential to occur within the Norseman Gold Project study areas.
- No Threatened ecological communities were found to have the potential to occur in the Norseman Gold Project area.

The field survey found the following, recorded in 61 quadrats in the Northern survey areas (Gladstone, North Royal, Gladstone-North Royal Haul Roads and Jimberlana Pipeline) and 40 quadrats in the Scotia survey area, plus several opportunistic records:

- In the Northern survey areas, 138 vascular plant taxa were recorded, representative of 60 genera and 33 families. The most common families were Myrtaceae, Chenopodiaceae, Fabaceae and Scrophulariaceae, and the most common genera were *Eucalyptus*, *Eremophila* and *Acacia*.
- In the Scotia survey area, 101 vascular plant taxa were recorded, representative of 50 genera and 31 families. Most taxa were part of the Myrtaceae, Fabaceae and Chenopodiaceae families. The most common genera were *Eucalyptus*, *Acacia* and *Eremophila*.
- Species accumulation analysis shows that approximately 73% of taxa potentially present in the survey areas were recorded during the field survey.
- No live threatened flora species were recorded within the five Norseman Gold Project survey areas; however, sites where *Davesia microcarpa* (T) was previously recorded within the survey areas were visited, with no alive specimens recorded in the current survey.
- Two priority flora species, *Calandrinia lefroyensis* (P1) and *Acacia kerryana* (P2), were recorded in the Gladstone and Jimberlana Pipeline survey areas, respectively. *Eremophila parvifolia* ?subsp. *parvifolia* (P4), which was recorded throughout the four Northern survey areas, was unable to be confidently identified to a sub-species level as a fruiting specimen is required. This species is treated with a precautionary approach as the Priority 4 subspecies.
- Eleven taxa, including three potential identifications, recorded within the survey areas represent extensions to their current known distributions based on known data. Three of the taxa are

ranked as being Moderate range extensions and one as High and due to lack of lowering and fruiting material could not be confirmed.

- Two introduced (weed) species, **Asphodelus fistulosus* (Onion Weed) and **Gazania linearis*, were recorded in very small numbers at one site each. Under the Department of Parks and Wildlife Weed Prioritisation Process, **Gazania linearis* is considered to be one of the 17 Goldfields Region priority alert weeds and therefore the locations should be reported to the local regional office of the Department of Biodiversity, Conservation and Attractions.
- In the Northern survey areas, a total of 18 vegetation communities were defined and mapped: twelve Eucalypt woodland communities, two other woodland communities and four shrubland communities. Two of the shrubland communities, dominated by salt-tolerant species, formed almost 25 % of the Northern survey areas, reflecting the significant areas of salt lake in these areas.
- Nine vegetation communities were defined in the Scotia survey area: five Eucalypt woodland communities and four shrubland communities. Three Eucalypt woodland communities made up almost 85 % of the Scotia survey area.
- No Threatened or Priority ecological communities were recorded as occurring in the Norseman Gold survey areas.
- Approximately 93 % of the sites with a recorded condition ranking were assessed as being in Pristine or Excellent condition. The vegetation condition in the Scotia survey area is generally better than that in the Northern areas, although both areas have very little disturbance within the areas of native vegetation.
- Average species richness in the vegetation communities of the Scotia survey was greater than in the Northern survey areas, but values varied more widely in the Northern areas.
- The vegetation communities defined within both the Northern and Scotia survey areas are consistent with the Pre-European vegetation associations of the area, are typical of the regional vegetation of the Great Western Woodlands, and show the same gradation from salt lake vegetation with low chenopod shrublands on salt lake fringes into woodlands with mixed *Eucalyptus* species as noted for the area in earlier regional studies. The communities are all very similar to those mapped in previous local surveys in the area.

As the vegetation of the Norseman Gold Project survey areas is common at statewide and regional levels, clearing should not have significant detrimental effects at those levels. However, the presence of Priority listed flora species within the survey areas is of local importance with regard to clearing of vegetation.

1. INTRODUCTION

Mattiske Consulting Pty Ltd was commissioned in March 2020 by Pantoro Limited (Pantoro) to undertake a flora and vegetation assessment of the Norseman Gold Project areas.

1.1. Location and Scope of Project

The Norseman Gold Project lies within the Coolgardie Botanical District of the Southwestern Interzone (Beard 1990), surrounding the town of Norseman, Western Australia (Figure 1) and within the Coolgardie 3-Eastern Goldfields subregion of the Coolgardie Bioregion within the Southwestern Interzone botanical district (Cowan 2001). The overall Norseman Gold Project area consists of seven smaller areas: Gladstone, North Royal, Gladstone-North Royal Haul Roads, Jimberlana Pipeline, Cobbler, OK, TSF 4, Maybell, and Scotia. The tenements that underlie each of the smaller survey areas are presented in Table 1 and Figure 2.

This report outlines the methodology and results from a desktop assessment of flora and vegetation of the entire Norseman Gold Project area. For the purposes of this report, and to be consistent with the detailed field survey (see next paragraph), this assessment was divided into two study areas; 'North' (including Gladstone, North Royal, Gladstone-North Royal Haul Roads, Jimberlana Pipeline, Cobbler, OK, TSF 4 and surrounds) and 'South' (Maybell, Scotia and surrounds).

A detailed flora and vegetation field survey was carried out from 29th March to 3rd April 2020 in five of the smaller areas listed above. This report describes the methodology and results of that survey, and discusses their significance. The results, in terms of flora recorded and vegetation communities mapped, are grouped in two larger survey areas: 'Scotia' (comprising Scotia and its haul road only) and 'Northern' (Gladstone, North Royal, Gladstone-North Royal Haul Roads and Jimberlana Pipeline).

1.2. Environmental Legislation and Guidelines

The following key Commonwealth (federal) legislation relevant to this survey is the:

- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The following key Western Australian (state) legislation relevant to this survey include the:

- *Biodiversity Conservation Act 2016* (BC Act);
- *Biosecurity and Agriculture Management Act 2007* (BAM Act); and
- *Environmental Protection Act 1986* (EP Act);

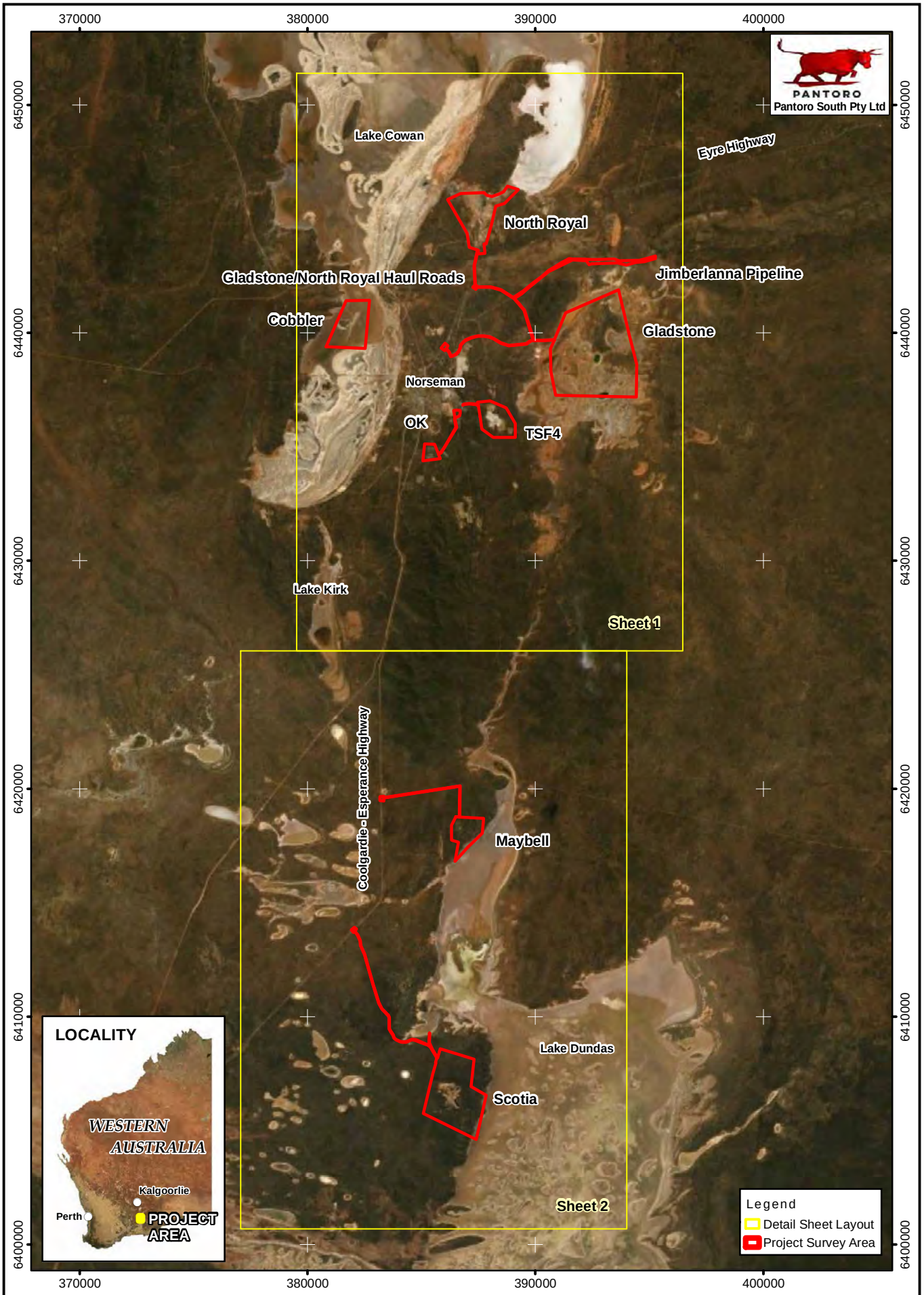
Furthermore, key Western Australian guidelines relevant to this survey are the:

- *Environmental Factor Guideline: Flora and Vegetation* (Environmental Protection Authority [EPA] 2016a); and
- *Technical Guidance – Flora and vegetation surveys for environmental impact assessment* (EPA 2016b).

Definitions of flora and vegetation terminology commonly used throughout this report are provided in Appendix A1-6.

Table 1: Tenements underlying each survey area

SURVEY AREA	TENEMENT	SURVEY AREA	TENEMENT
Cobbler	M 63/44 M 63/218 M 63/259	Maybell	L 63/56 L 63/74 M 63/119-I M 63/138 M 63/204-I M 63/515-I P 63/2035 P 63/2037 P 63/2095 P 63/2156 P 63/2162
Gladstone	M 63/42 M 63/43 M 63/275 M 63/659 P 63/1392 P 63/1393 Untitled Land	North Royal	L 63/32 M 63/11 M 63/29 M 63/155 M 63/156
Gladstone-North Royal Haul Roads	L 63/17 L 63/32 L 63/40 M 63/13 M 63/14 M 63/42 M 63/133-I M 63/140-I M 63/142 M 63/155 M 63/156 P 63/2003	OK	M 63/15 M 63/68-I
Jimberlana Pipeline	E 63/1042-I L 63/12 L 63/13 L 63/17 L 63/36 L 63/37 L 63/39 L 63/40 M 63/140-I P 63/2157 P 63/2158	Scotia	E 63/1914 L 63/19 M 63/35-I M 63/36 M 63/108-I M 63/112-I M 63/224-I M 63/325-I P 63/2119 Untitled Land
		TSF4	M 63/15 M 63/133-I



Notes: Image: DigitalGlobe (27/11/2016)

N

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Scale: 1:125,000
MGA94 (Zone 50)

CAD Ref: a2764_f01_01

Date: March 2020 | Rev: A | A4

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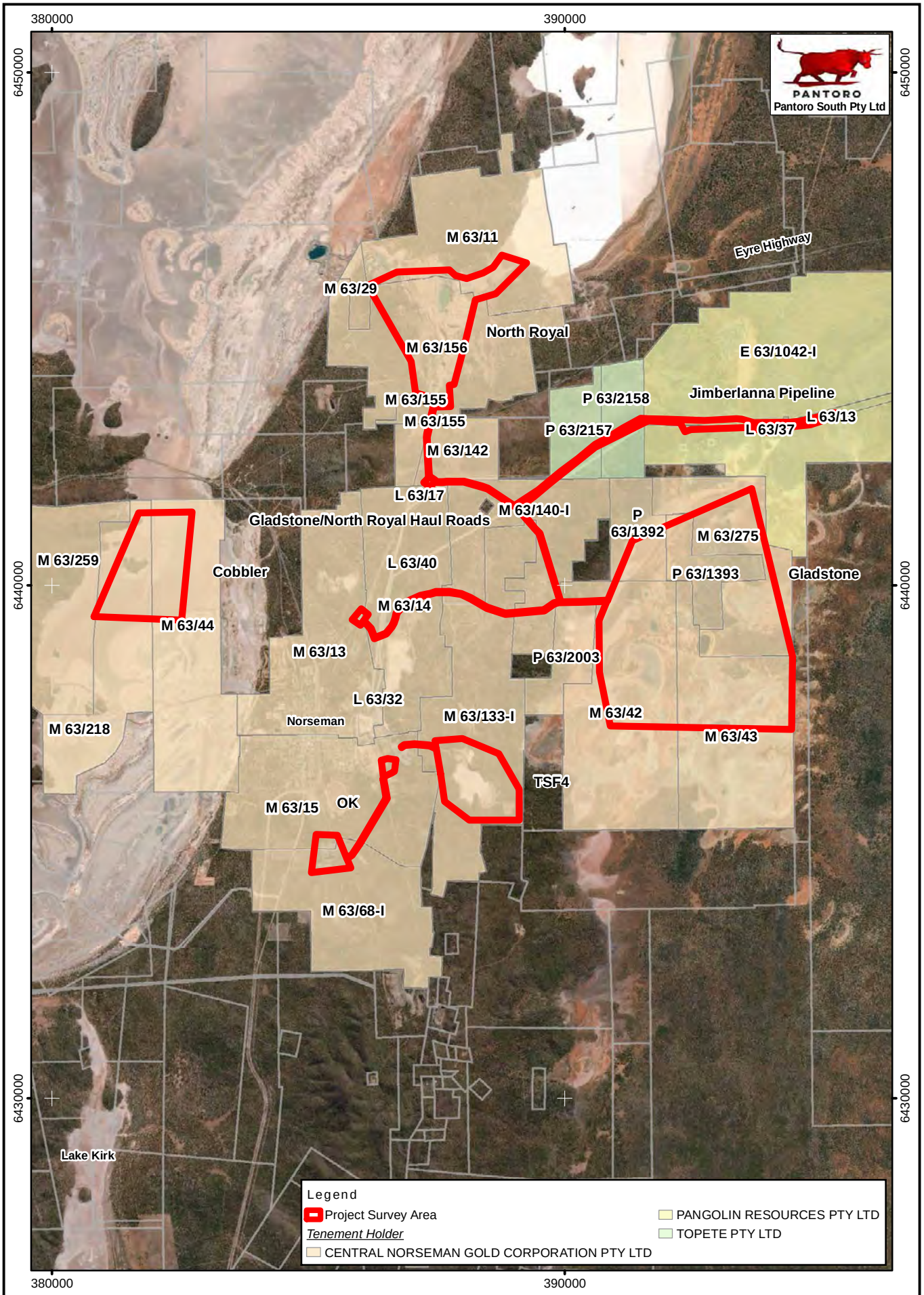
Norseman Gold Project
Locality

Figure: **1**



Notes: Image: DigitalGlobe (27/11/2016), Tenements: DMIRS (11/2/2020)

N

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Scale: 1:125,000
MGA94 (Zone 50)

CAD Ref: a2764_f01_02

Date: March 2020 | Rev: B | A4

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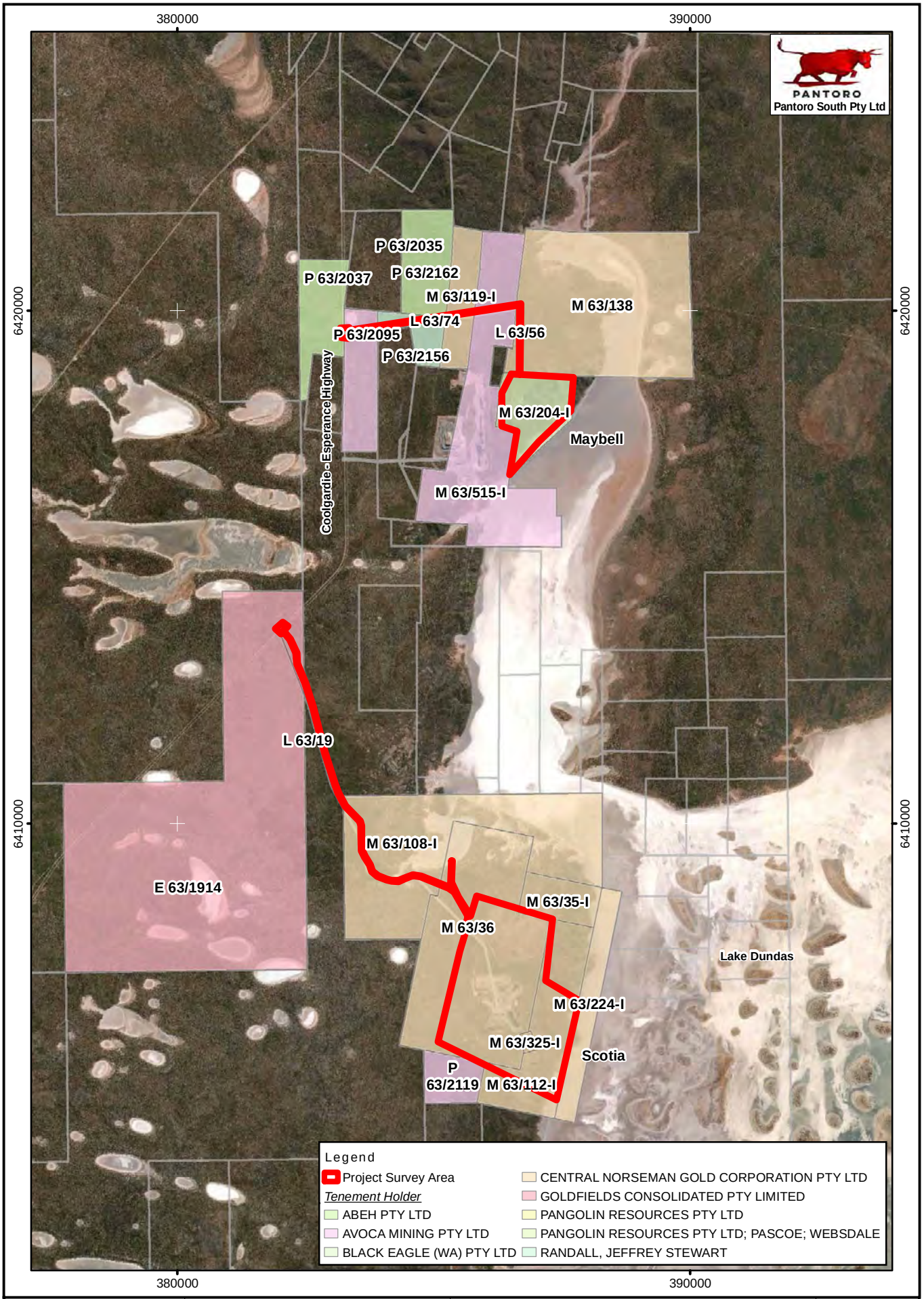
Norseman Gold Project
Tenements
Sheet 1 of 2

Figure:

2.1



Notes: Image: DigitalGlobe (27/11/2016), Tenements: DMIRS (11/2/2020)

N

0 1.6 km

Scale: 1:125,000
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Norseman Gold Project
Tenements
Sheet 2 of 2

Figure:

2.2

2. OBJECTIVES

The objective of this survey was to undertake a flora and vegetation assessment of the Norseman Gold Project survey areas, including to:

- Complete a desktop study of the flora and vegetation of the greater Norseman Gold Project area, with an emphasis on threatened and priority flora, and threatened and priority ecological communities;
- Review the historical literature of the greater Norseman Gold Project area;
- Undertake a detailed field survey of five of the Norseman Gold Project survey areas, and collect and identify the vascular plant species present;
- Review the conservation status of the vascular plant species recorded by reference to current literature and listings by the Department of Biodiversity, Conservation and Attractions (DBCA) and plant collections held at the Western Australian State Herbarium (WAH), and listed by the Department of Agriculture, Water and the Environment (DAWE) under the EPBC Act;
- Define and map the vegetation communities in the five Norseman Gold Project survey areas;
- Define and map the location of any threatened and priority flora located within the five Norseman Gold Project survey areas;
- Define any management issues related to flora and vegetation values;
- Provide recommendations on the local and regional significance of the vegetation communities; and
- Prepare a report summarising the findings.

3. METHODS

3.1. Desktop Assessment

A desktop assessment was conducted using FloraBase (WAH 1998-) and NatureMap (DBCA 2007-) databases, to identify the possible occurrence of threatened and priority flora and threatened and priority ecological communities within the Norseman Gold Project area.

The NatureMap search was conducted separately for two parts of the Norseman Gold Project area; North (Gladstone, Gladstone-North Royal Haul Roads, Jimberlana Pipeline, North Royal, Cobbler, OK and TSF 4 survey areas) and South (Maybell and Scotia survey areas). Search parameters used were a 10 km radius 'by circle' at the following points:

North: 32° 09′ 42″ S, 121° 48′ 25″ E.
South: 32° 24′ 51″ S, 121° 46′ 37″ E.

The aforementioned coordinates were also used in the *EPBC Act Protected Matters Search Tool* (DAWE 2015).

In addition, historical documentation and vegetation mapping of the region, principally that of Beard (1970, 1975, 1990), which provide extensive resource material for the floristics and vegetation of the greater Norseman Gold Project area, was reviewed.

Previous flora and vegetation surveys from the Norseman area (Botanica Consulting 2010; GHD Pty Ltd 2009, 2010a, 2010b; Goldfields Environmental Management Pty Ltd 1989; Landcare Services Pty Ltd 1995, 1996, 1997; Marianna Partners Environmental Services 1996; Mattiske Consulting 2001a, 2001b, 2002, 2005, 2013a, 2013b; Native Vegetation Solutions 2019; Outback Ecology 2003; Paul Armstrong & Associates 2004; Rally Revegetation and Environmental Services 2004, 2005; Umwelt Australia Pty Ltd 2016) were reviewed to identify the occurrence of threatened and priority flora likely to be found within the Norseman Gold Project survey areas and vegetation communities mapped in those areas (Appendix B).

The NatureMap (DBCA 2007-) database search, along with the records of previous surveys, was also used to help compile a list of all flora taxa that could possibly occur in the study area (Appendix C).

The Threatened and Priority Flora (DBCA 2020b) and WAH Flora (WAH 2020) databases were searched by CAD Resources for records of threatened and priority flora in the survey areas. The likelihood of occurrence of any threatened and priority flora within both the North and South Norseman Gold Project study areas was assessed on the basis of: proximity of previous records to the current survey areas, age of the record, and size of the recorded population (Appendix D).

3.2. Field Survey

A detailed field assessment of the flora and vegetation of five of the Norseman Gold Project survey areas was undertaken by four botanists from Mattiske Consulting Pty Ltd, from the 30th March 2020 to the 3rd April 2020 ("Autumn 2020"), in accordance with methods outlined in *Technical Guidance – Flora and vegetation surveys for environmental impact assessment* (EPA 2016b). All botanists held valid collection licences to collect flora for scientific purposes, issued under the BC Act.

The geographic co-ordinates defining the Norseman Gold Project survey areas were supplied by Pantoro. The areas to be surveyed in Autumn 2020 in the Northern survey area were Gladstone, Gladstone-North Royal Haul Roads, Jimberlana Pipeline and North Royal (and its pipeline); in the Scotia (southern) survey area they were Scotia and its associated haul road. Aerial photographic maps of the Norseman Gold

Project survey areas were prepared and supplied by CAD Resources. Survey sites were selected prior to the field survey using aerial photographic maps and locations modified in the field where observation or availability of time deemed changes to be necessary. A total of 101 survey sites, 61 in the Northern survey areas and 40 in the Scotia area, were selected to sample all vegetation types, with replication, within the Norseman Gold Project survey area.

Survey sites consisted of un-marked 20 x 20 metre quadrats. The GPS location of the northwest corner of each quadrat was recorded and a photo taken from that point looking to the southeast.

Flora and vegetation were described and sampled systematically at each survey site, and additional opportunistic collections were undertaken wherever previously unrecorded plants were observed. At each quadrat the following floristic and environmental parameters were recorded:

- GPS location (GDA94 datum, zone 51);
- Local site topography;
- Soil type and colour;
- Outcropping rocks and their type;
- Percentage litter cover and percentage bare ground;
- Approximate time since fire;
- Vegetation condition (based on Keighery 1994); and
- For each vascular plant species, the average height and the percentage cover (of both alive and dead material) over the survey site.

The location of any plant or population of plants thought to potentially be a Threatened or Priority taxon was recorded, along with the height of the plant (or average height of the population), the area which the population occupied, the plant or population's condition, and its reproductive status. Photographs were taken to aid in identification.

All plant specimens collected during the field surveys were dried and processed in accordance with the requirements of the WAH. The plant species were identified based on taxonomic literature and through comparison with pressed specimens housed at the WAH. Where appropriate, plant taxonomists with specialist skills were consulted. Nomenclature of the species recorded is in accordance with the WAH (1998-).

3.3. Survey Timing

According to the *Technical guidance – Flora and vegetation surveys for environmental impact assessment* (EPA 2016b), the primary survey timing for the Southwestern Interzone is Spring (September-November). The rainfall for the three months prior to the Autumn survey (67.2 mm for January-March 2020 against 92.7 mm as the long-term average for those months) and the 12 months (221.8 mm for the previous 12 months against 291.6 mm for the annual long-term average) was below average (Bureau of Meteorology [BOM] 2020).

3.4. Analysis of Site Data

A species accumulation curve for each of the Northern and Scotia survey areas, based on accumulated species versus sites surveyed was prepared to provide an indication of the level of adequacy of the survey effort (*EstimateS* – Colwell 2013). As the number of survey sites increases, and correspondingly the size of the area surveyed increases, there should be a diminishing number of new species recorded. At some point, the number of new species recorded becomes essentially asymptotic. The asymptotic value was

determined using Michaelis-Menten modelling and provided an incidence-based coverage estimator of species richness (Chao 2004). When the number of new species being recorded for survey effort expended approaches this asymptotic value, the survey effort can be considered to be adequate.

Plymouth Routines in Multivariate Ecological Research v7 (PRIMER) statistical analysis software was used to analyse species-by-site data and discriminate survey sites on the basis of their species composition (Clarke and Gorley 2015). The data were split into Northern and Scotia survey areas, with a very similar treatment in both areas. To down-weight the relative contributions of quantitatively dominant species, a fourth root transformation was applied to the data set. Introduced species, annual species, specimens not identified to species level and singletons (species recorded at a single quadrat and not forming a dominant structural component, i.e. <5 % foliage cover) were excluded from the data set prior to analysis. Taxa which were identified to the subspecies and variety levels were revised to the specific level to reduce the tendency to create further statistical variation in the analysis that was considered unwarranted. Two *Eucalyptus* species forming a dominant structural vegetation component were grouped for analysis in the Scotia survey area; *Eucalyptus flocktoniae* and *Eucalyptus urna* were combined to '*Eucalyptus flocktoniae* complex'. This is due to the two species being easily confused during identification, as juvenile material is required to form a confident identification. Computation of similarity matrices was based on the Bray-Curtis similarity measure. Data were analysed using a series of multivariate analysis routines including Similarity Profile (SIMPROF), Hierarchical Clustering (CLUSTER) and Similarity Percentages (SIMPER). Results were used to inform and support interpretation of aerial photography, quadrat data and delineation of individual plant communities.

Previous vegetation mapping by Mattiske Consulting Pty Ltd in the Gladstone and Gladstone-North Royal Haul Roads survey areas (Mattiske Consulting Pty Ltd 2001a) was used to guide interpretation of vegetation communities in the parts of those areas not surveyed during the Autumn 2020 survey. Whilst the original data were not available, the vegetation community descriptions were used in a qualitative manner. Some of the areas included in the 2001 survey were resurveyed in Autumn 2020 in order to provide verification of the earlier work. Immediately to the south of the Gladstone-North Royal Haul Roads survey area, Mattiske Consulting Pty Ltd carried out vegetation mapping over a proposed tailings dam area (Mattiske Consulting Pty Ltd 2005). This previous work was used qualitatively to assist with mapping in the Gladstone-North Royal Haul Roads survey area. North of the Scotia survey area, Mattiske Consulting Pty Ltd had carried out vegetation mapping over the Mt Henry mine and surrounds (Mattiske Consulting Pty Ltd 2013a, 2013b). This work was also used qualitatively to assist with mapping in the Scotia area.

3.5. Vegetation Descriptions

Vegetation descriptions were based on Alpin's (1979) modification of the vegetation classification system of Specht (1970), to align with the National Vegetation Information System (NVIS) (see Appendix A5). Vegetation communities were described at the association level of the NVIS classification framework, as defined by the Executive Steering Committee for Australian Vegetation Information (2003). Vegetation condition of each of the mapping sites was assessed as per the criteria developed by Keighery (1994) (see Appendix A6).

3.6. Survey Limitations

A general assessment was made of the current survey against a range of factors that may have limited the outcomes and conclusions of this report (Table 2).

Table 2: Potential limitations affecting the conclusions made in this report

POTENTIAL SURVEY LIMITATION	IMPACT ON CURRENT SURVEY
Availability of contextual information at a regional and local scale	Not a limitation: Historical studies including Beard's work (1970, 1975, 1990) and Keighery, Newbey & Hall (1993), covering flora and vegetation of the region, were reviewed. The results of twenty-one previous field surveys (1989-2019) in the greater Norseman Gold Project area, including six performed by Mattiske Consulting Pty Ltd (2001-2013), were analysed (Appendix B).
Competency/experience of team carrying out survey; experience in the bioregion surveyed	Not a limitation: Two of the team were experienced Botanists, one with experience in the southern part of the Coolgardie IBRA region, and the other having worked in the southern part of the Murchison IBRA region. The other two team members had some experience in the wider area of Western Australia. Mattiske Consulting Pty Ltd has carried out several surveys in the Norseman area (2001-2013).
Proportion of flora collected and identification issues	Minor limitation: The species accumulation curves for each of the Northern and Scotia survey areas (Figures 10.1-10.2) show that 73 % of taxa potentially present in each of the survey areas were recorded during this survey. In view of the extent of previous studies in different seasons, this was not seen as a limitation in 2020. Trees and mallees of the genus *Eucalyptus* (which often dominated the canopy) were an exception to this, as most were found with buds and fruit, making identification to species level possible.
Effort and extent of survey	Not a limitation: The survey was designed to be a reconnaissance assessment in degraded areas and a detailed flora and vegetation assessment in less disturbed environments. In view of the extent of previous studies in different seasons, this was not seen as a limitation in 2020. In most vegetation communities, three or more quadrats were surveyed in order to obtain statistically valid data. However, in total five communities contained only two quadrats each and eight communities contained only one quadrat. These thirteen communities were restricted in areal extent within the survey areas and thus it was not possible to survey more replicate sites (see section 5.2.1 for further detail). Although parts of the Gladstone-North Royal Haul Roads survey area and part of the Gladstone survey area were not surveyed at this time these areas had been covered by previous Mattiske Consulting Pty Ltd surveys (see Appendix B). Some parts of those previously mapped areas were re-surveyed at this time.
Access restrictions within survey area	Not a limitation: There were no restrictions to access encountered during the survey. Most sites could be reached by vehicle on pre-existing tracks followed by a short foot traverse. A small number of sites, particularly those in the east of the Scotia survey area, required walks of several km length to access.
Survey timing, rainfall, season of survey	Minor Limitation: As discussed in section 3.3, rainfall for 12 months prior to the Autumn survey was lower than average. In view of the extent of previous studies in the areas and nearby areas this was seen as a minor limitation.

Table 2: Potential limitations affecting the conclusions made in this report (continued)

POTENTIAL SURVEY LIMITATION	IMPACT ON CURRENT SURVEY
Disturbances (fire/flood/clearing)	Not a limitation: The vegetation at most survey sites was assessed as being Pristine or Excellent (Keighery 1994). However, some sites were adjacent to cleared areas, and a few areas (such as old tracks) had been cleared in the past. One site had been burnt around 6-10 years ago. These sites generally had a higher than usual number of weed species, a higher foliage cover of shrub species, and the Eucalypt species present were often juveniles.
Data and statistical analysis	Minor limitation: In view of lower rainfalls prior to the assessments, some plants were not flowering or fruiting at the time of the survey. This is seen as minor constraint in view of the extent of previous studies in the local and nearby areas. A significant number of vegetation communities (8 of 27) contained only one survey quadrat, and five another contained only two quadrats due to the restricted areal extent of some of the communities within the survey areas; and In some cases, taxa were combined to improve the robustness of the data (e.g. *Eucalyptus flocktoniae* complex – see section 3.4).

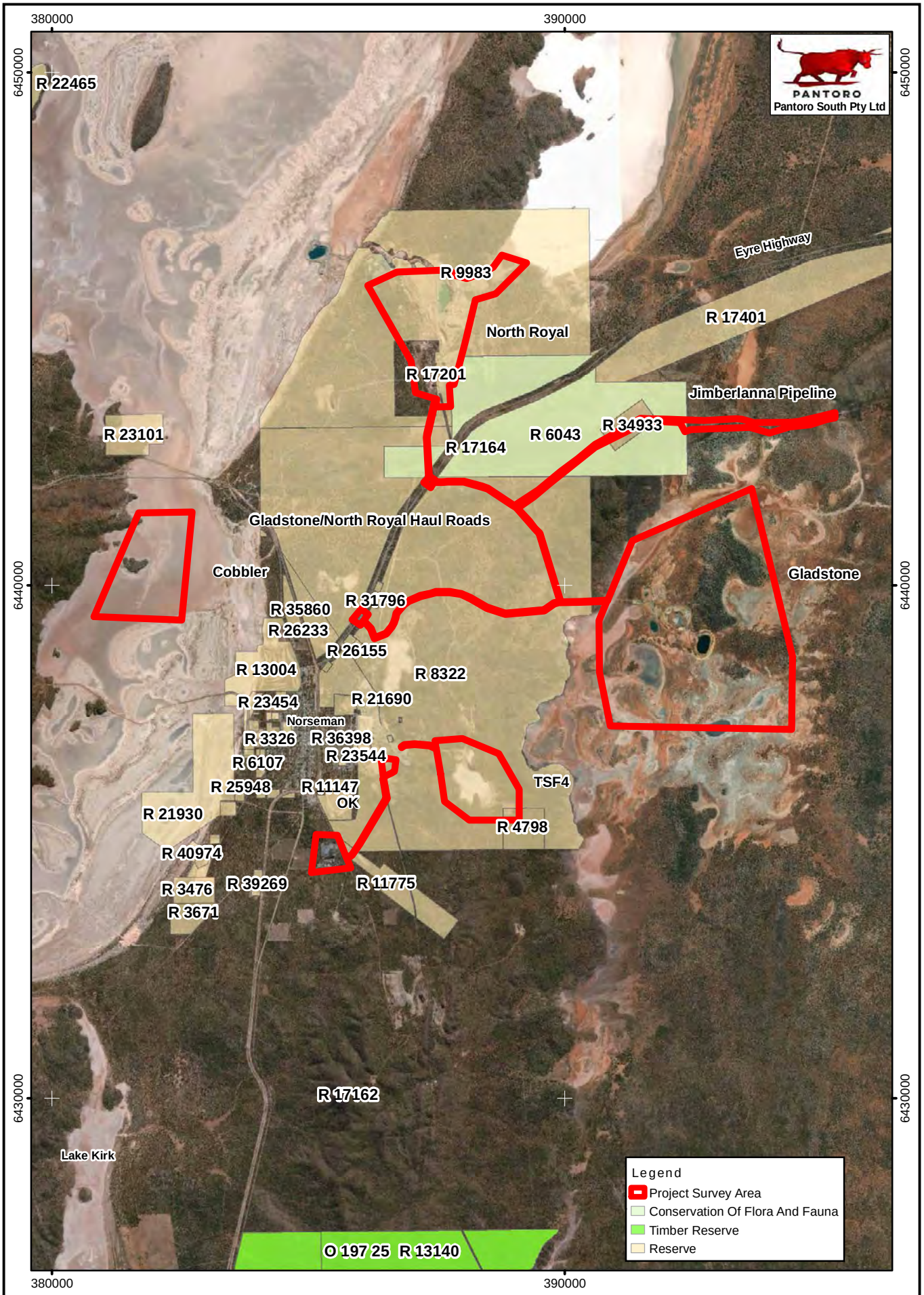
4. DESKTOP ASSESSMENT RESULTS

4.1. Regional Context

The Norseman Gold Project area lies within the Coolgardie Botanical District of the Southwestern Interzone (Beard 1990). The vegetation of Western Australia has been assigned to bioregions and subregions under the Interim Biogeographical Regionalisation for Australia (IBRA), with the survey area being within the *Coolgardie 3 – Eastern Goldfields* Subregion of the Coolgardie Bioregion (Cowan 2001). Geologically, the Norseman Gold Project survey area lies within the Yilgarn Block.

4.2. Managed Lands

There are a number of reserves in the area surrounding the Norseman Gold Project survey areas, presented in Figure 3. In the South, the 780,000 ha Class B Dundas Nature Reserve is located approximately 10 km east of the Scotia survey area. The southern border of the 2,610 ha Brockway Class C Forest Reserve (R 13140/O 19725) adjoins the northern section of the Maybell survey area (Figure 3). The Scotia Haul Road crosses water supply reserve R 4508. In the north, a former water supply reserve of 930 ha (R 6043) has been divested and converted to a Conservation Reserve. The latter encompasses Jimberlana Hill and covers parts of the Jimberlana Pipeline and North Royal pipeline survey areas. This reserve also includes a Main Roads Quarry (R 34933) and a Geodetic Infrastructure Reserve (R 17164). Reserve R 9983 (1954 ha) is reserved as common lands, and includes a small reserve (R 17201), covers part of the North Royal survey area. The TS4 and OK survey areas are covered by the common lands reserve R 8322 (3757 ha), and the rifle range reserve R 11775 (102 ha) intersects the OK haul road survey area.



Notes: Image: DigitalGlobe (27/11/2016), Managed Lands: DBCA, Reserves: Landgate

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Scale: 1:125,000
MGA94 (Zone 50)

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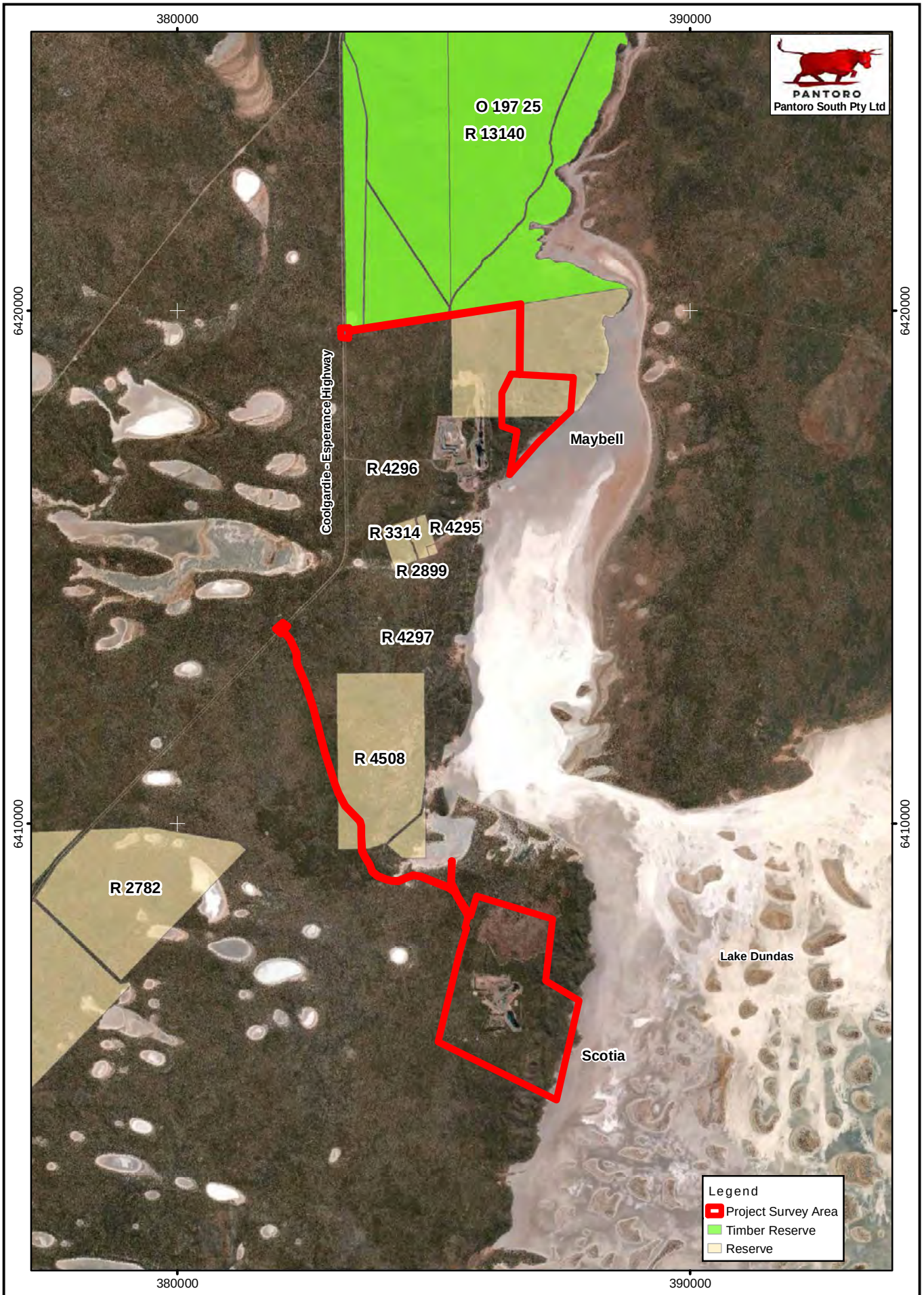
Norseman Gold Project
Managed Lands & Reserves
Sheet 1 of 2

Figure: **3.1**



Notes: Image: DigitalGlobe (27/11/2016), Managed Lands: DBCA, Reserves: Landgate

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Norseman Gold Project
Managed Lands & Reserves
Sheet 2 of 2

Figure: **3.2**

4.3. Climate

The Coolgardie Botanical District has a typically arid non-seasonal to semi-arid Mediterranean climate, with annual rainfall between 200 and 300 mm (Beard 1990). Norseman Aero WA (012009) is the closest active BOM weather station to the survey area. Rainfall and temperature data from Norseman Aero WA (012009) (BOM 2020) are illustrated in Figure 4. Below average rainfall was received in the three months before the survey (for January to March 2020 rainfall was 67.2 mm compared to an average of 92.7 mm). Although the March 2020 rainfall was above average, January and February 2020 rainfall was well below average (BOM 2020).

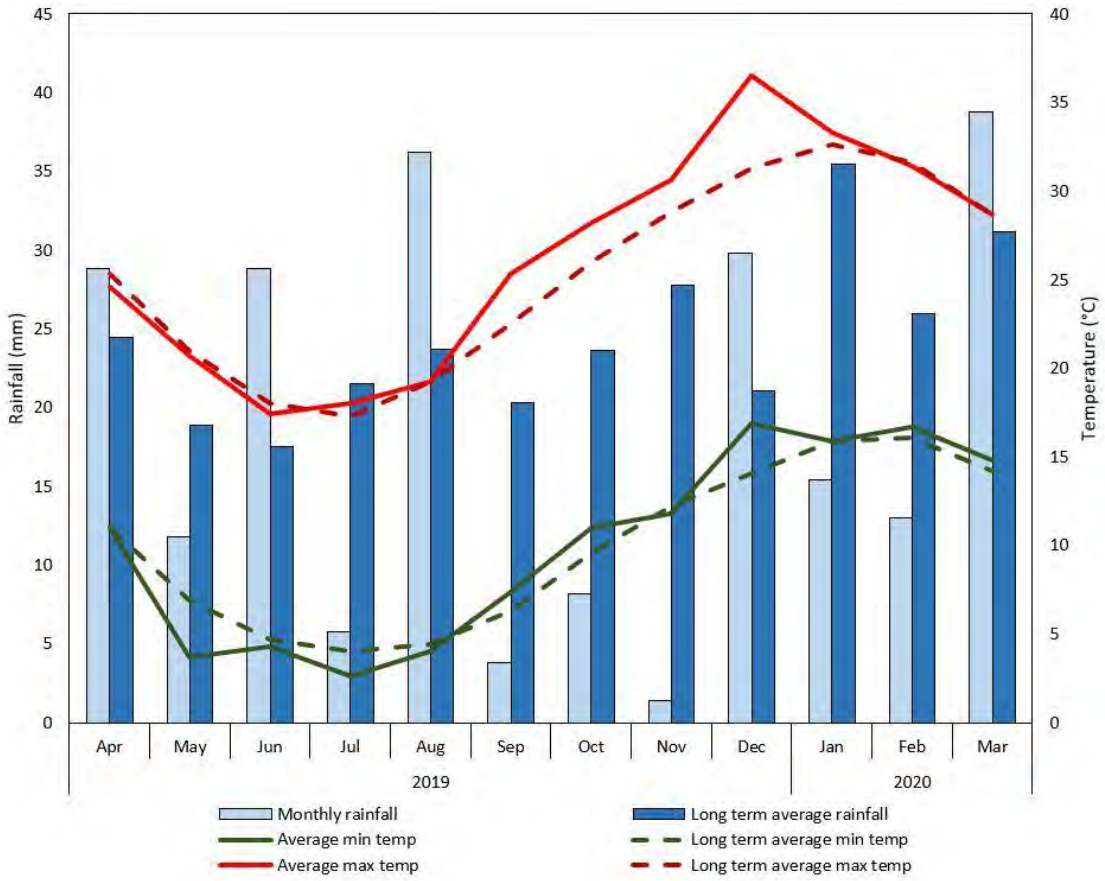


Figure 4: Rainfall and temperature data for Norseman Aero WA (012009)

Note: Long-term average monthly rainfall (2000-2020) and temperature (2000-2020) data, together with monthly rainfall and temperature data for the period of April 2019 to March 2020 (BOM 2020).

