
FLORA & VEGETATION ASSESSMENT

ARROWSMITH NORTH SURVEY AREA

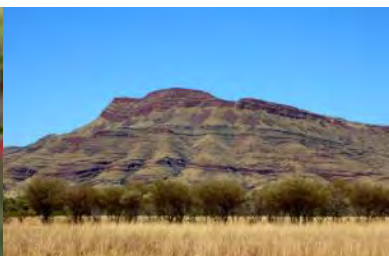
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LIST OF ABBREVIATIONS

BAM Act:	<i>Biosecurity and Agriculture Management Act 2007 (WA)</i>
BC Act:	<i>Biodiversity Conservation Act 2016 (WA)</i>
BOM:	Bureau of Meteorology
DAWE:	Department of Agriculture, Water and the Environment
DBCA:	Department of Biodiversity, Conservation and Attractions
DotEE	Department of the Environment and Energy
DPIRD:	Department of Primary Industries and Regional Development
EP Act:	<i>Environmental Protection Act 1986 (WA)</i>
EPA:	Environmental Protection Authority
EPBC Act:	<i>Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)</i>
IBRA:	Interim Biogeographical Regionalisation for Australia
Mattiske Consulting:	Mattiske Consulting Pty Ltd
NVIS:	National Vegetation Information System
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)
WAOL:	Western Australian Organism List

EXECUTIVE SUMMARY

Mattiske Consulting Pty Ltd (Mattiske Consulting) was commissioned in October 2017 by Preston Consulting Pty Ltd on behalf of VRX Silica Ltd to undertake a flora and vegetation survey of the Arrowsmith survey area. This survey occurred during the months of October and November 2018. In August 2019 Mattiske Consulting was again commissioned by VRX Silica Ltd to undertake a flora and vegetation survey of the Arrowsmith survey area. The 2019 survey occurred during the months of October and November and included an extension to both the Northern and Central survey areas within the Arrowsmith survey area. The Arrowsmith North survey area occupies an area of approximately 1727 ha, and is located between the towns of Eneabba and Dongara, Western Australia. A total of 98 survey sites were established in the Arrowsmith North survey area in 2018, and a further 15 survey sites were established in 2019. These 113 survey sites were selected to sample all vegetation types, with replication, within the survey area.

Rainfall in the three months preceding the October/November 2018 survey was above the long term average rainfall for the area, while in October/November 2019, rainfall in the three months preceding the survey was below average. Based on a range of factors including the proportion of potential flora recorded (estimated at 82 %), the proportion of annual taxa recorded (11.87 %), and vegetation quadrat distribution within the survey area, it can be concluded that the survey has not been constrained by factors which would adversely affect the survey outcomes nor the conclusions derived from the data used to support vegetation analysis.

A total of 219 vascular plant taxa, representative of 112 genera and 44 families, were recorded within survey quadrats within the Arrowsmith North survey area. The majority of taxa recorded were representative of the Myrtaceae (27 taxa), Proteaceae (25 taxa), and Fabaceae (21 taxa) families. The majority of the taxa recorded were widespread both locally and more broadly within the associated biogeographical subregion. Two species recorded in the Arrowsmith North survey area, *Tricoryne* sp. Mullewa (G.J. Keighery 12080) and *Synaphea spinulosa* subsp. *borealis*, represented extensions to their current known distribution.

No threatened flora pursuant to Part 2, Division 1, and Subdivision 2 of the *Biodiversity Conservation Act 2016* were recorded in the survey area. Eight priority taxa, as listed by the Western Australian Herbarium were recorded in the survey area. These were *Comesperma rhadinocarpum* (P3), *Hemilandra* sp. Eneabba (H. Demarz 3687) (P3), *Hypocalymma gardneri* (P3), *Leschenaultia juncea* (P3), *Persoonia rudis* (P3), *Banksia elegans* (P4), *Schoenus griffinianus* (P4) and *Stawellia dimorphantha* (P4).

Vegetation mapping based upon the quadrat-based species data resulted in eight vegetation communities comprising one Low Open Woodland, one Thicket to Scrub, one Scrub and five Heath communities. The most dominant vegetation type was the H4 vegetation community which was present throughout the northern and central portion of the survey area. This community accounted for 30.00 % of the total area surveyed. The second most commonly represented vegetation was the H2 vegetation community which was present in the eastern, southern and central portion of the survey area and accounting for 18.19 % of the total area surveyed. The H1 community, primarily recorded in the south western portion of the survey area accounted for 16.48 % of the total area surveyed. The remaining five communities account for 35.33 % of the survey area. The most restricted vegetation community defined was the S3 community, accounting for 1.43 % of the survey area.

Overall, the vegetation communities mapped and species recorded in the Arrowsmith North survey area were consistent with the historical mapping of Beard (1976, 1990). The majority of the survey area is situated on sand plains supporting mixed open to closed heath communities consisting of *Banksia attenuata*, *Banksia hookeriana*, *Melaleuca leuropoma* and *Conospermum triplinervium*, over mixed Myrtaceae, Restionaceae and Haemodoraceae species. The vegetation communities recorded within the survey area are not locally or regionally unique and are well represented in the wider area. It is recommended that more detailed and targeted searches are undertaken within the 10 year mine area to obtain an accurate idea of population numbers to be impacted.

1. INTRODUCTION

Mattiske Consulting Pty Ltd (Mattiske Consulting) was commissioned in October 2017 by Preston Consulting Pty Ltd on behalf of VRX Silica Ltd to undertake a flora and vegetation survey of the Arrowsmith survey area, this survey occurred during the months of October and November 2018. In August 2019, Mattiske Consulting was again commissioned by VRX Silica Ltd to undertake a flora and vegetation survey of the Arrowsmith survey area. The 2019 survey occurred during the months of October and November and included an extension to both the Northern and Central survey areas within the Arrowsmith survey area. VRX Silica Ltd are currently exploring their Arrowsmith tenements for construction sand and high quality silica sand.

1.1. Location and Scope of Survey

The Arrowsmith North survey area lies within the Irwin Botanical District of the South-West Botanical Province (Beard 1990), between the towns of Eneabba and Dongara, Western Australia (Figure 1). The Arrowsmith North survey area assessed in spring 2018 and 2019 consists of one polygon located across tenements E70/5027 and E70/5109 (Table 1, Figure 2). This report outlines the methodology and results from a detailed flora and vegetation survey and targeted threatened and priority flora survey carried out in native vegetation in the Arrowsmith North survey area.

Table 1: Location of Arrowsmith North survey area

GDA94_50J	
Easting mE	Northing mN
313806	6739575
316001	6739615
316010	6739158
317116	6733090
313921	6733043
313876	6735614
314267	6735621
314271	6736024
313876	6736017

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)

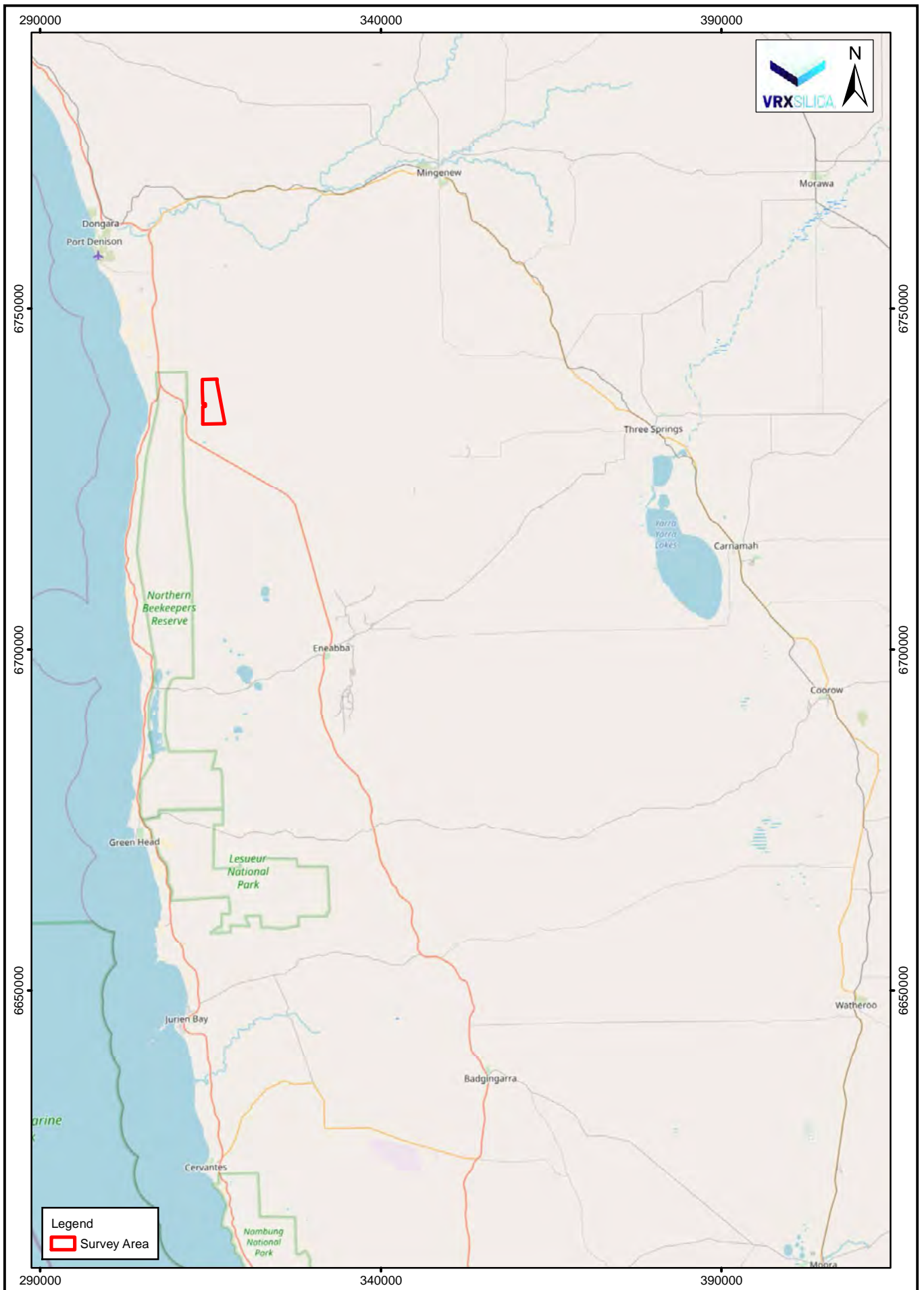
The following key Western Australian (state) legislation relevant to this survey include the:

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

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.



Legend
 Survey Area

Imagery: OpenStreetMap

0 14 km
 Scale: 1:750,000
 MGA94 (Zone 50)

Mattiske Consulting Pty Ltd
 28 Central Road, Kalamunda WA 6076 - Tel: 9257 1625 - Fax: 9257 1640

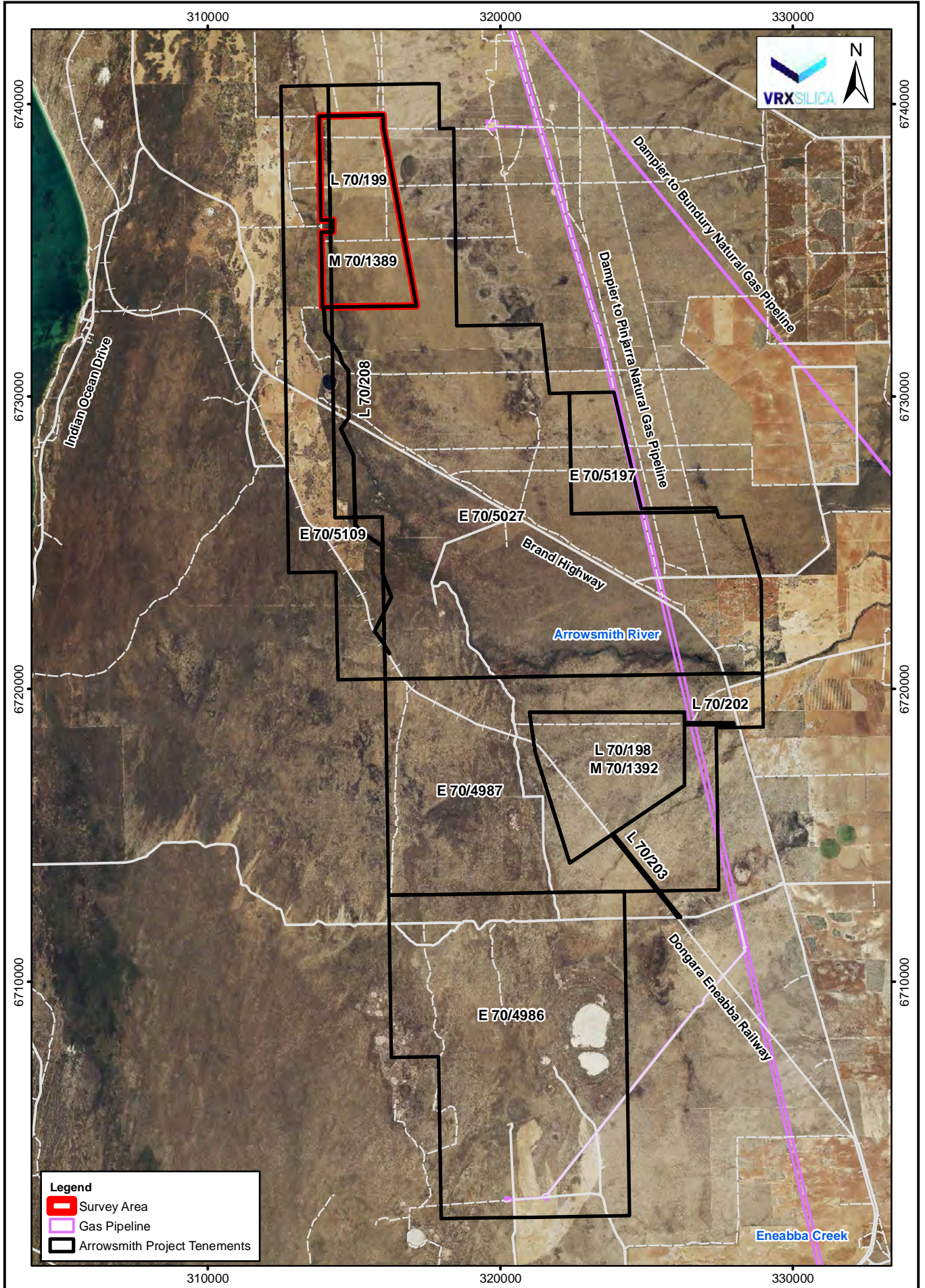
Author: E M Mattiske MCPL Ref: VRX1901

Drawn: CAD Resources ~ www.cadresources.com.au
 Tel: (08) 9246 3242 - Fax (08) 9246 3202