4.4. Geology, Soils and Topography

The geology of the area consists of Archaean greenstones and granite of the Yilgarn Block, and Proterozoic granite and gneiss of the Fraser Range Block (Beard 1990, Cowan 2001). The topography is of gently undulating plains, interrupted by occasional ranges of low hills and ridges of Archaean greenstones, playa lakes and sandplains in the west. A horst of Proterozoic basic granulite interrupts the undulating plains to the east (Beard 1990, Cowan 2001).

Soil-landscapes zones of Western Australia's rangelands and arid interior were defined by Tille (2006). The Norseman Gold Project survey area predominantly falls within the Kambalda Zone (265) of the

Kalgoorlie Province, although some of the southern survey areas are likely to cross into the northern section of the Salmon Gums Mallee Zone (246) of the Stirling Province (Tille 2006, Figure 5). The area is characterised by flat to undulating plains, hills, ranges, stony plains and salt lakes on greenstone and granite of the Yilgarn Craton (Tille 2006). Soils of the area include: Salt lake soils, red loamy earths, hardpan shallow loams, sandy duplexes and calcareous loamy earths. Calcareous earths are the predominant soil in the area, covering most of the plains and greenstone areas (Beard 1990, Cowan 2001, Tille 2006). Tille (2006) notes that the Stirling and Kalgoorlie Provinces grade into each other and that the boundary between the two reflects the change in terrain from Tertiary marine sediments supporting predominantly mallee vegetation with *Melaleuca* spp. understorey, to terrain formed by Aeolian deposits in the north that supports predominantly eucalypt woodland with halophytic understorey.

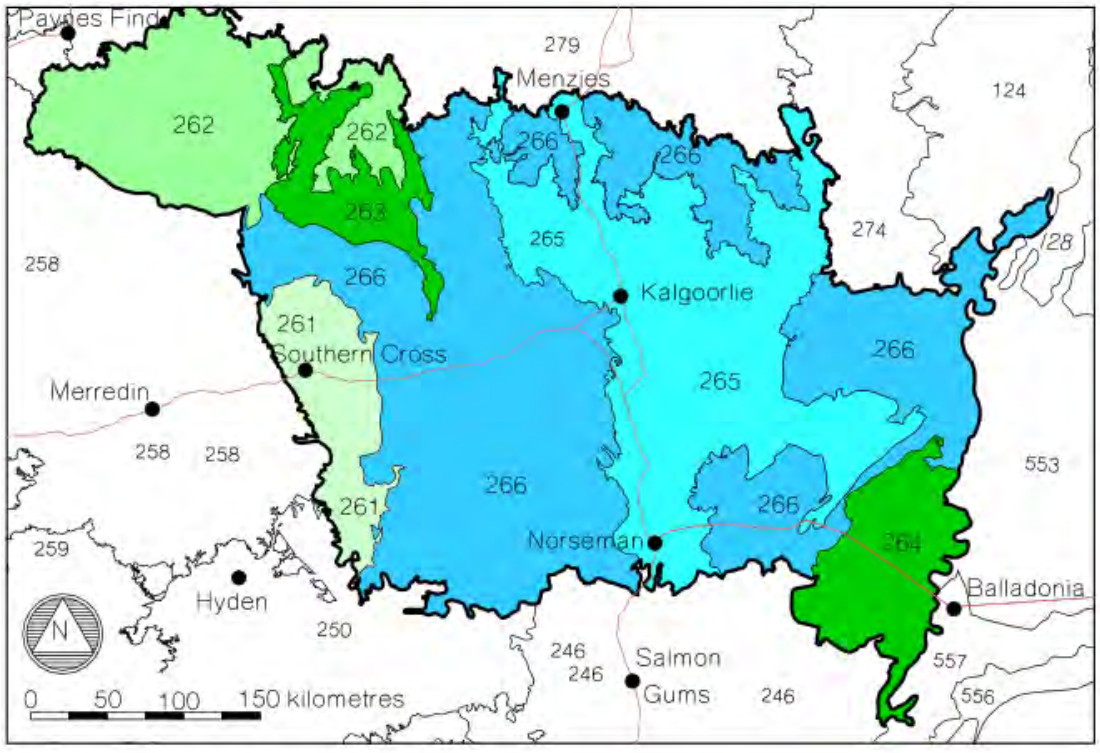


Figure 5: Soil-landscape zones of the WA rangelands and interior: Kalgoorlie Province (Tille 2006)

The Department of Primary Industries and Regional Development's (DPIRD) Land Systems present within the Norseman Gold Project survey area (Figure 6, Table 3) include:

1. SV2: Saline valleys with some dunes including barchan forms – salt lake channels, mostly devoid of true soils, and their fringing areas
2. DD14: Flat to undulating land with small valleys occasionally broken by low narrow rocky hills and ridges, or tors and bosses
3. BB5: Rocky ranges and hills of greenstones – basic igneous rocks
4. Lb10: Gently undulating plains with some granitic bosses and tors; acid clays common below surface

Table 3: Extent of Land Systems intersecting the Norseman Gold Project study areas

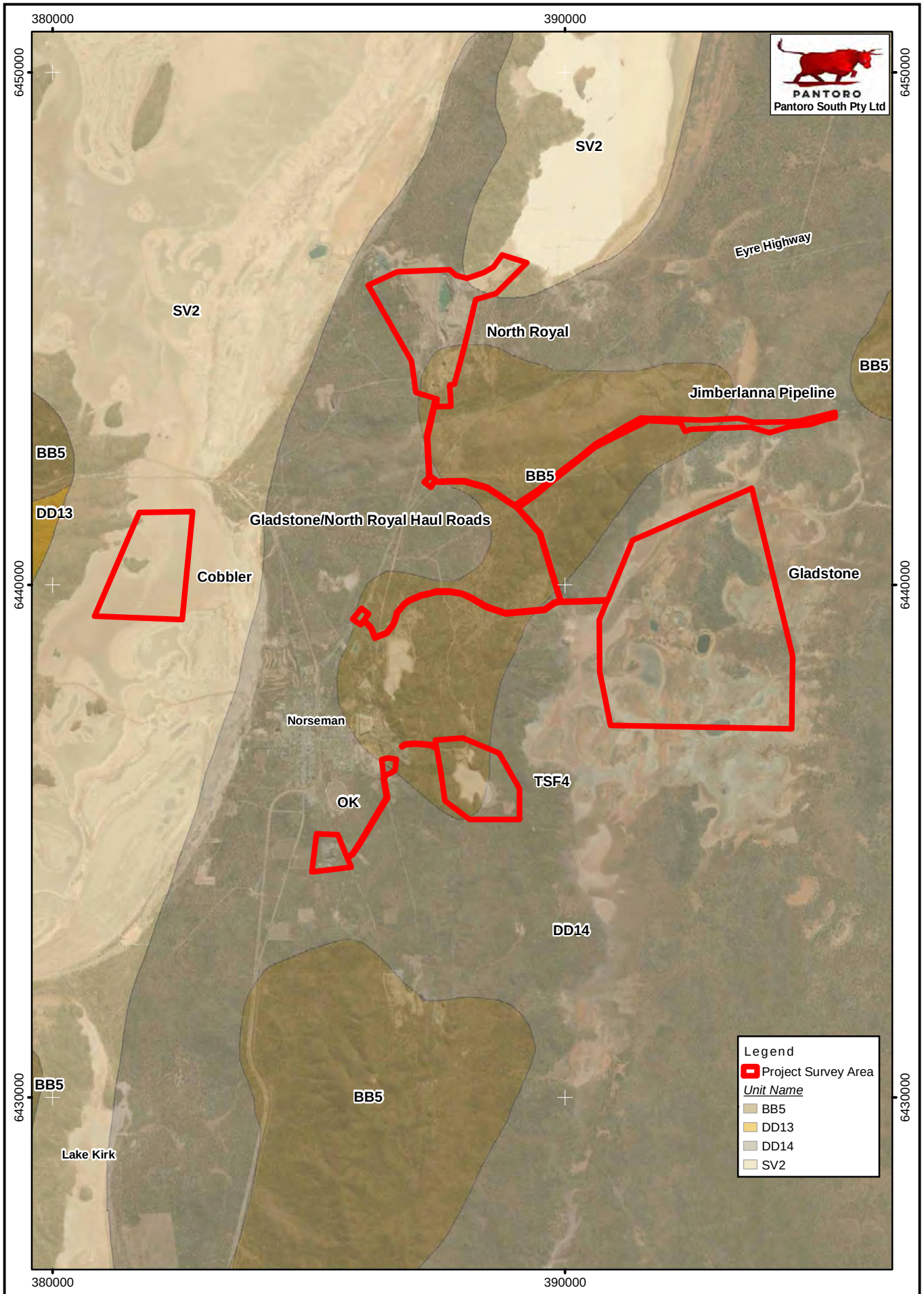
PROJECT SURVEY AREA	LAND SYSTEM	TOTAL STATEWIDE EXTENT (ha)	AREA OF INTERSECTION WITH THE SURVEY AREA (ha)	PROPORTION OF CURRENT EXTENT (%)
Cobbler	SV2	69941	284.5	0.41%
Gladstone	DD14	434972	1380.3	0.32%
Gladstone/North Royal Haul Road	BB5	145065	21.8	0.02%
	DD14	434972	7.3	0.00%
Jimberlana Pipeline	BB5	145065	37.1	0.03%
	DD14	434972	30.1	0.01%
Maybell	DD14	434972	128.1	0.03%
	SV2	69941	46.0	0.07%
North Royal	BB5	145065	64.6	0.05%
	DD14	434972	272.5	0.06%
	SV2	69941	42.8	0.06%
OK	BB5	145065	4.7	0.00%
	DD14	434972	47.9	0.01%
Scotia	BB5	145065	6.7	0.01%
	DD14	434972	10.9	0.00%
	Lb10	38417	470.0	1.22%
	SV2	87034	213.4	0.25%
TSF4	BB5	145065	123.3	0.09%
	DD14	434972	75.0	0.02%

4.5. Regional Vegetation

Beard (1990) described the vegetation of the Coolgardie Botanical District as predominantly Eucalypt woodland, becoming open and with saltbush-bluebush understorey on calcareous soils. *Allocasuarina* thickets and scrub-heath occur on sandplains and there are patches of shrub steppe adjoining the Great Victoria Desert (Beard 1990).

The Pre-European vegetation associations present within the Norseman Gold Project survey area (Figure 7, Table 4) include:

1. 125.0: Bare areas - Salt lake, lagoon, clay pan
2. 221.3: Succulent steppe/saltbush – *Grevillea* spp., *Atriplex* spp., *Maireana* spp. communities on alkaline soils
3. 524.1: Medium Eucalypt woodland over *Eremophila* sparse shrubland over *Atriplex* mixed chenopod open shrubland - *Eucalyptus salubris, E. oleosa, E. dundasii, E. flocktoniae* over *Eremophila scoparia, E. interstans* over *Atriplex vesicaria, Maireana sedifolia, M. pyramidata*
4. 110.0: Hummock grassland with scattered shrubs or mallee - *Triodia scariosa*, *Acacia* spp., *Grevillea* spp., *Eucalyptus* spp.
5. 9.0: Medium Eucalypt woodland over *Eremophila* sparse shrubland - *Eucalyptus salubris, E. oleosa, E. torquata, E. lesouefii, E. clelandiorum* over *Eremophila scoparia, E. glabra, E. oldfieldii*
6. 3106.0: Medium Eucalypt woodland - *Eucalyptus salubris, E. oleosa, E. salmonophloia, E. dundasii*



Notes: Image: DigitalGlobe (27/11/2016), Land Systems: DPIRD

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Scale: 1:100,000
MGA94 (Zone 50)

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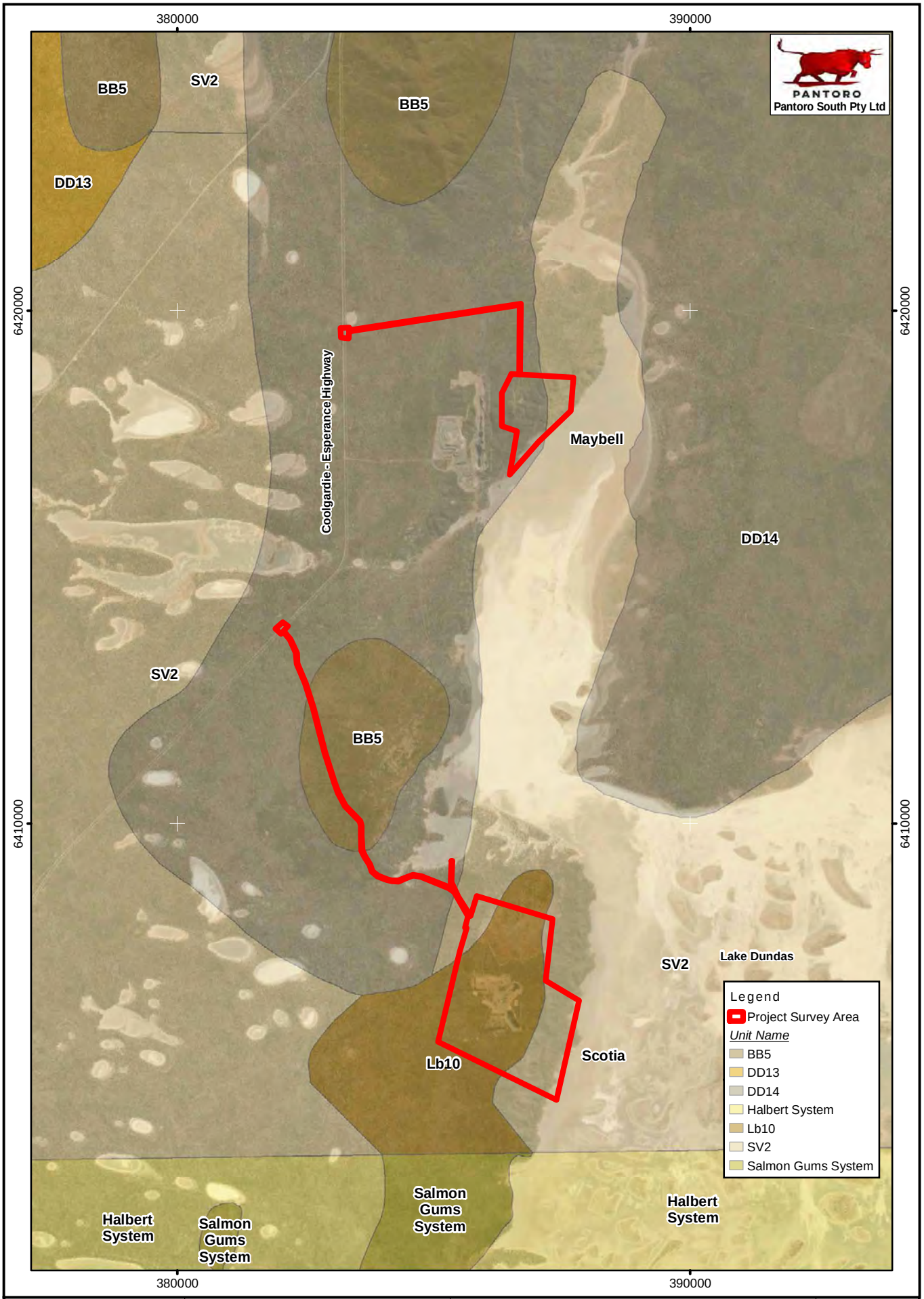
Norseman Gold Project
Land Systems
Sheet 1 of 2

Figure:
6.1



Notes: Image: DigitalGlobe (27/11/2016), Land Systems: DPIRD

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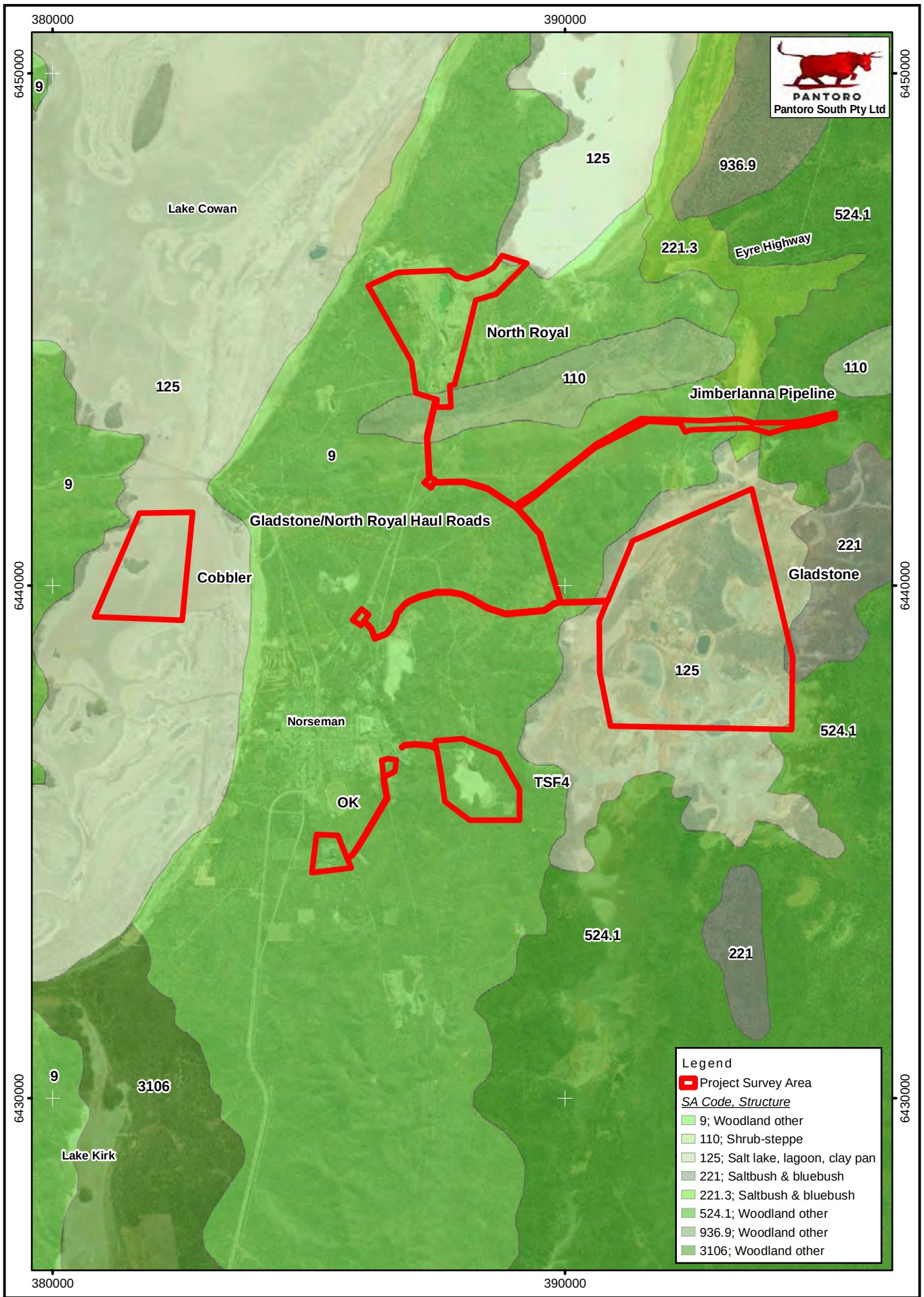
Norseman Gold Project
Land Systems
Sheet 2 of 2

Figure:
6.2



Notes: Image: DigitalGlobe (27/11/2016), Pre European Vegetation: DPIRD

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MGA94 (Zone 50)

CAD Ref: a2764_f01_05

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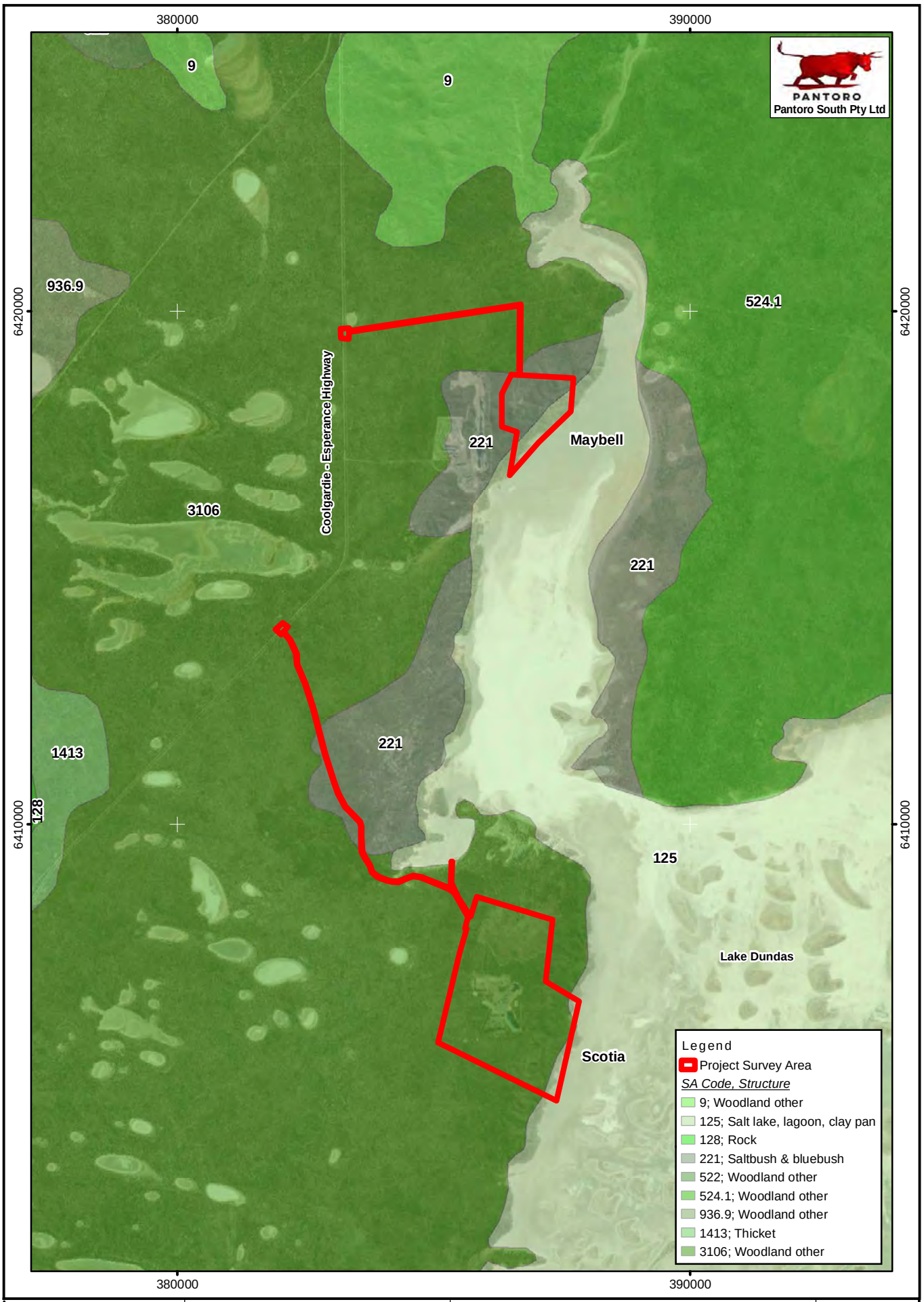
Norseman Gold Project

Pre European Vegetation

Sheet 1 of 2

Figure:

7.1



Notes: Image: DigitalGlobe (27/11/2016), Pre European Vegetation: DPIRD

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MGA94 (Zone 50)

CAD Ref: a2764_f01_05

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Norseman Gold Project
Pre European Vegetation
Sheet 2 of 2

Figure:

7.2

More recently, the vegetation of Western Australia has been assigned to bioregions and subregions under the Interim Biogeographical Regionalisation for Australia (IBRA), with the Norseman Gold Project survey area falling within the *Coolgardie 3* (COO3 – Eastern Goldfields) subregion of the Coolgardie Region (DAWE 2020a). The *Coolgardie 3* subregion is rich in endemic *Acacia* spp. and the vegetation of the area is described as mallees, *Acacia* thickets and shrub heaths on sandplains. Diverse *Eucalyptus* woodlands occur on ranges, in valleys and around salt lakes. Salt lakes support dwarf shrublands of samphire (Cowan 2001).

Table 4: Extent of pre-European vegetation associations intersecting the Norseman Gold Project study areas

PROJECT SURVEY AREA	VEGETATION ASSOCIATION	STATE-WIDE PRE-EUROPEAN EXTENT (ha)	AREA OF INTERSECTION WITH THE SURVEY AREA	PROPORTION OF CURRENT EXTENT (%)
Cobbler	125.0	3494560	284.5	0.01%
Gladstone	125.0	3494560	1368.2	0.04%
	221.3	56313	9.8	0.02%
	524.1	21745	2.4	0.01%
Gladstone/North Royal Haul Road	110.0	361263	1.8	0.00%
	125.0	3494560	0.6	0.00%
	9.0	240437	26.8	0.01%
Jimberlana Pipeline	221.3	7710	6.1	0.08%
	524.1	21745	19.1	0.09%
	9.0	240437	42.0	0.02%
Maybell	125.0	3494560	55.0	0.00%
	221.3	56313	107.0	0.19%
	3106.0	52639	12.4	0.02%
North Royal	110.0	361263	9.5	0.00%
	125.0	3494560	5.2	0.00%
	9.0	240437	365.2	0.15%
OK	9.0	240437	52.5	0.02%
Scotia	125.0	3494560	30.2	0.00%
	221.3	56313	5.2	0.01%
	3106.0	52639	665.4	1.26%
TSF4	9.0	240437	198.4	0.08%

4.6. Great Western Woodlands

The Department of Environment and Conservation's [DEC] (2010) *A Biodiversity and Cultural Conservation Strategy for the Great Western Woodlands* outlines the issues and management responses to the protection of the internationally significant Great Western Woodlands. The purpose of the strategy is to provide a management approach to the protection of the environmental and cultural values of the Great Western Woodlands through coordination and integration of many management elements. The Great Western Woodlands are the largest remaining intact Mediterranean-climate woodland which covers almost 16 million hectares in size and extends between the edge of the Western Australian Wheatbelt in the west, to Kalgoorlie-Boulder in the north, the inland deserts to the north east and the Nullarbor Plain to the east

(DEC 2010). The Great Western Woodlands spans two botanic and climatic zones, the wetter south-west and the arid interzone (into which the Norseman Gold Project area falls), and is an internationally significant area of biological richness (DEC 2010). The vegetation of the area is predominantly woodland communities, but also includes shrubland and mallee vegetation. The Great Western Woodlands supports approximately 20% of Australia's known flora and is a centre of *Eucalyptus* species diversity, with over 160 species of *Eucalyptus* found in the area (DEC 2010).

4.7. Previous Surveys

Many flora and vegetation surveys have been conducted in and around Norseman, with one of the earliest maps being produced fifty years ago by Beard (Beard 1970) and the accompanying memoir in 1975 (Beard 1975). Many more surveys have been required recently by mining companies with activities in and around Norseman. The location, purpose, method and results of twenty-one field surveys carried out between 1989 and 2019 are reviewed and summarised in Appendix B. Six of the previous surveys listed here were conducted by Mattiske Consulting Pty Ltd (2001a, 2001b, 2002, 2005, 2013a, 2013b).

4.8. Potential Flora

A total of 804 vascular plant taxa, representative of 260 genera and 115 families, have the potential to occur within the Norseman Gold Project study areas (based on NatureMap (DBCA 2007-) & EPBC Act (DAWE 2015) search results and previous surveys in the area (Botanica Consulting 2010; GHD Pty Ltd 2009, 2010a, 2010b; Goldfields Environmental Management Pty Ltd 1989; Landcare Services Pty Ltd 1995, 1996, 1997; Marianna Partners Environmental Services 1996; Mattiske Consulting Pty Ltd 2001a, 2001b, 2002, 2005, 2013a, 2013b; Outback Ecology 2003; Paul Armstrong & Associates 2004; Rally Revegetation and Environmental Services 2004; Umwelt Australia Pty Ltd 2016), included in Appendix B). The most commonly represented families were Myrtaceae (111 taxa), Fabaceae (90 taxa) and Asteraceae (86 taxa). The most commonly represented genera were *Eucalyptus* (64 taxa), *Acacia* (51 taxa), *Eremophila* (32 taxa), *Melaleuca* (28 taxa) and *Maireana* (18 taxa).

A total of 591 vascular plant taxa, representative of 206 genera and 61 families, have the potential to occur within the Norseman Gold Project North study areas (based on NatureMap (DBCA 2007-) & EPBC Act (DAWE 2015) search results and previous surveys in the area (Goldfields Environmental Management Pty Ltd 1989; Landcare Services Pty Ltd 1995, 1996, 1997; Mattiske Consulting Pty Ltd 2001a, 2001b, 2002, 2005; Outback Ecology 2003; Rally Revegetation and Environmental Services 2004), included in Appendix B). The most commonly represented families were Myrtaceae (86 taxa), Chenopodiaceae (70 taxa) and Fabaceae (67 taxa). The most commonly represented genera were *Eucalyptus* (54 taxa), *Acacia* (34 taxa), *Eremophila* (29 taxa), *Melaleuca* (21 taxa) and *Maireana* (18 taxa).

A total of 515 vascular plant taxa, representative of 184 genera and 65 families, have the potential to occur within the Norseman Gold Project South study areas (based on NatureMap (DBCA 2007-) & EPBC Act (DAWE 2015) search results and previous surveys in the area (Botanica Consulting 2010; GHD Pty Ltd 2010b; Landcare Services Pty Ltd 1995, 1997; Marianna Partners Environmental Services 1996; Mattiske Consulting Pty Ltd 2013a, 2013b; Paul Armstrong & Associates 2004; Umwelt Australia Pty Ltd 2016), included in Appendix B). The most commonly represented families were Myrtaceae (82 taxa), Fabaceae (55 taxa) and Chenopodiaceae (55 taxa). The most commonly represented genera were *Eucalyptus* (47 taxa), *Acacia* (37 taxa), *Melaleuca* (22 taxa), *Eremophila* (21 taxa) and *Maireana* (15 taxa).

4.8.1. Potential Threatened and Priority Flora

Three Threatened flora species, *Allocasuarina globosa* (T), *Daviesia microcarpa* (T) and *Eucalyptus platydisca* (T), pursuant to Part 2, Division 1, Subdivision 2 of the BC Act and as listed by DBCA (2018a) have the possibility of occurring in the Norseman Gold Project survey area. All three of these species are pursuant to section 179 of the EPBC Act or listed by the DAWE (2020b). They all could possibly occur in

the Norseman Gold Project study areas (Appendix D), with both *Daviesia microcarpa* (T) and *Eucalyptus platydisca* (T) assessed as having a High likelihood of occurrence in the North study areas.

A total of 37 Priority flora species, including eleven Priority 1, five Priority 2, seventeen Priority 3 and four Priority 4 flora species, as listed by DBCA(2018b), have the potential to occur within the Norseman Gold Project study areas (Appendices C and D).

A total of 23 Priority flora species, including nine Priority 1, three Priority 2, eight Priority 3 and three Priority 4 flora species, as listed by DBCA (2018b), have the potential to occur within the Norseman Gold Project North study areas (Appendices C and D). Those species assessed as having a High likelihood of occurrence in the North study areas include the following species:

- Priority 1: *Bossiaea aurantiaca, Eucalyptus jimberlanica, Eucalyptus websteriana* subsp. *norsemanica, Grevillea phillipsiana* and *Micromyrtus papillosa*.
- Priority 3: *Eremophila purpurascens* and *Eucalyptus brockwayi*.

A total of 17 priority flora species, including four priority one, two priority two and 11 priority three flora species, as listed by DBCA (2018b), have the potential to occur within the Norseman Gold Project South study areas (Appendices C and D). Those species assessed as having a High likelihood of occurrence in the South study areas include the following species:

- Priority 1: *Eucalyptus jimberlanica* and *Philotheca apiculata.*
- Priority 3: *Allocasuarina eriochlamys* subsp. *grossa, Beyeria sulcata* var. *truncata, Eremophila purpurascens, Goodenia laevis* subsp. *laevis* and *Melaleuca coccinea.*

4.8.2. Potential Introduced (Weed) Species and Declared Pest (Plant) Organisms

Forty-two introduced species could potentially occur within the Norseman Gold Project study areas (based on NatureMap (DBCA 2007-) & EPBC Act (DAWE 2015) search results and previous surveys in the area (Botanica Consulting 2010; GHD Pty Ltd 2009, 2010a, 2010b; Goldfields Environmental Management Pty Ltd 1989; Landcare Services Pty Ltd 1995, 1996, 1997; Marianna Partners Environmental Services 1996; Mattiske Consulting Pty Ltd 2001a, 2001b, 2002, 2005, 2013a, 2013b; Outback Ecology 2003; Paul Armstrong & Associates 2004; Rally Revegetation and Environmental Services 2004; Umwelt Australia Pty Ltd 2016). Four of these species, **Ambrosia tenuifolia,* **Opuntia ficus-indica,* **Opuntia stricta* and **Tamarix aphylla* are declared pest organisms pursuant to section 22 of the BAM Act. In addition, **Opuntia* species and **Tamarix aphylla* are Weeds of National Significance (DAWE 2020c). None of these declared pest species have been recorded in the previous surveys summarised in this report (Appendix B); they were identified either by the NatureMap or EPBC Act searches.

**Ambrosia tenuifolia* has a declared pest organism control category of C1 Exclusion and keeping category of Prohibited for the whole of state (DPIRD 2020). A declared pest control category of C1 Exclusion requires organisms to be excluded from Western Australia. A declared pest keeping category of Prohibited requires the organism to only be kept under a permit for public display, education purposes or scientific research by entities approved by state authorities (DPIRD 2020).

**Opuntia ficus-indica* has a declared pest organism control category of C3 Management and keeping category of Exempt for the whole of state (DPIRD 2020). A declared pest control category of C3 Management requires the organisms should have management applied that would prevent or contain spread, reduce numbers or distribution or alleviate harmful impact of the organism (DPIRD 2020). A declared pest keeping category of Exempt requires no permits or conditions for keeping, although there may be other requirements under the *Biosecurity and Agriculture Management Act 2007.* Organisms in this category may also be regulated by legislation such as the *BC Act* administered by DBCA (DPIRD 2020). **Opuntia stricta* has a declared pest organism control category of C3 Management and keeping category of Restricted for the whole of state (DPIRD 2020). A declared pest control category of C3 Management requires the organisms should have management applied that would prevent or contain spread, reduce numbers or distribution or alleviate harmful impact of the organism (DPIRD 2020). A declared pest keeping

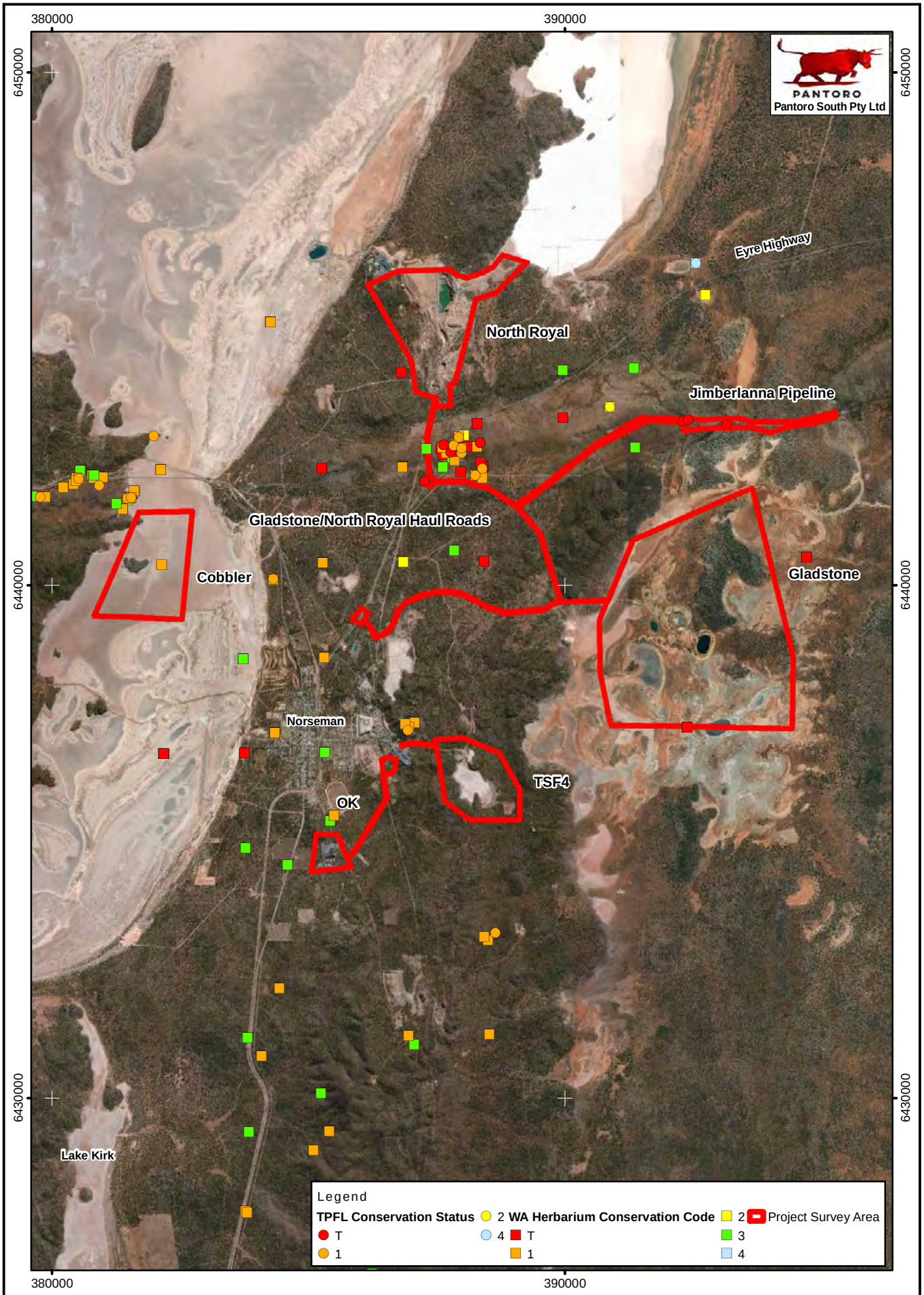
category of Restricted applies to organisms that can be kept under permit by private individuals as they have a relatively low risk of becoming a problem for primary industry, public safety or the environment (DPIRD 2020).

* *Tamarix aphylla* has a declared pest organism keeping category of Exempt for the whole of state (DPIRD 2020). A declared pest keeping category of Exempt requires no permits or conditions for keeping, although there may be other requirements under the *Biosecurity and Agriculture Management Act 2007.* Organisms in this category may also be regulated by legislation such as the *BC Act* administered by DBCA (DPIRD 2020).

4.9. Potential Threatened and Priority Ecological Communities

There are no threatened ecological communities (TECs) listed at Commonwealth level pursuant to sections 181 and 182 of the *EPBC Act* and listed by the DAWE (2020d) or at State level pursuant to Part 2, Division 2, Subdivision 1 of the BC Act and as listed by DBCA (2018c) with the potential to occur in the Norseman Gold Project study areas.

No priority ecological communities (PECs) as listed at State level by DBCA (2020a) have the potential to occur within any of the study areas of the Norseman Gold Project. The Priority 1 ecological community, '*Allocasuarina globosa* assemblages on greenstone rock' (Esperance District) is listed at State level by DBCA (2020a) and occurs approximately 3 km north of the Maybell survey area (Figure 8). The assemblage is only known from near Norseman and in the Bremer Range (see Bremer Range vegetation complexes (P1)). It is described as *Allocasuarina* thickets on greenstone ridges of lateritic breakaways; *Acacia duriuscula*, *Allocasuarina globosa*, *Eucalyptus georgei* subsp. *georgei* and *Eucalyptus oleosa* thickets on greenstone ridges with skeletal soils (DBCA 2020a).



Notes: Image: DigitalGlobe (27/11/2016), Flora: DBCA (18-0320FL)

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MGA94 (Zone 50)

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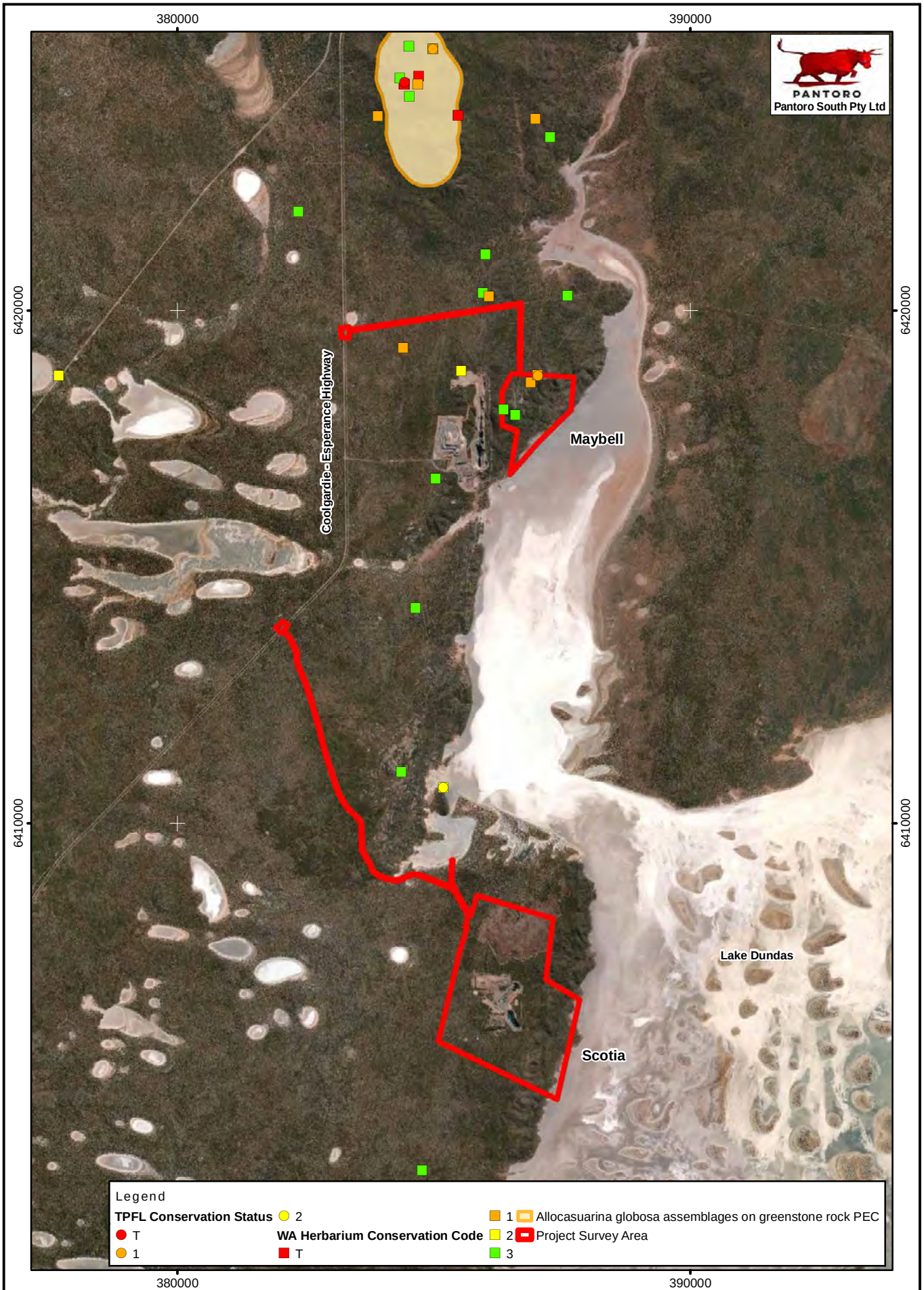
Norseman Gold Project
DBCA Threatened & Priority Species
Sheet 1 of 2

Figure:

8.1



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MGA94 (Zone 50)

CAD Ref: a2764_f01_06

Date: May 2020 | Rev: D | A4

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Norseman Gold Project
DBCA Threatened & Priority Species
Sheet 2 of 2

Figure: **8.2**

5. FIELD SURVEY RESULTS

A total of 101 quadrats were surveyed in five of the Norseman Gold Project survey areas (Gladstone, North Royal, Gladstone-North Royal Haul Roads, Jimberlana Pipeline and Scotia) by four botanists from Mattiske Consulting Pty Ltd, from the 30th March 2020 to the 3rd April 2020 ("Autumn 2020"), in accordance with methods outlined in *Technical Guidance – Flora and vegetation surveys for environmental impact assessment* (EPA 2016b). The survey site locations are listed in Appendix E and the sites, along with survey tracks, are shown in Figure 9.

5.1. Flora

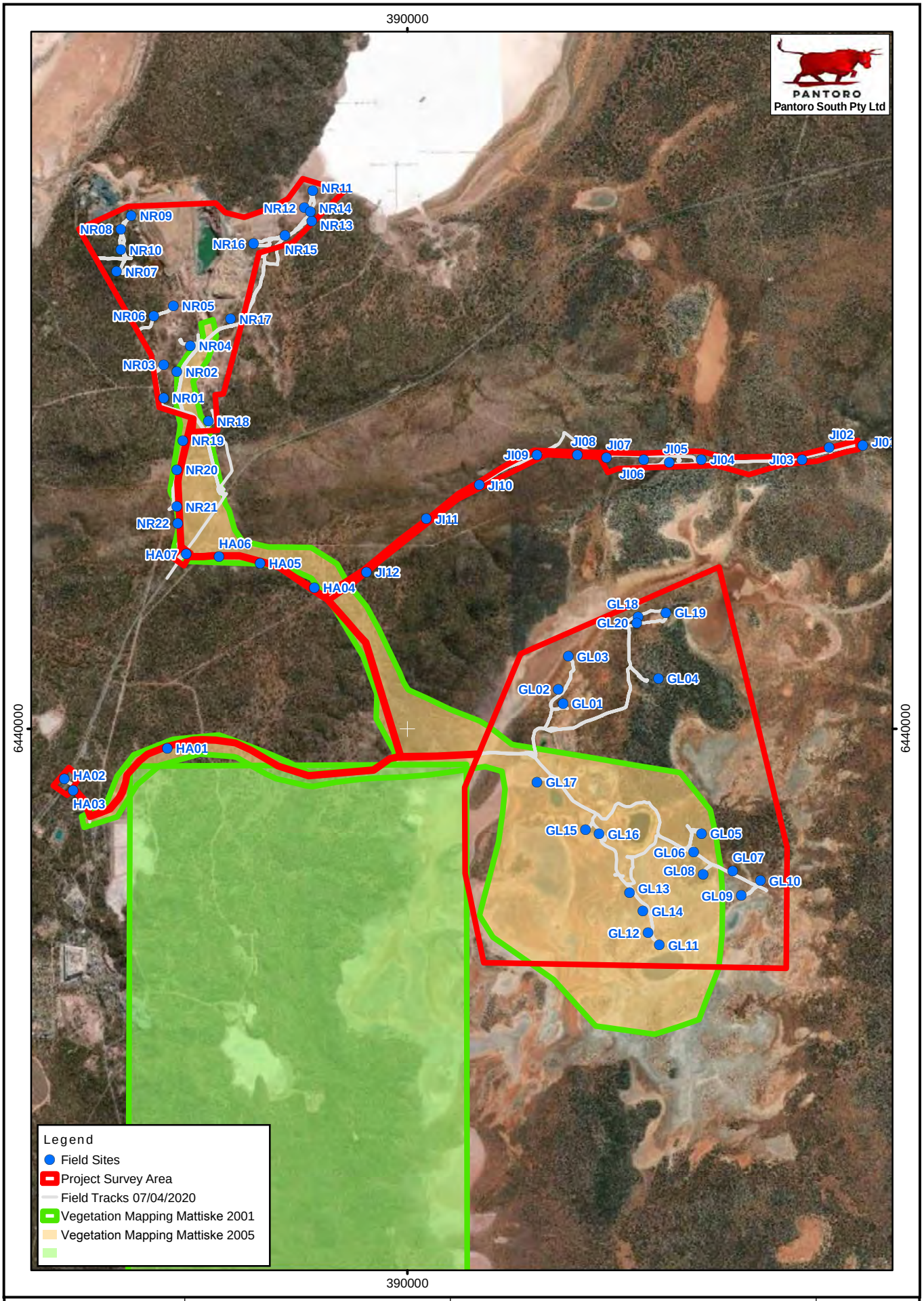
A total of 178 vascular plant taxa, representative of 72 genera and 38 families, were recorded within the five Norseman Gold Project survey areas; eight of these taxa were recorded opportunistically. The majority of taxa recorded were representative of the Myrtaceae (31 taxa), Chenopodiaceae (27 taxa) and Fabaceae (24 taxa) families (see Appendix F for a complete species list). The most common genera were *Eucalyptus* (20 taxa), *Acacia* (16 taxa) and *Eremophila* (11 taxa). Nineteen taxa could be annuals or short-lived perennials; none had a distinctly annual life-form.

In the Northern survey areas (Gladstone, North Royal, Gladstone-North Royal Haul Roads and Jimberlana Pipeline), 138 vascular plant taxa were recorded, representative of 60 genera and 33 families. Most taxa were part of the Myrtaceae (26 taxa), Chenopodiaceae (24 taxa), Fabaceae and Scrophulariaceae (13 taxa each) families. The most common genera were *Eucalyptus* (16 taxa), *Eremophila* (11 taxa) and *Acacia* (10 taxa).

In the Scotia survey area (Scotia and its haul road), 101 vascular plant taxa were recorded, representative of 50 genera and 31 families. Most taxa were part of the Myrtaceae (18 taxa), Fabaceae (15 taxa) and Chenopodiaceae (10 taxa) families. The most common genera were *Eucalyptus* (13 taxa), *Acacia* (9 taxa) and *Eremophila* (6 taxa).

Most of the vegetation was neither flowering nor fruiting, making identification to specific or subspecific level difficult or impossible. Eleven taxa were identified to family level only, and 24 to genus level. Three taxa of the genus *Tecticornia* could not be identified to species level by a taxonomic expert at the WAH (due to lack of fruit), but are recognised to be separate taxa (K. Shepherd 2020, personal communication, 28 April). Likewise, two taxa within *Melaleuca* were identified only as '*Melaleuca* sp. 1' and '*Melaleuca* sp. 2', and three taxa in the family Poaceae were identified similarly. In addition, three taxa were identified at species level but were question-marked at subspecies level, 32 were identified to genus level but were question-marked at species level, and seven were question-marked for both genus and species.

Species accumulation curves were used to evaluate the sampling adequacy for each of the Northern and Scotia survey areas and are presented in Figures 10.1 and 10.2. In the Northern survey areas the incidence-based coverage estimator of species richness was 179.7. Based on this value and the total of 132 taxa recorded (in vegetation mapping sites *only*), approximately 73 % of the flora species potentially present within this survey area were recorded. In the Scotia survey area, 100 taxa were recorded and the incidence-based coverage estimator of species richness was 136.6, resulting in an estimate of approximately 73% of the flora species potentially present within this survey area being recorded during this survey.



Notes: Image: DigitalGlobe (20/1/2019), Flora: DBCA (18-0320FL)

N

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Norseman Gold Project
Survey Sites and Tracks
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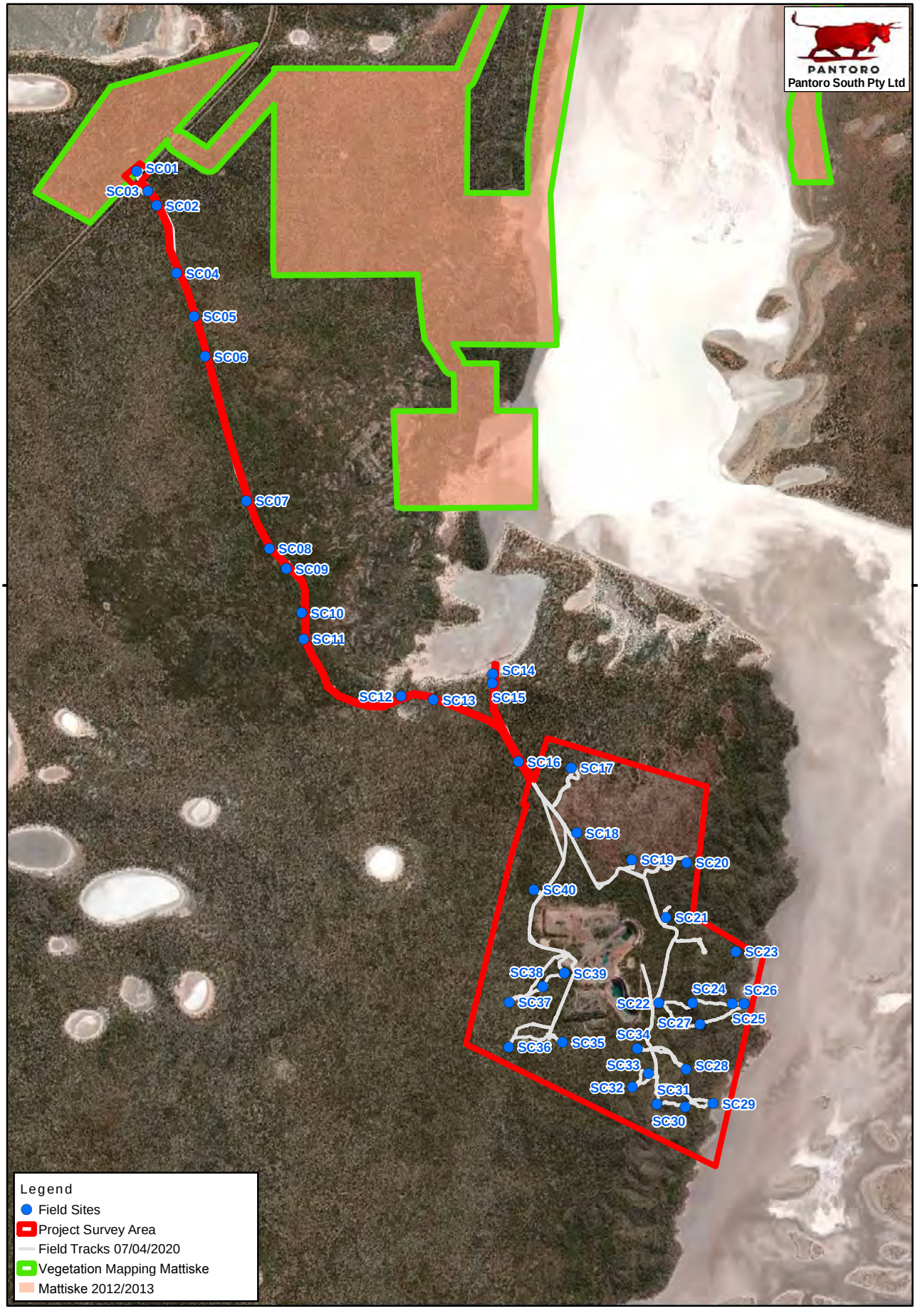
Figure:

9.1



Notes: Image: DigitalGlobe (20/1/2019), Flora: DBCA (18-0320FL)

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Norseman Gold Project
Survey Sites and Tracks
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Figure:

9.2

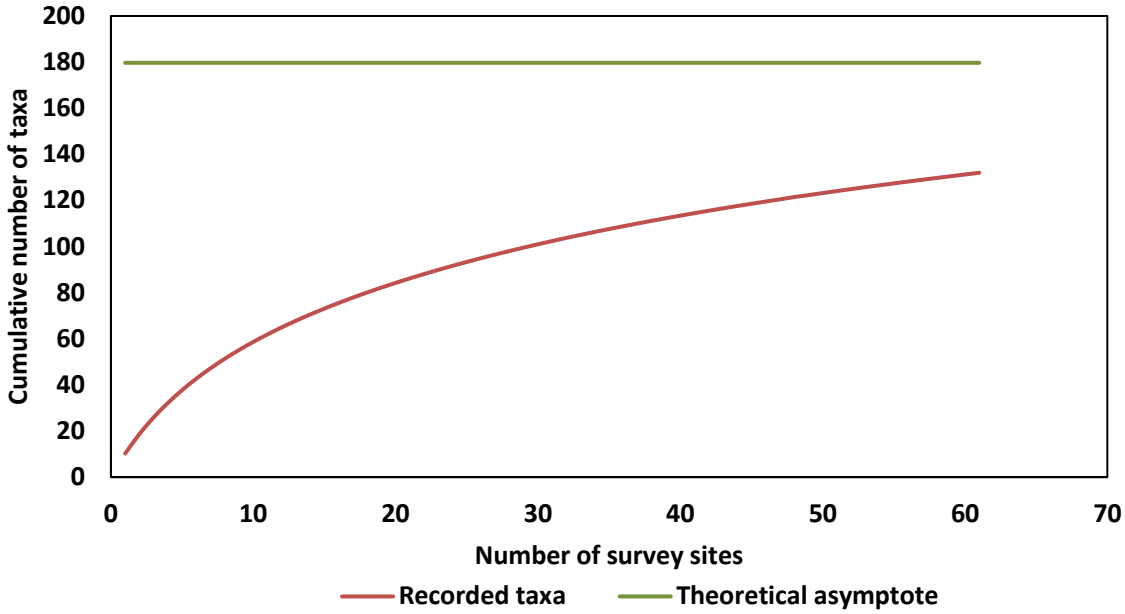


FIGURE 10.1: Average randomised Species Accumulation Curve for the Northern survey areas, April 2020

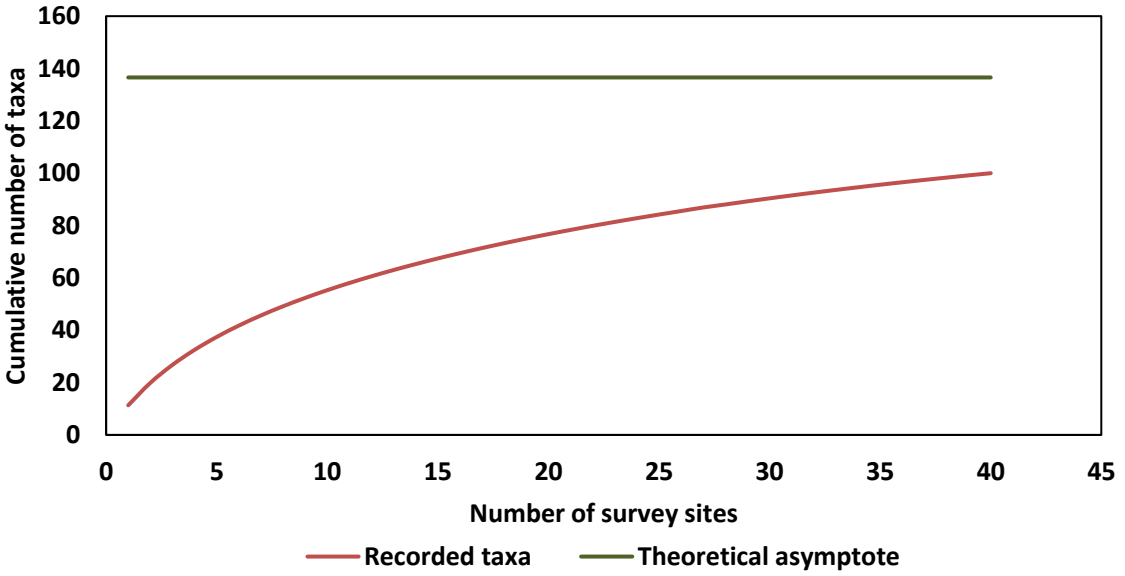


FIGURE 10.2: Average randomised Species Accumulation Curve for the Scotia survey area, April 2020

5.1.1. Threatened and Priority Flora

No live threatened flora species pursuant to pursuant to Part 2, Division 1, Subdivision 2 of the BC Act and as listed by DBCA (2018a), or pursuant to section 179 of the EPBC Act or listed by the DAWE (2020b), were recorded within the five Norseman Gold Project survey areas. One threatened species, *Davesia microcarpa* (T), was previously recorded within the survey areas, with the most recent record from 2001 (DBCA 2020b). Three sites, two along Jimberlana pipeline and one where the North Royal pipeline meets the Eyre Highway, where *Davesia microcarpa* (T) was previously found (DBCA 2020b) were traversed, with no alive specimens recorded in the current survey (Table 5). One dead plant was recorded at two of

the locations. As this species regenerates from seed it is likely to occur again when establishment and growth conditions are suitable.

Two priority flora species as listed by DBCA (2018b), *Calandrinia lefroyensis* (P1) and *Acacia kerryana* (P2), were recorded in two of the Northern survey areas (see Figures 12.1 and 12.2 in following Section 5.2). Furthermore, *Eremophila parvifolia* ?subsp. *parvifolia* (P4), which was recorded throughout the four Northern survey areas, was unable to be confidently identified to a sub-species level as a fruiting specimen is required. This species will be treated with a precautionary approach as the Priority 4 subspecies. A brief description of these species is provided below.

- PRIORITY 1: *Calandrinia lefroyensis* – MONTIACEAE

  A semi-erect to erect perennial herb, often scrambling through other plants (0.14-0.26 m high and 0.04-0.16 m wide) (Obbens 2018). This species is known only from salt lake flats between Kalgoorlie and Norseman, with the nearest record being 45 km north of Norseman (WAH 1998-). There are eight records in Florabase (WAH 1998-), all from the last 15 years. This species was only recognised in 2018 (Obbens 2018), and was previously known as '*Calandrinia* sp. Widgiemooltha (F. Obbens & E. Reid FO 9/05)'. It was not found in any previous surveys in and around the Norseman Gold Project survey areas.

  One specimen was found in the northern reaches of the Gladstone survey area, on flats on the edge of a salty drainage area (Table 5). The plant was in flower (Plate 1). One other specimen was found immediately adjacent; however, it was not flowering. Whilst the collected specimen was flowering in April, it is known from other populations to flower from early October to mid November (Obbens 2018).

Plate 1: *Calandrinia lefroyensis* (P1) (Photo: E. Chetwin)

- PRIORITY 2: *Acacia kerryana* – FABACEAE

  A low, spreading, dense shrub (0.5-1 m high). A scattered distribution occurs south of Kambalda to Lake Cronin (Forrestania) and Norseman. This species is commonly associated with shallow loam on low rocky hills within low rocky shrubland (WorldWideWattle 2020). The WAH houses 16 specimens of *Acacia kerryana* (WAH 1998-). This species was not recorded in previous surveys around Norseman (Appendix B); however, it was listed in both the Threatened and Priority Flora (DBCA 2020b) and WAH (2020) databases of Threatened and Priority Flora as occurring in the area, with two locations within 2 km of the Jimberlana pipeline (Appendix D).

Acacia kerryana (P2) was ranked as having a Medium likelihood of occurrence in the Northern survey areas prior to this survey.

The shrub is distinctive in habit (Plate 2) in the low shrubland where it was observed within the Jimberlana Pipeline survey area. At one location on the south side of the Jimberlana pipeline Mattiske recorded 40 individuals in a 60 m long and 10 m wide strip, with only a few plants on the north side of the pipeline (Table 5). This population extended in a 10 m wide strip approximately 400 m to the west. All plants in this population were sterile at the time of the survey. A second population was located in a disturbed area ~1.8 km to the west of the first, stretching 400 m along the south side of the Jimberlana pipeline. One plant in this population was flowering and was collected for identification purposes. No count was made of plants in this population at the time. This area is intended to be revisited in order to properly delineate the populations of *Acacia kerryana* (P2) already identified, and to map any more populations that may exist both inside and outside the impact area of the pipeline and associated vehicle track.

Plate 2: *Acacia kerryana* (P2) habit (Photo: E. Chetwin)

- POTENTIAL PRIORITY 4: *Eremophila parvifolia* ?subsp. *parvifolia* – SCROPHULARIACEAE

A low spreading divaricate shrub to 0.5 m tall, flowering yellow and purple in June or September to October or January to February (Plate 3). This species occurs from near Yalata, South Australia, westwards along the Nullarbor to near Caiguna, Western Australia (Chinnock 2007). The WAH houses 12 specimens of *Eremophila parvifolia* subsp. *parvifolia*. This species was recorded previously by Landcare Services (1997) on the East Polar Bear peninsula ~30 km north of Norseman, but was not found in the Threatened and Priority Flora (DBCA 2020b) or WAH Flora (2020) databases. It was ranked as having a Low likelihood of occurrence in the Northern survey areas prior to this survey (Appendix D).

Scattered populations of this species were recorded across the Northern survey areas in April 2020 (see Table 5 for exact coordinates of priority specimens). This species was flowering at a few sites, but no fruiting specimens were found.

Plate 3: *Eremophila parvifolia* subsp. *parvifolia* (P4) (WAH 1998-)

Table 5: Location and extent of priority species within the Norseman Gold Project survey areas

SPECIES	SURVEY AREA	No. INDIVIDUALS	AREA OF POPN. (m)	LOCATION (GDA94 Z50)	
				EASTING (mE)	NORTHING (mN)
Acacia kerryana (P2)	Jimberlana	40	10 x 60[a]	392758	6443187
Acacia kerryana (P2)	Jimberlana	1	1 x 1[b]	390547	6442691
Calandrinia lefroyensis	Gladstone	2	1 x 1	392821	6441244
Daviesia microcarpa (T)	Jimberlana	0 alive, 1 dead	-	392309	6443214
Daviesia microcarpa (T)	Jimberlana	0 alive, 1 dead	-	392406	6443230
Daviesia microcarpa (T)	Gladstone-North Royal Haul Roads	0 alive, 0 dead	-	387265	6442022
Eremophila parvifolia subsp. *parvifolia* (P4)	Gladstone	2	20 x 20	393465	6438298
Eremophila parvifolia subsp. *parvifolia* (P4)	Gladstone	2	20 x 20	393027	6441361
Eremophila parvifolia subsp. *parvifolia* (P4)	Gladstone-North Royal Haul Roads	1	20 x 20	387795	6442016
Eremophila parvifolia subsp. *parvifolia* (P4)	Gladstone-North Royal Haul Roads	1	20 x 20	387375	6443377
Eremophila parvifolia subsp. *parvifolia* (P4)	Jimberlana	2	20 x 20	394935	6443288
Eremophila parvifolia subsp. *parvifolia* (P4)	Jimberlana	1	20 x 20	393443	6443153
Eremophila parvifolia subsp. *parvifolia* (P4)	North Royal	1	20 x 20	387037	6444834
Eremophila parvifolia subsp. *parvifolia* (P4)	North Royal	1	20 x 20	386600	6445354
Eremophila parvifolia subsp. *parvifolia* (P4)	North Royal	1	20 x 20	386651	6445849
Eremophila parvifolia subsp. *parvifolia* (P4)	North Royal	10	20 x 20	388204	6445678
Eremophila parvifolia subsp. *parvifolia* (P4)	North Royal	1	20 x 20	387931	6444799
Eremophila parvifolia subsp. *parvifolia* (P4)	North Royal	1	20 x 20	387675	6443602

[a] – This population continued to the west in an area 10 x 400 m, but numbers of individuals were not recorded.

[b] - This location is in the centre of a population that extends at least 10 x 400 m, but numbers of individuals were not recorded.

5.1.2. Other Significant Flora

Six collections were made of *Lepidosperma* species plants from seven locations, two from the Northern survey areas and four from the Scotia area, Table 6. However, even though all collections had good, suitable material that could be used for identification, it was not possible for a taxonomic expert at the WAH to satisfactorily identify the specimens beyond genus level (M. Hislop 2020, personal communication, 11 May) due to issues with classification of the genus.

Table 6: Location and extent of the *Lepidosperma* species (currently under taxonomic review) within the Norseman Gold Project survey areas

SPECIES	SURVEY AREA	No. INDIVIDUALS	AREA OF POPN. (m)	LOCATION (GDA94 Z50)	
				EASTING (mE)	NORTHING (mN)
Lepidosperma sp.	Jimberlana	2-5	20x20	390224	6442456
Lepidosperma sp.	North Royal	2-5	20x20	387305	6442600
Lepidosperma sp.	North Royal	1	20x20	387316	6442409
Lepidosperma sp.	Scotia	6-10	20x20	385328	6409183
Lepidosperma sp.	Scotia	2-5	20x20	385324	6409097
Lepidosperma sp.	Scotia	2-5	20x20	387115	6405165
Lepidosperma sp.	Scotia	1	20x20	386625	6405346

Eight taxa recorded within the Norseman Gold Project survey areas represent extensions to their current known distributions based on WAH data in FloraBase (WAH 1998-). Three other taxa, *Acacia* ?*beauverdiana, Eremophila parvifolia* ?subsp. *parvifolia* (P4) and *Rhagodia* ?*eremaea* could not definitively be identified to species due to lack of either fruiting or flowering material, but are listed here as tentative range extensions. A list of species representing a range extension for this area and the approximate distance from their currently known distribution is presented below (Table 7). Two of the taxa listed below, *Eremophila parvifolia* ?subsp. *parvifolia* (P4) and *Rhagodia* ?*eremaea* have been found in previous surveys in the area, but these records to do not appear in Florabase (WAH 1998-) (Appendix C). In this report 100 km has been used as a basis to determine an extension to the currently known range for a species. A rating has also been applied to each species, of Low (100-149 km), Moderate (150-199 km) or High (<200 km) range extension.

Table 7: Taxa recorded within the Norseman Gold Project survey areas in 2019 representing an extension to currently known distributions (WAH 1998-)

SPECIES	DISTANCE (km)	RATING
Acacia ?beauverdiana	110 km	Low
Dianella revoluta var. *divaricate*	115 km	Low
Enneapogon avenaceus	140 km	Low
Enteropogon ramosus	110 km	Low
Eragrostis lacunaria	215 km	High
Eremophila parvifolia subsp. ?*parvifolia* (P4)	175 km	Moderate
Eucalyptus distuberosa subsp. *distuberosa*	140 km	Low
Maireana lobiflora	165 km	Moderate
Myoporum montanum	100 km	Low
Paspalidium gracile	100 km	Low
Rhagodia ?eremaea	150 km	Moderate

5.1.3. Introduced (Weed) Species and Declared Pest (Plant) Organisms

Two introduced (weed) species, **Asphodelus fistulosus* (Onion Weed) (GPS: 387302mE: 6443032mN) and **Gazania linearis* (GPS: 392602mE:6438087mN), were recorded within the Norseman Gold Project survey areas (see Appendix F). Neither of these are declared pest organisms pursuant to section 22 of the BAM Act (both are permitted under section 11 of the BAM Act).

Under the Department of Parks and Wildlife (DPaW) 2013 Weed Prioritisation Process (DPaW 2013), **Gazania linearis* is considered to be one of the 17 Goldfields Region priority alert weeds; in 2014 it was not found within the DBCA estate (DPaW 2014) and should be reported to the local DBCA office. **Asphodelus fistulosus* has an Ecological Impact rating of Unknown and an Invasiveness rating of Rapid.

These species were recorded in very small numbers at one site each: **Asphodelus fistulosus* at a very disturbed area on the North Royal pipeline route (vegetation community CL); **Gazania linearis* in sparse low shrubland with grasses in an occasionally inundated area at the edge of salt lake within the Gladstone survey area (vegetation community NS3). **Asphodelus fistulosus* was previously recorded by Mattiske (2001a) in the Gladstone area, and **Gazania linearis*, whilst appearing in the results of the NatureMap (DBCA 1998-) search, was not recorded in any of the previous surveys described in this report.

5.2. Vegetation

5.2.1. Statistical Analysis

Statistical analyses for the Northern and Scotia survey areas were conducted separately due to distinct differences between the areas in species composition, vegetation communities, landforms and hydrology observed in the field.

5.2.1.1. Northern Survey Areas

SIMPROF analysis identified 15 significantly associated groups of survey quadrats ($Pi = 3.764$; $p < 0.001$). Four outlier quadrats were identified using PRIMER (communities NW1, NW2a, NW2b, NW12 – see Table 8, Figure 11.1); another two outliers were based on the occurrence of species not found in any other quadrats in the Northern survey areas, but making up a significant part of the quadrat in which they were found (communities NW3 and NW9). Three of the groups identified by PRIMER were combined into two vegetation communities (NW2 and NW11). The remaining eight groups of quadrats identified by PRIMER were assigned to ten vegetation communities, resulting in a total of 18 vegetation communities for the Northern survey areas (Figure 11.1). Field observations indicated that Eucalypt woodlands form a significant part of the vegetation of the Northern survey areas; this was not reflected in the PRIMER groupings nor in the SIMPER results. Most of the PRIMER groups were assigned on the basis of their understorey, as could be seen in the SIMPER results; four groups included a mixture of woodland and shrubland quadrats. Therefore the PRIMER groups were not used strictly; rather they were used along with field observations of species composition, vegetation structure, topography and aerial photography to guide the delineation of the remaining vegetation communities.

Six outlier quadrats, each clearly within their own distinct vegetation community, were outlined as described above. Community NW1 was a 0.2 ha stand of *Eucalyptus prolixa* with almost no understorey restricted to a low area and surrounded by *Tecticornia* spp. Communities NW2a and NW2b are both found in an area of rocky hills along the Jimberlana pipeline; they differ from community NW2 in that they both have a significant coverage mid-tall shrub layer of *Acacia* sp. (sterile, but the same species based on field observation). Community NW2a was in a creekline that ran across the Jimberlana pipeline route, and NW2b was in a slightly disturbed area with evidence of sheet flow running parallel to the pipeline route and between two tracks. Vegetation community NW3 had a significant tall shrub layer of *Melaleuca quadrifaria*, which was not seen in any other survey quadrats. It is located on a small rise adjacent to a tailings dump in the North Royal survey area. Community NW9 is a dominated *Eucalyptus spreta* and

occurs in the Gladstone area on the 3rd dune ridge back from a salt lake, a landform restricted in areal distribution. Vegetation community NW12 occurred on another restricted landform, the 2nd dune ridge back from a salt lake, and contained isolated trees of *Pittosporum angustifolium* over sparse low salt tolerant shrubs. Two communities, NW8 and NS1, each contain only two quadrats; these communities were part of one group in the PRIMER analysis. Vegetation community NW8, comprising *Eucalyptus torquata* low woodland, was found on the haul road between the Eyre Highway and the Jimberlana pipeline, and appears on aerial photographs to extend no further than 1 km in an east-west direction and 400 m in a north-south direction. Community NS1 is an open shrubland found at the edge of a salt lake and salty drainage in the North Royal survey area. While this community may exist elsewhere in the broader region, it was not observed elsewhere in the Northern survey areas. A greater degree of replication within the aforementioned vegetation communities was not possible due to their restricted areal extent. The other nine vegetation communities in the Northern survey areas contained from three to nine quadrats.

5.2.1.2. Scotia Survey Area

SIMPROF analysis identified 12 significantly associated groups of survey quadrats ($Pi = 5.085$; $p < 0.001$). Where appropriate, outliers and small groupings were assigned to broader comparative vegetation units based on factors including species composition and site descriptions. For the purposes of vegetation mapping (i.e. extrapolating quadrat data to generalise vegetation communities over broad areas), an inclusive rather than exclusive approach was adopted. Based on this approach, nine significantly dissimilar vegetation communities were delineated within the Scotia survey area, including two outliers (Figure 11.2, Table 8).

The two outliers recognised were community groups S3 and S4. Community S3 was located on a small portion of the Scotia access road, leading to a salt lake. This community is not considered to be restricted; rather, the survey area did not cover large areas near the salt lake, reducing the ability for site replication in this community. The S4 community was recognised from one site in the Scotia survey area, located on a small ridge with outcropping present. This community did not occur often and replication within the survey area was not possible. Community groups S1, S2 and W5 each contain two survey quadrats. Again these communities were not common within the survey area; however, associated geology and landforms seen from aerial photography suggest these communities may be present within the broader region.

5.2.2. Vegetation Communities

A summary of the vegetation communities mapped in both the Northern and Scotia survey areas is presented below and details are given in Appendices G and H. Maps of the vegetation communities in the Northern survey areas are shown in Figures 12.1-12.2 and for the nine in the Scotia survey area they are in Figures 13.1-13.2. A total of 2664.8 ha mapped area is represented in Figures 12.1-12.2 and 13.1-13.2; 1963.9 ha in the Northern survey areas and 700.9 ha in the Scotia survey area. Note that mapped areas shown in Figures 12.1-12.2 extend outside the survey boundary polygon for the Gladstone-North Royal Haul Road survey area; this was because the boundary polygon was tight against the edge of the existing Haul Road, which has no vegetation. The total area inside the survey boundary polygons is 2557.4 ha.

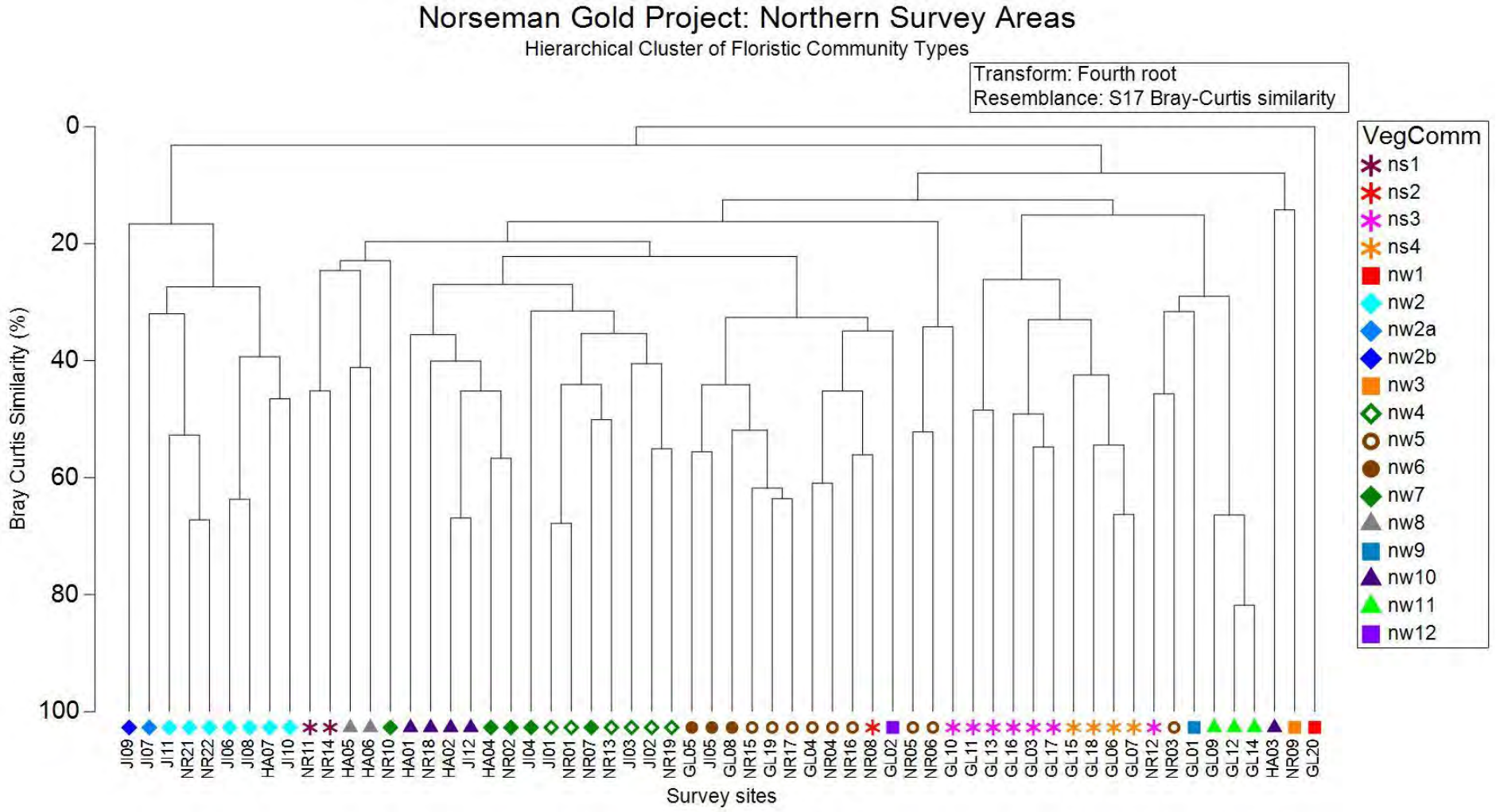


Figure 11.1: Dendrogram of Vegetation Communities for the Northern survey areas

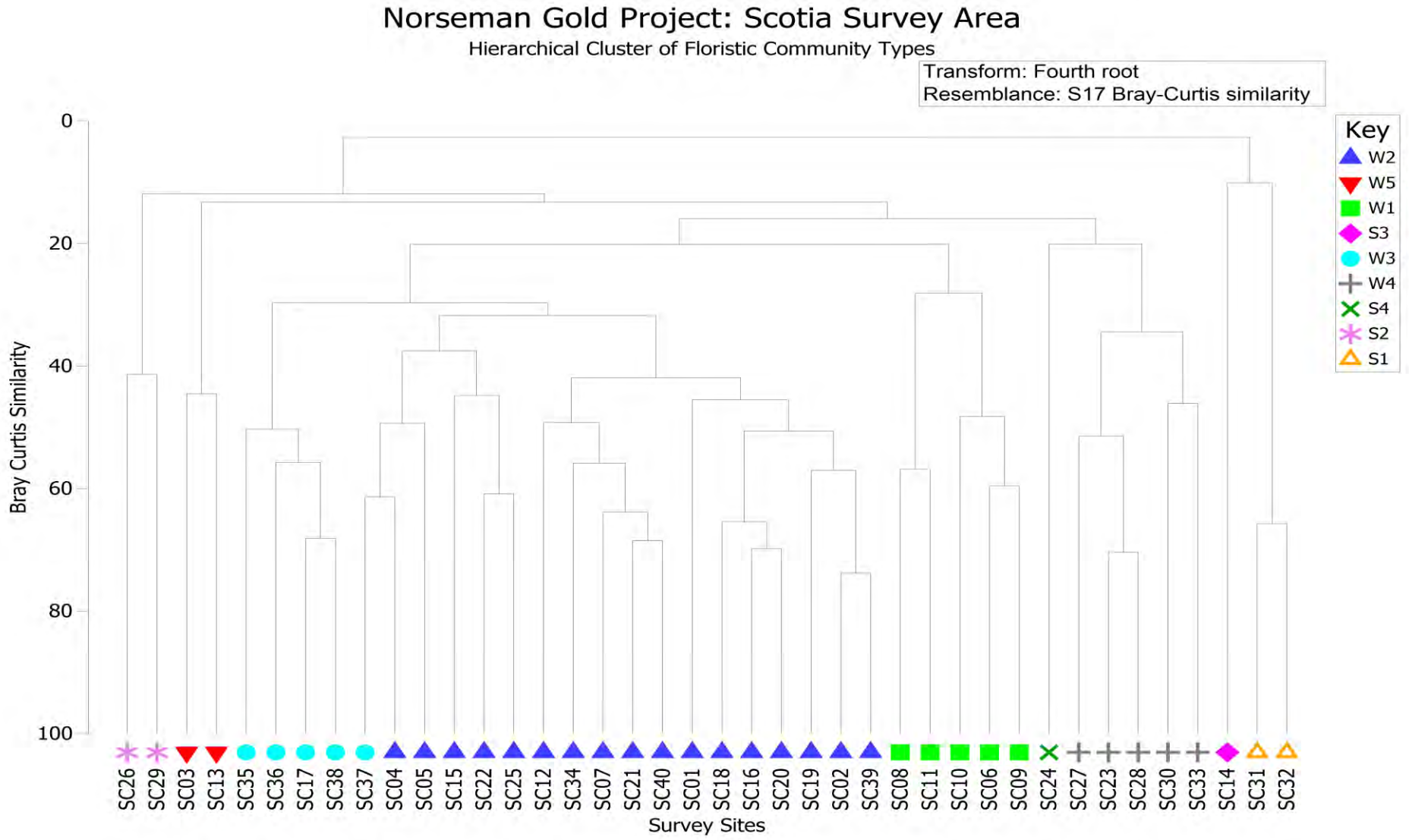


Figure 11.2: Dendrogram of Vegetation Communities for the Scotia survey area

5.2.2.1. Northern Survey Area

Eighteen vegetation communities were defined across the Northern (N) survey areas: twelve Eucalypt woodland (W) communities, two other woodland (W) communities and four shrubland (S) communities (Table 8).

Table 8: Vegetation communities in the Northern survey areas

VEG. COMM.	DESCRIPTION	AREA (ha)	% of NORTH AREAS
NW1	Closed low mallet forest of *Eucalyptus prolixa* on red-brown clayey loam flats in deep litter on red-brown clayey loam on flats.	1.0	0.05
NW2	Open mallee woodland of *Eucalyptus planipes* and occasional *Eucalyptus longissima* over sparse mid-low shrubland of *Allocasuarina helmsii, Eremophila* spp. and *Westringia rigida* over open-sparse low hummock grassland of *Triodia scariosa* on occasionally rocky red-brown sandy clayey loam on flats to mid-slopes.	67.4	3.43
NW2a	Isolated clumps of *Eucalyptus* ?*oleosa* subsp. *oleosa* low mallees over tall *Acacia* sp. shrubland over isolated clumps of *Grevillea anethifolia* mid shrubs over isolated clumps of *Triodia scariosa* mid hummock grass on red-brown sandy clayey loam in a creekline.	1.0	0.05
NW2b	Isolated clumps of *Eucalyptus planipes* mallees over mid sparse shrubland of *Acacia* sp., *Senna artemisioides* ?subsp. *filifolia* and *Eremophila* ?*deserti* over low open shrubland of *Dodonaea* ?*microzyga* on red-brown sandy loam on mid slopes with evidence of sheet flow.	0.6	0.03
NW3	Open low woodland of *Eucalyptus lesouefii* over open shrubland of *Melaleuca quadrifaria* over *Dodonaea stenozyga* and *Cratystylis conocephala* on brown clay on low rises.	3.4	0.17
NW4	Open low woodland of *Eucalyptus lesouefii* over tall isolated clumps of *Melaleuca* ?*sheathiana* and *Eremophila* spp. shrubs over low isolated clumps of *Cratystylis conocephala* shrubs on brown sandy clayey loam with some surface rocks on flats and gentle slopes.	58.2	2.96
NW5	Mid woodland of *Eucalyptus lesouefii* and *Eucalyptus salubris* over mid isolated shrubs of *Eremophila scoparia* and occasional low *E. parvifola* subsp. ?*parvifolia* (P4) shrubs over open low chenopod shrubland of *Tecticornia* sp. 3 and *Atriplex* ?*vesicaria* on orange to brown sandy clay with some surface gravel on flats and gentle slopes.	288.8	14.71
NW6	Mid woodland of *Eucalyptus salubris* over isolated tall *Santalum acuminatum* shrubs over isolated mid *Eremophila* spp. shrubs over low sparse shrubland of *Atriplex* ?*vesicaria, Cratystylis conocephala* and *Olearia muelleri* on red-brown clayey loam with occasional surface rocks on ridges and upland flats.	64.8	3.30
NW7	Low woodland of *Eucalyptus salubris* and *E. lesouefii* over tall sparse shrubland of *Melaleuca* ?*sheathiana* or *M. lanceolata* over mid-low sparse shrubland of *Atriplex* ?*nummularia* and *Atriplex* ?*vesicaria* on red to brown sandy clay with scattered surface rocks on flats and lower slopes.	55.7	2.84
NW8	Open low woodland of *Eucalyptus torquata* over mid sparse shrubland of *Beyeria sulcata* var. *brevipes* and *Eremophila* spp. over low isolated clumps of shrubs of *Scaevola spinescens, Atriplex* ?*vesicaria* and *Olearia muelleri* on red to brown clayey loam on lower slopes.	12.9	0.66
NW9	Low woodland of *Eucalyptus spreta* over isolated samphire shrubs of *Tecticornia* sp. 3 and isolated tussock grassland of Poaceae sp. 3 on dry, powdery cream clayey loam on low dunes ridges near salt lakes.	10.3	0.53
NW10	Mid woodland of mixed *Eucalyptus* spp. over tall sparse shrubland of *Melaleuca* ?*sheathiana* over open mid-low shrubland of *Atriplex* ?*nummularia* and *A.* ?*vesicaria* on brown clayey loam with some surface rocks on gentle mid slopes.	35.2	1.79
NW11	Open low woodland of *Casuarina obesa* over low isolated clumps of *Rhagodia* ?*drummondii*, *Atriplex* ?*vesicaria* and *Tecticornia* sp. 3 chenopod shrubs and isolated tussock grassland of Poaceae sp. 3 on dry, powdery cream clay on low dune ridges at the edge of salt lakes.	76.3	3.89
NW12	Isolated clumps of *Pittosporum angustifolium* low trees over isolated clumps of mid *Eremophila* ?*deserti* shrubs over sparse low shrubland of *Atriplex* ?*vesicaria*, *Tecticornia* sp. 3 and *Frankenia interioris* var. *interioris* on dry, powdery brown clayey loam on low dune ridges near salt lakes.	31.2	1.59

Table 8: Vegetation communities in the Northern survey areas (continued)

VEG. COMM.	DESCRIPTION	ARE A (ha)	% of NORTH AREAS
NS1	Open shrubland of *Callitris preissii,* ?*Geijera linearifolia* over *Senna artemisioides* ?subsp. *filifolia*, *Pittosporum angustifolium*, *Santalum acuminatum* and *Eremophila scoparia* over ?*Westringia rigida, Scaevola spinescens* and *Rhagodia ?drummondii* over mixed low chenopod shrubs on red sandy clay on flats near salt lakes.	8.9	0.45
NS2	Low shrubland of *Eremophila* ?*decipiens*, *Tecticornia* sp. 3 and *Atriplex* ?*vesicaria* on red-brown clay on valley floors.	7.0	0.35
NS3	Low open chenopod shrubland of *Maireana amoena, Atriplex* spp. and *Tecticornia* spp. on cream to red sandy clay on flats on the edge of salt lakes and salty drainages.	318.6	16.22
NS4	Sparse mid shrubland of *Dodonaea viscosa* subsp. *angustissima* over open low shrubland of *Eremophila* ?*decipiens, Scaevola spinescens, Atriplex* ?*vesicaria, Rhagodia ?drummondii,* mixed Chenopodiaceae spp. and *Frankenia* sp. on red-brown sandy clay on low rises at the edge of salt lakes and salty drainages.	159.4	8.12
CL	Previously cleared or disturbed.	413.0	17.44
SL	Salt lake or non-vegetated lake bed.	432.0	21.42

5.2.2.2. Scotia Survey Area

Nine vegetation communities were defined in the Scotia survey area: five Eucalypt woodland (W) communities and four shrubland (S) communities (Table 9).