Arrowsmith Northern Project Locality

Figure:
1

CAD Ref: a2602_f22_01
 Date: April 2020 Rev: B | A4



Source: Aerial Photography: Landgate (Nov. 2016), Tenements: DMIRS (24/06/2019)

Legend

- Survey Area
- Gas Pipeline
- Arrowsmith Project Tenements

0 4 km

Scale: 1:175,000
MGA94 (Zone 50)

CAD Ref: a2602_f22_02
Date: April 2020

Rev: B | A4

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Arrowsmith Northern Project Tenements

Figure:
2

2. OBJECTIVES

The objective of this survey was to undertake a flora and vegetation assessment of the Arrowsmith North survey area including:

- Undertake a desktop study of the flora and vegetation of the Arrowsmith North survey area, with an emphasis on threatened and priority flora, and threatened and priority ecological communities (TECs and PECs);
- Review the historical literature of the Arrowsmith North survey area;
- Undertake a detailed survey of the Arrowsmith North survey area, 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 Arrowsmith North survey area;
- Define and map the location of any threatened and priority flora located within the Arrowsmith North survey area;
- 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-), NatureMap (Department of Parks and Wildlife [DPaW] 2007-) and the EPBC Act *Protected Matters Search Tool* (DotEE 2013) databases, to identify the possible occurrence of threatened and priority flora and threatened and priority ecological communities within the Arrowsmith survey area.

The NatureMap search was conducted for the Arrowsmith North survey area (E70/5027 and part of E70/5109). **Search parameters were 'by rectangle' using the following parameters:**

Arrowsmith **North: 115° 4' 24" E, 115° 14' 31" E, - 29° 38' 17" S, - 29° 26' 47" S**

The aforementioned coordinates were also used in the *EPBC Act Protected Matters Search Tool* (DotEE 2013).

In addition, historical documentation and vegetation mapping of the region, principally that of Beard (1976, 1990) and Desmond and Chant (2001), that provide extensive resource material for the floristics and vegetation of the Arrowsmith North survey area, was reviewed.

3.2. Field Survey

A detailed field assessment of the flora and vegetation of the Arrowsmith North survey area within tenements E70/5027 and E70/5109 was undertaken by experienced botanists from Mattiske Consulting, between 29th October to 2nd November 2018 (4 botanists), 5th November to 9th November 2018 (2 botanists), 21st October to 25th October 2019 (4 botanists) and 11th November to 14th November 2019 (3 botanists), 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 Arrowsmith North survey area were supplied by VRX Silica Ltd. Aerial photographic maps of the proposed Arrowsmith survey area were prepared and supplied by CAD Resources. Survey sites for the Arrowsmith North survey area were selected using aerial photographic maps and field observations. A total of 98 survey sites were established in the Arrowsmith North survey area in 2018, and a further 15 survey sites were established in 2019. These 113 survey sites were selected to sample all vegetation types, with replication, within the survey area.

Survey sites consisted of pegged 10 x 10 metre quadrats. 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 50J);
- 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 methodology for assessing threatened and priority flora consisted of extensive foot traverses within the Arrowsmith North survey area. Botanists used handheld Garmin GPS units loaded with the survey polygons. Botanists walked in a zig-zag fashion between survey sites, recording conservation significant species. If suspected or known conservation significant flora species were encountered, a specimen was collected and plant numbers were recorded for the population.

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 Table 3 in the *Technical guidance – Flora and vegetation surveys for environmental impact assessment* (EPA 2016b), the primary survey timing for the Irwin Botanical Province is spring (September–November). As the current survey was conducted in October and November, it falls within this period. The survey was timed, where possible, to align with peak flowering periods of conservation significant flora with the potential to occur in the Arrowsmith North survey area. Rainfall in the three months preceding the 2018 survey (July to September) was slightly above average, while rainfall preceding the 2019 survey (July to September) was well below average (Figure 3).

3.4. Analysis of Site Data

A species accumulation curve, 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). To down-weight the relative contributions of quantitatively dominant species, a fourth root transformation was applied to the data set. Introduced species, annual species, species not identified to a species level and singletons (species recorded at a single quadrat and not forming a dominant structural component i.e. $\geq 5\%$ cover) were excluded from the data set prior to analysis. Taxa which were identified to more than one subspecies or variety level were revised to the specific level to reduce the tendency to create further statistical variation in the analysis that was considered unwarranted. Computation of similarity matrices was based on the Bray-Curtis similarity measure. Hierarchical Clustering (CLUSTER) was used in conjunction with Similarity Profile (SIMPROF), Similarity Percentages (SIMPER), quadrat descriptions, quadrat photographs and aerial photographs; combining these methods increased the understanding of quadrat inter-relations and thus the ability to accurately delineate those quadrats based on species composition.

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). Based on this assessment, the present survey has not been subject to constraints which would affect the thoroughness of the survey, and the conclusions which have been formed.

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: Reference resources such as Beard's mapping , together with online flora and vegetation information, has provided an appropriate level of information for the current survey.
Competency/experience of team carrying out survey; experience in the bioregion surveyed	Not a limitation: All botanists had extensive experience working in a range of botanical districts across the state. Majority of the plants observed in the field were collected for formal identification and were compared with specimens at the Western Australian State Herbarium where required.
Proportion of flora collected and identification issues	Potential limitation: While many plants were in flower during the survey, a proportion of plants encountered during the survey were sterile and may impact the chance of identification of some specimens to species level. Orchid species may not emerge each year if conditions are not favourable. Although this may affect the completeness of the species list, it is not expected to have a significant effect on mapping reliability, nor on the identification of threatened and priority species in the area as the majority were perennial species.
Effort and extent of survey	Potential limitation: The survey area was thoroughly covered. Survey quadrats were initially selected from high resolution aerial maps, with additional quadrats selected in situ based on in field observations. Replication of some vegetation communities was unavoidable given their low occurrences within the survey area.
Access restrictions within survey area	Not a limitation: Vehicle access to the Arrowsmith North survey area and foot traverses were sufficient to allow access to the entirety of the survey area.
Survey timing, rainfall, season of survey	Not a limitation: The EPA (2016a) recommends that flora and vegetation surveys in the South – West Botanical Province be conducted in Spring (September-November). The current survey was conducted in October and November which falls within this period. Rainfall in the three months preceding the 2018 survey was slightly above average, while below average rainfall was received prior to the 2019 survey (Figure 3).
Disturbances (fire/flood/clearing)	Not a limitation: The Arrowsmith North survey area exhibits minimal levels of disturbance, mainly from past fire events.
Data and statistical analysis	Not a limitation: Introduced species, annual species and singletons were excluded from the data set prior to analysis. Data collected was sufficient for delineation of vegetation communities based on statistical analysis.

4. DESKTOP ASSESSMENT RESULTS

4.1. Climate

The Irwin Botanical District has a typically dry, warm Mediterranean climate, with winter precipitation of 300-500 mm and 7-8 dry months per year (Beard 1990). Rainfall and temperature data for Eneabba is no longer available due to the closing of the Eneabba weather station, therefore rainfall data from Green Grove and long term temperature data from Carnamah (Bureau of Meteorology [BOM] 2019) are illustrated in Figure 3. Above average rainfall was received in the 3 months prior to the 2018 survey (July to September 2018; 200.5 mm cf. 212.6 mm) although September 2018 rainfall was 27 mm below average (Figure 3). In 2019, rainfall in the 3 months preceding the survey was well below average (July to September 2019; 200.5 mm cf. 88.6 mm)

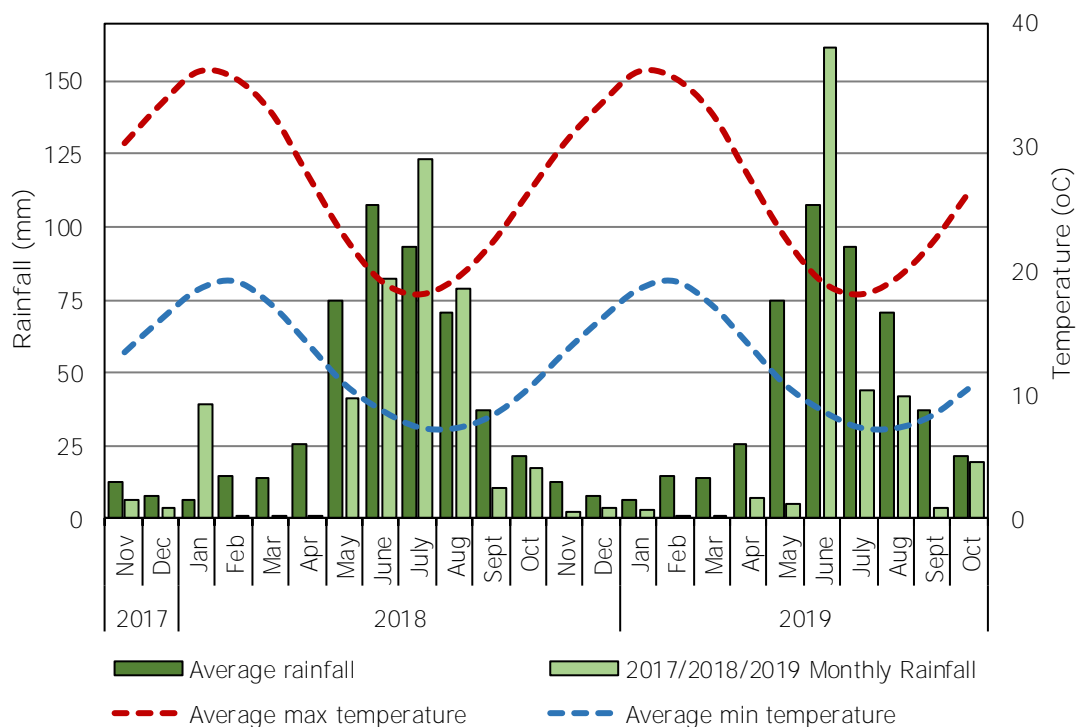


Figure 3: Rainfall and temperature data for Green Grove and Carnamah

Note: Long-term average monthly rainfall (1951-2019) and monthly rainfall data from Green Grove. Long-term average temperature data (1940-2019) from Carnamah (BOM 2019).

4.2. Managed Lands

There are a number of Nature Reserves in the area surrounding the Arrowsmith North survey area, presented in Figure 4. The Beekeepers Nature Reserve (R 24496) is located to the west of the Arrowsmith North survey area. The Yordanogo Nature Reserve (R 36203) is located north of the Arrowsmith North survey area. The Lake Logue Nature Reserve (R 29073) and nature reserves R 39744 and R 25495 are located to the south of the Arrowsmith North survey area (Figure 4).

4.3. Geology, Soils and Topography

The underlying geology of the area is predominantly Permian to Cretaceous sedimentary basins, with horsts of Proterozoic rocks (Beard 1990, Desmond and Chant 2001). The area is characterised by

undulating lateritic sandplains with leached sandy soils over laterite in coastal areas; earthy, yellow sands over laterite further inland; and hard-setting loams with red clay subsoils (Beard 1990, Desmond and Chant 2001).

The Department of Primary Industries and Regional Development's (DPIRD) Land Systems present within the Arrowsmith North survey area (Figure 5, Table 3) includes:

1. Tamala South System (221Ta): Rises and low hills with relict dunes and some limestone outcrop on coastal limestone north of Jurien Bay. Yellow deep sands common, with yellow/brown shallow sands and calcareous shallow and deep sands. *Banksia* woodlands and heathlands.

Table 3: Extent of Land Systems intersecting Arrowsmith North survey area

LAND SYSTEM	MAPPING UNIT	TOTAL STATEWIDE EXTENT (ha)	AREA OF INTERSECTION WITH THE SURVEY AREA (ha)	PROPORTION OF CURRENT EXTENT (%)
Tamala South System	221Ta	156,257.31	1,727.14	1.11

The Arrowsmith North survey area in tenements E70/5027 and E70/5109 consists solely of the Tamala South System (221Ta, Figure 5). The proportion of the Tamala South System within the state is 1.21 % (Table 3).

4.4. Regional Vegetation

Beard (1990) described the vegetation of the Irwin Botanical District as coastal scrub heath on sandplains, with *Acacia* and *Allocasuarina* thickets further inland, and hard-setting loams with *Acacia* scrub and scattered *Eucalyptus loxophleba*.