Table 9: Vegetation communities in the Scotia survey area

VEG. COMM.	DESCRIPTION	AREA (ha)	% of SCOTIA SURVEY AREA
W1	Woodland of *Eucalyptus dundasii* and *Eucalyptus salubris* and occasional *Eucalyptus clelandiorum* over *Scaevola spinescens*, *Beyeria sulcata*, *Exocarpos aphyllus* and *Santalum acuminatum* on orange to pale brown clayey loam on flats and gently sloping terrain.	3.9	0.56
W2	Woodland to open woodland of *Eucalyptus flocktoniae* complex, *Eucalyptus lesouefii* and *Eucalyptus dundasii* over sparse shrubland of *Melaleuca sheathiana*, *Scaevola spinescens*, *Beyeria sulcata* and *Exocarpos aphyllus* over isolated shrubs of *Olearia muelleri* on orange-red to brown clayey loam on flats and slopes.	290.8	41.49
W3	Open woodland of *Eucalyptus longicornis* over open shrubland of *Melaleuca sheathiana*, *Cratystylis conocephala* over mixed sparse chenopod shrubland on pale brown clayey loam flats.	226.4	32.30
W4	Open woodland of *Eucalyptus torquata* over *Melaleuca sheathiana*, *Dodonaea microzyga* and *Alyxia buxifolia* on red-brown clayey loam on hillside slopes.	71.3	10.17
W5	Open woodland of *Eucalyptus gracilis* and *Eucalyptus flocktoniae* over sparse shrubland of *Olearia* sp. Eremicola (Diels & Pritzel s.n. PERTH 00449628) and *Olearia muelleri* on red-orange clayey loam flats.	1.7	0.25
S1	Shrubland of *Allocasuarina campestris*, *Acacia neurophylla* subsp. *neurophylla*, *Melaleuca* ?*hamata* and *Cryptandra graniticola* over mixed Asteraceae sp. and *Lepidosperma* sp. on red-brown clayey loam and ironstone outcropping on upper slopes.	14.0	1.99
S2	Sparse shrubland of *Scaevola spinescens*, *Exocarpos aphyllus* and *Grevillea acuaria* over *Atriplex* spp. and *Maireana* spp. on orange clay flats on salt lake margins.	8.3	1.18
S3	Open woodland of *Eucalyptus* ?*salicola* over open shrubland of *Bossiaea barbarae*, *Acacia assimilis* subsp. *assimilis* and *Melaleuca lanceolata* over *Lepidosperma* sp. on pale orange sand flats on salt lake margins.	0.2	0.02

Table 9: Vegetation communities in the Scotia survey area (continued)

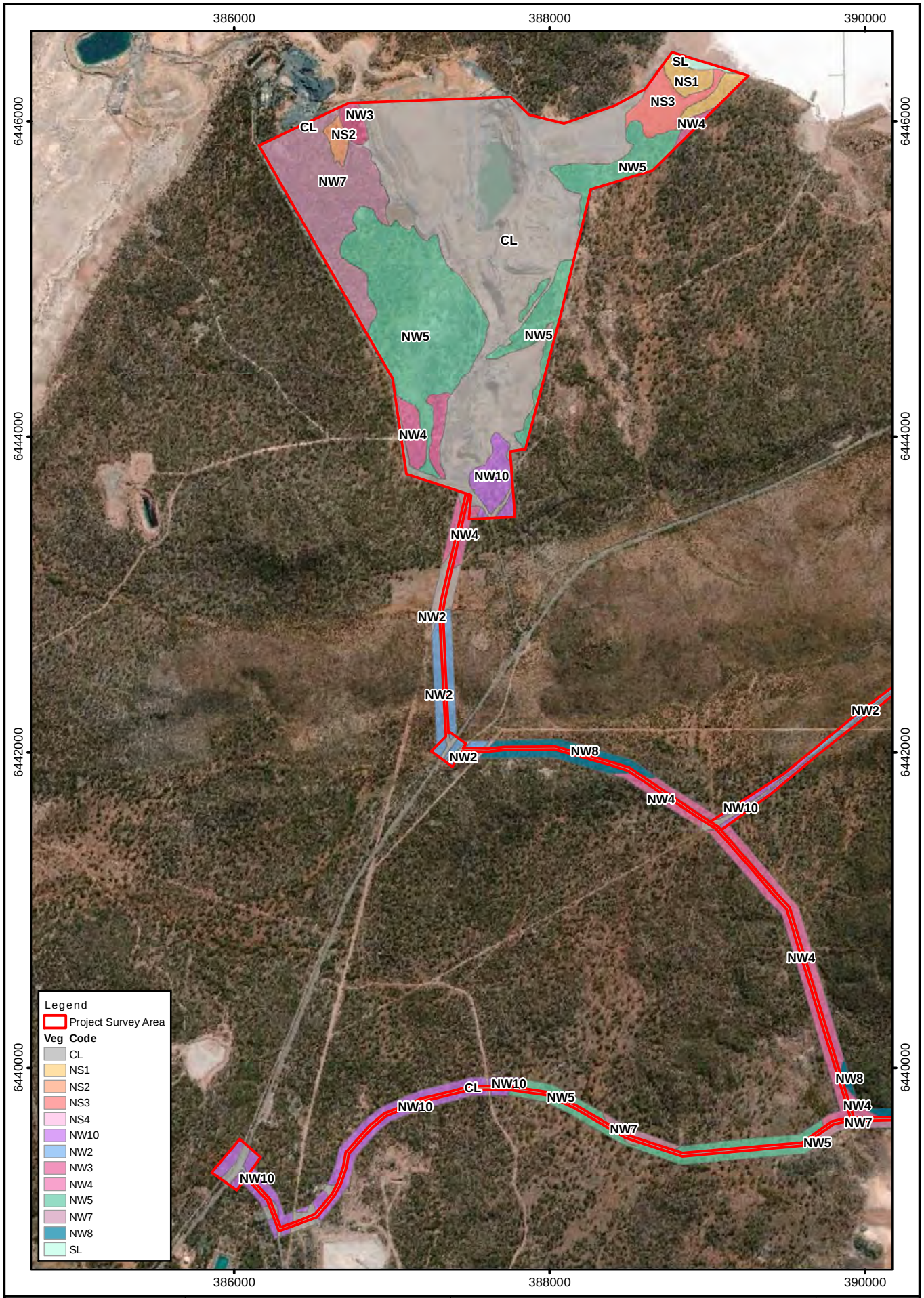
VEG. COMM.	DESCRIPTION	AREA (ha)	% of SCOTIA SURVEY AREA
S4	Open shrubland of *Grevillea nematophylla* subsp. *nematophylla* over *Hibbertia pungens*, *Allocasuarina acutivalvis* subsp. *acutivalvis* and *Dampiera latealata*.	2.4	0.34
CL	Previously cleared or disturbed.	70.6	10.08
SL	Salt lake or non-vegetated lake bed.	11.3	1.61

The vegetation communities NS3 (16.22 %), NW5 (14.71 %) and NS4 (8.12 %) made up most of the vegetated areas of the Northern survey areas, with all other communities comprising less than 5 % of the Northern areas. Salt lake and non-vegetated lake bed (SL) and previously disturbed areas (CL) covered significant parts of the Northern survey areas, with total extent across the Northern survey areas being 21.42 % and 17.44 %, respectively. The broad coverage of the shrubland communities NS3 and NS4, which are found adjacent to salt lakes, is not surprising given the extent of salt lakes in the Northern areas, particularly in the Gladstone survey area.

The Eucalypt woodland communities W2 (41.49 %), W3 (32.30 %) and W4 (10.17 %) made up the major part of the Scotia survey area, with the remaining two woodland communities (W1, W5) and the shrubland communities (S1-S4) in total comprising less than 5 % of the survey area. Only 1.61 % of the Scotia area was salt lake (SL) and 10.08 % of the survey area was disturbed (CL).

5.2.3. Threatened and Priority Ecological Communities

No TECs or PECs were recorded as occurring in the Norseman Gold survey areas. The Priority 1 ecological community, '*Allocasuarina globosa* assemblages on greenstone rock' (Esperance District), which is known to exist approximately 3 km north of the Maybell area, was not observed in any of the areas surveyed in Autumn 2020.



Imagery: ESRI, DigitalGlobe (May 2019)

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Scale: 1:32,500

MGA94 (Zone 50)

CAD Ref: a2764_f03_03

Date: June 2020 | Rev: A | A4

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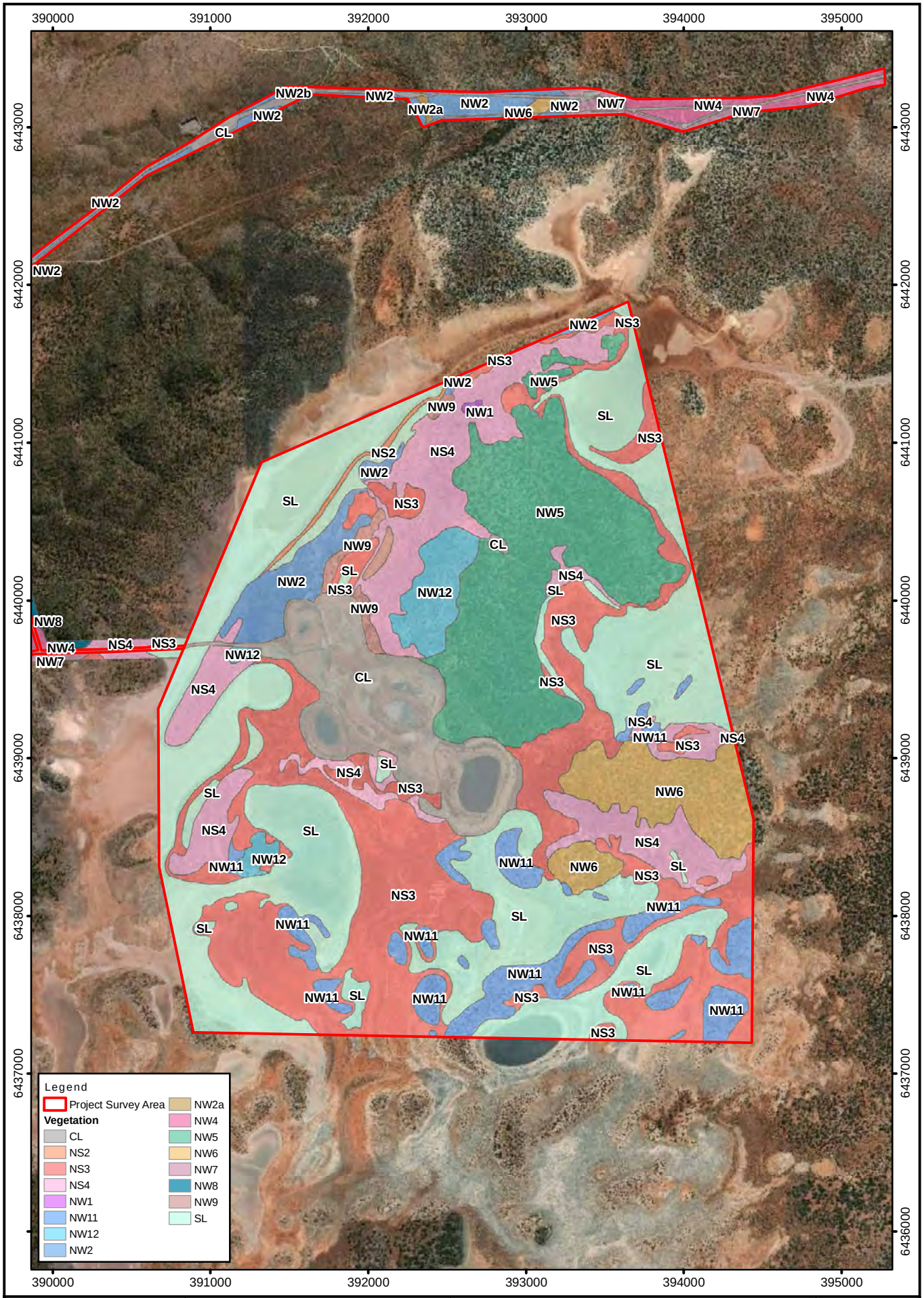
Norseman Gold Project
North Royal/ & G-NR Haul Roads
Survey Areas Vegetation

Figure:

12.1



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CAD Ref: a2764_f03_04

Date: June 2020 | Rev: A | A4

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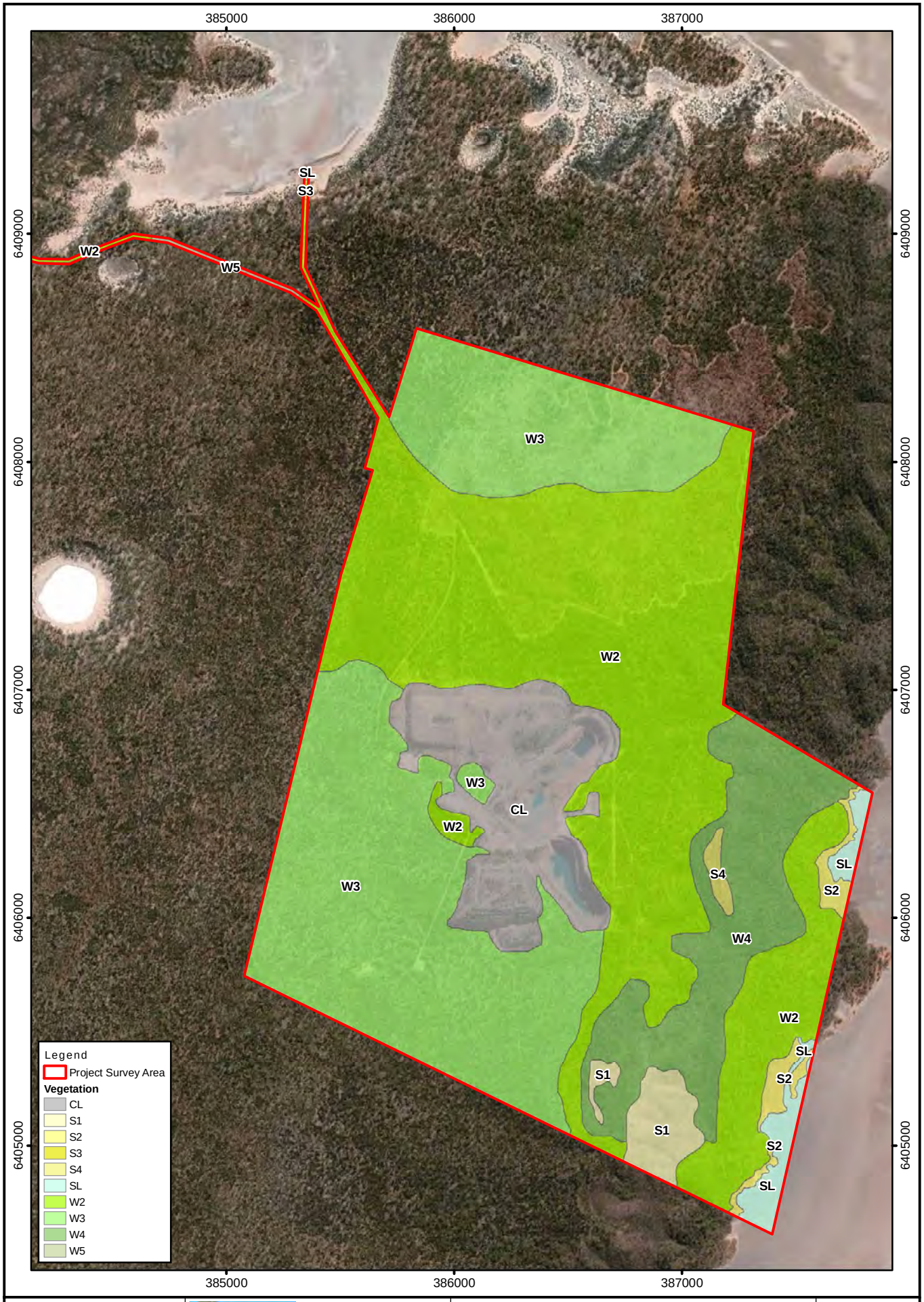
Norseman Gold Project
Gladstone & Jimberlana Pipeline
Survey Areas Vegetation

Figure:

12.2



Imagery: ESRI, DigitalGlobe (May 2019)

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Scale: 1:22,500
MGA94 (Zone 50)

CAD Ref: a2764_f03_01

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Norseman Gold Project
Scotia Survey Area
Vegetation

Figure:
13.1

Imagery: ESRI, DigitalGlobe (May 2019)

N

0 200 400 m

Scale: 1:22,500
MGA94 (Zone 50)

CAD Ref: a2764_f03_02

Date: June 2020 | Rev: A | A4

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Norseman Gold Project
Scotia Survey Area
Vegetation

Figure:

13.2

5.2.4. Vegetation Condition

Of the 101 survey sites, 56 had a condition ranking of Pristine and 33 Excellent. The remaining sites comprised five ranked Very Good, one Good and one Completely Degraded (five sites had no ranking recorded); all of which were in the Northern survey areas. The vegetated areas themselves were relatively undisturbed, with few introduced species, a very small amount of grazing (likely by kangaroos or camels as no signs of stock were observed), and only a few small areas with signs of recent fire. The five sites with a ranking of Very Good had some disturbance such as vehicle tracks, rubbish and cut or broken stumps. The site ranked as Good was JI02, on the Jimberlana pipeline, and had been burnt in the last 6-10 years, with no mature Eucalypts present and many stumps and branches on the ground (new growth was seen, both seedlings and resprouting of both trees and shrubs). The Completely Degraded site, NR20, had been cleared in the past and can clearly be seen on aerial photographs.

When the condition of each vegetation community is considered (as an average of the condition ranking of the survey sites within the community), throughout all survey areas 16 vegetation communities had a condition of Pristine (59.3 % of the overall survey area, excluding salt lake and non-vegetated lake bed), 10 communities had a condition of Excellent (19.5 % of the overall survey area), and one Very Good (3.3 % of the overall survey area). Previously cleared or disturbed areas were ranked Completely Degraded (17.9 % of the overall).

Table 10 lists the condition ranking for each vegetation community within the Northern and Scotia survey areas. It can be seen that the vegetation condition in the Scotia area is generally better than that in the Northern areas, although both areas have very little disturbance within the areas of native vegetation.

Table 10: Vegetation Condition by Vegetation Community in the Northern and Scotia survey areas

*Not including salt lake and non-vegetated lake bed.

NORTHERN SURVEY AREAS			SCOTIA SURVEY AREA		
VEGETATION CONDITION	VEGETATION COMMUNITY	% OF TOTAL AREA*	VEGETATION CONDITION	VEGETATION COMMUNITY	% OF TOTAL AREA*
Pristine	NS2, NS3, NS4, NW1, NW2, NW2a, NW4, NW6, NW9, NW11	49.5	Pristine	S2, S4, W1, W2, W3, W4, W5	87.7
Excellent	NS1, NW2b, NW3, NW5, NW7, NW8, NW10, NW12	28.3	Excellent	S1, S3	2.0
Very Good	NW11	4.9			-
Completely Degraded	CL	22.2			10.2

6. DISCUSSION

6.1. Flora

Whilst only 178 vascular plant taxa were recorded in the Norseman Gold Project survey areas in Autumn 2020, compared with a potential total of 804 taxa identified in the desktop study, the most common families and genera were very similar, with Myrtaceae being the most common family in both the desktop study and the field survey, and Fabaceae also being in the top three in both. *Eucalyptus* was the most common genus in both the desktop study and the field survey, with *Acacia* second and *Eremophila* third in both. The desktop study's most common family was Asteraceae, whereas in the field survey Chenopodiaceae was in the top three families.

When the separate Northern and Scotia field survey areas are compared with the corresponding North and South desktop study areas, the most common families and genera matched perfectly, with Myrtaceae always the most common family, followed by either Chenopodiaceae or Fabaceae, and with *Eucalyptus* the most common genus, followed by either *Acacia* or *Eremophila*.

The much smaller number of taxa recorded in the field (178) than what was expected given the results of the desktop study (804 taxa) can be explained by several factors, including the size of the desktop study (approximately 63,000 ha) compared with the field survey (2,665 ha mapped), i.e. a greater sample size; and the greater variation in ecosystems covered by the desktop study than the field survey. Species accumulation analysis shows that approximately 73% of taxa potentially present in the survey areas were recorded.

Less vascular plant taxa listed as Threatened or Priority either at Federal or State level (see Appendix A for definitions) were recorded in this field survey (one dead Threatened (*Daviesia macrocarpa*), one Priority 1, one Priority 2 and one potential Priority 4 species; section 5.1.1, Appendix F) than had the potential to occur in the Norseman Gold Project study area based on the desktop assessment (three Threatened and 37 Priority listed flora taxa; section 4.8.1, Appendix D). Some of this discrepancy is likely due to factors related to the size and coverage of the desktop study versus the field survey, as mentioned above for taxa in general.

There were also far fewer introduced species recorded in the field survey (two; section 5.1.3, Appendix F) than were expected to occur based on the desktop study (42 potential species; section 4.8.2, Appendix C). Both the species recorded in the field survey had the potential to occur in the survey areas based on the desktop assessment.

Of the eleven taxa recorded in the field survey representing extensions to their known range (section 5.1.2), three are ranked as Moderate extensions and one as a High range extension. Whilst two of the Moderate ranked taxa have actually been recorded previously in the area (Appendix C), *Maireana lobiflora* (Moderate range extension) and *Eragrostis lacunaria* (High range extension) have not. Both species have been recorded previously in the Coolgardie IBRA region (WAH 1998-).

6.2. Vegetation

Vegetation in the Norseman Gold Project survey areas is predominantly Eucalypt woodlands, with areas of chenopod shrubland near salty drainage systems. This is consistent with the Pre-European vegetation of the area (section 4.5) and that previously described around the greater Norseman area (Cowan 2001, Appendix B).

The *Eucalyptus* woodlands of the greater Norseman area are known to be very diverse. Observations made during the field survey and the results of the statistical analysis of the vegetation show that the

woodlands in the Norseman Gold Project survey area comprise a mosaic of various *Eucalyptus* species over slowly varying understorey species. Due to the complex nature of the woodland communities and the difficulty in identifying many species without flowering and fruiting material, definition of distinct vegetation communities was difficult. Fine scale changes in the landscape and species composition and cover were often unable to be observed from the aerial photographs. In areas where the landscape was flat or gently sloping (much of the survey area), gradients into adjacent communities were gradual with species occurring within communities on gradual changes in local site conditions. Only where ridges and rocky outcroppings were observed (predominantly in the Scotia survey area) were community boundaries more defined.

The vegetation communities found in the survey areas are discussed below.

6.2.1. Eucalypt woodlands

Eucalypt woodlands in Norseman Gold Project survey areas comprise a mosaic of vegetation communities, with continual slight changes in canopy *Eucalyptus* species, the mid stratum species and the lower stratum.

In the woodlands of the Northern survey areas the tree species *Eucalyptus lesouefii* and *E. salubris* were commonly dominant in the canopy, either singly or together. The mid stratum was often dominated by *Melaleuca* species (particularly *M. ?sheathiana*) and/or *Eremophila* species (particularly *E. scoparia*). The most common species in the lower stratum were the chenopods including *Atriplex ?vesicaria, Atriplex ?nummularia*, *Tecticornia* sp. 3 and *Maireana appressa*, along with the low shrubs *Cratystylis conocephala, Eremophila decipiens, Eremophila parvifolia* subsp. *parvifolia* (P4), *Olearia muelleri* and *Scaevola spinescens.* The lower stratum appeared to show a trend of greater numbers of *Tecticornia* spp. and *Maireana* spp. nearer salt lakes and salty drainages, with various *Atriplex* species and *Scaevola spinescens* appearing next and covering a broad variety of landforms, and an increase in *Eremophila* spp., *Cratystylis conocephala* and *Olearia muelleri* on higher ground further from the lakes.

Although a large part of the Northern survey areas was dominated by *Eucalyptus lesouefii – E. salubris* woodlands, there are several other Eucalypt woodland communities in the Northern areas. On rockier hilly areas along the Jimberlana pipeline and the North Royal pipeline mallee woodlands are present (communities NW2, NW2a and NW2B). These have a mid stratum of *Allocasuarina helmsii*, *Eremophila* species and *Acacia* sp. with a lower stratum of *Triodia scariosa*. Three other Eucalypt woodland communities, with only one or two survey quadrats in each, are defined on the basis of their differing Eucalyptus canopy (communities NW1, NW8, NW9). Vegetation community NW10 is also a Eucalypt woodland, with mixed Eucalyptus species in the upper stratum.

The dominant tree species of the Eucalypt woodlands in the Scotia survey area were more variable, with *Eucalyptus dundasii, E. ?flocktoniae* subsp. *flocktoniae, E. lesouefii* and *E. longicornis* all contributing significantly to the canopy layer. *Melaleuca ?sheathiana, Eremophila* species (*E. scoparia* and *E. ?psilocalyx*), *Alyxia buxifolia*, *Beyeria sulcata* var. *brevipes* and *Exocarpos aphyllus* were the most common species in the mid stratum. The lower stratum was dominated by *Olearia muelleri* and *Scaevola spinescens*, with some contribution from Chenopodiaceae species (particularly *Atriplex ?vesicaria*) and *Cratystylis conocephala*.

In general, the Scotia area had more varied canopy species in its Eucalypt woodland communities than did the Northern survey areas, which had most of its woodland areas dominated by two species. The Scotia area, however, had more diversity in its mid stratum. The Northern survey areas appeared to have more salt-tolerant species in the lower stratum, reflecting the larger areas in the Gladstone and North Royal areas adjacent to salt lakes or salty drainage lines.

Distinguishing separate vegetation communities in this continuum of Eucalypt woodland vegetation proved difficult, and several survey sites were on what could be considered (in hindsight) to be ecotones, so there are very likely several approaches to defining the vegetation communities in this vegetation.

6.2.2. Other vegetation communities

In the Northern survey areas there are two non-Eucalypt woodland vegetation communities (NW11 and NW12), both on low dune ridges near salt lakes. These have a similar understorey with *Atriplex ?vesicaria* and *Tecticornia* sp. 3 shrubs. There are four shrubland communities in the Northern areas, with three found very near salt lakes and salty drainage lines. They differ in their upper stratum, but all generally have *Eremophila* species in their mid stratum and chenopod shrubs such as *Atriplex ?vesicaria, Maireana* species, *Tecticornia* sp. 3 and *Rhagodia ?drummondii* and other shrubs like *Scaevola spinescens* and *Frankenia* sp. in the lower stratum.

The vegetation of the four shrubland communities of the Scotia survey area was highly variable. The upper stratum included *Allocasuarina* species, *Grevillea* species, *Acacia* species and *Melaleuca* species. *Scaevola spinescens* dominated the mid stratum with some contribution from *Alyxia buxifolia*, and the lower stratum comprised species such as *Atriplex ?vesicaria, Lepidosperma* sp. and *Frankenia* sp.

6.2.3. Species Richness

Average species richness (per quadrat) within each of the vegetation communities varied from 2.0 (no standard error as there was only one quadrat) in community NS1 to 16.0 ± 1.0 in NW1 (Appendices G and H). In general, average species richness in the vegetation communities of the Scotia survey area (11.3 ± 0.5) was greater than in the Northern survey areas (10.3 ± 0.5), but values varied more widely in the Northern areas (2.0 to 16.0 ± 1.0, as mentioned above) than in the Scotia area (7.0 in community S4 to 14.5 ± 0.2 in community S2). The greater range may reflect the wider variety of ecosystems surveyed in the Northern areas, from areas of seasonal inundation with low chenopod shrubs through to rocky ridges with Eucalypt woodlands, versus those in the Scotia area. The higher overall richness in the Scotia area may be because the woodland communities in the Scotia area (which formed a greater proportion of the survey area than the woodlands in the Northern areas) had higher average species richness (11.4 ± 0.5) than those in Northern areas (10.0 ± 0.5).

6.2.4. Comparison with previous mapping

Previous mapping in and adjacent to the Gladstone and Gladstone-North Royal Haul Roads survey areas was used to assist with vegetation mapping in those areas. The Gladstone and Daisy survey (Mattiske Consulting Pty Ltd 2001a), which covered some of the current survey areas, defined seven vegetation communities in the area and two outside. Seven of those vegetation communities reasonably closely resemble those defined here. They are: (1b) Low chenopod shrublands dominated by samphires, associated with salt lakes – corresponds to the current community NS3; (1c) *Casuarina, Callitris* and *Mypoporum* tall shrublands with a range of halophytic sclerophyllous shrubs, associated with salt lakes – corresponds approximately to current communities NS1, NS4 and NW11; (1d) Extensive low-lying saltbush plains adjacent to salt lakes – corresponds approximately to NW12; (2a) Broad drainage channels, undulating plains and low hills with *Eucalyptus salubris* woodlands and Chenopodiaceae species understorey – corresponds approximately to NW7 and possibly NW5; (3a) *Eucalyptus* woodlands dominated by *E. lesouefii, E. flocktoniae* subsp. *flocktoniae* and *E. dundasii* with *Atriplex* species and *Cratystylis conocephala* dominated understorey – similar to NW3, NW4 and NW10; (4a) Low mallee shrublands with diverse sclerophyllous shrubs on granite hills – corresponds to NW2, NW2a, NW2b; (4b) Eucalyptus woodlands with diverse sclerophyllous understorey on ironstone, greenstone and metamorphosed sedimentary hills and upper slopes – approximately corresponds to NW6 and NW8.

The mapping immediately to the south of the Gladstone-North Royal Haul Roads survey area (Mattiske Consulting Pty Ltd 2005) contains more detailed vegetation communities. Several of the 2005 communities bordering the south edge of the current survey area can be loosely correlated with the current vegetation communities. They are (2005 community listed first): (S1) Mixed open tall-mid shrubland over diverse halophytic shrubs on low dunes on the fringes of salt lakes – corresponds roughly with current communities

NS1 and NS4; (H1) Low Open Shrubland of *Tecticornia* species and *Frankenia* species on fringes of salt lakes – NS3; (E1 and E2) Open *Eucalyptus* Woodland over mid-low shrubland on clay-loams on lower slopes and extensive flats – NW4, NW5 and NW7; (E4) Open *Eucalyptus* Woodland over tall-mid shrubland over low halophytic shrubland on clay-loams on valley floors – NW6; (E7) Low Open *Eucalyptus* Woodland over tall-mid shrubland on sandy-gravels on mid slopes – NW6, NW7, NW10.

To the north of the Scotia survey area, the mapping over the Mt Henry area (Mattiske Consulting Pty Ltd 2013a, 2013b) resulted in the definition of 11 vegetation communities; three Eucalypt woodlands and eight shrublands. The three communities from the 2013 mapping that correspond reasonably closely to those defined in the current (Scotia) survey are (2013 communities listed first): (W1) Woodland to open woodland of *Eucalyptus dundasii*, *Eucalyptus torquata* and other mixed *Eucalyptus* spp. over *Melaleuca sheathiana*, *Exocarpos aphyllus*, *Scaevola spinescens*, *Alyxia buxifolia*, *Eremophila glabra* subsp. *glabra* and *Pomaderris forrestiana* over *Westringia rigida* and *Ptilotus obovatus* on orange-brown clayey loam with gravel on slopes and ridges – corresponds to current community W4; (W2) Woodland of *Eucalyptus urna*, *Eucalyptus lesouefii* and *Eucalyptus oleosa* subsp. *oleosa* and other mixed *Eucalyptus* spp. over *Melaleuca sheathiana*, *Exocarpos aphyllus*, *Scaevola spinescens* and *Eremophila scoparia* over *Olearia muelleri* and *Westringia rigida* on orange sandy clayey loam on flats and slopes – W2; (S4) Open scrub to scrub of *Acacia* ?*burkittii* and *Allocasuarina campestris* with occasional *Acacia neurophylla* subsp. *neurophylla* and occasional emergent *Eucalyptus griffithsii* over *Dodonaea microzyga* var. *acrolobata*, *Trymalium myrtillus* subsp. *myrtillus*, *Scaevola spinescens* and *Dampiera latealata* over *Lepidosperma* sp. aff *lyonsii* and small annual and perennial herbs on red to brown clayey loam on flats, slopes, valleys and micro channels - S1.

6.3. Local and regional context and impact

The vegetation communities defined within both the Northern and Scotia survey areas by Mattiske Consulting Pty Ltd in Autumn 2020 fit within the Pre-European vegetation associations of the area (section 4.5), are typical of the regional vegetation of the Great Western Woodlands (section 4.6), and show the same gradation from salt lake vegetation with low chenopod shrublands on salt lake fringes into woodlands with mixed *Eucalyptus* species as noted for the area by Beard (1990), Cowan (2001) and DEC (2010) (section 4.5, 4.6). The communities are all very similar to those mapped in previous surveys in the area.

Approximately 0.18 % of the statewide extent of Pre-European vegetation association 9.0 (primarily in the North Royal survey area), 0.11 % of association 221.3 (mostly in the Jimberlana Pipeline area), 0.10 % of association 524.1 (mostly in the Jimberlana Pipeline area) and 1.26 % of association 3106.0 fall within the areas surveyed in Autumn 2020. As the vegetation of the Norseman Gold Project survey areas is common at statewide and regional levels, clearing should not have significant detrimental effects at those levels.

Of local importance with regard to clearing is the presence of Priority listed flora species within the survey areas.

7. CONCLUSION

A desktop assessment of flora and vegetation of the entire Norseman Gold Project area was performed in March 2020, prior to a detailed flora and vegetation field survey of five smaller survey areas.

The Norseman Gold Project area lies within the *Coolgardie 3 – Eastern Goldfields* Subregion of the Coolgardie Bioregion, and more specifically, falls within the Great Western Woodlands. As such, it was expected that the majority of the vegetation to be encountered in the field survey would comprise *Eucalyptus* woodlands, often over *Eremophila* species and/or chenopod shrublands, and *Triodia* species grasslands with mallees in some places. A total of 804 vascular plant taxa, representative of 260 genera and 115 families, were found to have the potential to occur within the Norseman Gold Project study areas (based on NatureMap & EPBC Act search results and previous surveys in the area), with the most common families being Myrtaceae, Fabaceae and Asteraceae, and the most common genera being *Eucalyptus*, *Acacia* and *Eremophila*. Forty-two introduced species had the potential to occur within the Norseman Gold Project area, four of which are Declared Pest species.

The desktop study found that three Threatened flora species, had the possibility of occurring in the Norseman Gold Project area. *Daviesia microcarpa* (T) and *Eucalyptus platydisca* (T) were assessed as having a High likelihood of occurrence in the North study areas. One Priority ecological, '*Allocasuarina globosa* assemblages on greenstone rock' supporting the other Threatened flora species *Allocasuarina globosa* (T) is known to occur south of Norseman, and thus was assessed as having the potential to occur in the Scotia survey area.

A total of 37 Priority flora species, including eleven Priority 1, five Priority 2, seventeen Priority 3 and four Priority 4 flora species, were assessed as having the potential to occur within the Norseman Gold Project study areas. No Threatened ecological communities were found to have the potential to occur in the Norseman Gold Project area.

The field survey was carried out from the 30th March 2020 to the 3rd April 2020, during which 61 quadrats were surveyed in the Northern survey areas (Gladstone, North Royal, Gladstone-North Royal Haul Roads and Jimberlana Pipeline) and 40 quadrats in the Scotia survey area.

In the Northern survey areas, 138 vascular plant taxa were recorded, representative of 60 genera and 33 families. The most common families were Myrtaceae, Chenopodiaceae, Fabaceae and Scrophulariaceae, and the most common genera were *Eucalyptus*, *Eremophila* and *Acacia*. In the Scotia survey area, 101 vascular plant taxa were recorded, representative of 50 genera and 31 families. Most taxa were part of the Myrtaceae, Fabaceae and Chenopodiaceae families. The most common genera were *Eucalyptus*, *Acacia* and *Eremophila*. Whilst only 178 vascular plant taxa were recorded in both the Norseman Gold Project survey areas in autumn 2020, compared with a potential total of 804 taxa identified in the desktop study, the most common families and genera were very similar. The much smaller number of taxa recorded in the field than what was expected given the results of the desktop study (804 taxa) can be explained by several factors: the timing of the field survey resulting in few annual taxa being recorded; the size of the desktop study compared with the field; and the greater variation in ecosystems covered by the desktop study than the field survey. Species accumulation analysis shows that approximately 73% of taxa potentially present in the survey areas were recorded during the field survey.

The area that had previously supported the *Davesia microcarpa* (T) were re-assessed and no alive plants were recorded in the current survey. Two priority flora species, *Calandrinia lefroyensis* (P1) and *Acacia kerryana* (P2), were recorded in the Gladstone and Jimberlana Pipeline survey areas, respectively. *Eremophila parvifolia* ?subsp. *parvifolia* (P4), which was recorded throughout the four Northern survey areas, was unable to be confidently identified to a sub-species level as a fruiting specimen is required. This species is treated with a precautionary approach as the Priority 4 subspecies. The lower number of Threatened or Priority taxa recorded in the field survey, relative to that expected from the desktop study,

is likely due to the timing of the survey, as only five of the potential Threatened and Priority listed taxa are known to flower in March or April, making recognition in the field very difficult.

Eleven taxa, including three potential identifications, recorded within the survey areas represent extensions to their current known distributions based on known data. Three of the taxa are ranked as being Moderate range extensions and one as High.

Two introduced (weed) species, **Asphodelus fistulosus* (Onion Weed) and **Gazania linearis*, were recorded in very small numbers at one site each. Under the Department of Parks and Wildlife Weed Prioritisation Process, **Gazania linearis* is considered to be one of the 17 Goldfields Region priority alert weeds.

In the Northern survey areas, a total of 18 vegetation communities were defined and mapped: twelve Eucalypt woodland communities, two other woodland communities and four shrubland communities. Two of the shrubland communities, dominated by salt-tolerant species, formed almost 25 % of the Northern survey areas, reflecting the significant areas of salt lake in these areas. Nine vegetation communities were defined in the Scotia survey area: five Eucalypt woodland communities and four shrubland communities. Three Eucalypt woodland communities made up almost 85 % of the Scotia survey area. No Threatened or Priority ecological communities were recorded as occurring in the Norseman Gold survey areas.

Approximately 93 % of the sites with a recorded condition ranking were assessed as being in Pristine or Excellent condition. The vegetation condition in the Scotia survey area is generally better than that in the Northern areas, although both areas have very little disturbance within the areas of native vegetation. Whilst there was significant disturbance within the Norseman Gold Project survey areas as a whole, the vegetated areas themselves were little disturbed.

Vegetation in the Norseman Gold Project survey areas was found to be predominantly Eucalypt woodlands, with areas of chenopod shrubland near salty drainage systems. This is consistent with the Pre-European vegetation of the area and that previously described around the greater Norseman area. Observations made during the field survey and the results of the statistical analysis of the vegetation show that the woodlands in the Norseman Gold Project survey area comprise a mosaic of various *Eucalyptus* species over slowly varying understorey species. Due to the complex nature of the woodland communities and the difficulty in identifying many species without flowering and fruiting material, distinguishing separate vegetation communities was difficult. It is acknowledged that there are therefore very likely several approaches to defining the vegetation communities in this vegetation.

In general, average species richness in the vegetation communities of the Scotia survey was greater than in the Northern survey areas, but values varied more widely in the Northern areas, likely reflecting the wider variety of ecosystems surveyed in those areas.

The vegetation communities defined within both the Northern and Scotia survey areas fit within the Pre-European vegetation associations of the area, are typical of the regional vegetation of the Great Western Woodlands, and show the same gradation from salt lake vegetation with low chenopod shrublands on salt lake fringes into woodlands with mixed *Eucalyptus* species as noted for the area in earlier regional studies. The communities are all very similar to those mapped in previous local surveys in the area. As the vegetation of the Norseman Gold Project survey areas is common at statewide and regional levels, clearing should not have significant detrimental effects at those levels. However, the presence of Priority listed flora species within the survey areas is of local importance with regard to clearing of vegetation.

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9. PERSONNEL

The following Mattiske Consulting Pty Ltd personnel were involved in this project:

NAME	POSITION	PROJECT INVOLVEMENT	FLORA COLLECTION PERMITS
Dr EM Mattiske	Managing Director & Principal Ecologist	Planning, managing, reporting	N/A
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Mr N Watson	Botanist	Fieldwork, plant identification	FB62000146
Ms M Behn	Ecologist	Fieldwork	N/A
Mrs J Wescombe	Experienced Botanist	Reporting	N/A

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APPENDIX A1: THREATENED AND PRIORITY FLORA DEFINITIONS

Under section 179 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), threatened flora are categorised as extinct, extinct in the wild, critically endangered, endangered, vulnerable and conservation dependent (Table A1.1).

Table A1.1 Federal definition of threatened flora species

Note: Adapted from section 179 of the EPBC Act.

CODE	CATEGORY	DEFINITION
Ex	Extinct	Species 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	Species 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	Species 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	Species 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	Species 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	Species which at a particular time if, at that time, the species is the focus of a specific conservation program, the cessation of which would result in the species becoming vulnerable, endangered or critically endangered within a period of 5 years.

The *Biodiversity Conservation Act 2016* (BC Act) provides for (amongst other things) the protection of flora that is facing an extremely high risk of extinction in the wild in the immediate, near or medium-term future in Western Australia under Part 10 (Division 2).

Threatened flora are listed in the *Wildlife Conservation (Rare Flora) Notice 2018* (under Part 2, Division 1, Subdivision 2 of the BC Act; Department of Biodiversity, Conservation and Attractions (DBCA) 2018a) and are categorised under Schedules 1-3. A flora species is defined as threatened if it is facing an extremely high risk of extinction in the wild in the immediate, near or medium-term future, pursuant to sections 20, 21 and 22 of the BC Act (DBCA 2019). Threatened species are categorised as critically endangered, endangered, and vulnerable (Table A1.2).

Table A1.2 State definition of threatened flora species

Note: Adapted from DBCA (2019).

CODE	CATEGORY	DEFINITION
CR	Critically endangered	Species considered to be facing an extremely high risk of becoming extinct in the wild (listed under Schedule 1 of the *Wildlife Conservation (Rare Flora) Notice 2018*).
EN	Endangered	Species considered to be facing a very high risk of becoming extinct in the wild (listed under Schedule 2 of the *Wildlife Conservation (Rare Flora) Notice 2018*).
VU	Vulnerable	Species considered to be facing a high risk of becoming extinct in the wild (listed under Schedule 3 of the *Wildlife Conservation (Rare Flora) Notice 2018*).

Priority flora species are defined as "possibly threatened species that do not meet the survey criteria, or are otherwise data deficient" or species that are "adequately known, are rare but not threatened, meet criteria for near threatened or have recently been removed from the threatened species list" for other than taxonomic reasons" (DBCA 2019). Priority species are not afforded the same level of protection under state or federal legislation as the listed Threatened species, however are considered significant under the Environmental Protection Authority's *Environmental Factor Guideline: Flora and Vegetation* (Environmental Protection Authority 2016a). The Department of Biodiversity, Conservation and Attractions categorises priority flora into four categories: Priority 1; Priority 2, Priority 3 and Priority 4 (Table A1.3).

Table A1.3: State definition of priority flora species

Note: Adapted from DBCA (2019).