The Pre-European vegetation systems present within the Arrowsmith North survey area (Figure 6, Table 4) include:

1. Eridoon System: flat coastal plain with various small rivers and creeks with numerous small lakes and swamps and some limited alluvial flats of heavier soil on the lower Arrowsmith River. Vegetation consists of scattered small trees with an open layer of tall shrubs over a closed layer of small heath-like shrubs, which experiences frequent fires.
 - a. Vegetation Association 378: Shrublands; scrub-heath with scattered *Banksia* spp., *Eucalyptus todtiana* and *Xylomelum angustifolium* on deep sandy flats in the Geraldton Sandplain Region – Beard (1976) code x₅SZc

Table 4: Extent of pre-European vegetation associations intersecting the Arrowsmith North survey area

VEGETATION ASSOCIATION	STATE-WIDE PRE-EUROPEAN EXTENT (ha)	SURVEY AREA	
		AREA OF INTERSECTION (ha)	PROPORTION OF CURRENT EXTENT (%)
Vegetation Association 378	94,789.76	1,727.14	1.82

More recently, the vegetation of Western Australia has been assigned to bioregions and subregions under the Interim Biogeographical Regionalisation for Australia (IBRA), with the survey falling within the Lesueur Sandplain subregion of the Geraldton Sandplain Region (Department of Agriculture, Water and the Environment [DAWE] 2020a). The Geraldton Sandplain 3 (GS3 – Lesueur Sandplain subregion) is described as having high floristic diversity and levels of endemism, with vegetation composed mainly of

proteaceous scrub-heaths (Desmond and Chant 2001). Extensive York Gum (*Eucalyptus loxophleba*) and Jam woodlands occur on outwash plains associated with drainage (Desmond and Chant 2001).

4.5. Potential Flora

A total of 438 vascular plant taxa, representative of 167 genera and 67 families, have the potential to occur within the Arrowsmith area (based on NatureMap search results, included in Appendix B). The most commonly represented families were the Myrtaceae (75 taxa), Proteaceae (66 taxa) and Fabaceae (41 taxa). The most commonly represented genera were *Stylidium* (20 taxa), *Acacia* (18 taxa), *Eucalyptus* (15 taxa), *Banksia* (15 taxa) and *Conostylis* (13 taxa).

A total of 364 vascular plant taxa, representative of 146 genera and 66 families, have the potential to occur within the Arrowsmith North survey area (based on NatureMap search results, included in Appendix B). The most commonly represented families were the Myrtaceae (69 taxa), Proteaceae (51 taxa) and Fabaceae (29 taxa). The most commonly represented genera were *Stylidium* (16 taxa), *Acacia* (14 taxa), *Eucalyptus* (14 taxa), *Conostylis* (12 taxa) and *Verticordia* (11 taxa).

4.6 Potential Threatened and Priority Flora

Thirteen threatened flora species, pursuant to Part 2, Division 1, and Subdivision 2 of the BC Act and as listed by the DBCA (2018a) have the possibility of occurring in the Arrowsmith survey area. All of these species, are pursuant to section 179 of the EPBC Act or are listed by the DAWE (2020b) (Appendices B and C, Figure 7).

A total of 42 priority flora species, including six priority one, nine priority two, 18 priority three and nine priority four flora species as listed by WAH (1998-) have the potential to occur within the Arrowsmith survey area (Appendices B and C, Figure 7).

Thirteen threatened flora species, pursuant to Part 2, Division 1, and Subdivision 2 of the BC Act and as listed by the DBCA (2018a) have the possibility of occurring in Arrowsmith North survey area. All of these species, are pursuant to section 179 of the EPBC Act or listed by the DAWE (2020b) (Appendices B and C, Figure 7).

A total of 36 priority flora species, including five priority one, eight priority two, 14 priority three and nine priority four flora species as listed by WAH (1998-) have the potential to occur within the Arrowsmith North survey area (Appendices B and C, Figure 7).

An assessment of the likelihood of recording any of the listed threatened and priority taxa within the Arrowsmith survey area, based on factors including known soil type, topography and distribution, is set out in Appendix C. Based on this assessment, four threatened flora species, *Conostylis dielsii* subsp. *teres* (T), *Conostylis micrantha* (T), *Hemiandra gardneri* (T) and *Paracaleana dixonii* (T) had a high likelihood of occurring in Arrowsmith North survey area. Eight threatened flora species had a moderate likelihood and one had a low likelihood of occurring in the Arrowsmith North survey area. Four priority flora species had a low likelihood of occurring in Arrowsmith survey area and 21 had a moderate likelihood. Seventeen priority species, *Verticordia luteola* var. *rosea* (P1), *Comesperma griffinii* (P2), *Scholtzia calcicola* (P2), *Verticordia argentea* (P2), *Guichenotia alba* (P3), *Grevillea erinacea* (P3), *Hemiandra* sp. Eneabba (H. Demarz 3687) (P3), *Persoonia rudis* (P3), *Verticordia fragrans* (P3), *Banksia elegans* (P4), *Banksia scabrella* (P4), *Calytrix chrysantha* (P4), *Calytrix eneabensis* (P4), *Calytrix superba* (P4), *Eucalyptus macrocarpa* subsp. *elachantha* (P4), *Schoenus griffinianus* (P4) and *Stawellia dimorphantha* (P4) had a high likelihood of occurrence, mainly due to previous records in the area and suitable habitat.

4.7 Potential Introduced (Weed) Species and Declared Pest (Plant) Organisms

Seven introduced species have the potential to occur within the Arrowsmith survey area (based on NatureMap search results, included in Appendix B). Two of these species, **Asparagus asparagoides* and **Tamarix aphylla*, are declared pest organisms pursuant to section 22 of the BAM Act.

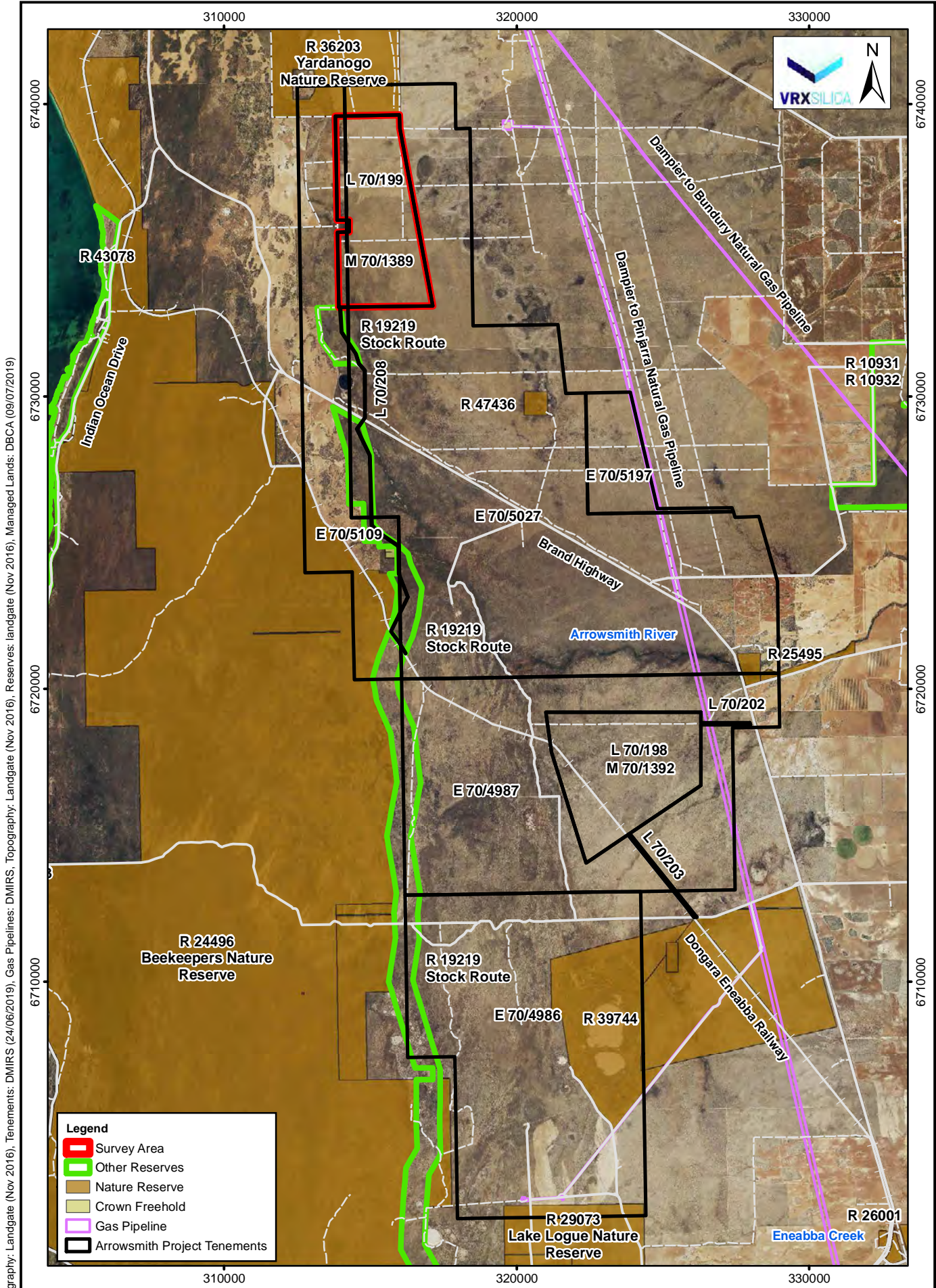
**Asparagus asparagoides* and **Tamarix aphylla* both have a declared pest organism keeping category of Exempt for the whole of Western Australia (DPIRD 2019). A declared pest category of Exempt requires no permits or conditions for keeping, although there may be other requirements under the *Biosecurity and Agriculture Management Act 2007*. Organisms in this category may also be regulated by legislation such as the *Biodiversity Conservation Act 2016* administered by DBCA (DPIRD 2019).

4.8 Potential Threatened and Priority Ecological Communities

There are no threatened ecological communities (TECs) listed 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 of the BC Act and as listed by DBCA (2018b) and no priority ecological communities (PECs) as listed at State Level by the DBCA (2019b) that potentially occur within the Arrowsmith North survey area.

4.9 Kwongan Region Vegetation

Kwongan vegetation occurs on the sandplains of south-western Australia and includes Proteaceae and Myrtaceae dominated scrub-heath and heath, *Banksia* woodlands, heath-like scrub in temporary wet depressions and low scrub on coastal slopes (Mucina et al. 2014). The Arrowsmith North survey area occurs within the Kwongan Region (Figures 8.1 & 8.2).



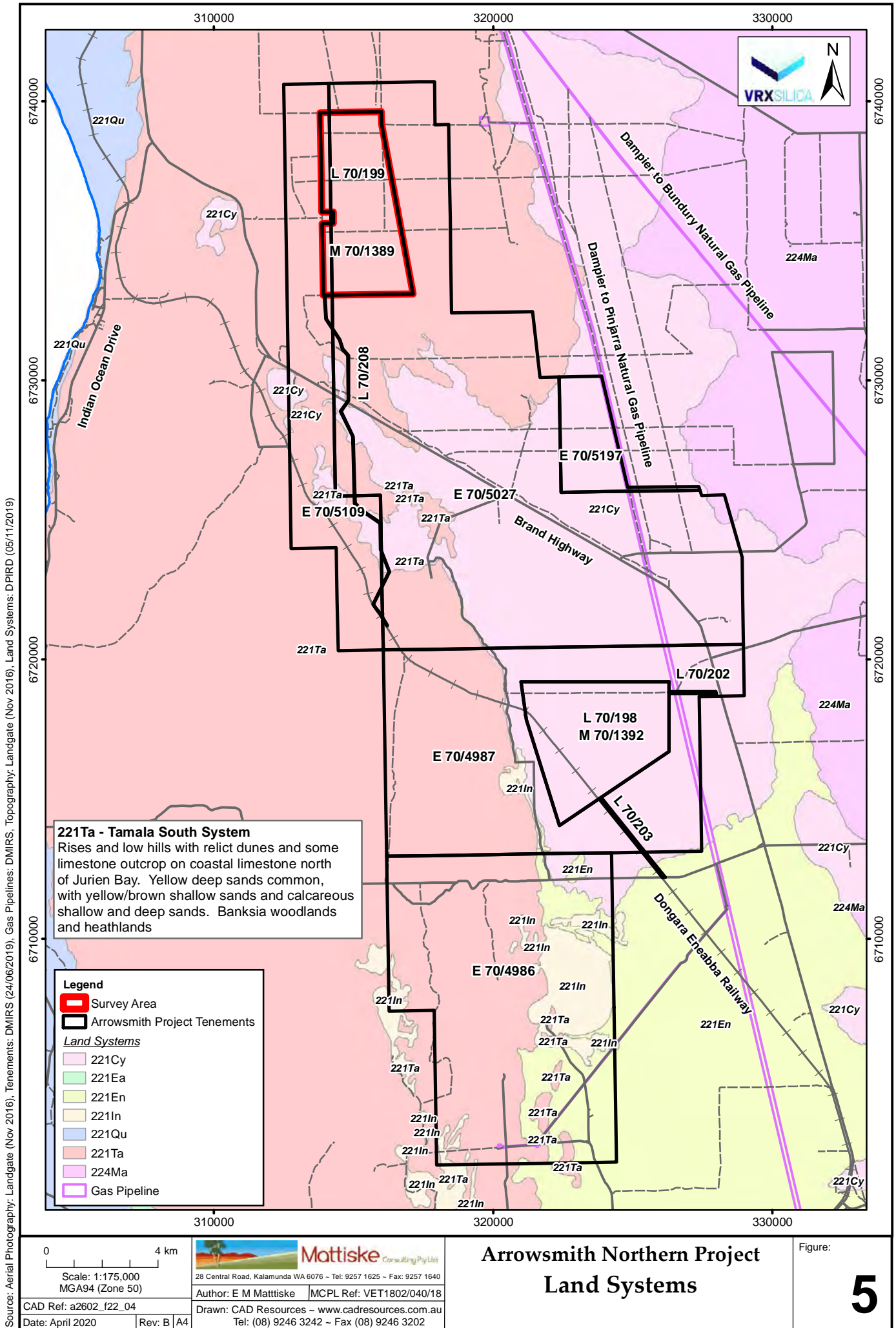
Source: Aerial Photography: Landgate (Nov. 2016), Tenements: DMIRS (24/06/2019), Gas Pipelines: DMIRS, Topography: Landgate (Nov 2016), Reserves: landgate (Nov 2016), Managed Lands: DBCA (09/07/2019)

0 4 km
 Scale: 1:175,000
 MGA94 (Zone 50)
 CAD Ref: a2602_f22_03
 Date: April 2020 Rev: B | A4

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Arrowsmith Northern Project Managed Lands

Figure:
4



Source: Aerial Photography: Landgate (Nov 2016), Tenements: DMIRS (24/06/2019), Gas Pipelines: DMIRS, Topography: Landgate (Nov 2016), Land Systems: DPIRD (05/11/2019)

221Ta - Tamala South System
 Rises and low hills with relict dunes and some limestone outcrop on coastal limestone north of Jurien Bay. Yellow deep sands common, with yellow/brown shallow sands and calcareous shallow and deep sands. Banksia woodlands and heathlands

Legend

- Survey Area
- Arrowsmith Project Tenements

Land Systems

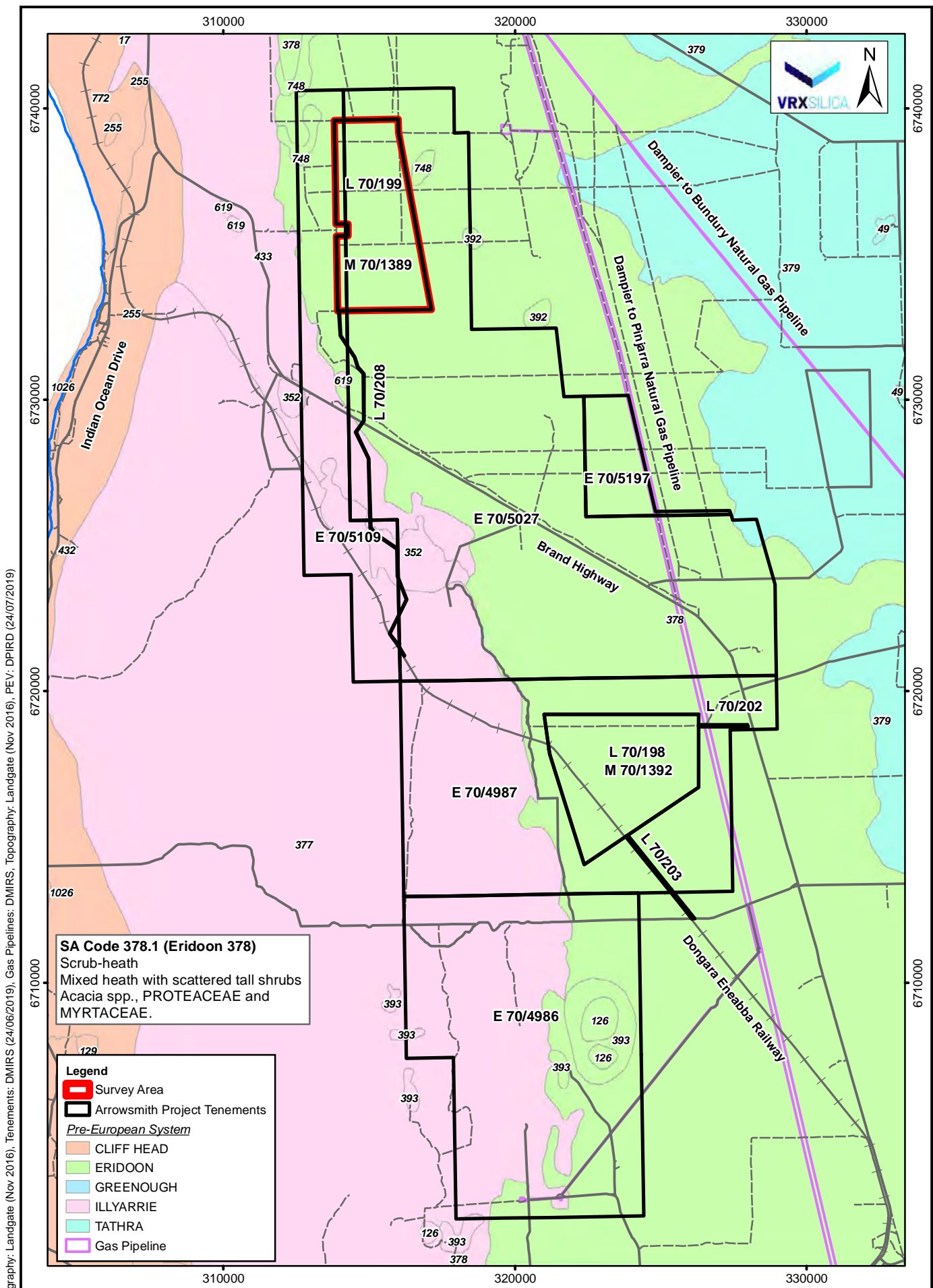
- 221Cy
- 221Ea
- 221En
- 221In
- 221Qu
- 221Ta
- 224Ma
- Gas Pipeline

0 4 km
 Scale: 1:175,000
 MGA94 (Zone 50)
 CAD Ref: a2602_f22_04
 Date: April 2020

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Arrowsmith Northern Project Land Systems

Figure:
5



SA Code 378.1 (Eridoon 378)
 Scrub-heath
 Mixed heath with scattered tall shrubs
 Acacia spp., PROTEACEAE and MYRTACEAE.

- Legend**
- Survey Area
 - Arrowsmith Project Tenements
 - Pre-European System*
 - CLIFF HEAD
 - ERIDOOON
 - GREENOUGH
 - ILLYARRIE
 - TATHRA
 - Gas Pipeline

0 4 km

Scale: 1:175,000
 MGA94 (Zone 50)



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Arrowsmith Northern Project Pre-European Vegetation

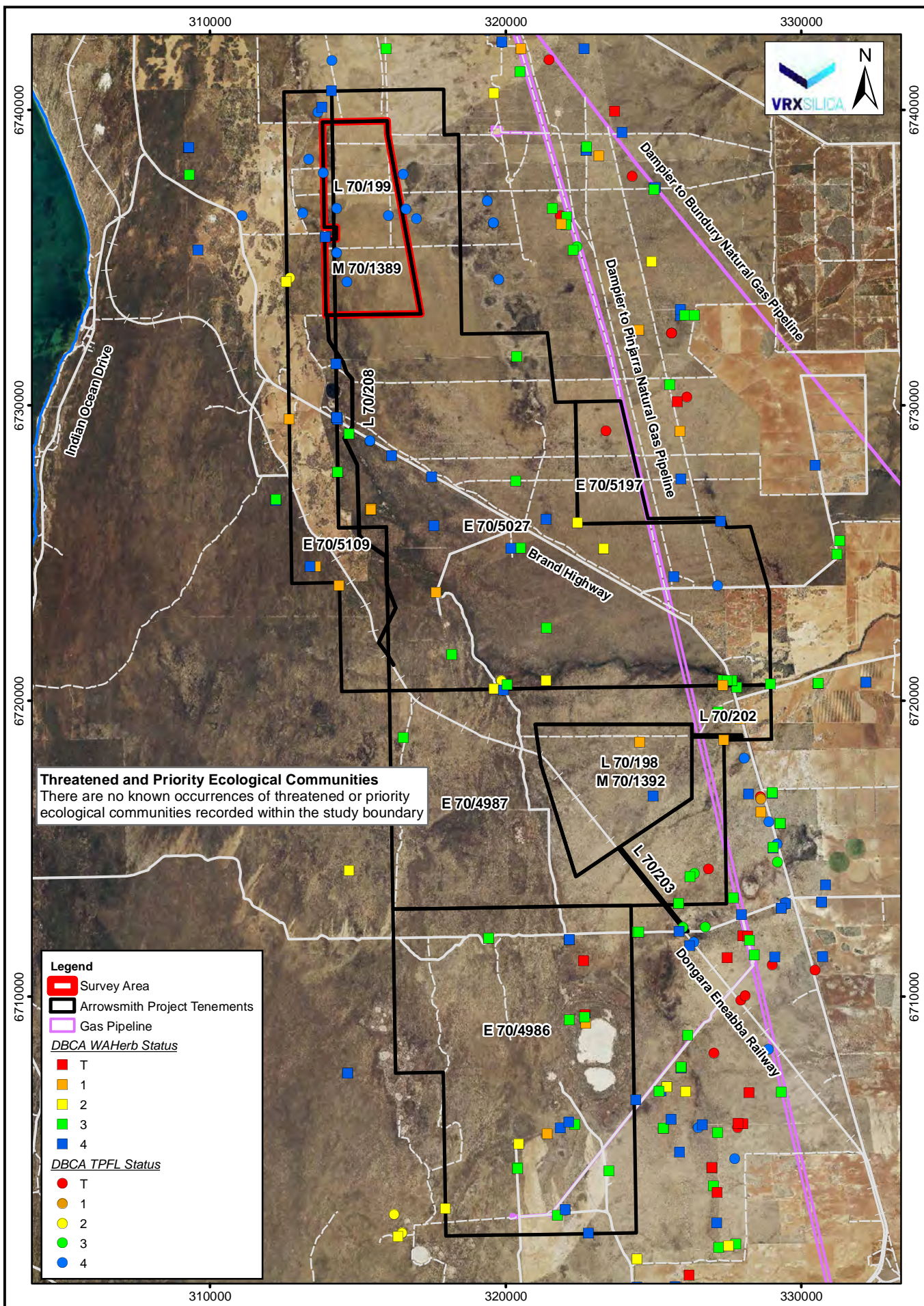
Figure:

6

Sources: Aerial Photography: Landgate (Nov. 2016), Tenements: DMIRS (24/06/2019), Gas Pipelines: DMIRS, Topography: Landgate (Nov 2016), PEV: DPIRD (24/07/2019)

CAD Ref: a2602_f22_05
 Date: April 2020 Rev: B | A4

Source: Aerial Photography: Landgate (Nov 2016), Tenements: DMIRS (24/06/2019), Gas Pipelines: DMIRS, Topography: Landgate (Nov 2016), Flora: DBCA (10-0208, 16-0118FL, 08-0218EC)



Threatened and Priority Ecological Communities
 There are no known occurrences of threatened or priority ecological communities recorded within the study boundary