CODE	CATEGORY	DEFINITION
P1	Priority 1: Poorly-known species	Known from one or a few locations (< 5) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation; or are otherwise under threat of habitat destruction or degradation. In urgent need of further survey.
P2	Priority 2: Poorly-known species	Known from one or a few locations (< 5). Some occurrences are on lands managed primarily for nature conservation. In urgent need of further survey.
P3	Priority 3: Poorly-known species	Known from several locations and the species does not appear to be under imminent threat; or from few but widespread locations with either a large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. In need of further survey.
P4	Priority 4: 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) Other - Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

APPENDIX A2: THREATENED AND PRIORITY ECOLOGICAL COMMUNITY DEFINITIONS

Under section 181 of the EPBC Act, threatened ecological communities are categorised as critically endangered, endangered and vulnerable (Table A2.1).

Table A2.1 Federal definition of threatened ecological communities

Note: Adapted from section 181 and section 182 of the EPBC Act.

CATEGORY	DEFINITION
Critically Endangered	If, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future.
Endangered	If, at that time, it is not critically endangered and is facing a very high risk of extinction in the wild in the near future.
Vulnerable	If, at that time, it is not critically endangered or endangered, and is facing a high risk of extinction in the wild in the medium-term future.

Threatened ecological communities (TECs) are listed in the *List of Threatened Ecological Communities endorsed by the Western Australian Minister for Environment (28 June 2018)* (under Part 2, Division 2, Subdivision 1 of the BC Act; DBCA 2018c). An ecological community is defined as threatened if it is facing an extremely high risk of collapse in the immediate, near or medium-term future, pursuant to sections 28, 29 and 30 of the BC Act. Threatened ecological communities are categorised as critically endangered, endangered, and vulnerable (Table A2.2).

Currently there is no Western Australian legislation covering the conservation of state listed threatened ecological communities (TECs), however, a non-statutory process is in place, whereby the DBCA (and former equivalent departments) have been identifying and informally listing TECs since 1994. Some of these TECs are also endorsed by the Federal Minister as threatened, and some of these are listed under the EPBC Act and therefore afforded legislative protection at the Commonwealth level.

Table A2.2 State definition of threatened ecological communities

Note: Adapted from Department of Environment and Conservation (2013).

CODE	CATEGORY	DEFINITION
CR	Critically Endangered	An ecological community will be listed as CR when it has been adequately surveyed and is found to be facing an extremely high risk of total destruction in the immediate future, meeting any one or more of the following criteria: 1. The estimated geographic range and distribution has been reduced by at least 90% and is either continuing to decline with total destruction imminent, or is unlikely to be substantially rehabilitated in the immediate future due to modification; 2. The current distribution is limited i.e. highly restricted, having very few small or isolated occurrences, or covering a small area; or 3. The ecological community is highly modified with potential of being rehabilitated in the immediate future.
EN	Endangered	An ecological community will be listed as EN when it has been adequately surveyed and is not CR, but is facing a very high risk of total destruction in the near future. The ecological community must meet any one or more of the following criteria: 1. The estimated geographic range and distribution has been reduced by at least 70% and is either continuing to decline with total destruction imminent in the short term future, or is unlikely to be substantially rehabilitated in the short term future due to modification; 2. The current distribution is limited i.e. highly restricted, having very few small or isolated occurrences, or covering a small area; or 3. The ecological community is highly modified with potential of being rehabilitated in the short term future.
VU	Vulnerable	An ecological community will be listed as VU when it has been adequately surveyed and is not Critically Endangered or Endangered but is facing high risk of total destruction in the medium to long term future. The ecological community must meet any one or more of the following criteria: 1. The ecological community exists largely as modified occurrences that are likely to be able to be substantially restored or rehabilitated; 2. The ecological community may already be modified and would be vulnerable to threatening process, and restricted in range or distribution; or 3. The ecological community may be widespread but has potential to move to a higher threat category due to existing or impending threatening processes.

Priority ecological communities (PECs) are defined as possible threatened ecological communities that do not meet the stringent survey criteria for the assessment of threatened ecological communities, and are listed by the DBCA (2020a) in the *Priority Ecological Communities for Western Australia – Version 29 (05 May 2020)*. Similarly to priority flora, PECs are not afforded legislative protection, however are considered significant under the Environmental Protection Authority's (2016a) *Environmental Factor Guideline: Flora and Vegetation*. The Department of Biodiversity, Conservation and Attractions categorises priority ecological communities into five categories: Priority 1; Priority 2, Priority 3, Priority 4 and Priority 5 (Table A2.3).

Table A2.3 State definition of priority ecological communities

Note: Adapted from Department of Environment and Conservation (2013).

CODE	CATEGORY	DEFINITION
P1	Priority 1 (Poorly known ecological communities)	Ecological communities that are known from very few, restricted occurrences (generally ≤ 5 occurrences or a total area of ≤ 100 ha). Most of these occurrences are not actively managed for conservation (e.g. located within agricultural or pastoral lands, urban areas, or active mineral leases) and for which immediate threats exist.
P2	Priority 2 (Poorly known ecological communities)	Communities that are known from few small occurrences (generally ≤ 10 occurrences or a total area of ≤ 200 ha). At least some occurrences are not believed to be under immediate threat of destruction or degradation.
P3	Priority 3 (Poorly known ecological communities)	1. 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; 2. 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 3. Communities made up of large, and/or widespread occurrences, that may or not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing and inappropriate fire regimes.
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)	1. Rare – Communities known from few occurrences that are considered to have been adequately surveyed, sufficient knowledge is available, and are considered not to be currently threatened. 2. Near Threatened – Communities considered to have been adequately surveyed and do not qualify for Conservation Dependent, but are close to qualifying for Vulnerable. 3. Communities that have been removed from the list of threatened communities during the past five years.
P5	Priority 5 (Conservation Dependent ecological communities)	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.

APPENDIX A3: CATEGORIES AND CONTROL MEASURES OF DECLARED PEST (PLANT) ORGANISMS IN WESTERN AUSTRALIA

Section 22 of Western Australia's *Biosecurity and Agriculture Management Act 2007* (BAM Act) makes provision for a plant taxon to be listed as a declared pest organism in respect to parts of, or the entire State. According to the BAM Act, a declared pest is defined as a prohibited organism (section 12), or an organism for which a declaration under section 22 (2) of the Act is in force.

Under the *Biosecurity and Agriculture Management Regulations 2013* (WA), declared pest plants are placed in one of three control categories, C1 (exclusion), C2 (eradication) or C3 (management), which determines the measures of control which apply to the declared pest (Table A4.1). The current listing of declared pest organisms and their control category is through the Western Australian Organism List (Department of Primary Industries and Regional Development 2020).

Table A3.1 Categories and control measures of declared pest (plant) organisms

Note: Adapted from *Biosecurity and Agriculture Management Regulations 2013*.

CONTROL CATEGORY	CONTROL MEASURES
C1 (Exclusion) '(a) Category 1 (C1) — Exclusion: if in the opinion of the Minister introduction of the declared pest into an area or part of an area for which it is declared should be prevented.' Pests will be assigned to this category if they 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.	In relation to a category 1 declared pest, the owner or occupier of land in an area for which an organism is a declared pest or a person who is conducting an activity on the land must take such of the control measures specified in subregulation (1) as are reasonable and necessary to destroy, prevent or eradicate the declared pest.
C2 (Eradication) '(b) Category 2 (C2) — Eradication: if in the opinion of the Minister eradication of the declared pest from an area or part of an area for which it is declared is feasible.' Pests will be assigned to this category if they are present in Western Australia in low enough numbers or in sufficiently limited areas that their eradication is still a possibility.	In relation to a category 2 declared pest, the owner or occupier of land in an area for which an organism is a declared pest or a person who is conducting an activity on the land must take such of the control measures specified in subregulation (1) as are reasonable and necessary to destroy, prevent or eradicate the declared pest.
C3 (Management) '(c) Category 3 (C3) — Management: if in the opinion of the Minister eradication of the declared pest from an area or part of an area for which it is declared is not feasible but that it is necessary to: (i) alleviate the harmful impact of the declared pest in the area; or (ii) reduce the number or distribution of the declared pest in the area; or (iii) prevent or contain the spread of the declared pest in the area.' Pests will be assigned to this category if they are established in Western Australia 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.	In relation to a category 3 declared pest, the owner or occupier of land in an area for which an organism is a declared pest or a person who is conducting an activity on the land must take such of the control measures specified in subregulation (1) as are reasonable and necessary to: (a) alleviate the harmful impact of the declared pest in the area for which it is declared; or (b) reduce the number or distribution of the declared pest in the area for which it is declared; or (c) prevent or contain the spread of the declared pest in the area for which it is declared.

APPENDIX A4: OTHER DEFINITIONS

Environmentally sensitive areas

Environmentally sensitive areas are declared by the State Minister under section 51B of the *Environmental Protection Act 1986* (EP Act) and are listed in the *Environmental Protection (Environmentally Sensitive Areas) Notice 2005*, gazetted 8 April 2005. Specific environmentally sensitive areas relevant to this report include: a defined wetland and the area within 50 metres of the wetland; the area covered by vegetation within 50 metres of rare flora; the area covered by a threatened ecological community; a Bush Forever site – further areas and information are described in the *Environmental Protection (Environmentally Sensitive Areas) Notice 2005*.

Conservation significant flora

Under the *Environmental Factor Guideline: Flora and Vegetation* (Environmental Protection Authority 2016a), flora may be considered significant for a range of reasons, including, but not limited to the following:

- being identified as threatened or priority species;
- locally endemic or associated with a restricted habitat type (e.g. surface water or groundwater dependent ecosystems);
- new species or anomalous features that indicate a potential new species;
- representative of the range of a species (particularly, at the extremes of range, recently discovered range extensions, or isolated outliers of the main range);
- unusual species, including restricted subspecies, varieties or naturally occurring hybrids; or
- relictual status, being representative of taxonomic groups that no longer occur widely in the broader landscape.

Conservation significant vegetation

Under the *Environmental Factor Guideline: Flora and Vegetation* (Environmental Protection Authority 2016a), vegetation may be considered significant for a range of reasons, including, but not limited to the following:

- being identified as threatened or priority ecological communities;
- restricted distribution;
- degree of historical impact from threatening processes;
- a role as a refuge; or
- providing an important function required to maintain ecological integrity of a significant ecosystem.

APPENDIX A5: NVIS STRUCTURAL FORMATION TERMINOLOGY

Note: Adapted from Environmental Steering Committee for Australian Vegetation Information (2003).

COVER CHARACTERISTICS							
Foliage cover*	70-100	30-70	10-30	<10	≈0	0-5	unknown
Crown cover**	>80	50-80	20-50	0.25-20	<0.25	0-5	unknown
% cover***	>80	50-80	20-50	0.25-20	<0.25	0-5	unknown
Cover code	d	c	i	r	bi	bc	unknown

GROWTH FORM	HEIGHT RANGES (m)	STRUCTURAL FORMATION CLASSES						
tree, palm	<10, 10-30, >30	closed forest	open forest	woodland	open woodland	isolated trees	isolated clumps of trees	trees
tree mallee	<3, <10, 10-30	closed mallee forest	open mallee forest	mallee woodland	open mallee woodland	isolated mallee trees	isolated clumps of mallee trees	mallee trees
shrub, cycad, grass-tree, tree-fern	<1, 1-2, >2	closed shrubland	shrubland	open shrubland	sparse shrubland	isolated shrubs	isolated clumps of shrubs	shrubs
mallee shrub	<3, <10, 10-30	closed mallee shrubland	mallee shrubland	open mallee shrubland	sparse mallee shrubland	isolated mallee shrubs	isolated clumps of mallee shrubs	mallee shrubs
heath shrub	<1, 1-2, >2	closed heathland	heathland	open heathland	sparse heathland	isolated heath shrubs	isolated clumps of heath shrubs	heath shrubs
chenopod shrub	<1, 1-2, >2	closed chenopod shrubland	chenopod shrubland	open chenopod shrubland	sparse chenopod shrubland	isolated chenopod shrubs	isolated clumps of chenopod shrubs	chenopod shrubs
samphire shrub	<0.5, >0.5	closed samphire shrubland	samphire shrubland	open samphire shrubland	spare samphire shrubland	isolated samphire shrubs	isolated clumps of samphire shrubs	samphire shrubs
hummock grass	<2, >2	closed hummock grassland	hummock grassland	open hummock grassland	sparse hummock grassland	isolated hummock grasses	isolated clumps of hummock grasses	hummock grasses
tussock grass	<0.5, >0.5	closed tussock grassland	tussock grassland	open tussock grassland	sparse tussock grassland	isolated tussock grassland	isolated clumps of tussock grasses	tussock grasses
other grass	<0.5, >0.5	closed grassland	grassland	open grassland	sparse grassland	isolated grasses	isolated clumps of grasses	other grasses
sedge	<0.5, >0.5	closed sedgeland	sedgeland	open sedgeland	sparse sedgeland	isolated sedges	isolated clumps of sedges	sedges
rush	<0.5, >0.5	closed rushland	rushland	open rushland	sparse rushland	isolated rushes	isolated clumps of rushes	rushes
forb	<0.5, >0.5	closed forbland	forbland	open forbland	sparse forbland	isolated forbs	isolated clumps of forbs	forbs
fern	<1, 1-2, >2	closed fernland	fernland	open fernland	sparse fernland	isolated ferns	isolated clumps of ferns	ferns
bryophyte	<0.5	closed bryophytelan d	bryophytelan d	open bryophytela nd	sparse bryophyteland	isolated bryophytes	isolated clumps of bryophytes	bryophytes
lichen	<0.5	closed lichenland	lichenland	open lichenland	sparse lichenland	isolated lichens	isolated clumps of lichens	lichens
vine	<10, 10-30, >30	closed vineland	vineland	open vineland	sparse vineland	isolated vines	isolated clumps of vines	vines
aquatic	0-0.5, <1	closed aquatic bed	aquatic bed	open aquatic bed	sparse aquatics	isolated aquatics	isolated clumps of aquatics	aquatics
seagrass	0-0.5, <1	closed seagrass bed	seagrass bed	open seagrass bed	sparse seagrasses	isolated seagrasses	isolated clumps of seagrasses	seagrasses

APPENDIX A6: DEFINITION OF VEGETATION CONDITION SCALE FOR THE SOUTH WEST AND INTERZONE BOTANICAL PROVINCES

Vegetation condition ratings relate to vegetation structure, level of disturbance at each structural layer and the ability of the vegetation unit to regenerate (Table A5.1). Vegetation condition provides complementary information for assessing the significance of potential impacts.

Table A6.1 Definition of Vegetation Condition Categories

Note: Adapted from Keighery (1994).

CATEGORY	DEFINITION
Pristine	Pristine or nearly so, no obvious sign of disturbance or damage caused by human activities since European settlement.
Excellent	Vegetation structure intact, disturbance affecting individual species, and weeds are non-aggressive species. Damage to trees caused by fire, the presence of non-aggressive weeds and occasional vehicle tracks.
Very Good	Vegetation structure altered obvious signs of disturbance. For example, disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing.
Good	Vegetation structure significantly altered by obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. For example, disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing.
Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. For example, disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds at high density, partial clearing, dieback and grazing.
Completely Degraded	The structure of the vegetation is no longer intact and the area is completely or almost completely without native species. These areas are often described as 'parkland cleared' with the flora comprising weed or crop species with isolated native trees or shrubs.

APPENDIX B: PREVIOUS FLORA AND VEGETATION FIELD SURVEYS CONDUCTED IN THE NORSEMAN AREA, 1989-2019

Note: Threatened and Priority Flora are listed with their status as at March 2020 (WAH 1998-) - see Appendix A for definitions.

SURVEY YEAR (MONTH)	AUTHOR (REPORT YEAR)	LOCATION	PURPOSE	METHODS	FLORA AND VEGETATION RESULTS
1989 (Apr)	Goldfields Environmental Management Pty Ltd (1989)	North: Red, White & Blue Lease (8km south of Norseman)	Flora, vegetation, soils, fauna habitat	2 x sampling sites of 1 ha each All flowering plants and ferns recorded	Flora: 44 flowering plant species Priority flora: 2 species – Philotheca apiculata (P2), Eucalyptus brockwayi (P3). Vegetation Communities: 2
1995 (Mar)	Landcare Services Pty Ltd (1995)	North: Harlequin, Active Tailings Dam, North Royal, Bullen Hill, OK, Viking South: Scotia Hill	Baseline vegetation and initial rehabilitation monitoring	Baseline vegetation – 30 sites of 10m x 50m Vegetation composition and structure in five 10m x 10m quadrats at 12 sites Species abundance and foliage cover recorded at 12 sites Species presence/absence recorded at 18 sites	Flora: 263 vascular plant species Threatened flora: 1 – Eucalyptus platydisca (T) Priority flora: 9 - Acacia dorsenna (P1), Eucalyptus jimberlanica (P1), Grevillea phillipsiana (P1), Philotheca apiculata (P2), Comesperma calcicola (P3), Eremophila purpurascens (P3), Eucalyptus brockwayi (P3), Darwinia polycephala (P4), Eremophila parvifolia subsp. parvifolia (P4). Vegetation Communities: 14
1995 (Oct)	Landcare Services Pty Ltd (1996)	North: Active Tailings Dam, Golden Dragon, Harlequin, North Royal, Penneshaw, Polar Bear, Venture	Baseline vegetation Phase 2	Baseline vegetation – 13 areas, ?31 sites Similar to March 19995 survey	Flora: 248 vascular plant species (98 additional to March survey) Threatened flora additional to March 1995 survey: 1 – Daviesia microcarpa (T) Priority flora additional to March 1995 survey: 3 – Eucalyptus websteriana subsp. norsemanica (P1), Diocirea microphylla (P3), Phebalium drummondii (P3). Introduced flora species: 2 significant species
1996 (unknown)	Marianna Partners Environmental Services (1996)	South: Mt Henry, Iron Prince	Baseline survey – flora, soil, fauna	Survey area 175 ha Transects	Flora: 253 vascular plant species Priority flora: 2 species – Philotheca apiculata (P2), Eucalyptus brockwayi (P3). Introduced flora species: 0 species Vegetation Communities: 4

APPENDIX B: PREVIOUS FLORA AND VEGETATION FIELD SURVEYS CONDUCTED IN THE NORSEMAN AREA, 1989-2019

Note: Threatened and Priority Flora are listed with their status as at March 2020 (WAH 1998-) - see Appendix A for definitions.

SURVEY YEAR (MONTH)	AUTHOR (Report year)	LOCATION	PURPOSE	METHODS	FLORA AND VEGETATION RESULTS
1996 (Sep-Oct)/1997 (June)	Landcare Services Pty Ltd (1997)	North: East Polar Bear, Lady Miller/Penneshaw South: Albion, Bromus/Goodia	Increase knowledge of endemic flora Add to client's reference herbarium Identify priority and threatened flora	Total survey area ~218 km^2 50 sites across 4 areas	Flora: 98 endemic plant species additional to Oct 1995 cumulative total Threatened flora additional to 1995 & 1996 surveys: 1 - Allocasuarina globosa (T) Priority flora additional to 1995 & 1996 surveys: 4 Ptilotus rigidus (P1), Acacia truculenta (P3), Diocirea microphylla (P3), Eremophila parvifolia subsp. parvifolia (P4) Introduced flora species: 7 species
2001 (May)	Mattiske Consulting Pty Ltd (2001a)	North: Gladstone, Daisy	Flora and vegetation survey	Flora and Vegetation Survey: Total survey area ~10 km^2 6 sites	Flora: 144 vascular plant taxa Threatened flora species: 2 species - Daviesia microcarpa (T), Eucalyptus platydisca (T) Priority flora: 2 species – Eremophila purpurascens (P3), Darwinia polycephala (P4) Introduced flora species: 9 species Vegetation Communities: 7
2001 (Jul)	Mattiske Consulting Pty Ltd (2001b)	North: Phoenix and Venture Tailings Storage Facilities	Tree Health	Tree Health Survey: 250 trees (Phoenix), 170 trees (Venture)	Flora: 5 Eucalypt species (Phoenix), 3 Eucalypt species (Venture)
2002 (Aug)	Mattiske Consulting Pty Ltd (2002)	North: Cobbler	Flora and vegetation survey	Vehicle and foot traverse	Flora: 89 vascular plant taxa Threatened flora species: 0 species Priority flora: 3 species Introduced flora species: 1 Vegetation Communities: 15
2003 (June)	Outback Ecology Environmental Management Services (2003)	North: Lake Cowan	Baseline environmental (terrestrial and aquatic flora and fauna) Targeted flora search	5 aquatic sites	Flora: 54 vascular plant taxa Threatened flora species: 0 species Priority flora: 0 species Introduced flora species: 2 Vegetation Communities: 8

APPENDIX B: PREVIOUS FLORA AND VEGETATION FIELD SURVEYS CONDUCTED IN THE NORSEMAN AREA, 1989-2019

Note: Threatened and Priority Flora are listed with their status as at March 2020 (WAH 1998-) - see Appendix A for definitions.

SURVEY YEAR (MONTH)	AUTHOR (Report year)	LOCATION	PURPOSE	METHODS	FLORA AND VEGETATION RESULTS
2004 (Aug)	Paul Armstrong & Associates (2004)	South: North Scotia	Rare flora search Vegetation mapping	Vehicle and foot traverse	Flora: 132 plant taxa Priority flora: 3 species – Drosera salina (P2), Eremophila purpurascens (P3), Melaleuca macronychia subsp. trygonoides (P3). Introduced flora species: 6 Vegetation Communities: 10
2004 (Sep)	Rally Revegetation and Environmental Services (2004)	North: Bullen	Flora and Vegetation survey	Total survey area ~5 ha	Threatened flora species: 0 species Priority flora: 0 species Vegetation Communities: 4
2005 (Feb)	Mattiske Consulting Pty Ltd (2005)	North: Proposed Tailings Dam	Flora and Vegetation survey Vertebrate fauna habitat survey	Vehicle and foot traverse	Flora: 134 plant taxa Threatened flora species: 0 species Priority flora: 3 species – Acacia dorsenna (P1), Eremophila purpurascens (P3), Eucalyptus brockwayi (P3). Introduced flora species: 2 Vegetation Communities: 17
2005 (Aug)	Rally Revegetation and Environmental Services (2005)	North: Daisy, Gladstone, Golden Dragon South: Scotia	Ecosystem Function Analysis of Waste Dumps	Transects 10 m wide x 50 m long with sampling points every 10 m Analogue transects	-
2009 (Sep, Nov)	GHD Pty Ltd (2009)	South: Mt Henry, North Scotia	Targeted Flora	Foot traverse	Threatened flora species: 0 species Priority flora: 3 species – Philotheca apiculata (P2), Eremophila purpurascens (P3), Eucalyptus brockwayi (P3).
2010 (Mar)	GHD Pty Ltd (2010a)	South: Mt Henry, North Scotia	Targeted Flora	Foot traverse	Priority flora: 1 species – Philotheca apiculata (P2).

APPENDIX B: PREVIOUS FLORA AND VEGETATION FIELD SURVEYS CONDUCTED IN THE NORSEMAN AREA, 1989-2019

Note: Threatened and Priority Flora are listed with their status as at March 2020 (WAH 1998-) - see Appendix A for definitions.

SURVEY YEAR (MONTH)	AUTHOR (Report year)	LOCATION	PURPOSE	METHODS	FLORA AND VEGETATION RESULTS
2010 (Apr)	GHD Pty Ltd (2010b)	South: Brockway Timber Reserve	Baseline flora and flora assessment	Total survey area 300 ha Vehicle and foot traverse	Flora: 116 plant taxa Threatened flora species: 0 species Priority flora: 4 species – Philotheca apiculata (P2), Beyeria sulcata var. truncata (P3), Eremophila purpurascens (P3), Eucalyptus brockwayi (P3). Introduced flora species: 3 Vegetation Communities: 5
2010 (Sep)	Botanica Consulting (2010)	South: Brockway Timber Reserve	Level 1 Flora and Vegetation survey	Total survey area 519 ha	Flora: 139 plant taxa Threatened flora species: 0 species Priority flora: 4 species – Philotheca apiculata (P2), Beyeria sulcata var. truncata (P3), Eremophila purpurascens (P3), Eucalyptus brockwayi (P3). Introduced flora species: 2 Vegetation Communities: 4
2012 (Oct)	Mattiske Consulting Pty Ltd (2013a)	South: Mt Henry, Selene, North Scotia	Level 1 Flora and Vegetation survey Targeted flora (ridges)	66 sites (20 m x 20 m quadrats)	Flora: 150 vascular plant taxa Threatened flora species: 0 species Priority flora: 6 species – Philotheca apiculata (P2), Allocasuarina eriochlamys subsp. grossa (P3), Eremophila purpurascens (P3), Eucalyptus brockwayi (P3), Goodenia laevis subsp. laevis (P3), Melaleuca coccinea (P3). Introduced flora species: 3 Vegetation Communities: 6

APPENDIX B: PREVIOUS FLORA AND VEGETATION FIELD SURVEYS CONDUCTED IN THE NORSEMAN AREA, 1989-2019

Note: Threatened and Priority Flora are listed with their status as at March 2020 (WAH 1998-) - see Appendix A for definitions.

SURVEY YEAR (MONTH)	AUTHOR (Report year)	LOCATION	PURPOSE	METHODS	FLORA AND VEGETATION RESULTS
2013 (June)	Mattiske Consulting Pty Ltd (2013b)	South: Mt Henry, Selene, North Scotia	Level 2 Flora and Vegetation survey Targeted flora (ridges)	Total survey area ~1340 ha 82 sites (20 m x 20 m quadrats)	Flora: 102 vascular plant taxa (additional to 2012 survey) Threatened flora species: 0 species Priority flora: 2 species (additional to 212 survey) – Eucalyptus jimberlanica (P1), Cyathostemon sp. Salmon Gums (B. Archer 769) (P3). Introduced flora species: 5 (additional to 2012 survey) Vegetation Communities: 11
2015 (Oct)	Umwelt (Australia) Pty Ltd (2016)	South: Maybell	Level 1 Flora and Vegetation survey in support of application for Native Vegetation Clearing Permit	20 sites Vehicle and foot traverse	Flora: 76 vascular plant taxa Threatened flora species: 0 species Priority flora: 5 species – Philotheca apiculata (P2), Allocasuarina eriochlamys subsp. grossa (P3), Eremophila purpurascens (P3), Eucalyptus brockwayi (P3), Melaleuca coccinea(P3). Introduced flora species: 3 Vegetation Communities: 9
2019 (Nov)	Native Vegetation Solutions (2019)	South: Maybell, Lord Percy	Targeted Flora	Known locations and likely habitat targeted	Priority flora: 5 species – Eucalyptus jimberlanica (P1), Philotheca apiculata (P2), Allocasuarina eriochlamys subsp. grossa (P3), Eremophila purpurascens (P3), Eucalyptus brockwayi (P3).

APPENDIX C: VASCULAR PLANT SPECIES WITH THE POTENTIAL TO OCCUR IN THE CENTRAL NORSEMAN GOLD SURVEY AREAS

NORTH and SOUTH denote the two survey regions as shown in Figure 1. * denotes introduced taxa. SCC is State Conservation Code (Appendix A; DBCA 2019z); FCC is Federal Conservation Code (Appendix A; EPBC Act 1999). EPBC is the EPBC Act Protected Matters Search NatureMap is the WA state search tool (DBCA 2007-). Gold Env denotes Goldfields Environmental Management Pty Ltd; LS is Landcare Services Pty Ltd; OE is Outback Ecology Environmental Management Services; MCPL is Mattiske Consulting Pty Ltd; Rally is Rally Revegetatio Marianna is Marianna Partners Environmental Services; PAA is Paul Armstrong and Associates; Bot is Botanica Consulting; GHD is GHD Pty Ltd; and Umwelt is Umwelt Australia Pty Ltd.

FAMILY	SPECIES	SCC	FCC	DBCA T&P	NORTH												SOUTH										
					North EPBC	North Nature Map	Gold Env	LS (North)	LS	LS (North)	MCPL Veg	MCPL Trees	MCPL	OE	Rally	MCPL	South EPBC	South Nature Map	LS (South)	Marianna	LS (South)	PAA	Bot	GHD	MCPL	MCPL	Umwelt
							1989	1995	1996	1997	2001a	2001b	2002	2003	2004	2005			1995	1996	1997	2004	2010	2010	2012	2013	2016
AIZOACEAE	*Carpobrotus modestus*																								x	x	
	Carpobrotus sp.																				x					x	
	Disphyma crassifolium							x	x	x	x			x		x			x	x		x	x	x	x	x	
	Gunniopsis glabra																				x						
	Gunniopsis quadrifida					x		x	x		x		x					x					x	x	x	x	
	Gunniopsis septifraga																	x								x	
	Gunniopsis sp.																									x	
	* *Mesembryanthemum nodiflorum*					x																				x	
	Sarcozona praecox																								x		
	Aizoaceae sp.																									x	
AMARANTHACEAE	*Ptilotus aervoides*								x																		
	Ptilotus carlsonii					x																					
	Ptilotus drummondii					x																					
	Ptilotus exaltatus					x		x	x		x								x				x	x			
	Ptilotus gaudichaudii								x																		
	Ptilotus helichrysoides					x			x	x																	
	Ptilotus holosericeus					x																				x	x
	Ptilotus obovatus					x	x	x	x	x					x			x	x	x		x	x	x	x	x	x
	Ptilotus obovatus var. *obovatus*										x		x	x		x											
	Ptilotus rigidus	P1		x						x																	
	Ptilotus spathulatus					x																					
	Ptilotus sp.																										x
	Surreya diandra							x	x	x			x			x							x	x	x	x	
APIACEAE	*Daucus glochidiatus*																						x		x	x	
APOCYNACEAE	*Alyxia buxifolia*						x	x	x	x	x		x	x	x	x		x	x	x	x	x	x	x	x	x	x
	Vincetoxicum lineare																							x		x	
ARALIACEAE	*Hydrocotyle intertexta*					x												x									
	Trachymene ornata																	x					x				
	Trachymene sp.								x																		

APPENDIX C: VASCULAR PLANT SPECIES WITH THE POTENTIAL TO OCCUR IN THE CENTRAL NORSEMAN GOLD SURVEY AREAS

NORTH and SOUTH denote the two survey regions as shown in Figure 1. * denotes introduced taxa. SCC is State Conservation Code (Appendix A; DBCA 2019z); FCC is Federal Conservation Code (Appendix A; EPBC Act 1999). EPBC is the EPBC Act Protected Matters Search NatureMap is the WA state search tool (DBCA 2007-). Gold Env denotes Goldfields Environmental Management Pty Ltd; LS is Landcare Services Pty Ltd; OE is Outback Ecology Environmental Management Services; MCPL is Mattiske Consulting Pty Ltd; Rally is Rally Revegetatio Marianna is Marianna Partners Environmental Services; PAA is Paul Armstrong and Associates; Bot is Botanica Consulting; GHD is GHD Pty Ltd; and Umwelt is Umwelt Australia Pty Ltd.

FAMILY	SPECIES	SCC	FCC	DBCA T&P	NORTH												SOUTH											
					North EPBC	North Nature Map	Gold Env	LS (North)	LS	LS (North)	MCPL Veg	MCPL Trees	MCPL	OE	Rally	MCPL	South EPBC	South Nature Map	LS (South)	Marianna	LS (South)	PAA	Bot	GHD	MCPL	MCPL	Umwelt
							1989	1995	1996	1997	2001a	2001b	2002	2003	2004	2005			1995	1996	1997	2004	2010	2010	2012	2013	2016
ASPARAGACEAE	*Dianella revoluta*								x													x			x	x	
	Lomandra effusa							x	x												x	x				x	
	Lomandra sp.									x																	
	Thysanotus brachyantherus	P2		x		x																					
	Thysanotus manglesianus					x			x	x													x		x	x	x
	Thysanotus sp.																									x	
ASPHODELACEAE	* *Asphodelus fistulosus*										x																
	Bulbine semibarbata																					x	x				
ASPLENIACEAE	*Pleurosorus rutifolius*							x	x	x								x				x	x	x			
ASTERACEAE	*Actinobole uliginosum*								x														x				
	* *Ambrosia tenuifolia*					x																					
	Angianthus cornutus																	x									
	Angianthus tomentosus					x			x									x					x		x		
	Asteridea athrixioides					x																				x	
	Asteridea chaetopoda							x	x				x														
	Brachyscome ciliaris					x		x	x		x												x				
	Brachyscome iberidifolia					x			x																		
	Brachyscome sp.																										x
	Calocephalus sp.								x																		
	Calotis hispidula								x														x				
	* *Carthamus lanatus*												x														
	* *Centaurea melitensis*										x											x	x	x			
	Centipeda crateriformis subsp. *crateriformis*																	x									
	Chondropyxis halophila								x																		
	Chrysocephalum apiculatum										x																
	Chrysocephalum apiculatum subsp. *glandulosum*					x																					
	* *Chrysocephalum apiculatum* subsp. *norsemanense*	P3		x		x																					
	Chrysocephalum puteale								x										x						x		
	Cratystylis conocephala					x	x	x	x	x	x		x	x		x			x	x	x	x	x	x	x	x		
	Cratystylis microphylla								x				x															
	Cratystylis subspinescens					x																					
	Erymophyllum ramosum subsp. *ramosum*					x			x		x												x		x		

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					North EPBC	North Nature Map	Gold Env	LS (North)	LS	LS (North)	MCPL Veg	MCPL Trees	MCPL	OE	Rally	MCPL	South EPBC	South Nature Map	LS (South)	Marianna	LS (South)	PAA	Bot	GHD	MCPL	MCPL	Umwelt
							1989	1995	1996	1997	2001a	2001b	2002	2003	2004	2005			1995	1996	1997	2004	2010	2010	2012	2013	2016
ASTERACEAE	* *Gazania linearis*					x																					
(continued)	*Gnaphalium indutum*																	x								x	
	Gnephosis angianthoides																					x					
	Gnephosis brevifolia					x																	x				
	Gnephosis tenuissima																	x									
	Gnephosis tridens																	x									
	Hyalochlamys globifera																						x				
	Hyalosperma demissum																	x									
	* *Hypochaeris glabra*																					x					
	Kippistia suaedifolia					x																					
	Leiocarpa semicalva subsp. *semicalva*					x																					
	Millotia myosotidifolia					x																					
	Millotia tenuifolia																						x				
	Millotia sp.																							x			
	Minuria cunninghamii							x			x																
	Minuria gardneri					x																					
	Minuria sp.								x																		
	* *Monoculus monstrosus*					x																					
	Notisia intonsa	P3		x		x																					
	Olearia axillaris							x	x	x																	
	Olearia exiguifolia																						x	x		x	
	Olearia incana					x																					
	Olearia ?magniflora																								x		
	Olearia muelleri					x	x	x	x	x	x		x	x	x	x		x	x	x	x	x	x	x	x	x	x	x
	Olearia pimeleoides																						x	x	x		
	Olearia subspicata					x			x																		
	Olearia sp. Eremicola (Diels & Pritzel s.n. PERTH 00449628)					x					x							x				x			x	x	
	* *Oligocarpus calendulaceus*					x																					
	* *Osteospermum ecklonis*					x																					
	Podolepis capillaris							x	x		x			x							x					x	
	Podolepis rugata					x																					
	Podolepis tepperi																	x									
	Pogonolepis muelleriana								x																		
	Pogonolepis stricta								x																		
	* *Pseudognaphalium luteoalbum*								x																		

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					North EPBC	North Nature Map	Gold Env	LS (North)	LS	LS (North)	MCPL Veg	MCPL Trees	MCPL	OE	Rally	MCPL	South EPBC	South Nature Map	LS (South)	Marianna	LS (South)	PAA	Bot	GHD	MCPL	MCPL	Umwelt
							1989	1995	1996	1997	2001a	2001b	2002	2003	2004	2005			1995	1996	1997	2004	2010	2010	2012	2013	2016
ASTERACEAE	*Rhodanthe floribunda*																						x				
(continued)	*Rhodanthe haigii*																	x									
	Rhodanthe laevis																	x					x				
	Rhodanthe oppositifolia subsp. *oppositifolia*					x																					
	Rhodanthe pygmaea					x																					
	Rhodanthe rubella					x																					
	Rhodanthe spicata					x																					
	Rhodanthe stricta					x																					
	Schoenia cassiniana								x									x									
	Senecio glossanthus								x																	x	
	Senecio lacustrinus					x																					
	Senecio pinnatifolius										x					x										x	
	Senecio quadridentatus																					x	x				
	Senecio spanomerus								x																		
*	*Sonchus oleraceus*					x					x										x					x	x
*	*Taraxacum khatoonae*					x																					
	Thiseltonia gracillima					x																					
*	*Tragopogon porrifolius*					x																					
	Trichanthodium skirrophorum					x			x																		
	Vittadinia dissecta var. *hirta*					x												x								x	
	Vittadinia gracilis																						x				
	Vittadinia nullarborensis							x	x																		
	Waitzia acuminata								x														x				
	Waitzia acuminata var. *acuminata*					x																x			x		
	Waitzia acuminata var. *albicans*																										
	Waitzia fitzgibbonii					x			x												x		x		x		
	Waitzia suaveolens var. *flava*																										x
	Asteraceae sp.								x		x															x	
BORAGINACEAE	*Halgania andromedifolia*					x	x	x	x	x								x	x	x	x	x	x	x	x	x	x
	Halgania cyanea					x		x																			x
	Halgania cyanea var. Charleville (R.W. Purdie +111)																									x	
	Halgania erecta					x																					
	Halgania integerrima					x												x				x				x	

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					North EPBC	North Nature Map	Gold Env	LS (North)	LS	LS (North)	MCPL Veg	MCPL Trees	MCPL	OE	Rally	MCPL	South EPBC	South Nature Map	LS (South)	Marianna	LS (South)	PAA	Bot	GHD	MCPL	MCPL	Umwelt
							1989	1995	1996	1997	2001a	2001b	2002	2003	2004	2005			1995	1996	1997	2004	2010	2010	2012	2013	2016
BORAGINACEAE	*Halgania* sp.									x											x						
(continued)	*Plagiobothrys australasicus*					x																					
BORYACEAE	*Borya constricta*																					x				x	
BRASSICACEAE	* *Carrichtera annua*				x						x			x	x	x	x					x	x	x	x	x	
	Lepidium platypetalum					x		x	x				x			x		x					x	x			
	Lepidium rotundum					x			x													x					
	Lepidium sp.																							x			
	Phlegmatospermum eremaeum	P3		x																							
	* *Sisymbrium orientale*										x																
	Stenopetalum filifolium					x																			x		
	Stenopetalum lineare var. *lineare*																	x									
	Brassicaceae sp.																									x	
CACTACEAE	* *Opuntia ficus-indica*					x																					
	* *Opuntia stricta*					x																					
CAMPANULACEAE	*Isotoma petraea*					x		x																			
	Isotoma scapigera								x																		
	Lobelia gibbosa								x																		
	Wahlenbergia gracilenta																	x									
CARYOPHYLLACEAE	* *Silene gallica* var. *gallica*																										x
	* *Spergularia diandra*																									x	
	Stellaria filiformis					x												x									
CASUARINACEAE	*Allocasuarina acutivalvis* subsp. *acutivalvis*					x		x	x	x	x			x		x					x	x	x	x	x	x	
	Allocasuarina campestris					x	x	x					x						x			x	x	x	x	x	
	Allocasuarina eriochlamys subsp. *grossa*	P3		x		x		x																	x		x
	Allocasuarina globosa	T	VU	x						x																	
	Allocasuarina helmsii			x		x		x	x		x		x			x		x				x	x		x		
	Allocasuarina huegeliana								x																		
	Allocasuarina trichodon																			x							

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							1989	1995	1996	1997	2001a	2001b	2002	2003	2004	2005			1995	1996	1997	2004	2010	2010	2012	2013	2016
CASUARINACEAE	*Casuarina obesa*					x																					
(continued)	*Casuarina pauper*							x	x	x	x				x	x	x										
CELASTRACEAE	*Stackhousia monogyna*							x	x										x			x			x	x	
	Stackhousia muricata										x		x	x													x
	Stackhousia pubescens					x																					
	Stackhousia scoparia															x											
	Stackhousia sp. Mt Keith (G. Cockerton & G. O'Keefe 11017)					x																x					
CENTROLEPIDACEAE	*Centrolepis cephaloformis* subsp. *cephaloformis*																	x									
CHENOPODIACEAE	*Atriplex acutibractea* subsp. *karoniensis*					x																					
	Atriplex bunburyana							x	x	x	x	x							x		x						
	Atriplex codonocarpa							x	x																		
	Atriplex eardleyae					x																					
	Atriplex holocarpa							x	x		x															x	
	Atriplex lindleyi subsp. *conduplicata*	P3		x		x																					
	Atriplex lindleyi subsp. *inflata*								x																		
	Atriplex nana							x	x		x		x					x				x			x	x	x
	Atriplex nummularia					x	x								x												x
	Atriplex nummularia subsp. *spathulata*					x			x	x	x		x	x		x							x	x			
	Atriplex pumilio					x		x	x										x								
	Atriplex quadrivalvata var. *quadrivalvata*					x		x	x																		
	Atriplex semibaccata							x	x																		
	Atriplex stipitata					x	x	x	x	x													x	x		x	
	Atriplex suberecta					x																					
	Atriplex vesicaria					x	x	x	x	x			x	x	x	x		x		x	x	x	x	x	x	x	x
	Atriplex sp.								x						x											x	
	Chenopodium curvispicatum							x	x														x	x		x	
	Chenopodium desertorum subsp. *desertorum*																									x	
	Chenopodium desertorum subsp. *microphyllum*																	x									
	Chenopodium sp.																			x						x	
	Didymanthus roei																									x	
	Dysphania glomulifera subsp. *eremaea*																	x									
	Dysphania melanocarpa							x																			

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							1989	1995	1996	1997	2001a	2001b	2002	2003	2004	2005			1995	1996	1997	2004	2010	2010	2012	2013	2016
CHENOPODIACEAE (continued)	*Dysphania* sp.																				x						
	Enchylaena lanata								x																		
	Enchylaena tomentosa var. *tomentosa*						x	x	x		x		x		x	x			x	x		x	x	x	x	x	x
	Eriochiton sclerolaenoides							x	x		x							x	x				x			x	
	Maireana amoena					x																			x	x	
	Maireana appressa							x										x								x	x
	Maireana brevifolia					x		x	x											x							
	Maireana erioclada					x		x	x	x	x					x		x	x						x	x	
	Maireana eriosphaera					x																					
	Maireana georgei					x			x				x											x			
	Maireana glomerifolia									x	x			x						x			x	x			
	Maireana oppositifolia					x		x	x									x							x	x	
	Maireana pentatropis					x	x	x	x	x	x			x					x	x	x	x	x	x	x	x	
	Maireana platycarpa					x																	x	x			
	Maireana radiata					x			x							x			x						x		x
	Maireana sedifolia							x			x			x					x								
	Maireana suaedifolia					x																					
	Maireana tomentosa subsp. *tomentosa*						x				x		x		x								x	x			
	Maireana trichoptera					x		x	x							x				x			x	x			
	Maireana triptera										x												x	x			
	Maireana turbinata					x																					
	Maireana sp.								x						x	x									x	x	
	Rhagodia crassifolia							x	x							x			x				x	x	x		
	Rhagodia drummondii							x	x	x	x			x				x	x	x			x	x		x	x
	Rhagodia eremaea																								x		x
	Rhagodia preissii subsp. *preissii*								x																		
	Rhagodia spinescens																		x						x		x
	Rhagodia sp.												x			x									x		
	Roycea divaricata												x			x		x				x					
	Salsola australis										x																
	Sclerolaena brevifolia							x	x																		
	Sclerolaena cuneata					x		x	x																		
	Sclerolaena diacantha						x	x	x		x					x			x				x	x	x	x	x
	Sclerolaena drummondii					x																					
	Sclerolaena eurotioides																	x							x	x	

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							1989	1995	1996	1997	2001a	2001b	2002	2003	2004	2005			1995	1996	1997	2004	2010	2010	2012	2013	2016
CHENOPODIACEAE	*Sclerolaena obliquicuspis*					x		x	x		x					x							x		x		
(continued)	*Sclerolaena parviflora*							x	x									x				x	x	x		x	
	Sclerolaena uniflora																	x									
	Sclerolaena sp.								x											x						x	
	Tecticornia disarticulata					x		x	x	x						x		x				x	x	x		x	
	Tecticornia halocnemoides					x		x	x	x								x			x						
	Tecticornia halocnemoides subsp. *caudata*					x																				x	
	Tecticornia halocnemoides subsp. *halocnemoides*										x			x		x											
	Tecticornia indica subsp. *bidens*					x					x			x		x						x	x	x			
	Tecticornia ?lepidosperma										x		x														
	Tecticornia lylei								x					x				x	x								
	Tecticornia moniliformis					x		x	x																	x	
	Tecticornia peltata					x					x		x	x		x											
	Tecticornia pergranulata							x	x																		
	Tecticornia pergranulata subsp. *pergranulata*												x					x								x	
	Tecticornia aff. *pterygosperma*							x	x																		
	Tecticornia pterygosperma subsp. *pterygosperma*								x																		
	Tecticornia syncarpa							x	x							x							x	x	x		
	Tecticornia triandra					x										x											
	Tecticornia undulata					x							x														
	Tecticornia sp.								x		x					x				x					x	x	
	Chenopodiaceae sp.																									x	
COLCHICACEAE	*Wurmbea tenella*																									x	
	Wurmbea sp.																									x	
CONVOLVULACEAE	*Convolvulus remotus*					x																					
	Wilsonia humilis								x														x	x			
CRASSULACEAE	*Crassula colorata*																								x		
CUCURBITACEAE	* *Cucumis myriocarpus*										x																