Legend

- Survey Area
- Arrowsmith Project Tenements
- Gas Pipeline

DBCWA WA Herb Status

- T
- 1
- 2
- 3
- 4

DBCWA TPFL Status

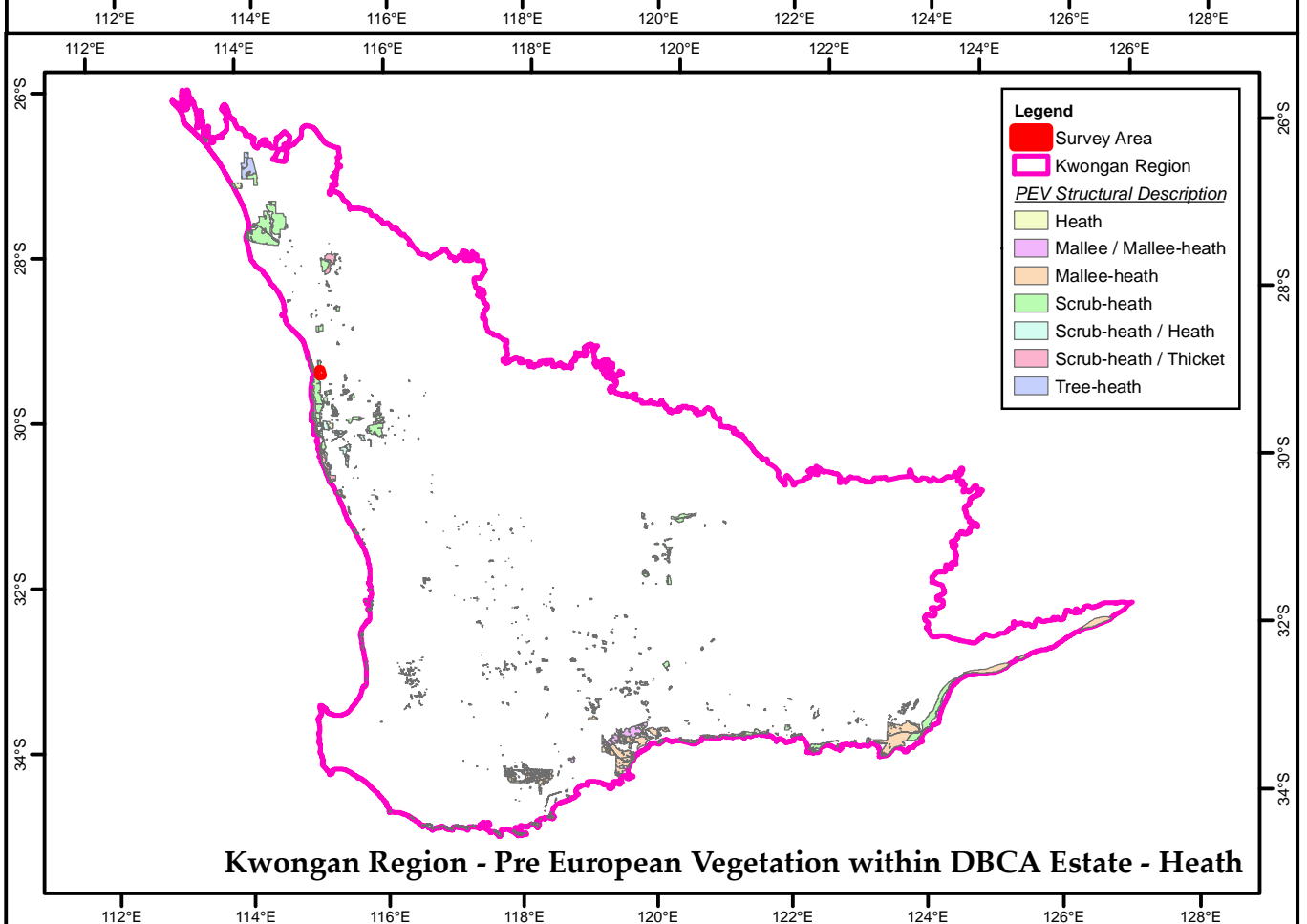
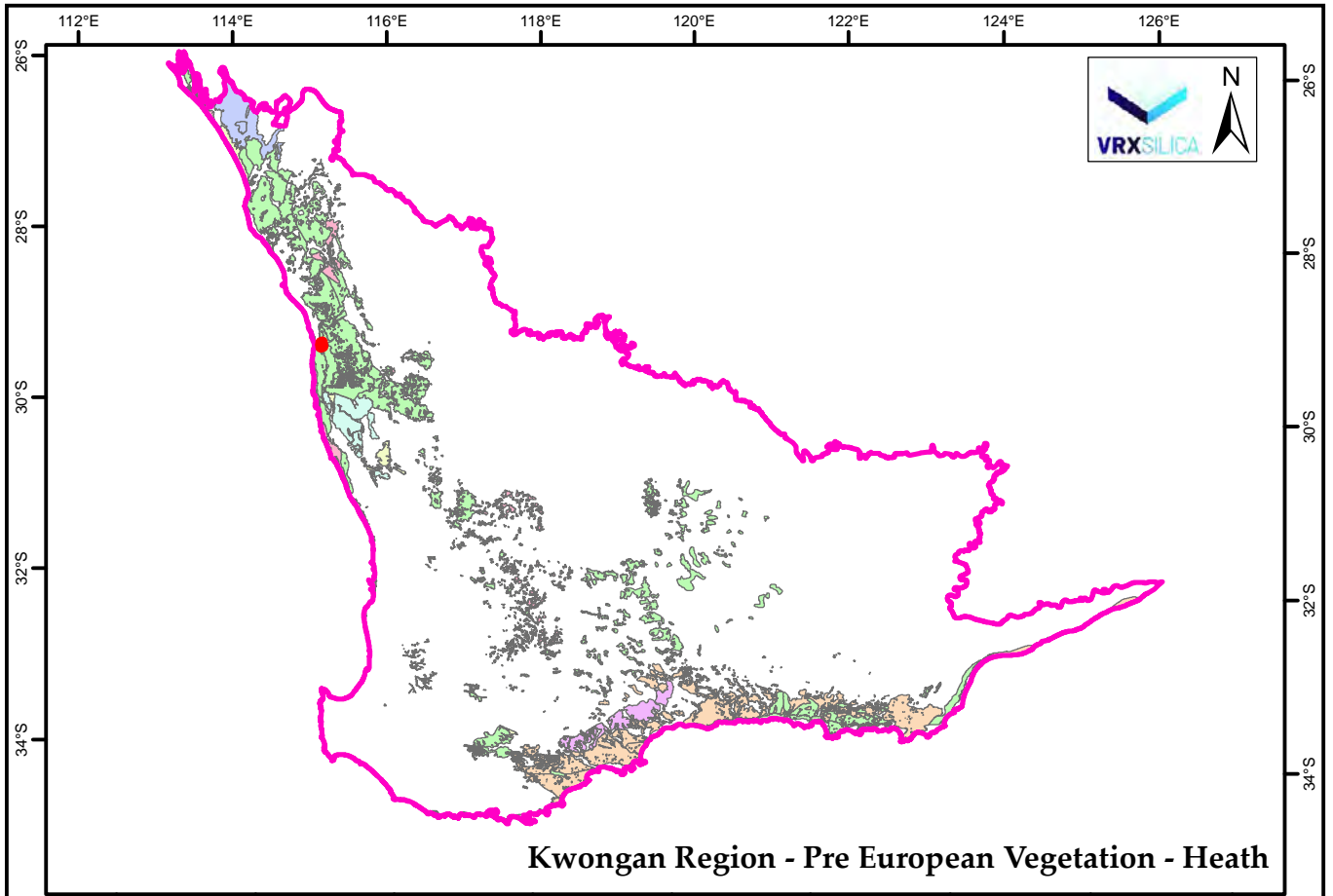
- T
- 1
- 2
- 3
- 4

0 4 km
 Scale: 1:175,000
 MGA94 (Zone 50)
 CAD Ref: a2602_f22_06
 Date: April 2020 Rev: B | A4

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Arrowsmith Northern Project Threatened & Priority Species

Figure:
7



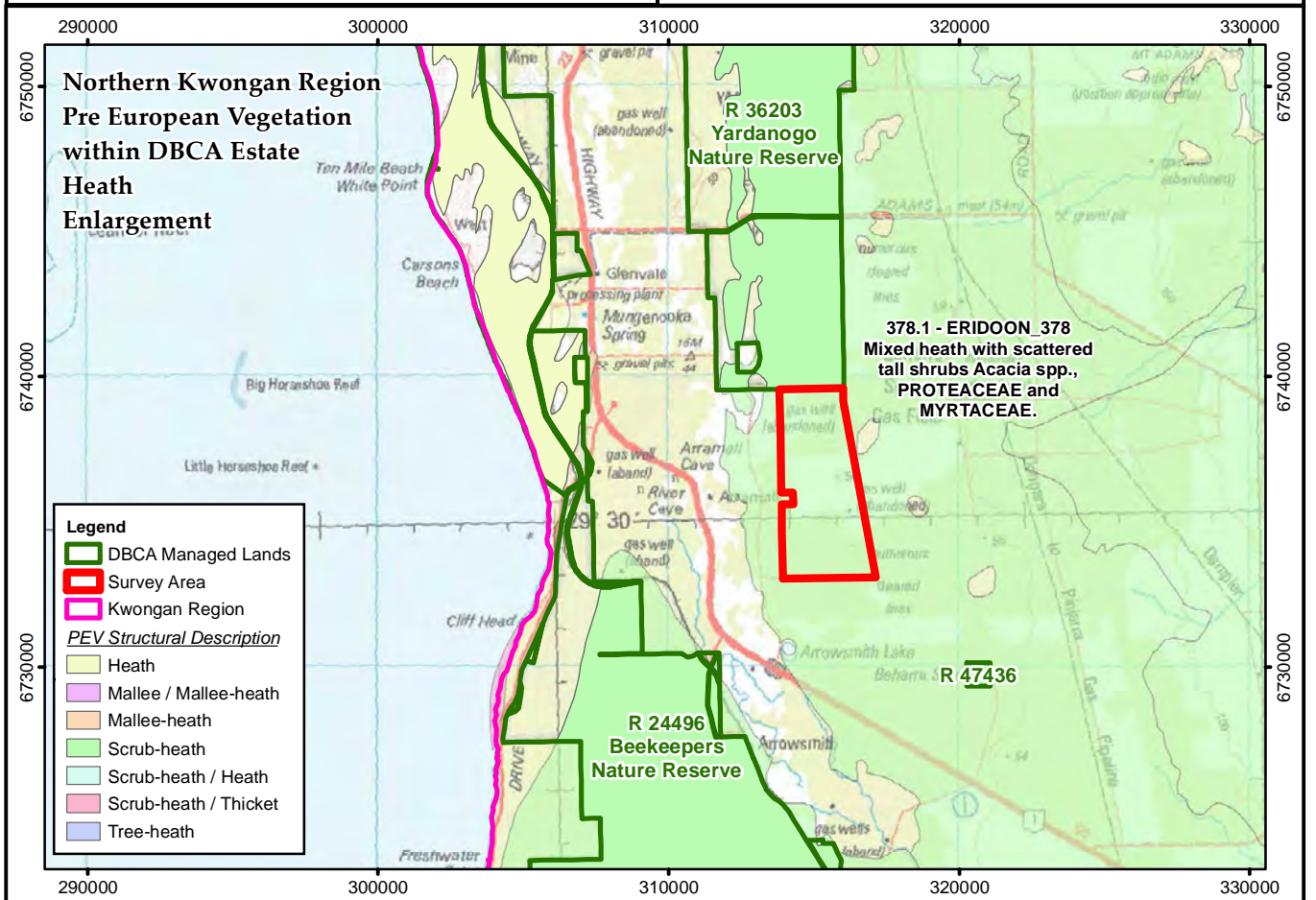
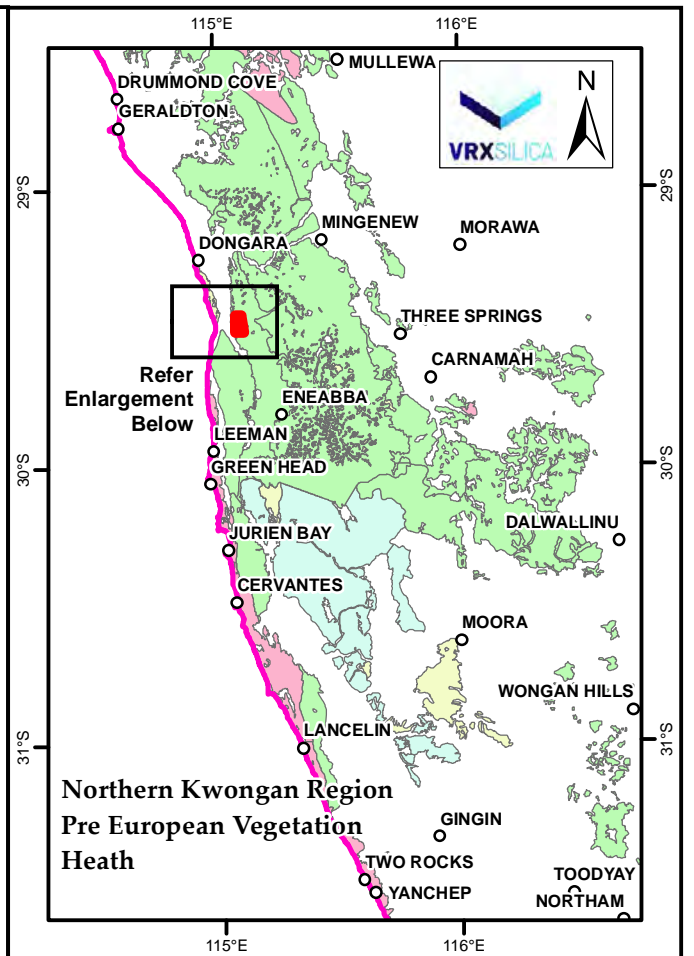
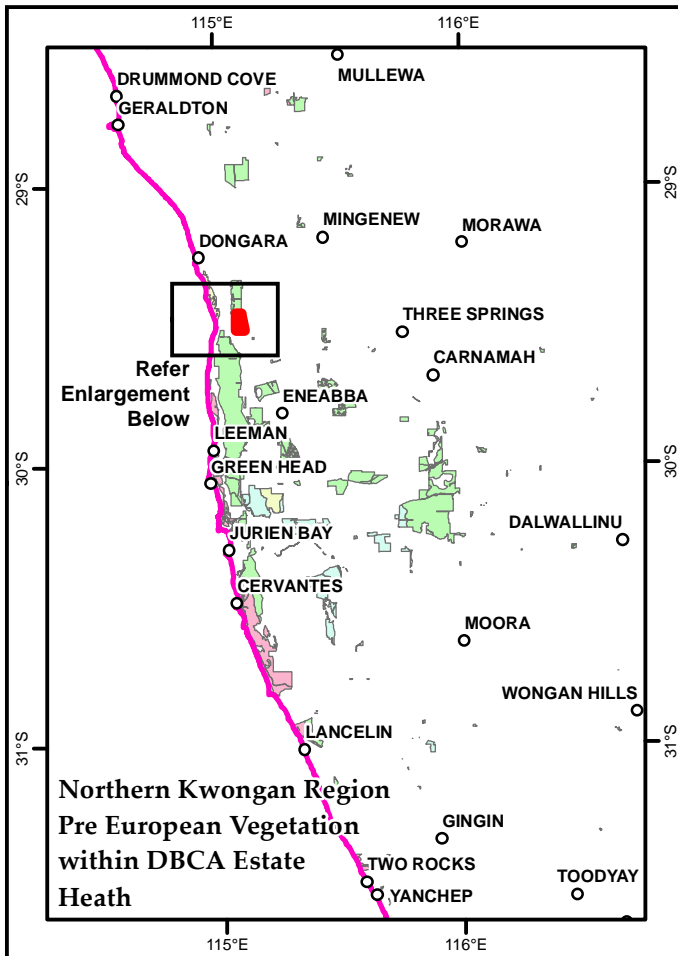
Source: Kwongan Region: UWA, Pre European Vegetation; DPIRD, DBCA Estate; DBCA

0 204,000 m
 Scale: 1:9,747,067
 MGA94 (Zone 50)
 CAD Ref: a2602_f22_07_01
 Date: April 2020

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Arrowsmith Northern Project
Kwongan Region
Pre European Vegetation - Heath

Figure:
8.1



Source: Background Image: GSA, Kwongan Region; UWA, Pre European Vegetation: DPIRD, DBCA Estate: DBCA

0 5,200 m
Scale: 1:250,000
MGA94 (Zone 50)
CAD Ref: a2602_f22_07_02
Date: April 2020

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Arrowsmith Northern Project
Northern Kwongan Region
Pre European Vegetation - Heath

Figure:
8.2

5 FIELD SURVEY RESULTS

A total of 113 survey quadrats were used to assess the flora and vegetation of the Arrowsmith North survey area. Appendix D contains a list of the geographic locations for each of the survey quadrats. The taxa recorded during the survey are set out in Appendix E. A list of plant taxa recorded at each survey quadrat within the Arrowsmith North survey area is set out in Appendix F.

5.1 Flora

A total of 219 vascular plant taxa, representative of 112 genera and 44 families, were recorded within survey quadrats within the Arrowsmith North survey area. The majority of taxa recorded were representative of the Myrtaceae (27 taxa), Proteaceae (25 taxa), and Fabaceae (21 taxa) families (see Appendix E for a complete species list). Twenty-six annual plant species were recorded during the survey of the Arrowsmith North survey area, representing 11.76 % of all taxa recorded, six of these represent introduced annual species. A number of plant species collected could not be identified accurately to species level due to the absence of sufficient taxonomic characters to enable accurate identification. The principle reasons for not being able to fully identify some of the collected specimens to species level were:

1. Plant material was sterile or lacked sufficient taxonomic features to permit accurate identification to species level. In these cases the species is identified as, for example, *Thysanotus* sp. or *Drosera* sp. and,
2. The plant material collected could not be determined to a known taxon. For example, *Lepidosperma* species are currently undergoing taxonomic revision.

A species accumulation curve was used to evaluate the sampling adequacy and is presented in Figure 9. The incidence based coverage estimator (ICE) of species richness was 264.96. Based on this value and the total of 219 species recorded (in vegetation mapping sites *only*), approximately 82 % of the flora species potentially present within the Arrowsmith survey area were recorded.

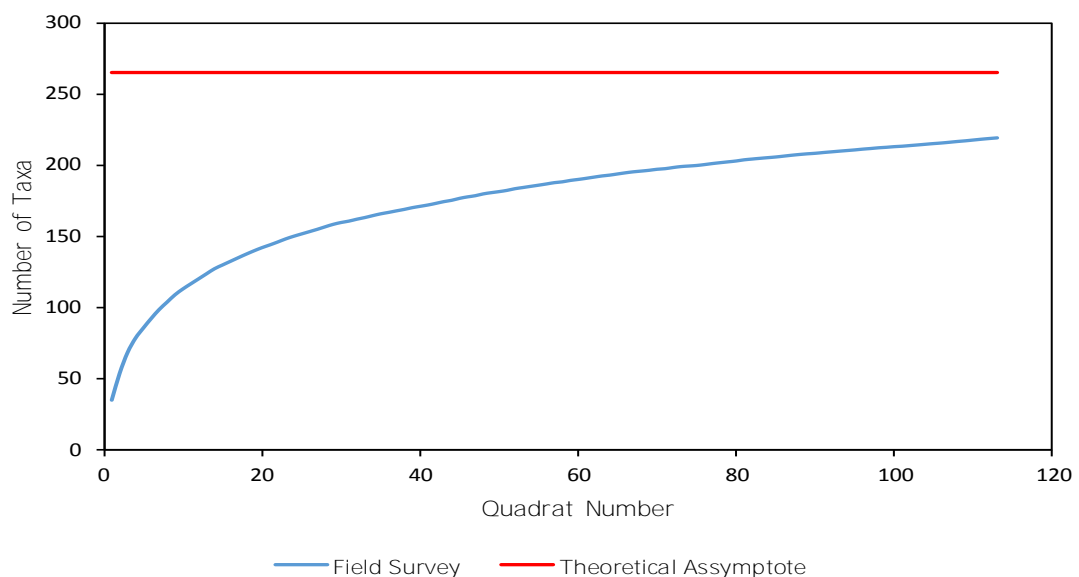


Figure 9: Average randomised species accumulation curve

5.2 Threatened and Priority Flora

No threatened flora species pursuant to Part 2, Division 1, and Subdivision 2 of the BC Act and as listed by the DBCA (2018a), or pursuant to section 179 of the EPBC Act or listed by the DAWE (2020b), were recorded within the Arrowsmith North survey area.

Eight priority flora species, *Comesperma rhadinocarpum* (P3), *Hemiandra* sp. Eneabba (H. Demarz 3687) (P3), *Hypocalymma gardneri* (P3), *Leschenaultia juncea* (P3), *Persoonia rudis* (P3), *Banksia elegans* (P4), *Schoenus griffinianus* (P4) and *Stawellia dimorphantha* (P4), as listed by the WAH (1998-), were recorded within the Arrowsmith North survey area (Table 5). The geographic locations of priority flora species are presented in Figure 10 and Appendix G.

A brief description of priority species recorded is provided below:

- PRIORITY 3:

Comesperma rhadinocarpum – POLYGALACEAE – Perennial herb to 40 cm high. Blue flowers from October to January. Occurring on yellow, grey sand. WAH houses 15 records from the Shire of Dandaragan, Shire of Gingin, City of Gosnells, City of Greater Geraldton, Shire of Irwin, Shire of Northampton, Shire of Toodyay and the Shire of Yilgarn (WAH 1998-).

Hemiandra sp. Eneabba (H. Demarz 3687) – LAMIACEAE – Straggly, erect shrub, growing from 0.5 to 0.9 m high. Blue/violet/white flowers from September to February. Occurring on sand. WAH houses 33 records from the Shire of Carnamah, Shire of Coorow, Shire of Irwin and Shire of Three Springs (WAH 1998-).

Hypocalymma gardneri – MYRTACEAE – Shrub, growing to 0.3 m high. Yellow flowers from August to September. Occurring on grey-brown sand, laterite, sandplains and upper slopes. WAH houses 21 records from the Shire of Carnamah, Shire of Coorow, Shire of Dandaragan and Shire of Irwin (WAH 1998-).

Leschenaultia juncea – GOODENEACEAE – Erect grass-like perennial herb to 0.5 m high. Blue flowers from November to December. Occurs on white, grey or yellow sand and sandy gravel. WAH houses 21 records from the Shire of Carnamah, Shire of Coorow, Shire of Dandaragan, Shire of Dandaragan, Shire of Mingenew, Shire of Moora and Shire of Three Springs (WAH 1998-).

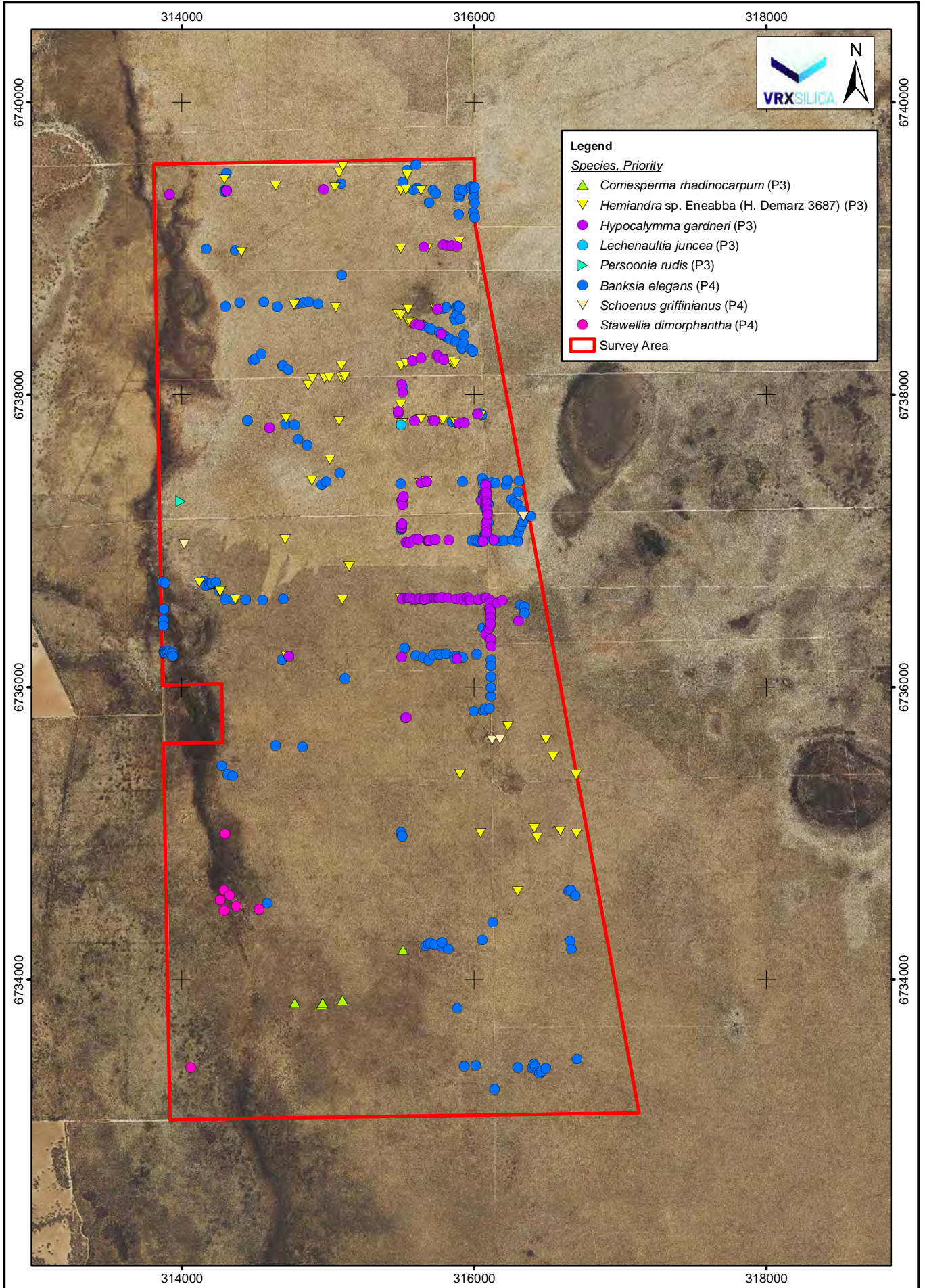
Persoonia rudis – PROTEACEAE – Erect, often spreading shrub, growing from 0.2 to 1 m high. Yellow flowers from September to December or January. Occurring on white, grey or yellow sand often over laterite. WAH houses 40 records from the Shire of Carnamah, Shire of Coorow, Shire of Dandaragan, Shire of Gingin, Shire of Irwin, City of Swan, Shire of Three Springs and Shire of Victoria Plains (WAH 1998-).

- PRIORITY 4:

Banksia elegans – PROTEACEAE – Shrub (with fire-tolerant rootstock, often suckering), growing from 1 to 4 m high. Yellow flowers from October to November. Occurring on yellow, white or red sandplains or low consolidated dunes. WAH houses 42 records from the Shire of Carnamah, Shire of Dandaragan, City of Greater Geraldton, Shire of Irwin and the Shire of Three Springs (WAH 1998-).

Schoenus griffinianus – CYPERACEAE – Small, tufted perennial sedge to 0.1 m high. Flowers from September to October. Occurs on white sand, often in disturbed areas. WAH houses 38 records from the Shire of Carnamah, Shire of Chittering, Shire of Coorow, Shire of Dandaragan, Shire of Gingin, City of Greater Geraldton, Shire of Irwin, City of Swan, Shire of Three Springs and Shire of Wongan Ballidu (WAH 1998-).

Stawellia dimorphantha – HEMEROCALLIDACEAE – Stilt-rooted perennial herb 0.05 to 0.2 m high. Purple/cream flowers from June to November. Occurs on white, grey and yellow sand. WAH houses 23 records from the Shire of Carnamah, Shire of Irwin and the Shire of Three Springs (WAH 1998-).



Source: Aerial Photography: Landgate (Nov. 2016), Flora: MCPL (17/12/2019)

0 800 m
 Scale: 1:35,000
 MGA94 (Zone 50)
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Arrowsmith Northern Project Threatened & Priority Flora

Figure:
10

Table 5: Priority flora species recorded within the Arrowsmith North survey area

Conservation Code	Species	Arrowsmith North survey area	
		No. Records	No. Plants
P3	<i>Comesperma rhadinocarpum</i>	5	6
	<i>Hemiandra</i> sp. Eneabba (H. Demarz 3687)	83	139
	<i>Hypocalymma gardneri</i>	130	218
	<i>Lechenaultia juncea</i>	1	1
	<i>Persoonia rudis</i>	1	1
P4	<i>Banksia elegans</i>	229	1598
	<i>Schoenus griffinianus</i>	4	8
	<i>Stawellia dimorphantha</i>	8	14

5.3 Flora Range Extensions

Two species recorded at the Arrowsmith North survey area represented extensions to their current known distributions, these species being *Tricoryne* sp. Mullewa (G.J. Keighery 12080) and *Synaphea spinulosa* subsp. *borealis*. *Tricoryne* sp. Mullewa (G.J. Keighery 12080) represents a range extension of approximately 110 km to the south of its current known distribution (WAH 1998-). While, *Synaphea spinulosa* subsp. *borealis* represents a range extension of approximately 130 km to the south of its current known distribution (WAH 1998-). In this report, 100 km has been used as a basis to determine an extension to the currently known range for a species.