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							1989	1995	1996	1997	2001a	2001b	2002	2003	2004	2005			1995	1996	1997	2004	2010	2010	2012	2013	2016
CUPPRESSACEAE	*Callitris canescens*												x															
	Callitris columellaris					x		x	x																	x		
	Callitris preissii								x	x																		
CYPERACEAE	*Gahnia* sp. South West (K.L. Wilson & K. Frank KLW 9266)					x												x										
	Gahnia sp.																									x		
	Isolepis congrua																	x										
	Lepidosperma aff. *fimbriatum*																								x	x		
	Lepidosperma lyonsii	P1																x							x	x		
	Lepidosperma pruinosum												x															
	Lepidosperma sanguinolentum																	x				x			x	x		
	Lepidosperma sp. Bandalup Scabrid (N. Evelegh 10798)																	x										
	Lepidosperma sp. Kambalda (A.A. Mitchell 5156)																						x					
	Lepidosperma sp.					x		x	x	x	x		x		x	x		x				x						x
	Schoenus nanus																	x										
	Cyperaceae sp.							x											x								x	
DILLENIACEAE	*Hibbertia acerosa*																			x								
	Hibbertia exasperata																						x	x	x			
	Hibbertia pungens					x		x	x	x	x					x						x				x		
DROSERACEAE	*Drosera salina*	P2		x														x				x						
	Drosera sp. Branched styles (S.C. Coffey 193)					x																						
	Drosera sp. (climbing)																									x		
ELATINACEAE	*Elatine gratioloides*																	x										
ERICACEAE	*Conostephium drummondii*							x	x																			
	Conostephium preissii																									x		
	Conostephium sp.																				x							
	Leucopogon sp. Clyde Hill (M.A. Burgman 1207)					x																				x		
	Leucopogon sp. Kau Rock (M. A. Burgman 1126)																									x		
	Leucopogon sp. ?Salt Lake (G.F. Craig 3069)																	x								x		
	Styphelia exserta					x		x	x		x			x														

APPENDIX C: VASCULAR PLANT SPECIES WITH THE POTENTIAL TO OCCUR IN THE CENTRAL NORSEMAN GOLD SURVEY AREAS

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FAMILY	SPECIES	SCC	FCC	DBCA T&P	NORTH												SOUTH											
					North EPBC	North Nature Map	Gold Env	LS (North)	LS	LS (North)	MCPL Veg	MCPL Trees	MCPL	OE	Rally	MCPL	South EPBC	South Nature Map	LS (South)	Marianna	LS (South)	PAA	Bot	GHD	MCPL	MCPL	Umwelt
							1989	1995	1996	1997	2001a	2001b	2002	2003	2004	2005			1995	1996	1997	2004	2010	2010	2012	2013	2016
EUPHORBIACEAE	*Bertya virgata*								x												x							
	Beyeria brevifolia							x	x	x											x							
	Beyeria calycina																		x			x						
	Beyeria lechenaultii					x							x					x								x		
	Beyeria ?*opaca*	P1																							x			
	Beyeria sulcata var. *brevipes*					x							x			x		x				x			x	x		
	Beyeria sulcata var. *gracilis*					x																						
	Beyeria sulcata var. *sulcata*																								x			
	Beyeria sulcata var. *truncata*	P3		x		x			x														x	x				
	Euphorbia drummondii																						x	x				
	Euphorbia multifaria																	x										
	Ricinocarpos muricatus									x								x			x							
	Ricinocarpos stylosus					x		x	x	x	x				x	x			x		x		x	x			x	
	Ricinocarpos sp.																					x						
FABACEAE	*Acacia acanthoclada* subsp. *acanthoclada*					x					x																	
	Acacia acuminata					x							x					x	x		x	x						
	Acacia ancistrophylla var. *ancistrophylla*																	x										
	Acacia ancistrophylla var. *perarcuata*	P3		x														x										
	Acacia andrewsii								x		x					x			x							x	x	
	Acacia assimilis subsp. *assimilis*					x		x			x										x							
	Acacia assimilis subsp. *atroviridis*																				x							
	Acacia ?*burkittii*																								x	x		
	Acacia calcarata																					x						
	Acacia camptoclada					x												x	x		x						x	
	Acacia castanostegia					x										x												
	Acacia chrysella					x												x										
	Acacia collegialis					x																	x	x				
	Acacia colletioides							x	x	x											x		x	x	x			
	Acacia dempsteri					x												x	x			x					x	
	Acacia dissona var. *dissona*					x																						
	Acacia donaldsonii					x								x														
	Acacia dorsenna	P1		x		x		x								x												
	Acacia enervia subsp. *enervia*							x			x																	
	Acacia enervia subsp. *explicata*																											x

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FAMILY	SPECIES	SCC	FCC	DBCA T&P	NORTH												SOUTH											
					North EPBC	North Nature Map	Gold Env	LS (North)	LS	LS (North)	MCPL Veg	MCPL Trees	MCPL	OE	Rally	MCPL	South EPBC	South Nature Map	LS (South)	Marianna	LS (South)	PAA	Bot	GHD	MCPL	MCPL	Umwelt
							1989	1995	1996	1997	2001a	2001b	2002	2003	2004	2005			1995	1996	1997	2004	2010	2010	2012	2013	2016
FABACEAE	*Acacia eremophila* var. *eremophila*					x												x										
(continued)	*Acacia erinacea*					x	x	x	x	x	x		x			x		x		x		x	x	x	x	x		
	Acacia evenulosa					x												x										
	Acacia fragilis								x												x							
	Acacia fraternalis					x																						
	Acacia gibbosa																	x										
	Acacia hemiteles					x					x																	
	Acacia inamabilis					x			x	x	x														x	x		
	Acacia inceana subsp. *inceana*					x					x					x						x	x					
	Acacia jibberdingensis										x							x	x							x		
	Acacia kalgoorliensis															x						x						
	Acacia kerryana	P2		x		x																						
	Acacia lachnophylla					x																						
	Acacia lasiocalyx																	x	x			x						
	Acacia leptopetala																	x										
	Acacia ligulata					x		x	x	x											x							
	Acacia merinthophora					x																						
	Acacia merrallii					x	x	x	x	x	x		x			x		x			x	x	x	x	x	x	x	x
	Acacia murrayana					x																						
	Acacia neurophylla subsp. *neurophylla*					x		x		x			x			x			x			x			x	x	x	
	Acacia nyssophylla					x							x			x		x				x				x		
	Acacia pachypoda					x		x										x					x	x			x	
	Acacia poliochroa																					x						
	Acacia resinistipulea																	x	x						x	x		
	Acacia spinosissima																										x	
	Acacia tetragonophylla												x															
	Acacia truculenta	P3		x																	x							
	Acacia warramaba																		x				x	x		x		
	Acacia yorkrakinensis subsp. *acrita*																									x		
	Acacia sp.									x								x			x							
	Aotus sp. Dundas (M.A. Burgman 2835)	P2		x		x												x										
	Bossiaea arcuata	P1		x																								
	Bossiaea aurantiaca	P1		x		x																						
	Bossiaea ?barbarae																									x		
	Bossiaea leptacantha								x										x						x	x		

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FAMILY	SPECIES	SCC	FCC	DBCA T&P	NORTH												SOUTH											
					North EPBC	North Nature Map	Gold Env	LS (North)	LS	LS (North)	MCPL Veg	MCPL Trees	MCPL	OE	Rally	MCPL	South EPBC	South Nature Map	LS (South)	Marianna	LS (South)	PAA	Bot	GHD	MCPL	MCPL	Umwelt
							1989	1995	1996	1997	2001a	2001b	2002	2003	2004	2005			1995	1996	1997	2004	2010	2010	2012	2013	2016
FABACEAE	*Bossiaea walkeri*					x		x	x												x	x			x	x	
(continued)	*Cullen discolor*					x																					
	Daviesia aphylla					x			x												x				x	x	
	Daviesia argillacea					x															x	x	x	x	x	x	
	Daviesia microcarpa	T	EN	x	x	x					x																
	Daviesia sp.																				x						
	Dillwynia acerosa					x																					
	Dillwynia uncinata										x	x	x														
	* *Erythrostemon gilliesii*					x																					
	Glycine peratosa					x																				x	
	Indigofera australis							x	x										x			x					
	Indigofera occidentalis					x																					
	Kennedia prorepens					x					x											x					
	Leptosema daviesioides																					x					
	* *Medicago minima*					x																					
	* *Medicago sativa*					x																					
	Mirbelia depressa					x																					
	Mirbelia granitica					x					x																
	Mirbelia microphylla					x			x				x					x	x							x	
	Mirbelia seorsifolia					x																					
	Pultenaea arida															x		x					x	x	x	x	
	Senna artemisioides					x																					
	Senna artemisioides subsp. *filifolia*					x		x	x	x	x		x	x	x	x			x	x	x	x	x	x	x	x	x
	Senna artemisioides subsp. *petiolaris*					x																					
	Senna artemisioides subsp. x *artemisioides*					x																			x		x
	Senna cardiosperma					x		x																			
	Senna pleurocarpa																					x					
	Senna pleurocarpa var. *angustifolia*																		x			x	x	x			
	Senna sp. Pallinup River (J.W. Green 4847)					x																					
	Senna sp.										x																
	Swainsona canescens																	x									
	Swainsona tenuis					x																					
	Swainsonia sp.								x																		
	Templetonia sulcata															x											
	* *Vicia monantha* subsp. *triflora*					x																					

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					NORTH												SOUTH											
FAMILY	SPECIES	SCC	FCC	DBCA T&P	North EPBC	North Nature Map	Gold Env	LS (North)	LS	LS (North)	MCPL Veg	MCPL Trees	MCPL	OE	Rally	MCPL	South EPBC	South Nature Map	LS (South)	Marianna	LS (South)	PAA	Bot	GHD	MCPL	MCPL	Umwelt
							1989	1995	1996	1997	2001a	2001b	2002	2003	2004	2005			1995	1996	1997	2004	2010	2010	2012	2013	2016
FRANKENIACEAE	*Frankenia cinerea*							x	x		x		x	x		x										x	
	Frankenia desertorum					x					x		x	x		x							x	x	x	x	
	Frankenia glomerata	P4		x		x																					
	Frankenia interioris					x			x																		
	Frankenia interioris var. *interioris*							x																		x	
	Frankenia interioris var. *parviflora*					x																					
	Frankenia irregularis								x																	x	
	Frankenia setosa					x					x			x		x											
	Frankenia tetrapetala																					x					
	Frankenia sp.								x	x	x									x				x		x	
GENTIANACEAE	*Schenkia australis*								x																		
GERANIACEAE	*Erodium crinitum*										x																
	Erodium cygnorum												x										x	x			
	Pelargonium australe																					x					
	Pelargonium littorale					x																					
	Pelargonium sp.																									x	
GOODENIACEAE	*Brunonia australis*					x																					
	Coopernookia strophiolata					x			x									x								x	
	Dampiera latealata					x		x	x	x	x					x		x	x			x	x	x	x	x	x
	Goodenia berardiana					x		x	x									x									
	Goodenia concinna					x																				x	
	Goodenia dyeri																									x	
	Goodenia havilandii																	x									
	Goodenia laevis subsp. *laevis*	P3		x																					x	x	
	Goodenia quasilibera					x			x		x																
	Goodenia sp.																									x	
	Lechenaultia sp.										x																
	Scaevola bursariifolia							x																	x	x	
	Scaevola collaris					x					x																
	Scaevola oxyclona					x		x	x		x																
	Scaevola restiacea subsp. *divaricata*					x																					
	Scaevola spinescens					x	x	x	x	x	x		x	x	x	x		x	x	x	x	x	x	x	x	x	x

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FAMILY	SPECIES	SCC	FCC	DBCA T&P	NORTH												SOUTH											
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							1989	1995	1996	1997	2001a	2001b	2002	2003	2004	2005			1995	1996	1997	2004	2010	2010	2012	2013	2016
GOODENIACEAE	*Velleia daviesii*					x																					
(continued)	*Velleia trinervis*								x																		
GYROSTEMONACEAE	*Codonocarpus cotinifolius*								x										x								
	Gyrostemon racemiger																					x					
	Gyrostemon ramulosus								x																		
HALORAGACEAE	*Glischrocaryon angustifolium*					x																					
	Glischrocaryon aureum					x							x												x		
	Glischrocaryon flavescens					x			x		x								x								
	Haloragis dura					x					x																
	Haloragis hamata																	x									
	Haloragis trigonocarpa					x			x																		
	Myriophyllum petraeum	P4		x																							
HEMEROCALLIDACEAE	*Dianella revoluta*							x	x		x		x														x
	Dianella revoluta var. *divaricata*										x		x			x											
	Stypandra glauca																	x				x				x	
JUNCAGINACEAE	*Triglochin isingiana*																	x									
	Triglochin longicarpa																	x									
	Triglochin minutissima																	x									
	Triglochin mucronata																	x									
	Triglochin sp. Condingup (R. Davis 10877)	P2		x																							
LAMIACEAE	*Cyanostegia angustifolia*					x												x									
	Dicrastylis parvifolia					x			x												x						
	Hemigenia teretiuscula					x																					
	Pityrodia chrysocalyx	P3		x		x																					
	Prostanthera grylloana					x			x	x						x					x	x	x	x	x	x	
	Prostanthera incurvata					x							x			x			x								
	Prostanthera laricoides					x																					
	Prostanthera wilkieana								x																		
	Prostanthera sp.																				x						
	Teucrium sessiliflorum																	x					x				

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							1989	1995	1996	1997	2001a	2001b	2002	2003	2004	2005			1995	1996	1997	2004	2010	2010	2012	2013	2016
LAMIACEAE	*Teucrium* sp. Norseman (T.E.H. Aplin 1851)					x																					
(continued)	*Westringia cephalantha*																				x	x			x	x	
	Westringia rigida					x	x	x	x	x	x		x	x	x	x		x	x	x	x	x	x	x	x	x	x
	Lamiaceae sp.															x											
LAURACEAE	*Cassytha glabella*																								x		
	Cassytha melantha								x																x		
	Cassytha nodiflora					x																					
	Cassytha sp.												x												x		
LOGANIACEAE	*Logania perryana*					x																					
	Orianthera judithiana					x																					
LORANTHACEAE	*Amyema miquelii*					x													x						x		
	Amyema preissii							x	x			x															
LYCOPODIACEAE	*Phylloglossum drummondii*																					x					
MALVACEAE	*Abutilon cryptopetalum*																									x	
	Alyogyne hakeifolia					x			x										x			x					
	Androcalva cuneata										x																
	Androcalva luteiflora					x												x				x				x	
	Commersonia craurophylla					x		x	x			x						x									
	Hannafordia bissillii subsp. *latifolia*																	x									
	Lawrencia berthae																	x									
	Lawrencia repens					x																					
	Lawrencia squamata					x		x	x							x		x					x	x	x	x	
	Lawrencia sp.										x																
	* *Malva pseudolavatera*					x																					
	Radyera farragei							x	x		x																
	Seringia cacaobrunnea					x																					
	Seringia velutina					x												x				x				x	
	Sida calyxhymenia								x																	x	
	Sida sp.																		x								
	Thomasia sarotes																	x									

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							1989	1995	1996	1997	2001a	2001b	2002	2003	2004	2005			1995	1996	1997	2004	2010	2010	2012	2013	2016
MONTIACEAE	*Calandrinia eremaea*															x								x	x	
	Calandrinia granulifera																					x				
	Calandrinia polyandra								x																	
	Calandrinia sp.																								x	
MYRTACEAE	*Aluta appressa*					x																				
	Baeckea sp.								x												x					
	Callistemon phoeniceus																				x	x		x		
	Calothamnus gilesii					x	x	x	x		x					x								x	x	x
	Calytrix tetragona																							x		
	Cyathostemon aff. *ambiguus*																				x					
	Cyathostemon sp. Salmon Gums (B. Archer 769)	P3		x																					x	
	Darwinia polycephala	P4						x	x		x															
	Darwinia sp. Karonie (K. Newbey 8503)					x							x					x							x	
	Eucalyptus aspratilis																								x	
	Eucalyptus brockwayi	P3		x		x	x	x	x							x		x		x			x	x	x	x
	Eucalyptus calycogona					x																x	x			
	Eucalyptus calycogona subsp. *calycogona*					x		x			x		x			x					x					
	Eucalyptus campaspe						x																			
	Eucalyptus capillosa								x																	
	Eucalyptus celastroides					x													x							
	Eucalyptus clelandiorum					x	x												x	x						
	Eucalyptus concinna							x																	x	
	Eucalyptus ?corrugata																								x	
	Eucalyptus cylindriflora					x												x								
	Eucalyptus cylindrocarpa					x					x			x		x		x	x							
	Eucalyptus diptera											x														
	Eucalyptus dundasii					x	x	x	x	x	x	x		x	x	x		x	x	x	x	x	x	x	x	x	x
	Eucalyptus eremophila					x													x		x					
	Eucalyptus eremophila subsp. *eremophila*										x															
	Eucalyptus extensa								x																	
	Eucalyptus flocktoniae					x		x	x	x						x		x	x	x						x
	Eucalyptus flocktoniae subsp. *flocktoniae*										x	x		x							x					
	Eucalyptus gracilis							x		x								x			x				x	x	
	Eucalyptus griffithsii					x				x	x		x								x				x	x	

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							1989	1995	1996	1997	2001a	2001b	2002	2003	2004	2005			1995	1996	1997	2004	2010	2010	2012	2013	2016
MYRTACEAE	*Eucalyptus grossa*					x																					
(continued)	*Eucalyptus incrassata*					x										x									x		
	Eucalyptus jimberlanica	P1		x		x		x										x							x		
	Eucalyptus kumarlensis					x												x						x	x		
	Eucalyptus leptophylla																	x									
	Eucalyptus lesouefii					x		x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x	
	Eucalyptus longicornis					x		x	x	x	x					x		x	x		x	x			x		x
	Eucalyptus longissima					x		x	x	x						x									x		
	Eucalyptus loxophleba subsp. *lissophloia*					x												x	x		x	x			x	x	
	Eucalyptus loxophleba subsp. *loxophleba*																	x								x	
	Eucalyptus melanoxylon					x		x	x	x								x			x				x		
	Eucalyptus oleosa					x	x											x									x
	Eucalyptus oleosa subsp. *cylindroidea*																	x									
	Eucalyptus oleosa subsp. *oleosa*					x		x								x		x	x				x	x	x	x	
	Eucalyptus planipes					x																					
	Eucalyptus platycorys					x			x	x																	
	Eucalyptus platydisca	T	VU	x	x	x		x			x																
	Eucalyptus prolixa					x																					
	Eucalyptus protensa								x												x						
	Eucalyptus pterocarpa	P3		x		x																					
	Eucalyptus ravida					x				x															x		
	Eucalyptus salicola							x	x	x	x					x		x			x				x		
	Eucalyptus salmonophloia						x	x	x	x	x			x	x	x		x		x	x	x	x	x			
	Eucalyptus salubris					x			x	x	x	x		x		x					x	x	x	x			x
	Eucalyptus ?scyphocalyx																									x	
	Eucalyptus sheathiana																				x						
	Eucalyptus sporadica																					x					
	Eucalyptus spreta					x		x										x						x			
	Eucalyptus stricklandii					x	x	x	x	x	x					x				x			x	x	x		
	Eucalyptus subangusta															x											
	Eucalyptus subangusta subsp. *subangusta*															x											
	Eucalyptus tenuis																					x					
	Eucalyptus terebra								x											x							
	Eucalyptus torquata					x	x	x	x	x	x		x			x		x	x	x	x	x	x	x	x	x	x
	Eucalyptus transcontinentalis																	x	x		x				x	x	x

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							1989	1995	1996	1997	2001a	2001b	2002	2003	2004	2005			1995	1996	1997	2004	2010	2010	2012	2013	2016
MYRTACEAE	*Eucalyptus urna*					x										x						x	x	x	x	x	
(continued)	*Eucalyptus valens*					x																					
	Eucalyptus virella															x		x								x	
	Eucalyptus vittata					x																					
	Eucalyptus websteriana					x																					
	Eucalyptus websteriana subsp. *norsemanica*	P1		x		x		x					x														
	Eucalyptus yilgarnensis								x	x								x		x	x	x					
	Eucalyptus sp.															x									x	x	x
	Leptospermum fastigiatum																					x					
	Leptospermum incanum																									x	
	Leptospermum roei								x	x						x			x		x		x				
	Melaleuca acuminata								x												x					x	
	Melaleuca acuminata subsp. *acuminata*																		x			x					
	Melaleuca brevifolia								x																		
	Melaleuca bromelioides											x							x		x						
	Melaleuca calycina					x																					
	Melaleuca cliffortioides					x		x																			
	Melaleuca coccinea	P3		x														x							x		x
	Melaleuca eleuterostachya					x												x				x					
	Melaleuca elliptica					x		x													x					x	
	Melaleuca fulgens																		x								
	Melaleuca fulgens subsp. *fulgens*					x																x				x	
	Melaleuca halmaturorum					x		x	x					x													
	Melaleuca hamata					x												x								x	x
	Melaleuca hamulosa																					x					
	Melaleuca lanceolata					x		x	x	x								x	x		x	x			x	x	
	Melaleuca lateriflora							x	x	x			x			x					x	x	x		x	x	
	Melaleuca leiocarpa														x												
	Melaleuca macronychia subsp. *trygonoides*	P3		x														x				x					
	Melaleuca pauperiflora subsp. *fastigiata*						x																x	x			
	Melaleuca pauperiflora subsp. *pauperiflora*												x														
	Melaleuca quadrifaria												x										x	x		x	
	Melaleuca radula					x												x								x	
	Melaleuca sheathiana					x		x	x	x	x			x		x		x	x	x	x	x	x	x	x	x	x
	Melaleuca sparsiflora																		x								

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							1989	1995	1996	1997	2001a	2001b	2002	2003	2004	2005			1995	1996	1997	2004	2010	2010	2012	2013	2016
MYRTACEAE	*Melaleuca subalaris*							x	x												x		x	x			
(continued)	*Melaleuca thyoides*																		x			x				x	
	Melaleuca uncinata						x	x	x	x	x		x			x			x		x	x			x	x	
	Melaleuca sp.						x		x	x											x					x	
	Micromyrtus papillosa	P1		x		x		x	x				x														
	Rinzia carnosa																	x									
	Thryptomene australis								x		x								x								
	Thryptomene australis subsp. *brachyandra*																					x				x	
	Thryptomene kochii					x																					
	Verticordia chrysantha					x																					
	Verticordia plumosa var. *incrassata*					x																					
ORCHIDACEAE	*Caladenia longicauda* subsp. *rigidula*					x																					
	Caladenia microchila																	x									
	Corunastylis fuscoviridis					x																					
	Microtis graniticola																	x									
	Pheladenia deformis																	x									
	Prasophyllum gracile																	x									
	Pterostylis mutica					x												x				x	x				
	Pterostylis roensis					x												x									
	Pterostylis sp. inland (A.C. Beauglehole 11880)					x												x				x					
	Pterostylis sp.								x			x															
	Thelymitra aff. *macrophylla*											x															
	Thelymitra petrophila																	x				x					
	Thelymitra sp.								x																		
OROBANCHACEAE	* *Orobanche minor*																	x									
OXALIDACEAE	*Oxalis perennans*																					x	x	x			
	* *Oxalis pes-caprae*										x																
PHYLLANTHACEAE	*Poranthera triandra*					x																					

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							1989	1995	1996	1997	2001a	2001b	2002	2003	2004	2005			1995	1996	1997	2004	2010	2010	2012	2013	2016
PITTOSPORACEAE	*Billardiera coriacea*																	x									
	Billardiera lehmanniana								x																		
	Cheiranthera filifolia					x			x				x														
	Pittosporum angustifolium							x	x	x	x			x		x						x	x	x	x		
PLANTAGINACEAE	*Plantago drummondii*					x			x																		
POACEAE	?*Amphipogon* sp.																									x	
	Aristida contorta							x	x									x			x		x	x		x	
	Aristida sp.					x																		x			
	Austrostipa acrociliata					x																					
	Austrostipa drummondii					x			x																		
	Austrostipa elegantissima					x		x	x		x		x			x			x			x	x	x	x	x	x
	Austrostipa eremophila					x			x																x		
	Austrostipa hemipogon								x														x				
	Austrostipa juncifolia																									x	
	Austrostipa nitida					x		x	x							x										x	
	Austrostipa platychaeta					x																			x	x	
	Austrostipa scabra												x														
	Austrostipa scabra subsp. *scabra*										x														x		
	Austrostipa trichophylla																										x
	Austrostipa variabilis					x																					
	Austrostipa vickeryana															x											
	Austrostipa sp.																									x	x
	Bromus arenarius																	x									
	Chloris truncata								x									x									
*	*Chloris virgata*					x																					
	Cymbopogon obtectus					x		x	x																		
	Digitaria brownii								x																		
	?*Enneapogon* sp.																									x	
	Eragrostis dielsii								x		x		x			x		x				x	x	x		x	
	Eragrostis falcata																									x	
	Eragrostis pergracilis								x																		
	Eriachne sp.																							x			
	Monachather paradoxus								x																		

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							1989	1995	1996	1997	2001a	2001b	2002	2003	2004	2005			1995	1996	1997	2004	2010	2010	2012	2013	2016
POACEAE	*Neurachne alopecuroidea*																									x	
(continued)	*Panicum effusum*					x																					
	Paspalidium constrictum																									x	
	* *Pentameris airoides* subsp. *airoides*																					x	x	x			
	* *Rostraria pumila*																	x								x	
	Rytidosperma caespitosum					x			x							x										x	
	Rytidosperma setaceum																								x	x	
	* *Setaria verticillata*					x																					
	Spartochloa scirpoidea																	x								x	
	Tragus australianus					x																					
	Triodia ?irritans															x											
	Triodia scariosa					x		x	x	x	x		x														
	* *Vulpia muralis*																	x									
	* *Vulpia myuros*																	x									
	Poaceae sp.								x																x	x	x
POLYGALACEAE	*Comesperma drummondii*																	x									
	Comesperma integerrimum																	x									
	Comesperma polygaloides					x																					
	Comesperma scoparium												x														
	Comesperma volubile					x		x	x				x														
POLYGONACEAE	*Muehlenbeckia adpressa*																				x						
	* *Rumex vesicarius*								x					x													
PORTULACACEAE	*Portulaca* sp.																				x						
PRIMULACEAE	* *Lysimachia arvensis*					x					x										x				x	x	x
PROTEACEAE	*Banksia nutans* var. *nutans*					x																					
	Grevillea acuaria					x	x	x	x	x	x		x	x	x	x		x			x	x	x	x	x	x	
	Grevillea anethifolia					x					x								x			x				x	
	Grevillea huegelii								x									x							x	x	
	Grevillea nematophylla															x											x
	Grevillea nematophylla subsp. *nematophylla*					x															x	x	x	x			

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							1989	1995	1996	1997	2001a	2001b	2002	2003	2004	2005			1995	1996	1997	2004	2010	2010	2012	2013	2016
PROTEACEAE	*Grevillea oncogyne*					x																					
(continued)	*Grevillea phillipsiana*	P1		x		x		x	x																		
	Grevillea plurijuga					x			x	x											x						
	Grevillea plurijuga subsp. *plurijuga*																	x								x	
	Grevillea plurijuga subsp. *superba*					x																					
	Grevillea sarissa																					x	x				
	Grevillea sp.						x													x				x			
	Hakea cinerea					x																					
	Hakea ?commutata																									x	
	Hakea sp.						x		x																		
	Persoonia helix								x																		
PTERIDACEAE	*Cheilanthes austrotenuifolia*																									x	
	Cheilanthes distans								x										x								
	Cheilanthes lasiophylla					x															x			x	x		
	Cheilanthes sieberi subsp. *sieberi*					x			x		x		x						x							x	
	Cheilanthes sp.																				x						
RHAMNACEAE	*Cryptandra aridicola*					x					x			x								x	x				x
	Cryptandra graniticola					x							x											x	x		
	Cryptandra minutifolia subsp. *brevistyla*																	x									
	Cryptandra wilsonii																	x				x					
	Cryptandra sp.							x	x				x			x			x								x
	Pomaderris forrestiana					x		x	x	x	x				x	x		x	x	x	x		x	x	x	x	
	Spyridium sp.															x											
	Stenanthemum stipulosum												x					x									
	Trymalium myrtillus subsp. *myrtillus*					x	x	x	x	x										x	x	x	x	x		x	x
RUBIACEAE	*Opercularia vaginata*					x					x																
RUTACEAE	*Boronia fabianoides*							x	x																		
	Boronia fabianoides subsp. *rosea*					x												x									
	Boronia inornata subsp. *inornata*																									x	
	Boronia inornata subsp. *leptophylla*					x			x									x									
	Geijera linearifolia					x		x	x	x	x		x			x		x			x		x	x	x		

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							1989	1995	1996	1997	2001a	2001b	2002	2003	2004	2005			1995	1996	1997	2004	2010	2010	2012	2013	2016
RUTACEAE	*Microcybe multiflora*																	x									
(continued)	*Microcybe multiflora* subsp. *multiflora*					x																x					
	Phebalium canaliculatum					x														x			x	x		x	
	Phebalium elegans					x																					
	Phebalium filifolium					x	x				x					x		x			x				x		
	Phebalium lepidotum					x															x				x		
	Phebalium tuberculosum					x		x	x												x					x	
	Philotheca apiculata	P1		x		x	x		x									x	x	x			x	x	x	x	x
	Philotheca coccinea					x																					
	Philotheca fitzgeraldii							x		x											x		x	x		x	
	Philotheca rhomboidea															x											
SANTALACEAE	*Exocarpos aphyllus*					x	x	x	x	x	x		x	x	x	x		x	x	x	x	x	x	x	x	x	x
	Exocarpos sparteus								x																		
	Santalum acuminatum						x	x	x	x	x		x	x	x	x			x	x	x	x	x	x	x	x	x
	Santalum murrayanum								x							x									x		
	Santalum spicatum					x			x	x	x		x	x				x	x	x		x			x	x	x
SAPINDACEAE	*Dodonaea adenophora*					x										x											x
	Dodonaea amblyophylla					x																					
	Dodonaea lobulata								x	x		x	x	x	x							x	x	x			x
	Dodonaea microzyga						x	x		x										x	x		x	x			
	Dodonaea microzyga var. *acrolobata*					x		x	x		x	x	x	x					x			x				x	x	
	Dodonaea stenozyga					x	x	x	x		x					x		x	x	x	x		x	x	x	x	x
	Dodonaea viscosa									x																	
	Dodonaea viscosa subsp. *angustissima*							x	x		x			x		x		x				x					
SCROPHULARIACEAE	*Diocirea microphylla*	P3																			x						
	Eremophila alternifolia					x		x		x			x														
	Eremophila alternifolia x purpurascens							x					x														
	Eremophila caerulea					x		x													x						
	Eremophila caerulea subsp. *caerulea*															x					x						
	Eremophila clavata					x																					
	Eremophila decipiens																	x		x			x	x			x
	Eremophila decipiens subsp. *decipiens*					x										x		x								x	

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FAMILY	SPECIES	SCC	FCC	DBCA T&P	NORTH												SOUTH										
					North EPBC	North Nature Map	Gold Env	LS (North)	LS	LS (North)	MCPL Veg	MCPL Trees	MCPL	OE	Rally	MCPL	South EPBC	South Nature Map	LS (South)	Marianna	LS (South)	PAA	Bot	GHD	MCPL	MCPL	Umwelt
							1989	1995	1996	1997	2001a	2001b	2002	2003	2004	2005			1995	1996	1997	2004	2010	2010	2012	2013	2016
SCROPHULARIACEAE	*Eremophila dempsteri*					x			x	x						x		x	x		x		x	x			
(continued)	*Eremophila deserti*					x		x	x							x			x	x		x			x	x	x
	Eremophila dichroantha					x																					
	Eremophila drummondii					x																					
	Eremophila gibbosa					x		x	x	x	x		x	x				x	x						x	x	
	Eremophila glabra							x	x	x					x	x			x	x			x	x			x
	Eremophila glabra subsp. *albicans*					x					x		x														
	Eremophila glabra subsp. *glabra*					x								x		x		x				x			x	x	
	Eremophila granitica									x																	
	Eremophila interstans					x		x	x										x								
	Eremophila interstans subsp. *interstans*					x					x					x		x		x		x	x	x	x	x	x
	Eremophila ionantha					x	x			x			x			x		x	x		x	x	x		x	x	
	Eremophila labrosa					x																					
	Eremophila maculata								x	x					x						x						
	Eremophila oppositifolia																			x							
	Eremophila pantonii									x						x											
	Eremophila parvifolia subsp. *auricampa*					x					x			x													
	Eremophila parvifolia subsp. *parvifolia*	P4								x																	
	Eremophila psilocalyx					x		x	x	x	x		x		x	x		x	x		x	x	x	x	x	x	x
	Eremophila purpurascens	P3		x		x		x	x	x	x		x			x		x	x			x	x	x	x	x	x
	Eremophila saligna					x			x	x								x			x		x	x	x	x	
	Eremophila scoparia					x	x	x	x	x	x		x	x	x	x		x	x	x	x		x	x	x	x	x
	Eremophila serrulata																				x						
	Eremophila subfloccosa subsp. *glandulosa*					x												x				x					
	Eremophila sp.						x				x					x				x							x
	Myoporum platycarpum					x		x	x														x	x	x		
	Myoporum platycarpum subsp. *platycarpum*					x					x			x		x											
SOLANACEAE	*Anthocercis anisantha*					x																					
	Duboisia hopwoodii								x																		
	Lycium australe					x		x	x		x			x						x		x	x	x		x	
	* *Lycium ferocissimum*				x	x																					
	* *Nicotiana glauca*					x																					
	Nicotiana rotundifolia																	x									
	Nicotiana sp.																				x						

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FAMILY	SPECIES	SCC	FCC	DBCA T&P	NORTH												SOUTH										
					North EPBC	North Nature Map	Gold Env	LS (North)	LS	LS (North)	MCPL Veg	MCPL Trees	MCPL	OE	Rally	MCPL	South EPBC	South Nature Map	LS (South)	Marianna	LS (South)	PAA	Bot	GHD	MCPL	MCPL	Umwelt
							1989	1995	1996	1997	2001a	2001b	2002	2003	2004	2005			1995	1996	1997	2004	2010	2010	2012	2013	2016
SOLANACEAE	*Solanum hoplopetalum*							x	x														x	x		x	
(continued)	*Solanum lasiophyllum*					x		x															x				
	* *Solanum nigrum*														x							x				x	
	Solanum nummularium							x	x						x	x		x	x				x	x	x	x	
	Solanum orbiculatum																			x							
	Solanum plicatile					x			x										x		x						
	Solanum simile																	x									
	Solanum sp.							x			x			x													
STYLIDIACEAE	*Stylidium dielsianum*																				x						
TAMARICACEAE	* *Tamarix aphylla*				x												x										
THYMELAEACEAE	*Pimelea angustifolia*																					x				x	
	Pimelea graniticola																					x					
	Pimelea micrantha					x																					
	Pimelea microcephala							x	x										x							x	
	Pimelea microcephala subsp. *microcephala*					x					x			x													
	Pimelea spiculigera var. *thesioides*					x												x				x			x	x	
	Pimelea subvillifera					x																					
	Pimelea trichostachya					x			x																		
URTICACEAE	*Parietaria cardiostegia*																									x	
VIOLACEAE	*Hybanthus epacroides*																										
	Hybanthus floribundus												x									x					
	Hybanthus floribundus subsp. *curvifolius*					x		x	x			x		x												x	
ZYGOPHYLLACEAE	*Roepera apiculata*					x		x	x							x			x						x	x	x
	Roepera aurantiaca							x	x				x												x		x
	Roepera aurantiaca subsp. *aurantiaca*					x																					
	Roepera billardierei							x	x																		
	Roepera compressa																					x				x	
	Roepera eremaea					x		x	x		x					x			x				x	x	x	x	
	Roepera fruticulosa									x																	

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FAMILY	SPECIES	SCC	FCC	DBCA T&P	NORTH												SOUTH										
					North EPBC	North Nature Map	Gold Env	LS (North)	LS	LS (North)	MCPL Veg	MCPL Trees	MCPL	OE	Rally	MCPL	South EPBC	South Nature Map	LS (South)	Marianna	LS (South)	PAA	Bot	GHD	MCPL	MCPL	Umwelt
							1989	1995	1996	1997	2001a	2001b	2002	2003	2004	2005			1995	1996	1997	2004	2010	2010	2012	2013	2016
ZYGOPHYLLACEAE	*Roepera glauca*					x		x	x	x	x												x		x	x	
(continued)	*Roepera halophila*					x																					
	Roepera ovata							x	x		x					x									x	x	
	Roepera tesquorum					x																					
	Roepera sp.								x						x												
	* *Tribulus terrestris*					x																					

APPENDIX D: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT IN THE CENTRAL NORSEMAN GOLD SURVEY AREAS

Notes: Refer to Appendix A for State (SCC; Department of Biodiversity, Conservation and Attractions 2017a) and Federal (FCC; EPBC Act) conservation code definitions. IBRA Distribution: AVW – Avon Wheatbelt; COO – Coolgardie; ESP – Esperance Plains; GAS – Gascoyne; GES – Geraldton Sandplains; GVD – Great Victoria Desert; LSD – Little Sandy Desert; MAL – Mallee; MUR – Murchison; NUL – Nullarbor; PIL – Pilbara. Likelihood of occurrence in survey area is based on a Low, Moderate or High ranking. Survey Areas: COB – Cobbler; GLA – Gladstone; GNRHR – Gladstone/North Royal Haul Roads; JIPI – Jimberlana Pipeline; MAY – Maybell; NR – North Royal; SCO – Scotia. FB refers to Florabase (WAH 1998-), TPFL is the Department of Biodiversity, Conservation and Attractions' Threatened and Priority Flora database, and WAH is the Western Australian Herbarium.

Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Allocasuarina globosa	Casuarinaceae	T	VU	Habit: Dioecious shrub, to 2 m high. Flower colour: - Flowering period (indicated in green): (flowering period unknown) J F M A M J J A S **O** N D Soils & landforms: Laterite, rocky clay and loam. Ridges and rocky slopes. Mallee shrubland. IBRA Distribution: COO Florabase records: 32	Medium in North. Medium in South. Habitat occurs in the survey area. Recorded by LS (1997) at Iron King (2.5 km SE of OK). Six locations in TPFL + WAH databases (1989-2008), all at Mt Deans in Brockway Timber Reserve, ~3 km NE of Maybell.
Daviesia microcarpa	Fabaceae	T	EN	Habit: Sprawling, tangled shrub, to 0.4 m high, ca 1 m wide. Flower colour: orange & red Flowering period (indicated in green): J F M A M J J A **S** O N D Soils & landforms: Weathered gravel, red-brown loam. Rocky slopes and disturbed areas. IBRA Distribution: COO Florabase records: 10	High in North. Medium in South. Habitat occurs in the survey area. Recorded by LS (1996) and MCPL (2001a), both at Jimberlana Hill (NR & GNRHR). More than 10 locations near Norseman on TPFL + WAH databases (1974-2016), many along JIPI.
Eucalyptus platydisca	Myrtaceae	T	VU	Habit: Mallee, 2-4 m high, bark smooth. Flower colour: cream Flowering period (indicated in green): J F M **A** M J **J** A S O N D Soils & landforms: Granitic soils, clay. Stony hills. IBRA Distribution: COO Florabase records: 41	High in North. Medium in South. Habitat occurs in the survey area. Recorded by LS (1995) and MCPL (2001a), both at Jimberlana Hill (NR & GNRHR). More than 20 locations near Norseman (Jimberlana Hill and Dundas Hills on TPFL + WAH databases (1935-2004).

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Acacia dorsenna	Fabaceae	P1	-	Habit: Dense, domed shrub, 1-1.6 m high, to 3 m wide. Flower colour: yellow Flowering period (indicated in green): J F M A M J J **A S** O N D Soils & landforms: Rocky sandy loam or clay loam. Low rocky hills. IBRA Distribution: COO Florabase records: 13	Medium in North. Low in South. Habitat occurs in the survey area. Recorded by LS (1995) at Bullen mine and MCPL (2005) on the east flank of Dundas Hills. Only 2 locations near Norseman, Beacon Hill 2002 (OK/TSF4) and west side of town 1969) on TPFL + WAH databases. All other FB records >20km north & west of Norseman.
Beyeria ?opaca	Euphorbiaceae	P1	-	Habit: Erect, compact shrub, to 1 m high. Flower colour: - Flowering period (indicated in green): (flowering period unknown) J F M A M J J A S O N D Soils & landforms: Red sandy clay. Dunes, slopes. IBRA Distribution: COO Florabase records: 2	Low in North. Medium in South. Habitat potentially occurs in the survey area. Recorded by MCPL (2012) ~1.5 km E of the MAY pit survey area (question-marked). Only 2 records in Florabase (1971, 1995), both >75 km E of Norseman.
Bossiaea arcuata	Fabaceae	P1	-	Habit: Erect, divaricately branched, superficially leafless shrub, to 1.5 m high. Flower colour: red/yellow Flowering period (indicated in green): J F **M A** M J J A S **O** N D Soils & landforms: Deep white sand. Edge of salt lakes. IBRA Distribution: COO Florabase records: 12	Low in North. Low in South. Habitat occurs in the survey area. Nine records in TPFL + WAH databases (2000-2009), all 20-25 km SW of Norseman.

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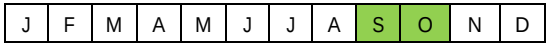
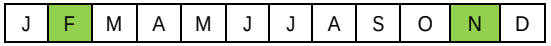
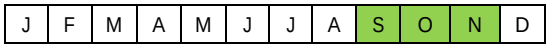
Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Bossiaea aurantiaca	Fabaceae	P1	-	Habit: Compact, rounded or spreading, spinescent shrub, to 1.5 m high. Flower colour: red/yellow Flowering period (indicated in green):  Soils & landforms: Red sand, red clay loam. Low-lying, winter-damp sites. IBRA Distribution: COO Florabase records: 13	High in North. Low in South. Habitat potentially occurs in the survey area. 13 records in TPFL + WAH databases (1968-2014), nearest are ~8 km NW of Norseman (W side of Lake Cowan), 1 km from the W side of COB.
Eucalyptus jimberlanica	Myrtaceae	P1	-	Habit: Mallee or tree, 4-10 m high, bark smooth. Flower colour: pale yellow-yellow-cream Flowering period (indicated in green):  Soils & landforms: Loam. Valley edges. IBRA Distribution: COO Florabase records: 24	High in North. High in South. Habitat occurs in the survey area. Recorded by LS (1995) at Bullen minesite (TSF4) and 15 km S of Norseman (MAY road) and MCPL (2013) just S of the Mt Henry pit (~1 km from the S end of MAY). More than 20 records in TPFL + WAH databases (1967-2018), most at Jimberlana Hill, & various other locations e.g. W of Lake Cowan ~3 km SW of COB, ~2.5 km S of TSF4, NE of Mt Henry pit at MAY.
Eucalyptus websteriana subsp. *norsemanica*	Myrtaceae	P1	-	Habit: Spreading mallee to 3 m high, bark 'minni-ritchi'. Flower colour: yellow Flowering period (indicated in green):  Soils & landforms: Rocky rises. IBRA Distribution: COO Florabase records: 15	High in North. Medium in South. Habitat occurs in the survey area. Recorded by LS (1995) at Lake Cowan Causeway (COB) and MCPL (2002) at COB. More than 10 records in TPFL + WAH databases (1974-2008), all just west of Lake Cowan at or near COB.

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Grevillea phillipsiana	Proteaceae	P1	-	Habit: Prickly shrub, 0.8-1.5 m high. Flower colour: red/red & orange Flowering period (indicated in green): J F M A M J **J** **A** **S** O N D Soils & landforms: Red sand, stony loam. Granite hills. IBRA Distribution: COO, NUL Florabase records: 19	High in North. Medium in South. Habitat occurs in the survey area. Recorded by LS (1995, 1996) at Lake Cowan Causeway. 12 records in TPFL + WAH databases (1951-2002), all just west of Lake Cowan at or near COB.
Lepidosperma lyonsii	Cyperaceae	P1	-	Habit: Tufted rhizomatous, perennial herb (sedge), leaves 0.31-0.53 m high, culms and leaves distichous. Flower colour: brown-light brown, white Flowering period (indicated in green): J F M A **M** **J** J **A** **S** **O** N D Soils & landforms: Pale orange skeletal sandy loam with banded ironstone gravel & rock, well-drained shallow stony loam with quartz. Gentle hill slopes, upper slopes of large hill. IBRA Distribution: COO Florabase records: 48	Low in North. Medium in South. Habitat occurs in the survey area. Recorded by MCPL (2012, 2013) as *Lepidosperma* aff. *lyonsii* at 7 sites around the Mt Henry pit (MAY). Florabase (2018) has one nearby record 15 km NW of Norseman.