5.4 Introduced (Weed) Species

A total of six introduced (weed) species were recorded within the Arrowsmith North survey area (Table 6). None of these species, **Aira caryophyllea*, **Hypochaeris glabra*, **Lysimachia arvensis*, **Trifolium arvense* var. *arvense*, **Ursinia anthemoides* and **Wahlenbergia capensis* are declared pest organisms pursuant to section 22 of the BAM Act.

None are listed as Weeds of National Significance (DAWE 2020c). All species recorded are listed in the Midwest region impact and invasiveness ratings (DPaW 2013). Two were listed as having high ecological impact and two were listed as being of low ecological impact. The two remaining species, **Trifolium arvense* var. *arvense* and **Wahlenbergia capensis*, are listed as having unknown ecological impacts (DPaW 2013). All weed species recorded were described as having rapid invasiveness, with the exception of **Trifolium arvense* var. *arvense*, which has moderate invasiveness (DPaW 2013).

Table 6: Location of Introduced (Weed) Species within Arrowsmith North survey area

Species	DPAW ¹		WAOL ²	WONS ³	GDA94_Z50	
	Ecological Impact	Invasiveness			Easting	Northing
<i>*Aira caryophyllea</i>	H	R	Permitted - s11	No	313997	6738148
<i>*Hypochaeris glabra</i>	L	R	Permitted - s11	No	313911	6738569
					313945	6736202
					313994	6736640
<i>*Lysimachia arvensis</i>	L	R	Permitted - s11	No	313908	6738965
					313911	6738569
<i>*Trifolium arvense</i> var. <i>arvense</i>	U	M	Permitted - s11	No	313911	6738569
<i>*Ursinia anthemoides</i>	H	R	Permitted - s11	No	314292	6734612
					314297	6733800
					314298	6734996
					314502	6733844
<i>*Wahlenbergia capensis</i>	U	R	Permitted - s11	No	314002	6737762
					314296	6738202
					314502	6733844

Note: ¹ DPAW - Department of Parks and Wildlife 2013 weed ranking category for the Midwest region; ² WAOL - Western Australian Organism List (BAM Act 2007; Department of Primary Industries and Regional Development 2019); Ecological Impact Rating: L - Low; M - Medium; H - High; U - Unknown. Invasiveness Rating: S - Slow; M - Moderate; R - Rapid; U - Unknown; ³ WONS - Weeds of National Significance (DAWE 2020c)

5.5 Vegetation

For the purpose of this report, vegetation was analysed, defined and mapped for the Arrowsmith North survey area.

5.5.1 Statistical Analysis

SIMPROF analysis of the 113 survey quadrats identified eight significantly associated groups of quadrats. Eight significantly dissimilar vegetation communities were delineated within the Arrowsmith North survey area. The dendrogram representing the results of the cluster analysis, and the corresponding eight vegetation communities is illustrated in Figure 11.

5.5.2 Vegetation Communities

Based on statistical analysis (Section 5.2.1.), eight vegetation communities were defined and mapped across the Arrowsmith North survey area. In addition to the statistical analysis, survey quadrat physical data and aerial photographic maps were used to delineate the boundaries of the vegetation communities in the Arrowsmith North survey area. The vegetation mapped is presented in Figure 12. A list of species recorded within each vegetation community is set out in Appendix H. Vegetation community descriptions, topographic and edaphic information and representative photos are shown in Appendix I. A summary of the vegetation communities is presented below. The area of each of the vegetation communities in Arrowsmith North survey area is presented in Table 7.

- H1: Open Heath to Closed Heath of *Hakea polyanthema*, *Calothamnus blepharospermus*, *Conospermum triplinervium*, *Petrophile macrostachya* and *Melaleuca leuropoma* with emergent *Banksia attenuata* over *Acanthocarpus preissii* and *Ecdeiocolea monostachya* on cream and white surface sands.
- H2: Open Heath to Closed Heath of *Banksia hookeriana*, *Banksia attenuata* with occasional *Banksia menziesii* over *Melaleuca leuropoma*, *Eremaea beaufortioides* var. *beaufortioides*, *Scholtzia laxiflora*, *Conospermum triplinervium*, *Eremaea violacea* subsp. *violacea* over *Mesomelaena pseudostygia* on white sands on plains.
- H3: Open Heath of *Melaleuca leuropoma*, *Leptospermum oligandrum*, *Hakea polyanthema*, *Conospermum triplinervium*, *Beaufortia elegans* and *Pileanthus filifolius*, with isolated trees of *Banksia attenuata* and *Xylomelum angustifolium* over *Mesomelaena pseudostygia* and *Ecdeiocolea monostachya* on cream/grey sand on plains.
- H4: Open Heath of *Conospermum triplinervium*, *Banksia attenuata*, *Banksia hookeriana*, *Melaleuca leuropoma*, *Daviesia divaricata* subsp. *divaricata* and *Eremaea beaufortioides* var. *beaufortioides* over *Mesomelaena pseudostygia* and *Dampiera spicigera* on yellow-cream/white sand on flats.
- H5: Open Heath to Closed Heath of *Banksia shuttleworthiana*, *Banksia attenuata* with occasional *Banksia menziesii* over *Melaleuca leuropoma*, *Eremaea beaufortioides* var. *beaufortioides*, *Conospermum triplinervium*, *Scholtzia laxiflora* and *Verticordia grandis* over *Mesomelaena pseudostygia*, *Ecdeiocolea monostachya* and *Lepidobolus preissianus* subsp. *preissianus* on pale yellow sandy flats.
- S3: Scrub of *Banksia attenuata*, *Banksia leptophylla* var. *melletica*, *Hakea polyanthema* and *Melaleuca leuropoma* over *Scholtzia laxiflora*, *Petrophila macrostachya*, *Petrophile drummondii*, *Allocasuarina humilis*, *Hakea costata* and *Acacia spathulifolia* over *Scaevola repens* subsp. Northern Sandplains (R.J. Cranfield & P.J. Spencer 8445) and *Mesomelaena pseudostygia* on white-yellow sand on flats and slopes.
- T1: Thicket to Scrub of *Allocasuarina campestris*, *Grevillea leucopteris*, *Guichenotia ledifolia*, *Acacia ?lineolata*, *Calothamnus quadrifidus* subsp. *quadrifidus* with occasional *Eucalyptus todtiana* and *Banksia attenuata* over *Dianella revoluta* and *Ecdeiocolea monostachya* on grey/cream/orange/red sand on flats and slopes.

W2: Low Open Woodland of *Banksia attenuata* and *Banksia menziesii* over open shrubland of *Melaleuca leuropoma*, *Eremaea beaufortioides* var. *beaufortioides*, *Daviesia triflora*, *Styphelia xerophylla*, *Pileanthus filifolius* and *Stirlingia latifolia* over *Alexgeorgea nitens*, *Lyginia imberbis* and *Stylidium crosscephalum* on cream to white sands on plains.

Table 7: Area of Vegetation Communities within Arrowsmith North survey area

Vegetation Community	Arrowsmith North survey area (ha)	Arrowsmith North survey area (%)
H1	284.703	16.484
H2	314.125	18.188
H3	258.151	14.947
H4	518.103	29.998
H5	112.442	6.510
S3	24.763	1.434
T1	119.458	6.917
W2	95.393	5.523
Total	1727.137	100

Arrowsmith North

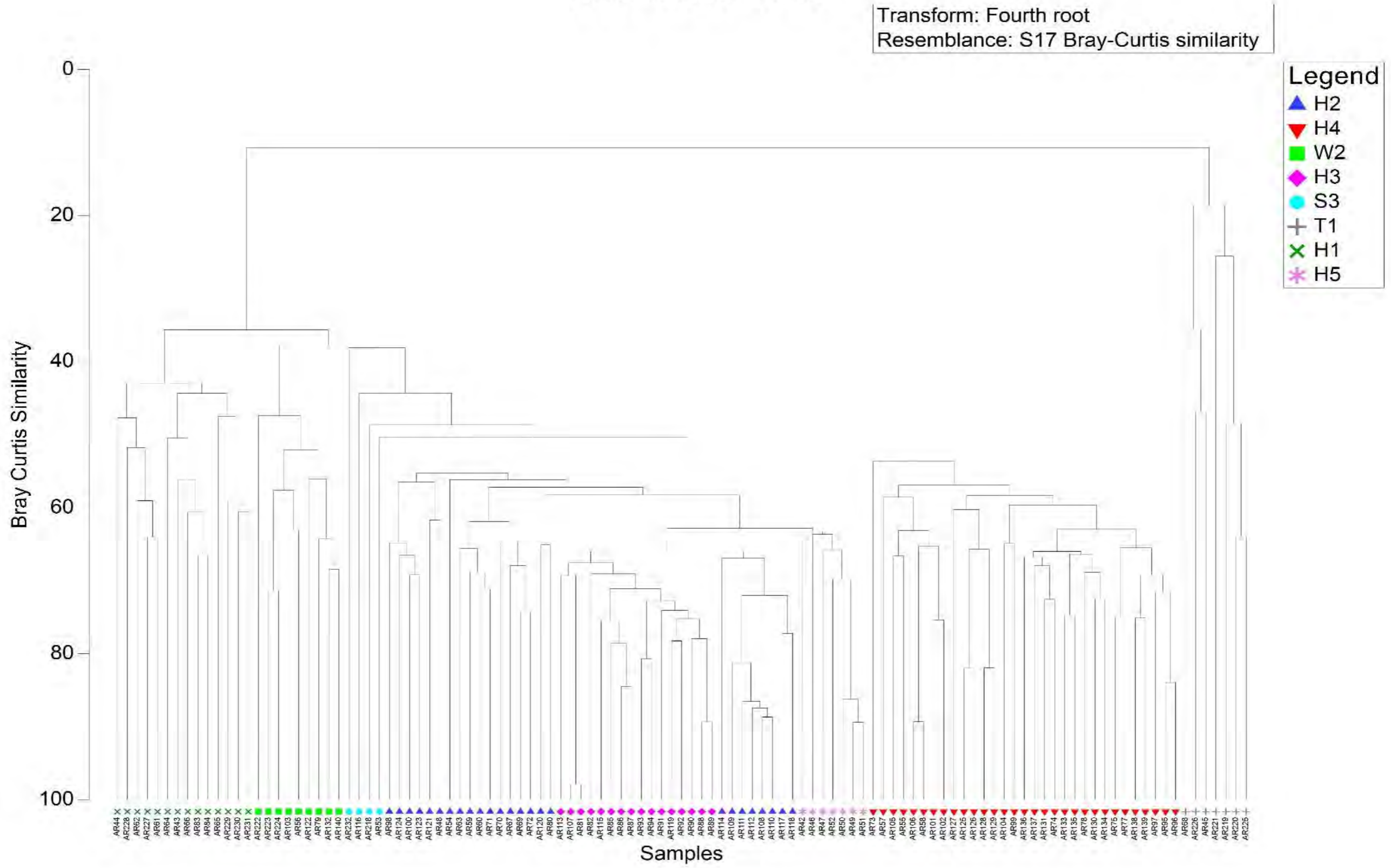
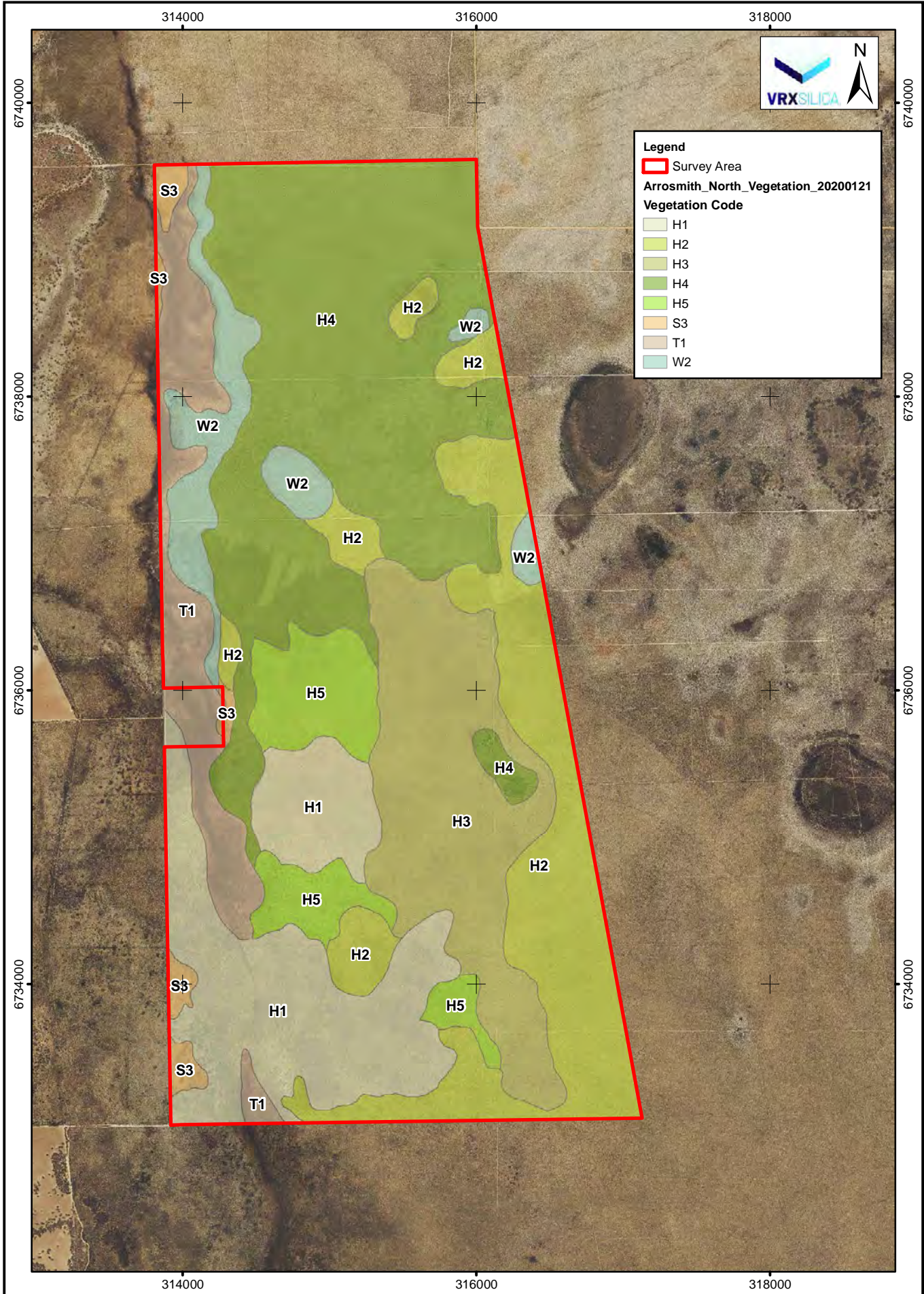
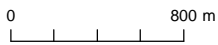