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Micromyrtus papillosa	Myrtaceae	P1	-	Habit: Erect or low, spreading shrub, 0.4-1.2 m high. Flower colour: white Flowering period (indicated in green): J F M **A** M J J **A** **S** **O** N D Soils & landforms: Sandy or clay soils, ironstone, granite. Rocky sites, outcrops, on hills from base to summit. IBRA Distribution: COO Florabase records: 16	High in North. Medium in South. Habitat occurs in the survey area. Recorded by LS (1995) at North Royal (NR) and LS (1996) at Bullen Hill North (TSF4) and MCPL (2002) at COB. 16 records in TPFL + WAH databases (1951-2014), most at Jimberlana Hill (NR & GNRHR) and Beacon Hill (OK/TSF4) and also at Brockway Timber Reserve (~5 km N of MAY; 2003) and near the Venture Pit (GNRHR; 1974).
Philotheca apiculata	Rutaceae	P1	-	Habit: Erect shrub, 0.5-1.5 m high. Flower colour: white-pink Flowering period (indicated in green): J F M A M J J **A** **S** **O** **N** D Soils & landforms: Stony clay loam. Rocky outcrops, hillsides. IBRA Distribution: AVW, COO, MAL Florabase records: 28	Medium in North High in South Habitat occurs in the survey area. Recorded by GS (1989) and LS (1996) in the North and LS (1995), Marianna (1996), Botanica (2010), GHD (2010), MCPL (2012, 2013), Umwelt (2016) in the South. More than 20 records in the WAH database (1965-2010), most to the S of Norseman.
Ptilotus rigidus	Amaranthaceae	P1		Habit: Shrub to 0.25 m high. Flower colour: pink Flowering period (indicated in green): J F M A M J J A **S** **O** N D Soils & landforms: Ironstone hills, quartz hills. Associated with salt lakes. IBRA Distribution: COO, MUR Florabase records: 17	Medium in North Low in South Habitat occurs in the survey area. Recorded by LS (1997) at East Polar Bear (~20 km N of NR). One record in WAH database (2015), ~15 km N of NR.

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Acacia kerryana	Fabaceae	P2	-	Habit: Low, spreading, domed shrub, 0.3-1 m high. Flower colour: yellow Flowering period (indicated in green): J F M A M J J A S O N D Soils & landforms: Granitic loamy sand, stony clayey loam or clayey sand. Low stony ridges, undulating plains. IBRA Distribution: COO Florabase records: 16	Medium in North Low in South Habitat occurs in the survey area. Not recorded in any of the previous surveys listed here. Nine records in the TPFL + WAH databases (1980-2014), the most recent ~300 m NE of Jimberlana Hill, one ~700 m N of GNRHR (1991), one ~500 m N of JIPI (1997).
Aotus sp. Dundas (M.A. Burgman 2835)	Fabaceae	P2	-	Habit: Shrub to 0.8 m high, to 1 m wide. Flower colour: orange, yellow/red, yellow-brown Flowering period (indicated in green): J F M A M J J A S O N D Soils & landforms: Sand, clayey sand, fine sandy loam. Flats, dunes on edge of salt lake, gentle undulating plains. IBRA Distribution: COO, MAL Florabase records: 23	Low in North Low in South Habitat occurs in the survey area. Not recorded in any of the previous surveys listed here. Four records on the WAH database (1980-2003), one ~1km from MAY (1980), the rest >5 km away.
Drosera salina	Droseraceae	P2	-	Habit: Erect, flexuose, tuberous, perennial herb to 0.07 m high. Flower colour: white Flowering period (indicated in green): J F M A M J J A S O N D Soils & landforms: Salt-free white sand. Margins of salt lakes. IBRA Distribution: COO, MAL Florabase records: 14	Low in North Low in South Habitat occurs in the survey area. Recorded by PAA (2004) at edge of Lake Dundas, 2 km NW of the SCO haul road. Next nearest record in FB is 45 km SW of SCO (2014).

APPENDIX D: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT IN THE CENTRAL NORSEMAN GOLD SURVEY AREAS

Notes: Refer to Appendix A for State (SCC; Department of Biodiversity, Conservation and Attractions 2017a) and Federal (FCC; EPBC Act) conservation code definitions. IBRA Distribution: AVW – Avon Wheatbelt; COO – Coolgardie; ESP – Esperance Plains; GAS – Gascoyne; GES – Geraldton Sandplains; GVD – Great Victoria Desert; LSD – Little Sandy Desert; MAL – Mallee; MUR – Murchison; NUL – Nullarbor; PIL – Pilbara. Likelihood of occurrence in survey area is based on a Low, Moderate or High ranking. Survey Areas: COB – Cobbler; GLA – Gladstone; GNRHR – Gladstone/North Royal Haul Roads; JIPI – Jimberlana Pipeline; MAY – Maybell; NR – North Royal; SCO – Scotia. FB refers to Florabase (WAH 1998-), TPFL is the Department of Biodiversity, Conservation and Attractions' Threatened and Priority Flora database, and WAH is the Western Australian Herbarium.

Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Thysanotus brachyantherus	Asparagaceae	P2	-	Habit: Caespitose perennial, herb (with roots becoming tuberous), 0.1-0.4 m high. Flower colour: purple Flowering period (indicated in green): J F M A M J J A S **O N D** Soils & landforms: Clay over limestone, loam. IBRA Distribution: COO, ESP, MAL, MUR Florabase records: 16	Low in North Low in South Habitat may occur in the survey area. Not recorded in any of the previous surveys listed here. One record on the WWAAH database (1980), ~2.5 km N of JIPI.
Triglochin sp. Condingup (R. Davis 10877)	Juncaginaceae	P2	-	Habit: Aquatic perennial herb to 0.3 m. Flower colour: green Flowering period (indicated in green): J F M A **M** J J A S **O** N D Soils & landforms: Brown clay and mud in pools in granite. IBRA Distribution: COO, ESP, MAL Florabase records: 5	Low in North Low in South Habitat may occur in the survey area. Not recorded in any of the previous surveys listed here. One record in WAH database (2011), W of Esperance Hwy, ~10 km W of Scotia.
Acacia ancistrophylla var. *perarcuata*	Fabaceae	P3	-	Habit: Rounded or obconic shrub, 0.6-1 m high, to 6 m wide. Flower colour: yellow Flowering period (indicated in green): J F M A M J J **A S** O N D Soils & landforms: Red sand, clay loam, loam. Undulating plains. IBRA Distribution: AVW, COO, MAL Florabase records: 24	Low in North Low in South Habitat may occur in the survey area. Not recorded in any of the previous surveys listed here. One record in WAH database (1980), ~2.5 km SW of SCO.

APPENDIX D: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT IN THE CENTRAL NORSEMAN GOLD SURVEY AREAS

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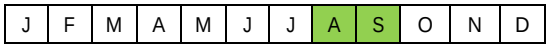
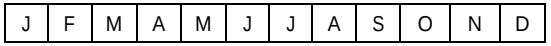
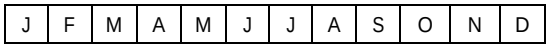
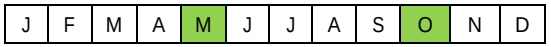
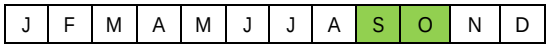
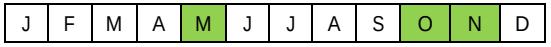
Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Acacia truculenta	Fabaceae	P3	-	Habit: Spreading, straggly, prickly shrub, 0.7-2.2 m high. Flower colour: yellow Flowering period (indicated in green):  Soils & landforms: Sand or loam. Flats and gentle slopes. IBRA Distribution: COO, MAL Florabase records: 12	Low in North Low in South Habitat occurs in the survey area. Recorded by LS (1997) ~12 km SW of SCO. Two records in WAH database, the nearest in Brockway Timber Reserve (2003).
Allocasuarina eriochlamys subsp. *grossa*	Casuarinaceae	P3	-	Habit: Dioecious or monoecious shrub, 1-3 m high, bracteoles prominently exceeding cone. Flower colour: - Flowering period (indicated in green): (flowering period unknown)  Soils & landforms: Stony loam, laterite clay. Granite outcrops. IBRA Distribution: COO, NUL Florabase records: 29	Medium in North High in South Habitat occurs in the survey area. Recorded by LS (1995) at North Royal, MCPL (2012) E of the Mt Henry pit, adjacent to or in MAY, and Umwelt (2016) inside MAY. Twenty records in the WAH database (1935-2007), in and around Norseman.
Atriplex lindleyi subsp. *conduplicata*	Chenopodiaceae	P3	-	Habit: Monoecious, short-lived annual or perennial, herb, ca 0.2 m high. Flower colour: - Flowering period (indicated in green): (flowering period unknown)  Soils & landforms: Crabhole plains. IBRA Distribution: COO, MUR, PIL Florabase records: 5	Low in North Low in South Habitat may occur in the survey area. Not recorded in any of the previous surveys listed here. One record in WAH database (1997) ~500 m W of OK.

APPENDIX D: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT IN THE CENTRAL NORSEMAN GOLD SURVEY AREAS

Notes: Refer to Appendix A for State (SCC; Department of Biodiversity, Conservation and Attractions 2017a) and Federal (FCC; EPBC Act) conservation code definitions. IBRA Distribution: AVW – Avon Wheatbelt; COO – Coolgardie; ESP – Esperance Plains; GAS – Gascoyne; GES – Geraldton Sandplains; GVD – Great Victoria Desert; LSD – Little Sandy Desert; MAL – Mallee; MUR – Murchison; NUL – Nullarbor; PIL – Pilbara. Likelihood of occurrence in survey area is based on a Low, Moderate or High ranking. Survey Areas: COB – Cobbler; GLA – Gladstone; GNRHR – Gladstone/North Royal Haul Roads; JIPI – Jimberlana Pipeline; MAY – Maybell; NR – North Royal; SCO – Scotia. FB refers to Florabase (WAH 1998-), TPFL is the Department of Biodiversity, Conservation and Attractions' Threatened and Priority Flora database, and WAH is the Western Australian Herbarium.

Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Beyeria sulcata var. *truncata*	Euphorbiaceae	P3	-	Habit: Shrub to 1.3 m high. Flower colour: - Flowering period (indicated in green):  Soils & landforms: Gravelly sand. IBRA Distribution: COO, MAL Florabase records: 7	Low in North High in South Habitat occurs in the survey area. Recorded by LS (1996) at Harlequin (near NR) and Active Tailings Dam (~500 m S of GNRHR), Bot (2010) and GHD (2010) in Brockway Timber Reserve on Banded Iron Formation ridges. Two records in WAH database, from Norseman town (no date) and ~5 km W of COB (2018).
Chrysocephalum apiculatum subsp. *norsemanense*	Asteraceae	P3	-	Habit: Annual herb to 0.4 m high. Flower colour: yellow Flowering period (indicated in green):  Soils & landforms: Sandy loam and sandy clay. Sandplains. IBRA Distribution: COO, MUR Florabase records: 17	Medium in North Low in South Habitat may occur in the survey area. Not recorded in any of the previous surveys listed here. Seven records in WAH database (1962-1980), five from around GNRHR and JIPI.
Cyathostemon sp. Salmon Gums (B. Archer 769)	Myrtaceae	P3	-	Habit: Erect, compact shrub, to 3 m high. Flower colour: white Flowering period (indicated in green):  Soils & landforms: Orange sand, white sand or sandy clay over granite, light brown clay with gypsum, saline soils. Flats, dry river beds, near claypans. IBRA Distribution: COO, MAL Florabase records: 14	Low in North Low in South Habitat may occur in the survey area. Recorded by MCPL (2013) on the edge of Lake Dundas, E of the North SCO pit (halfway between MAY and SCO). Two records in WAH database (1979, 1997), both ~40 km SW of SCO.

APPENDIX D: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT IN THE CENTRAL NORSEMAN GOLD SURVEY AREAS

Notes: Refer to Appendix A for State (SCC; Department of Biodiversity, Conservation and Attractions 2017a) and Federal (FCC; EPBC Act) conservation code definitions. IBRA Distribution: AVW – Avon Wheatbelt; COO – Coolgardie; ESP – Esperance Plains; GAS – Gascoyne; GES – Geraldton Sandplains; GVD – Great Victoria Desert; LSD – Little Sandy Desert; MAL – Mallee; MUR – Murchison; NUL – Nullarbor; PIL – Pilbara. Likelihood of occurrence in survey area is based on a Low, Moderate or High ranking. Survey Areas: COB – Cobbler; GLA – Gladstone; GNRHR – Gladstone/North Royal Haul Roads; JIPI – Jimberlana Pipeline; MAY – Maybell; NR – North Royal; SCO – Scotia. FB refers to Florabase (WAH 1998-), TPFL is the Department of Biodiversity, Conservation and Attractions' Threatened and Priority Flora database, and WAH is the Western Australian Herbarium.

Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Diocirea microphylla	Scrophulariaceae	P3	-	Habit: Rounded shrub, 0.45-0.9 m high, to 1 m wide. Flower colour: white, red Flowering period (indicated in green): J F M A M J J A S O **N** **D** Soils & landforms: Red-brown clay loam. IBRA Distribution: COO Florabase records: 18	Low in North Low in South Habitat may occur in the survey area. Recorded by LS (1997) at Albion, between MAY and SCO. No nearby records in TPFL + WAH databases, nor in FB.
Eremophila purpurascens	Scrophulariaceae	P3	-	Habit: Erect, bushy shrub, 0.3-1.5 m high. Flower colour: pink & purple/red Flowering period (indicated in green): J F M A M J J **A** **S** **O** N D Soils & landforms: Sandy clay, stony loam over greenstone. Granite hills & rocks. IBRA Distribution: COO Florabase records: 35	High in North High in South Habitat occurs in the survey area. Recorded by 6 previous surveys in the North (1995-2005) and 7 in the South (1995-2016). 30 records in WAH database (1931-2018), throughout both North and South survey areas.
Eucalyptus brockwayi	Myrtaceae	P3	-	Habit: Tree, 5-20 m high, bark smooth. Flower colour: white-cream Flowering period (indicated in green): J F **M** **A** **M** **J** J A S O N D Soils & landforms: Gravelly sandy loam. Low rocky hills & slopes. IBRA Distribution: COO, MAL Florabase records: 76	High in North Medium in South Habitat occurs in the survey area. Recorded by 4 previous surveys in the North (1989-2005) and 6 in the South (1996-2016). 73 records in WAH database (1936-2018), around Norseman and all N of SCO.

APPENDIX D: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT IN THE CENTRAL NORSEMAN GOLD SURVEY AREAS

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Eucalyptus pterocarpa	Myrtaceae	P3	-	Habit: Tree, to 15 m high, bark smooth throughout, becoming ribbony, light grey over salmon cream. Flower colour: - Flowering period (indicated in green): (flowering period unknown) J F M A M J J A S O N D Soils & landforms: Red-brown sandy loam, yellow-brown silty loam. Creek edges, rocky slopes. IBRA Distribution: COO Florabase records: 17	Low in North Low in South Some habitat occurs in the survey area. Not recorded in any of the previous surveys listed here. 14 records in WAH database (1942-2018), all >5 km W of COB.
Goodenia laevis subsp. *laevis*	Goodeniaceae	P3	-	Habit: Erect, woody shrub (subshrub), 0.1-0.25 m high, largest leaves 15-25 x 1-3mm, entire. Flower colour: yellow Flowering period (indicated in green): J F M A M J J **A S O N D** Soils & landforms: Sandy loam or laterite IBRA Distribution: COO, ESP, MAL Florabase records: 20	Low in North High in South Habitat occurs in the survey area. Recorded by MCPL (2012, 2013) just W of Mt Henry pit and in MAY. 3 records in WAH database (1999-2001), 2 in Brockway Timber Reserve halfway between OK and MAY.
Melaleuca coccinea	Myrtaceae	P3	-	Habit: Much branched shrub, 1.5-2.6 m high, leaf blade elliptic to ovate, 1.5-2.2 times as long as wide. Flower colour: red Flowering period (indicated in green): **J** F M A M J J A **S O N** D Soils & landforms: Sandy loam over granite. Granite outcrops, sandplain, river valleys. IBRA Distribution: COO, ESP Florabase records: 33	Low in North High in South Habitat occurs in the survey area. Recorded by MCPL (2012) and Umwelt (2016), both inside MAY. 4 records in WAH database (1967-2003), the nearest inside MAY (1998).

APPENDIX D: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT IN THE CENTRAL NORSEMAN GOLD SURVEY AREAS

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Melaleuca macronychia subsp. *trygonoides*	Myrtaceae	P3	-	Habit: Multi-stemmed, spreading shrub, 1-4 m high, leaves broadly elliptic. Flower colour: red Flowering period (indicated in green): J **F** M A M J **J** **A** S **O** N D Soils & landforms: Sandy soils. Granite outcrops. IBRA Distribution: COO, MAL Florabase records: 20	Low in North Medium in South Habitat occurs in the survey area. Recorded by PAA (2004) ~1 km E of the SCO Haul Road. This is the only record in the WAH database.
Notisia intonsa	Asteraceae	P3	-	Habit: Annual herb, stem and major branches prostrate to erect, 2.5-15 cm long. Flower colour: pink, brown, grey Flowering period (indicated in green): J F M A M J J A **S** **O** **N** D Soils & landforms: Brown stony saline loams, brown cracking clays, gilgai plains. IBRA Distribution: AVW, COO, ESP, MAL, MUR Florabase records: 25	Low in North Low in South Habitat may occur in the survey area. Not recorded in any of the previous surveys listed here. Two records in WAH database, one ~500 m NW of COB (1999) and the other <1 km from GNRHR (1974).
Phlegmatospermum eremaeum	Brassicaceae	P3	-	Habit: Prostrate to spreading annual herb, to 0.1 m high. Flower colour: white-cream Flowering period (indicated in green): J F M A M **J** **J** **A** **S** **O** N D Soils & landforms: Stony loam or clay on slopes and plains. IBRA Distribution: AVW, COO, HAM, MAL, NUL Florabase records: 16	Low in North Low in South Habitat may occur in the survey area. Not recorded in any of the previous surveys listed here. One WAH database record, ~4 km NW of COB (1951).

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Pityrodia chrysocalyx	Lamiaceae	P3	-	Habit: Erect, branched shrub, 0.3-0.75(-1) m high. Flower colour: white Flowering period (indicated in green): J F M A M J J A S O N D Soils & landforms: Sandy soils. IBRA Distribution: COO, MAL Florabase records: 19	Low in North Low in South Habitat may occur in the survey area. Not recorded in any of the previous surveys listed here. 3 records in WAH database (1967-2002), the most recent ~1 km NW of COB.
Darwinia polycephala	Myrtaceae	P4	-	Habit: Diffuse shrub, 0.1-0.5 m high. Flower colour: red-purple Flowering period (indicated in green): J F M A M J J A S O N D Soils & landforms: Sand, clay. Flats, near salt lakes. IBRA Distribution: MAL Florabase records: 34	Medium in North Low in South Habitat may occur in the survey area. Recorded by LS (1995, 1996) <1 km NW of NR and MCPL (2001) inside GLA. 0 records in WAH database. Nearest FB record >50 km to S of survey areas.
Eremophila parvifolia subsp. *parvifolia*	Scrophulariaceae	P4	-	Habit: Low, divaricate shrub, 0.15-0.7 m high. Flower colour: blue-purple Flowering period (indicated in green): J F M A M J J A S O N D Soils & landforms: Loam, yellow sand, clay, limestone. Plains, claypans. IBRA Distribution: COO,MAL, NUL. Florabase records: 12	Low in North Low in South Habitat may occur in the survey area. Recorded by LS (1997) ~20 km N of NR. 0 records in WAH database. The nearest FB record is >`50 km to the E of the survey areas.

APPENDIX D: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT IN THE CENTRAL NORSEMAN GOLD SURVEY AREAS

Notes: Refer to Appendix A for State (SCC; Department of Biodiversity, Conservation and Attractions 2017a) and Federal (FCC; EPBC Act) conservation code definitions. IBRA Distribution: AVW – Avon Wheatbelt; COO – Coolgardie; ESP – Esperance Plains; GAS – Gascoyne; GES – Geraldton Sandplains; GVD – Great Victoria Desert; LSD – Little Sandy Desert; MAL – Mallee; MUR – Murchison; NUL – Nullarbor; PIL – Pilbara. Likelihood of occurrence in survey area is based on a Low, Moderate or High ranking. Survey Areas: COB – Cobbler; GLA – Gladstone; GNRHR – Gladstone/North Royal Haul Roads; JIPI – Jimberlana Pipeline; MAY – Maybell; NR – North Royal; SCO – Scotia. FB refers to Florabase (WAH 1998-), TPFL is the Department of Biodiversity, Conservation and Attractions' Threatened and Priority Flora database, and WAH is the Western Australian Herbarium.

Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Frankenia glomerata	Frankeniaceae	P4	-	Habit: Prostrate shrub. Flower colour: pink-white Flowering period (indicated in green): J F M A M J J A S O **N** D Soils & landforms: White sand. IBRA Distribution: AVW, COO, GAS, GES, GVD, LSD, MAL Florabase records: 65	Low in North Low in South Habitat may occur in the survey area. Not recorded in any of the previous surveys listed here. One record in TPFL + WAH database (2000) ~3 km N of JIPI.
Myriophyllum petraeum	Haloragaceae	P4	-	Habit: Aquatic, annual herb, stems to 0.3 m long. Flower colour: white Flowering period (indicated in green): J F M A M J J **A S O N D** Soils & landforms: Restricted to ephemeral rockpools on granite outcrops. IBRA Distribution: AVW, COO, ESP, MAL Florabase records: 55	Low in North Low in South Habitat may occur in the survey area. Not recorded in any of the previous surveys listed here. 11 records in TPFL + WAH databases (1976-2011), the most recent ~10 km W of SCO and next nearest ~10 km W of MAY (2000)

APPENDIX E: SITE LOCATIONS FOR THE CENTRAL NORSEMAN GOLD PROJECT SURVEY AREAS, MARCH-APRIL 2020

Note: Site prefix GL indicates Gladstone area, HA is Gladstone area Haul Roads, JI is Jimberlana Pipeline, NR is North Royal area and pipeline, SC is Scotia area and Haul Road. Datum is GDA94 and UTM zone is 51H.

SITE	EASTING	NORTHING
GL01	391822	6440298
GL02	391765	6440462
GL03	391886	6440847
GL04	392940	6440591
GL05	393443	6438776
GL06	393353	6438556
GL07	393811	6438337
GL08	393465	6438298
GL09	393910	6438048
GL10	394134	6438220
GL11	392950	6437474
GL12	392817	6437616
GL13	392602	6438087
GL14	392756	6437870
GL15	392089	6438820
GL16	392243	6438770
GL17	391517	6439374
GL18	392701	6441310
GL19	393027	6441361
GL20	392686	6441240
HA01	387192	6439770
HA02	385986	6439414
HA03	386090	6439281
HA04	388912	6441657
HA05	388281	6441939
HA06	387795	6442016
HA07	387415	6442044

SITE	EASTING	NORTHING
JI01	395331	6443314
JI02	394935	6443288
JI03	394623	6443152
JI04	393443	6443153
JI05	393068	6443123
JI06	392770	6443151
JI07	392329	6443174
JI08	391990	6443208
JI09	391518	6443208
JI10	390842	6442855
JI11	390224	6442456
JI12	389524	6441840
NR01	387150	6443875
NR02	387302	6444178
NR03	387149	6444260
NR04	387463	6444486
NR05	387263	6444951
NR06	387037	6444834
NR07	386600	6445354
NR08	386651	6445849
NR09	386771	6446007
NR10	386648	6445605
NR11	388894	6446295
NR12	388797	6446096
NR13	388884	6445942
NR14	388869	6446053
NR15	388568	6445773
NR16	388204	6445678
NR17	387931	6444799
NR18	387675	6443602
NR19	387375	6443377
NR20	387302	6443032
NR21	387305	6442600
NR22	387316	6442409

SITE	EASTING	NORTHING
SC01	382026	6413846
SC02	382212	6413529
SC03	382131	6413663
SC04	382397	6412901
SC05	382557	6412500
SC06	382661	6412128
SC07	383043	6410790
SC08	383257	6410347
SC09	383413	6410157
SC10	383555	6409749
SC11	383574	6409507
SC12	384479	6408976
SC13	384779	6408939
SC14	385328	6409183
SC15	385324	6409097
SC16	385568	6408367
SC17	386058	6408311
SC18	386107	6407706
SC19	386622	6407460
SC20	387126	6407431
SC21	386939	6406923
SC22	386872	6406129
SC23	387585	6406605
SC24	387184	6406132
SC25	387552	6406116
SC26	387662	6406119
SC27	387250	6405926
SC28	387123	6405513
SC29	387373	6405193
SC30	387115	6405165
SC31	386852	6405191
SC32	386625	6405346
SC33	386771	6405475
SC34	386669	6405707
SC35	385976	6405762
SC36	385477	6405719
SC37	385483	6406136
SC38	385796	6406284
SC39	385994	6406404
SC40	385710	6407181

APPENDIX F: VASCULAR PLANT SPECIES RECORDED AT EACH SITE IN THE NORSEMAN GOLD PROJECT SURVEY AREAS, MARCH-APRIL 2020

Note: * denotes introduced species; SCC denotes State Conservation Code (see Appendix A for definitions); OPPO are species recorded outside quadrats only (N=Northern areas, S=Scotia).

FAMILY	SPECIES	SCC	GLADSTONE																			HAUL ROADS							JIMBERLANA PIPELINE											
			GL01	GL02	GL03	GL04	GL05	GL06	GL07	GL08	GL09	GL10	GL11	GL12	GL13	GL14	GL15	GL16	GL17	GL18	GL19	GL20	HA01	HA02	HA03	HA04	HA05	HA06	HA07	JI01	JI02	JI03	JI04	JI05	JI06	JI07	JI08	JI09	JI10	JI11	JI12
AIZOACEAE	*?Disphyma crassifolium*			x		x		x	x			x			x			x	x		x																			
	?Sarcozona praecox																																								
	Aizoaceae sp.		x																																					
AMARANTHACEAE	*Ptilotus ?obovatus* var. *obovatus*																																							
	Ptilotus obovatus var. *obovatus*																			x																					
	?Ptilotus sp.																																								
	Ptilotus sp.																																								
	Surreya diandra							x	x				x		x			x																							
APOCYNACEAE	*Alyxia buxifolia*																														x										x
	?Vincetoxicum lineare																																								
ASPARAGACEAE	*?Thysanotus* sp.																																								
ASPHODELACEAE	* *Asphodelus fistulosus*																																								
ASTERACEAE	*Asteridea chaetopoda*												x																												
	?Cratystylis conocephala																							x																	
	Cratystylis conocephala						x														x						x	x		x	x		x								
	* *Gazania linearis*														x																										
	Olearia muelleri						x			x											x						x	x				x	x								
	Olearia sp. Eremicola (Diels & Pritzel s.n. PERTH 00449628)																																								
	Senecio spanomerus														x																										
	Senecio sp.												x																												
	Asteraceae sp.			x	x													x	x	x																					
BORAGINACEAE	*Halgania ?andromedifolia*																																								
CASUARINACEAE	*Allocasuarina acutivalvis* subsp. *acutivalvis*																																								
	Allocasuarina campestris																																								
	Allocasuarina helmsii																												x					#	x	x		x	x	
	Casuarina obesa										x			x		x	x																								
CHENOPODIACEAE	*Atriplex ?lindleyi*											x																													
	Atriplex lindleyi subsp. *inflata*																																								
	Atriplex ?nana								x		x						x																								
	Atriplex nana														x																										
	Atriplex ?nummularia																						x	x	x	x				x		x									x
	Atriplex ?vesicaria			x	x	x	x	x		x	x			x		x	x	x	x	x	x		x	x		x	x	x		x	x	x	x				x			x
	Atriplex sp.							x			x		x		x																										
	Enchylaena lanata																																								
	Enchylaena tomentosa var. *tomentosa*																			x																					

APPENDIX F: VASCULAR PLANT SPECIES RECORDED AT EACH SITE IN THE NORSEMAN GOLD PROJECT SURVEY AREAS, MARCH-APRIL 2020

Note: * denotes introduced species; SCC denotes State Conservation Code (see Appendix A for definitions); OPPO are species recorded outside quadrats only (N=Northern areas, S=Scotia).

FAMILY	SPECIES	SCC	NORTH ROYAL																				
			NR01	NR02	NR03	NR04	NR05	NR06	NR07	NR08	NR09	NR10	NR11	NR12	NR13	NR14	NR15	NR16	NR17	NR18	NR19	NR20	NR21	NR22
AIZOACEAE	*?Disphyma crassifolium*						x			x							x							
	?Sarcozona praecox													x										
	Aizoaceae sp.																							
AMARANTHACEAE	*Ptilotus ?obovatus* var. *obovatus*																							
	Ptilotus obovatus var. *obovatus*																							
	?Ptilotus sp.																							
	Ptilotus sp.												x											
	Surreya diandra																	x						
APOCYNACEAE	*Alyxia buxifolia*											x												
	?Vincetoxicum lineare																							
ASPARAGACEAE	*?Thysanotus* sp.																							
ASPHODELACEAE	* *Asphodelus fistulosus*																					x		
ASTERACEAE	*Asteridea chaetopoda*																							
	?Cratystylis conocephala																							
	Cratystylis conocephala								x		x	x			x	x				x	x	x		
	* *Gazania linearis*																							
	Olearia muelleri											x			x		x		x					
	Olearia sp. Eremicola (Diels & Pritzel s.n. PERTH 00449628)															x								
	Senecio spanomerus																							
	Senecio sp.																							
	Asteraceae sp.																							
BORAGINACEAE	*Halgania ?andromedifolia*																							
CASUARINACEAE	*Allocasuarina acutivalvis* subsp. *acutivalvis*																							
	Allocasuarina campestris																						x	x
	Allocasuarina helmsii																						x	x
	Casuarina obesa																							
CHENOPODIACEAE	*Atriplex ?lindleyi*																							
	Atriplex lindleyi subsp. *inflata*																							
	Atriplex ?nana																							
	Atriplex nana																							
	Atriplex ?nummularia																			x	x	x		
	Atriplex ?vesicaria			x		x	x	x	x	x					x	x	x	x	x	x	x	x		
	Atriplex sp.																							
	Enchylaena lanata																							
	Enchylaena tomentosa var. *tomentosa*									x														

APPENDIX F: VASCULAR PLANT SPECIES RECORDED AT EACH SITE IN THE NORSEMAN GOLD PROJECT SURVEY AREAS, MARCH-APRIL 2020

Note: * denotes introduced species; SCC denotes State Conservation Code (see Appendix A for definitions); OPPO are species recorded outside quadrats only (N=Northern areas, S=Scotia).

FAMILY	SPECIES	SCC	SCOTIA																																						OPPO
			SC01	SC02	SC03	SC04	SC05	SC06	SC07	SC08	SC09	SC10	SC11	SC12	SC13	SC14	SC15	SC16	SC17	SC18	SC19	SC20	SC21	SC22	SC23	SC24	SC25	SC26	SC27	SC28	SC29	SC30	SC31	SC32	SC33	SC34	SC35	SC36	SC37	SC38	SC39	SC40	
AIZOACEAE	*?Disphyma crassifolium*																											x			x												
	?Sarcozona praecox																																										
	Aizoaceae sp.																																										
AMARANTHACEAE	*Ptilotus ?obovatus* var. *obovatus*																								x					x	x	x											
	Ptilotus obovatus var. *obovatus*																																										
	?Ptilotus sp.																																x										
	Ptilotus sp.																																										
	Surreya diandra																											x															
APOCYNACEAE	*Alyxia buxifolia*			x		x	x		x				x		x	x	x	x			x	x	x		x	x		x	x	x		x			x		x					x	
	?Vincetoxicum lineare									x																						x											
ASPARAGACEAE	*?Thysanotus* sp.				x																																						
ASPHODELACEAE	* *Asphodelus fistulosus*																																										
ASTERACEAE	*Asteridea chaetopoda*																																										
	?Cratystylis conocephala					x								x					x		x						x										x		x	x			
	Cratystylis conocephala																														x												
	* *Gazania linearis*																																										
	Olearia muelleri		x		x	x	x	x	x			x		x	x						x	x	x	x	x		x			x						x	x		x			x	
	Olearia sp. Eremicola (Diels & Pritzel s.n. PERTH 00449628)				x										x	x																											
	Senecio spanomerus																																										
	Senecio sp.																																										
	Asteraceae sp.												x		x																x		x										
BORAGINACEAE	*Halgania ?andromedifolia*		x																																								
CASUARINACEAE	*Allocasuarina acutivalvis* subsp. *acutivalvis*																									x																	
	Allocasuarina campestris																																x	x									
	Allocasuarina helmsii																																										
	Casuarina obesa																																										
CHENOPODIACEAE	*Atriplex ?lindleyi*																																										
	Atriplex lindleyi subsp. *inflata*																																										S
	Atriplex ?nana																																										
	Atriplex nana																																										
	Atriplex ?nummularia																																										
	Atriplex ?vesicaria													x					x		x						x	x			x									x			
	Atriplex sp.																																										
	Enchylaena lanata																																							x			
	Enchylaena tomentosa var. *tomentosa*																																										

APPENDIX F: VASCULAR PLANT SPECIES RECORDED AT EACH SITE IN THE NORSEMAN GOLD PROJECT SURVEY AREAS, MARCH-APRIL 2020

Note: * denotes introduced species; SCC denotes State Conservation Code (see Appendix A for definitions); OPPO are species recorded outside quadrats only (N=Northern areas, S=Scotia).

FAMILY	SPECIES	SCC	GLADSTONE																			HAUL ROADS							JIMBERLANA PIPELINE										
			GL01	GL02	GL03	GL04	GL05	GL06	GL07	GL08	GL09	GL10	GL11	GL12	GL13	GL14	GL15	GL16	GL17	GL18	GL19	GL20	HA01	HA02	HA03	HA04	HA05	HA06	HA07	JI01	JI02	JI03	JI04	JI05	JI06	JI07	JI08	JI09	JI10	JI11	JI12
CHENOPODIACEAE	*Maireana ?amoena*																																							
(continued)	*Maireana amoena*			x	x			x	x				x		x		x	x	x																					
	Maireana appressa				x					x				x		x										x									x		x			
	Maireana erioclada																																							
	Maireana lobiflora																				x																			
	Maireana suaedifolia																																							
	Maireana sp.																				x										x							x		x
	Rhagodia crassifolia																									x														
	Rhagodia ?drummondii							x	x		x			x		x				x																				
	Rhagodia drummondii																																							
	Rhagodia ?eremaea																																							
	Rhagodia ?ulicina																																							
	Rhagodia ulicina																									x														
	?Rhagodia sp.																																							
	Rhagodia sp.																																	x						
	Salsola australis																																				x			
	Sclerolaena cuneata																																							
	Sclerolaena diacantha																						x	x						x										
	Sclerolaena sp.																																							
	Tecticornia sp. 1																							x	x															
	Tecticornia sp. 2											x	x																											
	Tecticornia sp. 3		x	x		x		x			x		x	x	x	x	x				x																		
	Chenopodiaceae sp.		x	x			x		x		x		x	x		x	x	x			x		x	x		x				x										
CUPRESSACEAE	*Callitris preissii*																																							
CYPERACEAE	*Gahnia* sp. South West (K.L. Wilson & K. Frank KLW 9266)																																		x					
	Lepidosperma sp.																																						x	
	Cyperaceae sp.																																							
DILLENIACEAE	*Hibbertia pungens*																																							
	?Hibbertia sp.																																							
	Hibbertia sp.																																							
ERICACEAE	*Conostephium drummondii*																																							
EUPHORBIACEAE	*Beyeria lechenaultii*																																							
	Beyeria sulcata var. *brevipes*																										x	x	x		x						x		x		
	Beyeria sp.																																							
FABACEAE	*Acacia ?ancistrophylla* var. *ancistrophylla*																																							
	Acacia ?beauverdiana																																							
	Acacia ?hemiteles																												x								x		x	

APPENDIX F: VASCULAR PLANT SPECIES RECORDED AT EACH SITE IN THE NORSEMAN GOLD PROJECT SURVEY AREAS, MARCH-APRIL 2020

Note: * denotes introduced species; SCC denotes State Conservation Code (see Appendix A for definitions); OPPO are species recorded outside quadrats only (N=Northern areas, S=Scotia).

FAMILY	SPECIES	SCC	NORTH ROYAL																				
			NR01	NR02	NR03	NR04	NR05	NR06	NR07	NR08	NR09	NR10	NR11	NR12	NR13	NR14	NR15	NR16	NR17	NR18	NR19	NR20	NR21	NR22
CHENOPODIACEAE (continued)	*Maireana ?amoena*						x																	
	Maireana amoena																x							
	Maireana appressa													x			x				x			
	Maireana erioclada			x																				
	Maireana lobiflora																							
	Maireana suaedifolia												x			x								
	Maireana sp.			x		x													x	x	x			
	Rhagodia crassifolia																							
	Rhagodia ?drummondii												x			x								
	Rhagodia drummondii																							
	Rhagodia ?eremaea																							
	Rhagodia ?ulicina																							
	Rhagodia ulicina			x																				
	?Rhagodia sp.																							
	Rhagodia sp.																							
	Salsola australis					x																		
	Sclerolaena cuneata						x			x														
	Sclerolaena diacantha								x															
	Sclerolaena sp.													x										
	Tecticornia sp. 1																							
	Tecticornia sp. 2						x	x																
	Tecticornia sp. 3			x	x	x				x				x	x	x	x	x	x		x			
	Chenopodiaceae sp.		x			x									x			x						
CUPRESSACEAE	*Callitris preissii*												x											
CYPERACEAE	*Gahnia* sp. South West (K.L. Wilson & K. Frank KLW 9266)																							
	Lepidosperma sp.																						x	x
	Cyperaceae sp.																							
DILLENIACEAE	*Hibbertia pungens*																							
	?Hibbertia sp.																	x						
	Hibbertia sp.																							
ERICACEAE	*Conostephium drummondii*																							
EUPHORBIACEAE	*Beyeria lechenaultii*																							
	Beyeria sulcata var. *brevipes*																							
	Beyeria sp.														x									
FABACEAE	*Acacia ?ancistrophylla* var. *ancistrophylla*																							
	Acacia ?beauverdiana																						x	x
	Acacia ?hemiteles																							

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FAMILY	SPECIES	SCC	SCOTIA																																						OPPO
			SC01	SC02	SC03	SC04	SC05	SC06	SC07	SC08	SC09	SC10	SC11	SC12	SC13	SC14	SC15	SC16	SC17	SC18	SC19	SC20	SC21	SC22	SC23	SC24	SC25	SC26	SC27	SC28	SC29	SC30	SC31	SC32	SC33	SC34	SC35	SC36	SC37	SC38	SC39	SC40	
CHENOPODIACEAE (continued)	*Maireana ?amoena*																													x												
	Maireana amoena																											x														
	Maireana appressa																																									
	Maireana erioclada																																									
	Maireana lobiflora																																									
	Maireana suaedifolia																																									
	Maireana sp.																																									
	Rhagodia crassifolia																																									
	Rhagodia ?drummondii																											x														
	Rhagodia drummondii																													x												
	Rhagodia ?eremaea																		x																		x	x					
	Rhagodia ?ulicina																												x													
	Rhagodia ulicina																				x																						
	?Rhagodia sp.																								x																		
	Rhagodia sp.																																										
	Salsola australis																																									
	Sclerolaena cuneata																																									
	Sclerolaena diacantha														x				x		x																	x		x			
	Sclerolaena sp.																																									
	Tecticornia sp. 1																																									
	Tecticornia sp. 2																																									
	Tecticornia sp. 3																																									
	Chenopodiaceae sp.													x					x		x	x			x													x		x	x		
CUPRESSACEAE	*Callitris preissii*																																									
CYPERACEAE	*Gahnia* sp. South West (K.L. Wilson & K. Frank KLW 9266)																																									
	Lepidosperma sp.															x	x															x		x								
	Cyperaceae sp.															x																											
DILLENIACEAE	*Hibbertia pungens*																									x			x														
	?Hibbertia sp.																																										
	Hibbertia sp.																	x		x																		x		x			
ERICACEAE	*Conostephium drummondii*															x																											
EUPHORBIACEAE	*Beyeria lechenaultii*																															x											
	Beyeria sulcata var. *brevipes*					x	x	x	x	x		x	x					x		x		x	x	x	x		x		x	x						x			x			x
	Beyeria sp.																																										
FABACEAE	*Acacia ?ancistrophylla* var. *ancistrophylla*												x																														
	Acacia ?beauverdiana																																										
	Acacia ?hemiteles																																										

APPENDIX F: VASCULAR PLANT SPECIES RECORDED AT EACH SITE IN THE NORSEMAN GOLD PROJECT SURVEY AREAS, MARCH-APRIL 2020

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FAMILY	SPECIES	SCC	GLADSTONE																			HAUL ROADS						JIMBERLANA PIPELINE										
			GL01	GL02	GL03	GL04	GL05	GL06	GL07	GL08	GL09	GL10	GL11	GL12	GL13	GL14	GL15	GL16	GL17	GL18	GL19	GL20	HA01	HA02	HA03	HA04	HA05	HA06	HA07	JI01	JI02	JI03	JI04	JI05	JI06	JI07	JI08	JI09	JI10	JI11	JI12
FABACEAE	*Acacia ?kalgoorliensis*							x																															
(continued)	*Acacia ?nyssophylla*																																						
	Acacia ?resinistipulea																																						
	Acacia assimilis subsp. *assimilis*																																						
	Acacia camptoclada																																						
	Acacia erinacea																																					x	
	Acacia inamabilis																																x						
	Acacia inceana subsp. *inceana*																																						
	Acacia kerryana	P2																												P2									
	Acacia merrallii																										x	x											
	Acacia neurophylla subsp. *neurophylla*																																						
	Acacia pachypoda																																	x					
	Acacia sp.																																		x		x	x	
	Bossiaea barbarae																																						
	Daviesia aphylla																																						
	Daviesia argillacea																																						
	?Daviesia sp.																					x																	
	Senna artemisioides ?subsp. *×artemisioides*																																						
	Senna artemisioides ?subsp. *filifolia*																										x		x		x		x				x		x
	?Swainsona sp.														x																								
	Fabaceae sp.																																						
FRANKENIACEAE	*Frankenia interioris* var. *interioris*			x																																		
	Frankenia sp.							x	x				x				x	x	x	x																			
GERANIACEAE	*?Erodium* sp.																																						
GOODENIACEAE	*Dampiera latealata*																																						
	?Scaevola spinescens																																						
	Scaevola spinescens		x	x			x	x	x	x							x			x	x							x	x			x	x					x	
HEMEROCALLIDACEAE	*Dianella revoluta*																																						
	Dianella revoluta var. *divaricata*																																						x
LAMIACEAE	*Prostanthera ?semiteres*																																						
	?Westringia rigida									x																	x		x			x		x		x		x	x
	?Lamiaceae sp.																			x																			
LAURACEAE	*Cassytha* sp.													x		x																							
MALVACEAE	Malvaceae sp.																																						
MONTIACEAE	*Calandrinia lefroyensis*	P1																												P1									

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FAMILY	SPECIES	SCC	NORTH ROYAL																				
			NR01	NR02	NR03	NR04	NR05	NR06	NR07	NR08	NR09	NR10	NR11	NR12	NR13	NR14	NR15	NR16	NR17	NR18	NR19	NR20	NR21	NR22
FABACEAE (continued)	*Acacia ?kalgoorliensis*																							
	Acacia ?nyssophylla																							
	Acacia ?resinistipulea																							
	Acacia assimilis subsp. *assimilis*																							
	Acacia camptoclada																							
	Acacia erinacea								x			x												
	Acacia inamabilis				x		x																	
	Acacia inceana subsp. *inceana*														x	x								x
	Acacia kerryana	P2																						
	Acacia merrallii																							
	Acacia neurophylla subsp. *neurophylla*																							
	Acacia pachypoda																							
	Acacia sp.																							
	Bossiaea barbarae																							
	Daviesia aphylla																							
	Daviesia argillacea																							
	?Daviesia sp.																							
	Senna artemisioides ?subsp. *×artemisioides*																							
	Senna artemisioides ?subsp. *filifolia*								x				x								x			
	?Swainsona sp.																							
	Fabaceae sp.																							
FRANKENIACEAE	*Frankenia interioris* var. *interioris*																							
	Frankenia sp.															x					x			
GERANIACEAE	*?Erodium* sp.									x														
GOODENIACEAE	*Dampiera latealata*																							
	?Scaevola spinescens									x								x						
	Scaevola spinescens				x								x		x	x	x		x					
HEMEROCALLIDACEAE	*Dianella revoluta*																							
	Dianella revoluta var. *divaricata*																						x	x
LAMIACEAE	*Prostanthera ?semiteres*																							
	?Westringia rigida											x	x		x	x								
	?Lamiaceae sp.																							
LAURACEAE	*Cassytha* sp.																							
MALVACEAE	Malvaceae sp.																							
MONTIACEAE	*Calandrinia lefroyensis*	P1																						

APPENDIX F: VASCULAR PLANT SPECIES RECORDED AT EACH SITE IN THE NORSEMAN GOLD PROJECT SURVEY AREAS, MARCH-APRIL 2020

Note: * denotes introduced species; SCC denotes State Conservation Code (see Appendix A for definitions); OPPO are species recorded outside quadrats only (N=Northern areas, S=Scotia).

FAMILY	SPECIES	SCC	SCOTIA																																								OPPO
			SC01	SC02	SC03	SC04	SC05	SC06	SC07	SC08	SC09	SC10	SC11	SC12	SC13	SC14	SC15	SC16	SC17	SC18	SC19	SC20	SC21	SC22	SC23	SC24	SC25	SC26	SC27	SC28	SC29	SC30	SC31	SC32	SC33	SC34	SC35	SC36	SC37	SC38	SC39	SC40	
FABACEAE (continued)	*Acacia ?kalgoorliensis*																																										
	Acacia ?nyssophylla														x																												
	Acacia ?resinistipulea									x			x																														
	Acacia assimilis subsp. *assimilis*															x																											
	Acacia camptoclada				x																																						
	Acacia erinacea							x		x	x		x												x						x												
	Acacia inamabilis																																										
	Acacia inceana subsp. *inceana*																																										
	Acacia kerryana	P2																																									N
	Acacia merrallii		x		x		x				x	x	x				x																						x				
	Acacia neurophylla subsp. *neurophylla*																																x	x									
	Acacia pachypoda																																										
	Acacia sp.															x																											
	Bossiaea barbarae											x		x		x																											
	Daviesia aphylla										x	x																															
	Daviesia argillacea									x	x			x																													
	?Daviesia sp.		x			x																																					
	Senna artemisioides ?subsp. ×*artemisioides*		x		x	x	x	x				x							x						x							x							x				
	Senna artemisioides ?subsp. *filifolia*																																										
	?Swainsona sp.																																										
	Fabaceae sp.																			x																							
FRANKENIACEAE	*Frankenia interioris* var. *interioris*																																										
	Frankenia sp.																											x			x												
GERANIACEAE	*?Erodium* sp.																																										
GOODENIACEAE	*Dampiera latealata*																									x																	
	?Scaevola spinescens																											x			x												
	Scaevola spinescens				x	x	x	x	x	x	x	x	x	x	x	x	x			x		x		x	x	x	x	x		x	x				x				x			x	
HEMEROCALLIDACEAE	*Dianella revoluta*												x		x																												
	Dianella revoluta var. *divaricata*																																										
LAMIACEAE	*Prostanthera ?semiteres*																																	x									
	?Westringia rigida			x			x										x																										
	?Lamiaceae sp.																																										
LAURACEAE	*Cassytha* sp.																																										
MALVACEAE	Malvaceae sp.																			x																							
MONTIACEAE	*Calandrinia lefroyensis*	P1																																									N

APPENDIX F: VASCULAR PLANT SPECIES RECORDED AT EACH SITE IN THE NORSEMAN GOLD PROJECT SURVEY AREAS, MARCH-APRIL 2020

Note: * denotes introduced species; SCC denotes State Conservation Code (see Appendix A for definitions); OPPO are species recorded outside quadrats only (N=Northern areas, S=Scotia).

FAMILY	SPECIES	SCC	GLADSTONE																			HAUL ROADS						JIMBERLANA PIPELINE											
			GL01	GL02	GL03	GL04	GL05	GL06	GL07	GL08	GL09	GL10	GL11	GL12	GL13	GL14	GL15	GL16	GL17	GL18	GL19	GL20	HA01	HA02	HA03	HA04	HA05	HA06	HA07	JI01	JI02	JI03	JI04	JI05	JI06	JI07	JI08	JI09	JI10	JI11	JI12
MYRTACEAE	*Aluta appressa*																																								
	Calothamnus gilesii																																								
	Eucalyptus clelandiorum																																								
	Eucalyptus distuberosa subsp. *distuberosa*																								x																
	Eucalyptus dundasii																						x		x						x										
	Eucalyptus extensa																								x																
	Eucalyptus ?flocktoniae subsp. *flocktoniae*																																								
	Eucalyptus ?gracilis																																								
	Eucalyptus gracilis																																								
	Eucalyptus ?laevis																									x															
	Eucalyptus ?lesouefii																																								
	Eucalyptus lesouefii					x																			x	x				x	x	x									
	Eucalyptus ?longicornis																																								
	Eucalyptus longicornis																																								
	Eucalyptus ?longissima																																			x					
	Eucalyptus ?oleosa subsp. *oleosa*																																		x		x	x	x	x	
	Eucalyptus planipes																												x												
	Eucalyptus prolixa																					x																			
	Eucalyptus ?salicola															x																									
	Eucalyptus salubris						x			x											x									x			x								
	Eucalyptus spreta		x																				x																		
	Eucalyptus torquata																									x	x														
	Eucalyptus transcontinentalis																																								
	Eucalyptus ?urna																							x																	x
	Eucalyptus sp.																											x		x											
	Melaleuca ?brevifolia																																								
	Melaleuca ?hamata																																			x				x	
	Melaleuca ?lanceolata																								x															
	Melaleuca lanceolata																															x									
	Melaleuca quadrifaria																																								
	Melaleuca ?sheathiana						x																x	x		x	x														x
	Melaleuca sheathiana																																								
	Melaleuca ?sparsiflora																																								
	Melaleuca sp. 1																																								
	Melaleuca sp. 2																																			x			x		
	Myrtaceae sp.													x		x															x								x		
OXALIDACEAE	*Oxalis ?perennans*																		x	x																					
PITTOSPORACEAE	*Billardiera lehmanniana*																																								
	Pittosporum angustifolium			x																																					
POACEAE	*Enneapogon avenaceus*																			x																					
	Enteropogon ramosus			x																																					
	Eragrostis lacunaria														x																										

APPENDIX F: VASCULAR PLANT SPECIES RECORDED AT EACH SITE IN THE NORSEMAN GOLD PROJECT SURVEY AREAS, MARCH-APRIL 2020

Note: * denotes introduced species; SCC denotes State Conservation Code (see Appendix A for definitions); OPPO are species recorded outside quadrats only (N=Northern areas, S=Scotia).

FAMILY	SPECIES	SCC	NORTH ROYAL																					
			NR01	NR02	NR03	NR04	NR05	NR06	NR07	NR08	NR09	NR10	NR11	NR12	NR13	NR14	NR15	NR16	NR17	NR18	NR19	NR20	NR21	NR22
MYRTACEAE	*Aluta appressa*																							
	Calothamnus gilesii																						x	
	Eucalyptus clelandiorum																							
	Eucalyptus distuberosa subsp. *distuberosa*																							
	Eucalyptus dundasii							x																
	Eucalyptus extensa																							
	Eucalyptus ?flocktoniae subsp. *flocktoniae*																							
	Eucalyptus ?gracilis																							
	Eucalyptus gracilis																							
	Eucalyptus ?laevis																							
	Eucalyptus ?lesouefii																							
	Eucalyptus lesouefii		x	x		x	x	x	x		x				x				x		x			
	Eucalyptus ?longicornis																							
	Eucalyptus longicornis																			x				
	Eucalyptus ?longissima																						x	x
	Eucalyptus ?oleosa subsp. *oleosa*																							
	Eucalyptus planipes																							
	Eucalyptus prolixa																							
	Eucalyptus ?salicola																							
	Eucalyptus salubris			x	x	x		x	x			x					x		x					
	Eucalyptus spreta																							
	Eucalyptus torquata																							
	Eucalyptus transcontinentalis																							
	Eucalyptus ?urna																							
	Eucalyptus sp.				x													x						
	Melaleuca ?brevifolia																							
	Melaleuca ?hamata																						x	
	Melaleuca ?lanceolata																							
	Melaleuca lanceolata																							
	Melaleuca quadrifaria										x													
	Melaleuca ?sheathiana		x	x					x			x			x					x	x			
	Melaleuca sheathiana																							
	Melaleuca ?sparsiflora																							
	Melaleuca sp. 1																							
	Melaleuca sp. 2																							
	Myrtaceae sp.																							
OXALIDACEAE	*Oxalis ?perennans*																							
PITTOSPORACEAE	*Billardiera lehmanniana*																							
	Pittosporum angustifolium												x			x								
POACEAE	*Enneapogon avenaceus*																							
	Enteropogon ramosus																							
	Eragrostis lacunaria																							

APPENDIX F: VASCULAR PLANT SPECIES RECORDED AT EACH SITE IN THE NORSEMAN GOLD PROJECT SURVEY AREAS, MARCH-APRIL 2020

Note: * denotes introduced species; SCC denotes State Conservation Code (see Appendix A for definitions); OPPO are species recorded outside quadrats only (N=Northern areas, S=Scotia).

FAMILY	SPECIES	SCC	SCOTIA																																							OPPO
			SC01	SC02	SC03	SC04	SC05	SC06	SC07	SC08	SC09	SC10	SC11	SC12	SC13	SC14	SC15	SC16	SC17	SC18	SC19	SC20	SC21	SC22	SC23	SC24	SC25	SC26	SC27	SC28	SC29	SC30	SC31	SC32	SC33	SC34	SC35	SC36	SC37	SC38	SC39	SC40	
MYRTACEAE	*Aluta appressa*																																	x									
	Calothamnus gilesii																																										
	Eucalyptus clelandiorum						x	x			x																																
	Eucalyptus distuberosa subsp. *distuberosa*																																										
	Eucalyptus dundasii					x		x	x	x	x	x		x									x	x			x									x	x					x	
	Eucalyptus extensa																																										
	Eucalyptus ?flocktoniae subsp. *flocktoniae*					x	x	x			x			x				x				x	x																		x	x	
	Eucalyptus ?gracilis				x																																						
	Eucalyptus gracilis														x		x																										
	Eucalyptus ?laevis																																										
	Eucalyptus ?lesouefii						x								x		x																						x				
	Eucalyptus lesouefii																	x				x	x	x	x		x															x	
	Eucalyptus ?longicornis					x																																		x			
	Eucalyptus longicornis						x												x	x																	x	x	x				
	Eucalyptus ?longissima																																										
	Eucalyptus ?oleosa subsp. *oleosa*																																										
	Eucalyptus planipes																																										
	Eucalyptus prolixa																																										
	Eucalyptus ?salicola															x	x																										
	Eucalyptus salubris									x			x																														
	Eucalyptus spreta													x																													
	Eucalyptus torquata																								x				x	x		x			x								
	Eucalyptus transcontinentalis				x																																						
	Eucalyptus ?urna		x	x	x															x	x																			x			
	Eucalyptus sp.			x						x	x				x									x			x			x								x			x	x	
	Melaleuca ?brevifolia																																										N
	Melaleuca ?hamata															x																	x	x									
	Melaleuca ?lanceolata																																										
	Melaleuca lanceolata															x																			x								
	Melaleuca quadrifaria																																										
	Melaleuca ?sheathiana			x	x		x			x					x			x	x	x	x	x	x	x	x	x		x		x	x						x	x	x		x		x	
	Melaleuca sheathiana																																								x	x	
	Melaleuca ?sparsiflora																																										N
	Melaleuca sp. 1																																										N
	Melaleuca sp. 2																																										
	Myrtaceae sp.									x										x																							
OXALIDACEAE	*Oxalis ?perennans*																																										
PITTOSPORACEAE	*Billardiera lehmanniana*															x																											
	Pittosporum angustifolium																																										
POACEAE	*Enneapogon avenaceus*																																										
	Enteropogon ramosus																																										
	Eragrostis lacunaria																																										

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FAMILY	SPECIES	SCC	GLADSTONE																			HAUL ROADS						JIMBERLANA PIPELINE											
			GL01	GL02	GL03	GL04	GL05	GL06	GL07	GL08	GL09	GL10	GL11	GL12	GL13	GL14	GL15	GL16	GL17	GL18	GL19	GL20	HA01	HA02	HA03	HA04	HA05	HA06	HA07	JI01	JI02	JI03	JI04	JI05	JI06	JI07	JI08	JI09	JI10	JI11	JI12
POACEAE (continued)	*Paspalidium gracile*																			x																					
	Triodia scariosa																																	x	x	x		x	x	
	Triodia sp.																										x	x					x								
	Poaceae sp. 1																																								
	Poaceae sp. 2																																								
	Poaceae sp. 3		x								x		x	x		x				x																					
	Poaceae sp.			x	x		x		x														x																		
PROTEACEAE	*Grevillea acuaria*																										x										x				
	Grevillea anethifolia																																			x	x		x		
	Grevillea ?nematophylla subsp. *nematophylla*																																								
	Hakea commutata																																								
	Proteaceae sp.																																								
PTERIDACEAE	*Cheilanthes* sp.																																								
RESTIONACEAE	Restionaceae sp.			x	x										x		x		x	x										x			x							
RHAMNACEAE	*Cryptandra graniticola*																																						x		
	?Stenanthemum stipulosum									x																						x									
	?Trymalium myrtillus subsp. *myrtillus*																																								
RUTACEAE	*?Geijera linearifolia*						x		x					x						x											x	x	x								
	Phebalium tuberculosum																																								
SANTALACEAE	*Exocarpos aphyllus*							x	x	x																x	x			x	x	x	x			x					
	Santalum acuminatum						x			x																	x									x					x
	Santalum ?spicatum																																								
	Santalum sp.																									x															
SAPINDACEAE	*Dodonaea ?lobulata*																																								
	Dodonaea ?microzyga																																					x		x	
	Dodonaea microzyga																																								
	Dodonaea ?stenozyga																											x													
	Dodonaea stenozyga																																								
	Dodonaea viscosa subsp. *angustissima*							x	x								x		x	x	x																				
SCROPHULARIACEAE	*Eremophila alternifolia*																																								
	Eremophila ?decipiens						x	x	x										x	x							x			x			x						x		
	Eremophila ?deserti			x																																		x			
	Eremophila ?gibbosa																																							x	
	Eremophila ?glabra																																								
	Eremophila ?interstans subsp. *virgata*																																								
	Eremophila interstans subsp. *virgata*																												x												
	Eremophila ?ionantha																										x	x			x		x		x		x	x			

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FAMILY	SPECIES	SCC	NORTH ROYAL																					
			NR01	NR02	NR03	NR04	NR05	NR06	NR07	NR08	NR09	NR10	NR11	NR12	NR13	NR14	NR15	NR16	NR17	NR18	NR19	NR20	NR21	NR22
	Paspalidium gracile																							
	Triodia scariosa																						x	x
Poaceae (ctd.)	*Triodia* sp.																							
	Poaceae sp. 1																					x		
	Poaceae sp. 2																							
	Poaceae sp. 3																							
	Poaceae sp.																							
PROTEACEAE	*Grevillea acuaria*												x											
	Grevillea anethifolia																						x	x
	Grevillea ?nematophylla subsp. *nematophylla*																							
	Hakea commutata																							
	Proteaceae sp.																							
PTERIDACEAE	*Cheilanthes* sp.																							
RESTIONACEAE	Restionaceae sp.																							
RHAMNACEAE	*Cryptandra graniticola*																						x	x
	?Stenanthemum stipulosum											x												x
	?Trymalium myrtillus subsp. *myrtillus*																							
RUTACEAE	*?Geijera linearifolia*														x	x				x				
	Phebalium tuberculosum																							
SANTALACEAE	*Exocarpos aphyllus*						x					x	x			x					x	x		
	Santalum acuminatum							x				x	x			x								
	Santalum ?spicatum																							
	Santalum sp.																							
SAPINDACEAE	*Dodonaea ?lobulata*								x															
	Dodonaea ?microzyga																							x
	Dodonaea microzyga																							
	Dodonaea ?stenozyga																							
	Dodonaea stenozyga										x	x												
	Dodonaea viscosa subsp. *angustissima*												x											
SCROPHULARIACEAE	*Eremophila alternifolia*																							
	Eremophila ?decipiens						x			x						x			x		x	x		
	Eremophila ?deserti																							
	Eremophila ?gibbosa																						x	x
	Eremophila ?glabra																x							
	Eremophila ?interstans subsp. *virgata*							x																
	Eremophila interstans subsp. *virgata*																		x					
	Eremophila ?ionantha																			x				

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			SC01	SC02	SC03	SC04	SC05	SC06	SC07	SC08	SC09	SC10	SC11	SC12	SC13	SC14	SC15	SC16	SC17	SC18	SC19	SC20	SC21	SC22	SC23	SC24	SC25	SC26	SC27	SC28	SC29	SC30	SC31	SC32	SC33	SC34	SC35	SC36	SC37	SC38	SC39	SC40	
POACEAE (continued)	*Paspalidium gracile*																								x																		
	Triodia scariosa																																										
	Triodia sp.																																										
	Poaceae sp. 1																																										
	Poaceae sp. 2																																x										
	Poaceae sp. 3																																										
	Poaceae sp.					x		x					x		x		x		x	x	x								x														
PROTEACEAE	*Grevillea acuaria*																x										x	x			x												
	Grevillea anethifolia																																										
	Grevillea ?nematophylla subsp. *nematophylla*																									x						x											
	Hakea commutata																											x															
	Proteaceae sp.				x					x			x																														
PTERIDACEAE	*Cheilanthes* sp.																																x										
RESTIONACEAE	Restionaceae sp.																																										
RHAMNACEAE	*Cryptandra graniticola*																																x	x									
	?Stenanthemum stipulosum																													x		x			x								
	?Trymalium myrtillus subsp. *myrtillus*		x																										x														
RUTACEAE	*?Geijera linearifolia*				x																						x	x										x					
	Phebalium tuberculosum						x																																				
SANTALACEAE	*Exocarpos aphyllus*					x	x	x	x		x	x					x						x	x			x	x	x	x	x										x	x	
	Santalum acuminatum					x		x	x	x			x				x					x			x		x		x										x				
	Santalum ?spicatum																														x												
	Santalum sp.																																										
SAPINDACEAE	*Dodonaea ?lobulata*																																										
	Dodonaea ?microzyga																																										
	Dodonaea microzyga									x			x												x	x			x	x		x	x		x								
	Dodonaea ?stenozyga																																										
	Dodonaea stenozyga							x	x		x		x									x	x																				
	Dodonaea viscosa subsp. *angustissima*																																										
SCROPHULARIACEAE	*Eremophila alternifolia*																																										N
	Eremophila ?decipiens																														x												
	Eremophila ?deserti																																										
	Eremophila ?gibbosa																																										
	Eremophila ?glabra																		x		x	x			x		x	x		x						x							
	Eremophila ?interstans subsp. *virgata*																																										
	Eremophila interstans subsp. *virgata*									x			x								x																x	x	x	x	x	x	
	Eremophila ?ionantha		x					x			x	x																															

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FAMILY	SPECIES	SCC	GLADSTONE																			HAUL ROADS						JIMBERLANA PIPELINE											
			GL01	GL02	GL03	GL04	GL05	GL06	GL07	GL08	GL09	GL10	GL11	GL12	GL13	GL14	GL15	GL16	GL17	GL18	GL19	GL20	HA01	HA02	HA03	HA04	HA05	HA06	HA07	JI01	JI02	JI03	JI04	JI05	JI06	JI07	JI08	JI09	JI10	JI11	JI12
SCROPHULARIACEAE	*Eremophila parvifolia* subsp. *?parvifolia*	P4								x											x							x	P4	x		x								
(continued)	*Eremophila ?psilocalyx*									x													x				x														
	Eremophila scoparia					x	x	x	x	x											x					x	x	x						x							x
	Eremophila sp.																														x			x							
	?Myoporum montanum																																								
	Myoporum montanum																																								
	Myoporum ?platycarpum						x										x																								
SOLANACEAE	*Lycium australe*																																								
	Solanum nummularium						x	x												x								x	x												
THYMELAEACEAE	*Pimelea microcephala* subsp. *microcephala*			x																										x											
ZYGOPHYLLACEAE	*Roepera* sp.																																								

APPENDIX F: VASCULAR PLANT SPECIES RECORDED AT EACH SITE IN THE NORSEMAN GOLD PROJECT SURVEY AREAS, MARCH-APRIL 2020

Note: * denotes introduced species; SCC denotes State Conservation Code (see Appendix A for definitions); OPPO are species recorded outside quadrats only (N=Northern areas, S=Scotia).

FAMILY	SPECIES	SCC	NORTH ROYAL																				
			NR01	NR02	NR03	NR04	NR05	NR06	NR07	NR08	NR09	NR10	NR11	NR12	NR13	NR14	NR15	NR16	NR17	NR18	NR19	NR20	NR21	NR22
SCROPHULARIACEAE (continued)	*Eremophila parvifolia* subsp. *?parvifolia*	P4						x	x	x								x	x	x	x			
	Eremophila ?psilocalyx								x			x												
	Eremophila scoparia						x	x	x	x			x		x	x	x	x	x					
	Eremophila sp.																							
	?Myoporum montanum														x									
	Myoporum montanum								x				x											
	Myoporum ?platycarpum																							
SOLANACEAE	*Lycium australe*																							
	Solanum nummularium									x					x						x	x		
THYMELAEACEAE	*Pimelea microcephala* subsp. *microcephala*									x			x			x						x		
ZYGOPHYLLACEAE	*Roepera* sp.			x																				

APPENDIX F: VASCULAR PLANT SPECIES RECORDED AT EACH SITE IN THE NORSEMAN GOLD PROJECT SURVEY AREAS, MARCH-APRIL 2020

Note: * denotes introduced species; SCC denotes State Conservation Code (see Appendix A for definitions); OPPO are species recorded outside quadrats only (N=Northern areas, S=Scotia).

FAMILY	SPECIES	SCC	SCOTIA																																								OPPO
			SC01	SC02	SC03	SC04	SC05	SC06	SC07	SC08	SC09	SC10	SC11	SC12	SC13	SC14	SC15	SC16	SC17	SC18	SC19	SC20	SC21	SC22	SC23	SC24	SC25	SC26	SC27	SC28	SC29	SC30	SC31	SC32	SC33	SC34	SC35	SC36	SC37	SC38	SC39	SC40	
SCROPHULARIACEAE (continued)	*Eremophila parvifolia* subsp. *?parvifolia*	P4																																									
	Eremophila ?psilocalyx										x	x	x		x							x	x	x	x		x			x					x								
	Eremophila scoparia		x	x		x	x							x				x	x	x		x		x													x		x	x			
	Eremophila sp.																																										
	?Myoporum montanum																					x																				x	
	Myoporum montanum																																										
	Myoporum ?platycarpum										x		x																x			x											
SOLANACEAE	*Lycium australe*																																										N
	Solanum nummularium																											x															
THYMELAEACEAE	*Pimelea microcephala* subsp. *microcephala*																														x												
ZYGOPHYLLACEAE	*Roepera* sp.																		x																								

APPENDIX G: A SUMMARY OF VEGETATION COMMUNITIES RECORDED WITHIN THE NORTHERN SURVEY AREAS, APRIL 2020

Vegetation Community Description	
Vegetation map code: NW1	
Structural	
Closed low mallet forest of *Eucalyptus prolixa.*	
Associated species	
?Daviesia sp.	
Soils and Landforms: Red-brown clayey loam flats with deep litter.	
Outcropping: Absent.	
Total Area: 1.0 ha	Proportion of total survey area: 0.05 %
Number of Quadrats: 1	Species richness: 2.0 ± 0.0 (s.e.)

Representative Photograph

Quadrat GL20

APPENDIX G: A SUMMARY OF VEGETATION COMMUNITIES RECORDED WITHIN THE NORTHERN SURVEY AREAS, APRIL 2020

Vegetation Community Description
Vegetation map code: NW2 Structural Open mallee woodland of *Eucalyptus planipes* and occasional *Eucalyptus longissima* over sparse mid-low shrubland of *Allocasuarina helmsii, Eremophila* spp. and ?*Westringia rigida* over open-sparse low hummock grassland of *Triodia scariosa.* Associated species *Grevillea anethifolia, Melaleuca* spp. Soils and Landforms: Occasionally rocky red-brown sandy clayey loam on flats to mid-slopes. Outcropping: Occasional, granite. Total Area: 67.4 ha — Proportion of total survey area: 3.43 % Number of Quadrats: 7 — Species richness: 11.3 ± 0.9 (s.e.)
Representative Photograph
 Quadrat JI06

APPENDIX G: A SUMMARY OF VEGETATION COMMUNITIES RECORDED WITHIN THE NORTHERN SURVEY AREAS, APRIL 2020

Vegetation Community Description
Vegetation map code: NW2a Structural Isolated clumps of *Eucalyptus* ?*oleosa* subsp. *oleosa* low mallees over tall *Acacia* sp. shrubland over isolated clumps of *Grevillea anethifolia* mid shrubs over isolated clumps of *Triodia scariosa* mid hummock grass. Associated species *Allocasuarina helmsii, Eremophila* ?*ionantha* Soils and Landforms: Red-brown sandy clayey loam in a creekline. Outcropping: Absent Total Area: 1.0 ha — Proportion of total survey area: 0.05 % Number of Quadrats: 1 — Species richness: 8.0 ± 0.0 (s.e.)
Representative Photograph
 Quadrat JI07

APPENDIX G: A SUMMARY OF VEGETATION COMMUNITIES RECORDED WITHIN THE NORTHERN SURVEY AREAS, APRIL 2020

Vegetation Community Description
Vegetation map code: NW2b Structural Isolated clumps of *Eucalyptus planipes* mallees over mid sparse shrubland of *Acacia* sp., *Senna artemisioides* ?subsp. *filifolia* and *Eremophila* ?*deserti* over low open shrubland of *Dodonaea* ?*microzyga.* Associated species *Eremophila* ?*ionantha* Soils and Landforms: Red-brown sandy loam on mid slopes with evidence of sheet flow. Outcropping: Absent. Total Area: 0.6 ha — Proportion of total survey area: 0.03 % Number of Quadrats: 1 — Species richness: 10.0 ± 0.0 (s.e.)
Representative Photograph
 Quadrat JI09

APPENDIX G: A SUMMARY OF VEGETATION COMMUNITIES RECORDED WITHIN THE NORTHERN SURVEY AREAS, APRIL 2020

Vegetation Community Description
Vegetation map code: NW3 Structural Open low woodland of *Eucalyptus lesouefii* over open shrubland of *Melaleuca quadrifaria* over *Dodonaea stenozyga* and *Cratystylis conocephala.* Associated species - Soils and Landforms: Brown clay on low rises. Outcropping: Absent. Total Area: 3.4 ha — Proportion of total survey area: 0.17 % Number of Quadrats: 1 — Species richness: 4.0 ± 0.0 (s.e.)
Representative Photograph
 Quadrat NR09

APPENDIX G: A SUMMARY OF VEGETATION COMMUNITIES RECORDED WITHIN THE NORTHERN SURVEY AREAS, APRIL 2020

Vegetation Community Description
Vegetation map code: NW4 Structural Open low woodland of *Eucalyptus lesouefii* over tall isolated clumps of *Melaleuca ?sheathiana* and *Eremophila* spp. shrubs over low isolated clumps of *Cratystylis conocephala* shrubs. Associated species *Atriplex ?vesicaria.* Soils and Landforms: Brown sandy clayey loam with some surface rocks on flats and gentle slopes. Outcropping: Absent. Total Area: 58.2 ha — Proportion of survey area: 2.96 % Number of Quadrats: 6 — Species richness: 10.7 ± 2.2 (s.e.)
Representative Photograph
 Quadrat NR13

APPENDIX G: A SUMMARY OF VEGETATION COMMUNITIES RECORDED WITHIN THE NORTHERN SURVEY AREAS, APRIL 2020

Vegetation Community Description
Vegetation map code: NW5 Structural Mid woodland of *Eucalyptus lesouefii* and *Eucalyptus salubris* over mid isolated shrubs of *Eremophila scoparia* and occasional low *E. parvifola* subsp. ?*parvifolia* (P4) shrubs over open low chenopod shrubland of *Tecticornia* sp. 3 and *Atriplex* ?*vesicaria.* Associated species *Maireana* spp. Soils and Landforms: Orange to brown sandy clay with some surface gravel on flats and gentle slopes. Outcropping: Absent. Total Area: 288.8 ha — Proportion of total survey area: 14.71 % Number of Quadrats: 9 — Species richness: 8.7 ± 0.9 (s.e.)
Representative Photograph
 Quadrat NR17

APPENDIX G: A SUMMARY OF VEGETATION COMMUNITIES RECORDED WITHIN THE NORTHERN SURVEY AREAS, APRIL 2020

Vegetation Community Description

Vegetation map code: NW6

Structural

Mid woodland of *Eucalyptus salubris* over isolated tall *Santalum acuminatum* shrubs over isolated mid *Eremophila* spp. shrubs over low sparse shrubland of *Atriplex ?vesicaria, Cratystylis conocephala* and *Olearia muelleri.*

Associated species

Exocarpos aphyllus, ?*Geijera linearifolia, Scaevola spinescens*.

Soils and Landforms: Red-brown clayey loam with occasional surface rocks on ridges and upland flats.

Outcropping: Absent.

Total Area: 64.8 ha

Proportion of total survey area: 3.30 %

Number of Quadrats: 3

Species richness: 13.3 ± 0.7 (s.e.)

Representative Photograph

Quadrat GL05

APPENDIX G: A SUMMARY OF VEGETATION COMMUNITIES RECORDED WITHIN THE NORTHERN SURVEY AREAS, APRIL 2020

Vegetation Community Description
Vegetation map code: NW7 Structural Low woodland of *Eucalyptus salubris* and *E. lesouefii* over tall sparse shrubland of *Melaleuca* ?*sheathiana* or *M. lanceolata* over mid-low sparse shrubland of *Atriplex* ?*nummularia* and *Atriplex* ?*vesicaria.* Associated species *Eremophila scoparia, Santalum acuminatum* Soils and Landforms: Red to brown sandy clay with scattered surface rocks on flats and lower slopes. Outcropping: Total area: 55.7 ha — Proportion of total survey area: 2.84 % Number of Quadrats: 5 — Species richness: 12.0 ± 0.6 (s.e.)
Representative Photograph
 Quadrat NR07

APPENDIX G: A SUMMARY OF VEGETATION COMMUNITIES RECORDED WITHIN THE NORTHERN SURVEY AREAS, APRIL 2020

Vegetation Community Description
Vegetation map code: NW8 Structural Open low woodland of *Eucalyptus torquata* over mid sparse shrubland of *Beyeria sulcata* var. *brevipes* and *Eremophila* spp. over low isolated clumps of shrubs of *Scaevola spinescens, Atriplex ?vesicaria* and *Olearia muelleri.* Associated species Soils and Landforms: Red to brown clayey loam on lower slopes. Outcropping: Absent. Total area: 12.9 ha — Proportion of total survey area: 0.66 % Number of Quadrats: 2 — Species richness: 14.0 ± 0.0 (s.e.)
Representative Photograph
 Quadrat HA05

APPENDIX G: A SUMMARY OF VEGETATION COMMUNITIES RECORDED WITHIN THE NORTHERN SURVEY AREAS, APRIL 2020

Vegetation Community Description
Vegetation map code: NW9 Structural Low woodland of *Eucalyptus spreta* over isolated samphire shrubs of *Tecticornia* sp. 3 and isolated tussock grassland of Poaceae sp. 3. Associated species *Scaevola spinescens* Soils and Landforms: Dry, powdery cream clayey loam on low dunes ridges near salt lakes. Outcropping: Absent. Total area: 10.3 ha — Proportion of total survey area: 0.53 % Number of Quadrats: 1 — Species richness: 6.0 ± 0.0 (s.e.)
Representative Photograph
 Quadrat GL01

APPENDIX G: A SUMMARY OF VEGETATION COMMUNITIES RECORDED WITHIN THE NORTHERN SURVEY AREAS, APRIL 2020

Vegetation Community Description

Vegetation map code: NW10

Structural

Mid woodland of mixed *Eucalyptus* spp. over tall sparse shrubland of *Melaleuca* ?*sheathiana* over open mid-low shrubland of *Atriplex* ?*nummularia* and *A.* ?*vesicaria.*

Associated species

Eucalyptus distuberosa subsp. *distuberosa, E. dundasii, E.* ?*urna, ?Geijera linearifolia.*

Soils and Landforms: Brown clayey loam with some surface rocks on gentle mid slopes.

Outcropping: Absent.

Total area: 35.2 ha

Proportion of total survey area: 1.79 %

Number of Quadrats: 5

Species richness: 8.20 ± 0.4 (s.e.)

Representative Photograph

Quadrat HA02

APPENDIX G: A SUMMARY OF VEGETATION COMMUNITIES RECORDED WITHIN THE NORTHERN SURVEY AREAS, APRIL 2020

Vegetation Community Description
Vegetation map code: NW11 Structural Open low woodland of *Casuarina obesa* over low isolated clumps of *Rhagodia* ?*drummondii*, *Atriplex* ?*vesicaria* and *Tecticornia* sp. 3 chenopod shrubs and isolated tussock grassland of Poaceae sp. 3. Associated species *Maireana appressa.* Soils and Landforms: Dry, powdery cream clay on low dune ridges at the edge of salt lakes. Outcropping: Absent. Total area: 76.3 ha — Proportion of total survey area: 3.89 % Number of Quadrats: 3 — Species richness: 9.3 ± 0.7 (s.e.)
Representative Photograph
 Quadrat GL12

APPENDIX G: A SUMMARY OF VEGETATION COMMUNITIES RECORDED WITHIN THE NORTHERN SURVEY AREAS, APRIL 2020

Vegetation Community Description
Vegetation map code: NW12 Structural Isolated clumps of *Pittosporum angustifolium* low trees over isolated clumps of mid *Eremophila* ?*deserti* shrubs over sparse low shrubland of *Atriplex* ?*vesicaria*, *Tecticornia* sp. 3 and *Frankenia interioris* var. *interioris.* Associated species *Maireana amoena.* Soils and Landforms: Dry, powdery brown clayey loam on low dune ridges near salt lakes. Outcropping: Absent. Total area: 31.2 ha — Proportion of total survey area: 1.59 % Number of Quadrats: 1 — Species richness: 14.0 ± 0.0 (s.e.)
Representative Photograph
 Quadrat GL02

APPENDIX G: A SUMMARY OF VEGETATION COMMUNITIES RECORDED WITHIN THE NORTHERN SURVEY AREAS, APRIL 2020

Vegetation Community Description
Vegetation map code: NS1 Structural Open shrubland of *Callitris preissii,* ?*Geijera linearifolia* over *Senna artemisioides* ?subsp. *filifolia*, *Pittosporum angustifolium*, *Santalum acuminatum* and *Eremophila scoparia* over ?*Westringia rigida, Scaevola spinescens* and *Rhagodia ?drummondii* over mixed low chenopod shrubs. Associated species *Exocarpos aphyllus, Maireana suaedifolia, Pimelea microcephala* subsp. *microcephala.* Soils and Landforms: Red sandy clay on flats near salt lakes. Outcropping: Absent. Total area: 8.9 ha — Proportion of total survey area: 0.45 % Number of Quadrats: 2 — Species richness: 16.0 ± 1.0 (s.e.)
Representative Photograph
 Quadrat NR11

APPENDIX G: A SUMMARY OF VEGETATION COMMUNITIES RECORDED WITHIN THE NORTHERN SURVEY AREAS, APRIL 2020

Vegetation Community Description
Vegetation map code: NS2 Structural Low shrubland of *Eremophila* ?*decipiens*, *Tecticornia* sp. 3 and *Atriplex* ?*vesicaria.* Associated species ?*Disphyma crassifolium, Eremophila scoparia.* Soils and Landforms: Red-brown clay on valley floors. Outcropping: Absent. Total area: 7.0 ha — Proportion of total survey area: 0.35 % Number of Quadrats: 1 — Species richness: 12.0 ± 0.0 (s.e.)
Representative Photograph
 Quadrat NR08

APPENDIX G: A SUMMARY OF VEGETATION COMMUNITIES RECORDED WITHIN THE NORTHERN SURVEY AREAS, APRIL 2020

Vegetation Community Description
Vegetation map code: NS3 Structural Low open chenopod shrubland of *Maireana amoena, Atriplex* spp. and *Tecticornia* spp. Associated species *Atriplex* ?*vesicaria, Frankenia* sp., Restionaceae sp., *Surreya diandra, Tecticornia* sp. 3. Soils and Landforms: Cream to red sandy clay on flats on the edge of salt lakes and salty drainages. Outcropping: Absent. Total area: 318.6 ha — Proportion of total survey area: 16.22 % Number of Quadrats: 7 — Species richness: 7.30 ± 1.2 (s.e.)
Representative Photograph
 Quadrat GL13

APPENDIX G: A SUMMARY OF VEGETATION COMMUNITIES RECORDED WITHIN THE NORTHERN SURVEY AREAS, APRIL 2020

Vegetation Community Description
Vegetation map code: NS4 Structural Sparse mid shrubland of *Dodonaea viscosa* subsp. *angustissima* over open low shrubland of *Eremophila* ?*decipiens, Scaevola spinescens, Atriplex* ?*vesicaria, Rhagodia ?drummondii,* mixed *Chenopodiaceae* spp. and *Frankenia* sp. Associated species *Eremophila scoparia, Exocarpos aphyllus,* ?*Geijera linearifolia, Maireana amoena, Tecticornia* sp. 3. Soils and Landforms: Red-brown sandy clay on low rises at the edge of salt lakes and salty drainages. Outcropping: Absent. Total area: 159.4 ha — Proportion of total survey area: 8.12 % Number of Quadrats: 4 — Species richness: 14.5 ± 1.0 (s.e.)
Representative Photograph
 Quadrat GL07

APPENDIX H: A SUMMARY OF VEGETATION COMMUNITIES RECORDED WITHIN THE SCOTIA SURVEY AREA, APRIL 2020

Vegetation Community Description

Vegetation map code: W1

Structural

Woodland of *Eucalyptus dundasii* and *Eucalyptus salubris* and occasional *Eucalyptus clelandiorum* over *Scaevola spinescens*, *Beyeria sulcata*, *Exocarpos aphyllus* and *Santalum acuminatum.*

Associated species

Acacia erinacea, *Olearia muelleri.*

Soils and Landforms: Orange to pale brown clayey loam on flats and gently sloping terrain.

Outcropping: Occasional.

Total Area: 3.9 ha

Proportion of Scotia survey area: 0.56 %

Number of Quadrats: 5

Species richness: 14.0 ± 1.1 (s.e.)

Representative Photograph

Quadrat SC10

APPENDIX H: A SUMMARY OF VEGETATION COMMUNITIES RECORDED WITHIN THE SCOTIA SURVEY AREA, APRIL 2020

Vegetation Community Description

Vegetation map code: W2

Structural

Woodland to open woodland of *Eucalyptus flocktoniae* complex, *Eucalyptus lesouefii* and *Eucalyptus dundasii*, over sparse shrubland of *Melaleuca sheathiana*, *Scaevola spinescens*, *Beyeria sulcata* and *Exocarpos aphyllus*, over isolated shrubs of *Olearia muelleri.*

Associated species

Eremophila scoparia, *Senna artemisioides.*

Soils and Landforms: Orange-red to brown clayey loam on flats and slopes.

Outcropping: Absent.

Total Area: 290.8 ha

Proportion of total survey area: 41.49 %

Number of Quadrats: 16

Species richness: 10.7 ± 0.8 (s.e.)

Representative Photograph

Quadrat SC05

APPENDIX H: A SUMMARY OF VEGETATION COMMUNITIES RECORDED WITHIN THE SCOTIA SURVEY AREA, APRIL 2020

Vegetation Community Description	
Vegetation map code: W3	
Structural	
Open woodland of *Eucalyptus longicornis* over open shrubland of *Melaleuca sheathiana*, *Cratystylis conocephala* over mixed sparse chenopod shrubland.	
Associated species	
Eremophila interstans subsp. *virgata*, *Sclerolaena diacantha*, *Rhagodia* ?*eremaea*	
Soils and Landforms: Pale brown clayey loam flats.	
Outcropping: Absent.	
Total Area: 226.4 ha	**Proportion of total survey area:** 32.30 %
Number of Quadrats: 5	**Species richness:** 10.2 ± 0.7 (s.e.)

Representative Photograph

Quadrat SC35

APPENDIX H: A SUMMARY OF VEGETATION COMMUNITIES RECORDED WITHIN THE SCOTIA SURVEY AREA, APRIL 2020

Vegetation Community Description
Vegetation map code: W4 **Structural** Open woodland of *Eucalyptus torquata* over *Melaleuca sheathiana*, *Dodonaea microzyga* and *Alyxia buxifolia.* **Associated species** *Exocarpos aphyllus*, *Myoporum platycarpum*, *Ptilotus obovatus.* **Soils and Landforms:** Red-brown clayey loam on hillsides and slopes. **Outcropping:** Absent. **Total Area:** 71.3 ha **Proportion of total survey area:** 10.17 % **Number of Quadrats:** 5 **Species richness:** 12.0 ± 1.6 (s.e.)
Representative Photograph
 Quadrat SC30

APPENDIX H: A SUMMARY OF VEGETATION COMMUNITIES RECORDED WITHIN THE SCOTIA SURVEY AREA, APRIL 2020

Vegetation Community Description

Vegetation map code: W5

Structural

Open woodland of *Eucalyptus gracilis* and *Eucalyptus flocktoniae*, over sparse shrubland of *Olearia* sp. Eremicola (Diels & Pritzel s.n. PERTH 00449628) and *Olearia muelleri.*

Associated species

Scaevola spinescens, *Sclerolaena diacantha.*

Soils and Landforms: Red-orange clayey loam flats .

Outcropping: Absent.

Total Area: 1.7 ha

Proportion of total survey area: 0.25 %

Number of Quadrats: 2

Species richness: 12.5 ± 0.5 (s.e.)

Representative Photograph

Quadrat SC13

APPENDIX H: A SUMMARY OF VEGETATION COMMUNITIES RECORDED WITHIN THE SCOTIA SURVEY AREA, APRIL 2020

Vegetation Community Description

Vegetation map code: S1

Structural
Shrubland of *Allocasuarina campestris*, *Acacia neurophylla* subsp. *neurophylla*, *Melaleuca* ?*hamata* and *Cryptandra graniticola* over mixed Asteraceae sp. and *Lepidosperma* sp.

Associated species

Dodonaea microzyga.

Soils and Landforms: Red-brown clayey loam and ironstone outcropping on upper slopes.

Outcropping: Moderate.

Total Area: 14.0 ha

Proportion of survey area: 1.99 %

Number of Quadrats: 2

Species richness: 8.0 ± 1.0 (s.e.)

Representative Photograph

Quadrat SC31

APPENDIX H: A SUMMARY OF VEGETATION COMMUNITIES RECORDED WITHIN THE SCOTIA SURVEY AREA, APRIL 2020

Vegetation Community Description

Vegetation map code: S2

Structural

Sparse shrubland of *Scaevola spinescens*, *Exocarpos aphyllus* and *Grevillea acuaria* over *Atriplex* spp. and *Maireana* spp.

Associated species

Rhagodia drummondii, *Santalum spicatum*, ?*Geijera linearifolia.*

Soils and Landforms: Orange clay flats on salt lake margins.

Outcropping: Absent.

Total Area: 8.3 ha

Proportion of total survey area: 1.18 %

Number of Quadrats: 2

Species richness: 14.5 ± 0.5 (s.e.)

Representative Photograph

Quadrat SC26

APPENDIX H: A SUMMARY OF VEGETATION COMMUNITIES RECORDED WITHIN THE SCOTIA SURVEY AREA, APRIL 2020

Vegetation Community Description

Vegetation map code: S3

Structural

Open woodland of *Eucalyptus* ?*salicola* over open shrubland of *Bossiaea barbarae*, *Acacia assimilis* subsp. *assimilis* and *Melaleuca lanceolata* over *Lepidosperma* sp.

Associated species

Melaleuca lanceolata, *Conostephium drummondii.*

Soils and Landforms: Pale orange sand flats on salt lake margins.

Outcropping: Absent.

Total Area: 0.2 ha

Proportion of total survey area: 0.02 %

Number of Quadrats: 1

Species richness: 13.0 ± 0.0 (s.e.)

Representative Photograph

Quadrat SC14

APPENDIX H: A SUMMARY OF VEGETATION COMMUNITIES RECORDED WITHIN THE SCOTIA SURVEY AREA, APRIL 2020

Vegetation Community Description	
Vegetation map code: SC4	
Structural	
Open shrubland of *Grevillea nematophylla* subsp. *nematophylla* over *Hibbertia pungens*, *Allocasuarina acutivalvis* subsp. *acutivalvis* and *Dampiera latealata*.	
Associated species	
Dodonaea microzyga, *Alyxia buxifolia.*	
Soils and Landforms: Orange clay loam and ironstone outcropping.	
Outcropping: Moderate.	
Total area: 2.4 ha	**Proportion of total survey area:** 0.09 %
Number of Quadrats: 1	**Species richness:** 7.0 ± 0.0 (s.e.)

Representative Photograph

Quadrat SC24