Figure 11: Dendrogram of survey quadrats established within Arrowsmith North survey area



Source: Aerial Photography: Landgate (Nov. 2016), Vegetation: MCPL (21/01/2020)



Scale: 1:35,000
MGA94 (Zone 50)



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Arrowsmith Northern Project Vegetation

Figure:

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CAD Ref: a2602_f22_09
Date: April 2020 Rev: D | A4

5.5.3 Threatened and Priority Ecological Communities

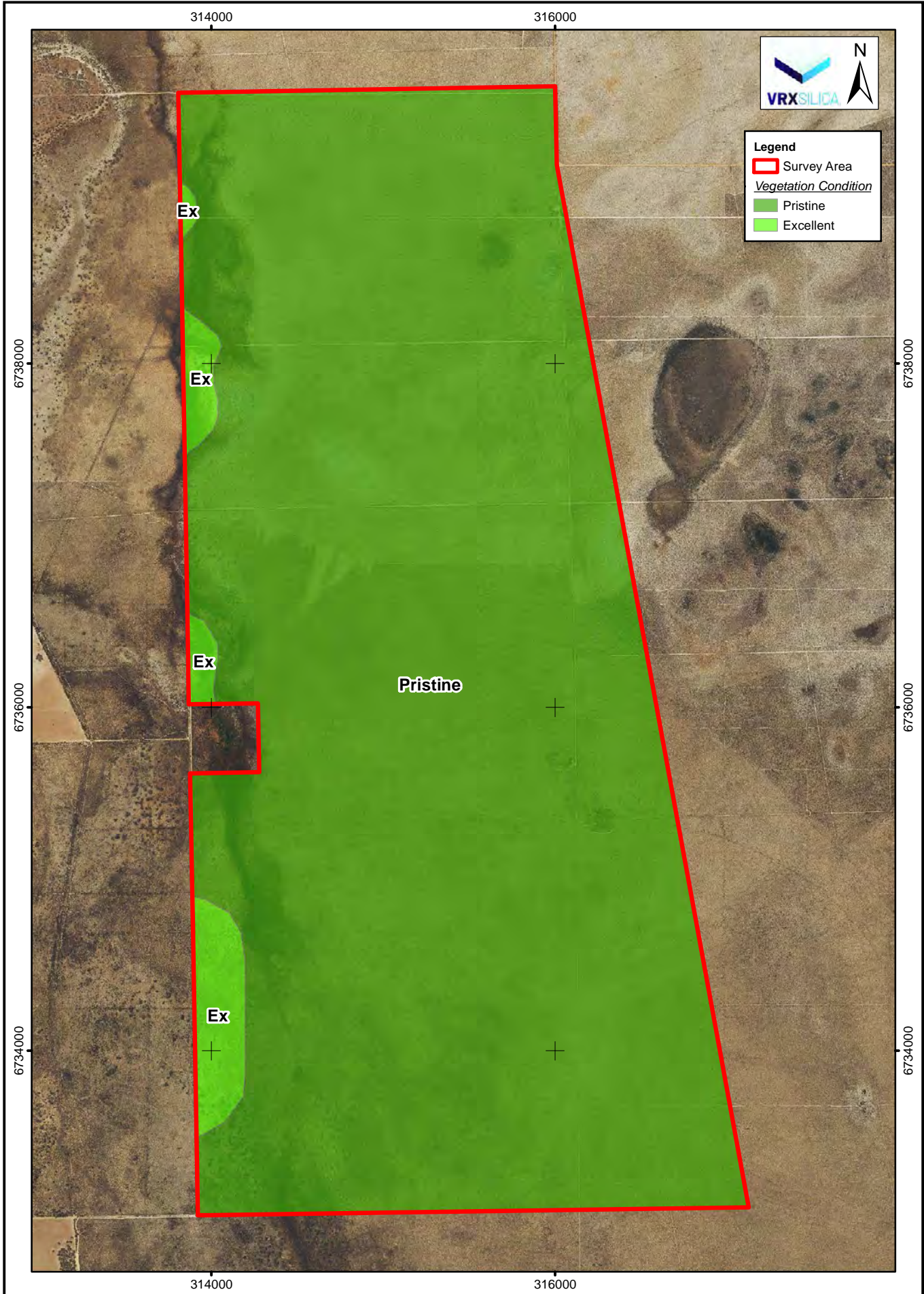
No TECs, pursuant to Part 2, Division 2, and Subdivision 1 of the BC Act and as listed by the DBCA (2018b) or DAWE (2020d) were recorded within the Arrowsmith North survey area. No PECs as listed by the DBCA (2019b) were recorded within the Arrowsmith survey area.

5.5.4 Vegetation Condition

The condition of the vegetation within the Arrowsmith North survey area ranged from Pristine to Excellent (Table 8), with the majority of the area considered Pristine according to the Keighery (1994; Appendix A5) scale. Some areas on the western part of the Arrowsmith North survey area, near tracks, were downgraded to Excellent. Figure 13 shows the vegetation condition of the Arrowsmith North survey area.

Table 8: Condition rating of areas within Arrowsmith North survey area

Condition	Arrowsmith North survey area (ha)	Arrowsmith North survey area (%)
Pristine	1666.646	96.498
Excellent	60.491	3.502
Very Good	0	0
Good	0	0
Degraded	0	0
Completely Degraded	0	0
Total	1727.137	100



Legend

Survey Area

Vegetation Condition

Pristine

Excellent

Source: Aerial Photography: Landgate (Nov. 2016), Vegetation Condition: MCPL (17/12/2019)

0 680 m

Scale: 1:29,964
MGA94 (Zone 50)

CAD Ref: a2602_f22_10
Date: April 2020

Rev: C | A4



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Arrowsmith Northern Project Vegetation Condition

Figure:
13

6 DISCUSSION

6.1 General

Mattiske Consulting was commissioned in October 2017 by Preston Consulting Pty Ltd on behalf of VRX Silica Ltd to undertake a flora and vegetation survey of the Arrowsmith survey area. This survey occurred during the months of October and November 2018. In August 2019, Mattiske consulting was again commissioned by VRX Silica Ltd to undertake a flora and vegetation survey of the Arrowsmith survey area. The 2019 survey occurred during the months of October and November and included an extension to both the Northern and Central survey areas within the Arrowsmith survey area. The Arrowsmith North survey area occupies an area of approximately 1727 ha, and is located between the towns of Eneabba and Dongara, Western Australia. A total of 113 vegetation survey quadrats were established to sample all the apparent vegetation community types which were located within the survey area.

Rainfall in the three months preceding the October/November 2018 survey was above the long term average rainfall for the area and that for the three months preceding the October/November 2019 survey was below the long term average rainfall for the area, based on Bureau of Meteorology data for Green Grove. Overall, based on a range of factors including the proportion of potential flora recorded (estimated at 82 %), proportion of annual taxa recorded (11.87 %), and vegetation quadrat distribution within the survey area, the survey has not been constrained by factors which would adversely affect the survey outcomes nor the conclusions derived from the data used to support vegetation analysis (Table 2).

6.2 Flora

A total of 219 vascular plant taxa, representative of 112 genera and 44 families, were recorded within the Arrowsmith North survey area. The majority of taxa recorded were representative of the Myrtaceae (27 taxa), Proteaceae (25 taxa), and Fabaceae (21 taxa) families (Appendix E). The majority of the taxa recorded were widespread both locally and more broadly within the associated biogeographical subregion. The 219 taxa recorded during the survey compares to 438 taxa recorded as being potentially present within the desktop assessment. This larger number of potential taxa can be attributed to the larger and more diverse tenement area in which was searched. This area covers a greater number of landscape features and hence vegetation communities.

Conservation significant taxa

Of the 13 threatened flora species and 42 priority taxa identified during the desktop survey, eight priority flora taxa were recorded in the Arrowsmith North survey area. The larger number of threatened and priority species identified as having the potential to occur within the survey area, can be attributed to the larger and more diverse tenement area in which was searched. Many of these species are restricted to specific landscape features such as lateritic hills and outcrops that do not occur in the Arrowsmith North survey area.

No threatened flora pursuant to Part 2, Division 1, and Subdivision 2 of the BC Act and as listed by the DBCA (2018a) were recorded in the survey area. Eight priority taxa, as listed by the WAH (1998-) were recorded in the survey area. These were *Comesperma rhadinocarpum* (P3), *Hemiandra* sp. Eneabba (H. Demarz 3687) (P3), *Hypocalymma gardneri* (P3), *Leschenaultia juncea* (P3), *Persoonia rudis* (P3), *Banksia elegans* (P4), *Schoenus griffinianus* (P4) and *Stawellia dimorphantha* (P4).

The following is a summary of the eight priority flora species recorded within the Arrowsmith North survey area:

Comesperma rhadinocarpum (P3) was recorded scattered in the southern section of the Arrowsmith North survey area (Figure 10) from 5 locations totalling 6 plants. The 16 records held at the WAH indicates *Comesperma rhadinocarpum* (P3) ranges from Perth to Utcha Well Nature Reserve. *Comesperma rhadinocarpum* (P3) occurs on a wide range of habitats from sandy loams, sandy clay and sand, sometimes over laterite or limestone. This species appears to be associated with the H1 community, with all records occurring in this community.

Hemiandra sp. Eneabba (H. Demarz 3687) (P3) was recorded scattered throughout the Arrowsmith North survey area (Figure 10) from 83 locations totalling 139 plants. The 34 records held at the WAH indicates *Hemiandra* sp. Eneabba (H. Demarz 3687) (P3) ranges from Eneabba to the Yandanogo Nature Reserve near Dongara with a preference for sandplain habitat. This species is not restricted to a unique set of ecological conditions and is present in various vegetation communities within the survey area.

Hypocalymma gardneri (P3) was recorded scattered throughout the Arrowsmith North survey area (Figure 10) from 130 locations totalling 218 plants. The 22 records held at the WAH indicates *Hypocalymma gardneri* (P3) ranges from Dandaragan to Dongara. *Hypocalymma gardneri* (P3) occurs on a wide range of habitat from grey to brown sand, often over laterite. This species is not restricted to a unique set of ecological conditions and is present in various vegetation communities within the survey area.

Leschenaultia juncea (P3) was recorded in the Arrowsmith North survey area (Figure 10) from 1 location totalling 1 plant. The 22 records held at the WAH indicates *Leschenaultia juncea* (P3) ranges from Hill River to Mingenew. *Leschenaultia juncea* (P3) occurs on a wide range of habitat including white, grey or yellow sand or sandy gravel. This species has currently only been recorded once in the survey area within the H6 community.

Persoonia rudis (P3) was recorded in the north-western part of the Arrowsmith North survey area (Figure 10) from 1 location totalling 1 plant. The 41 records held at the WAH indicates *Persoonia rudis* (P3) is a wide ranging species which occurs from the Bullsbrook Nature Reserve to Three Springs. *Persoonia rudis* (P3) occurs on a wide range of habitat from white, grey or yellow sand often over laterite. This species has currently only been recorded within the W2 community.

Banksia elegans (P4) was recorded throughout the Arrowsmith North survey area (Figure 10) from 229 locations totalling 1598 plants. The 44 records held at the WAH indicates *Banksia elegans* (P4) ranges from Moore River to Geraldton. *Banksia elegans* (P4) occurs on white or red sands, on sandplains and low dunes. This species is not restricted to a unique set of ecological conditions and is present in various vegetation communities within the survey area.

Schoenus griffinianus (P4) was recorded scattered throughout the Arrowsmith North survey area (Figure 10) from 4 locations totalling 8 plants. The 38 records held at the WAH indicates *Schoenus griffinianus* (P4) is a wide ranging species which occurs from Perth to Geraldton with a preference for sandplain habitat. This species is not restricted to a unique set of ecological conditions and is present in various vegetation communities within the survey area.

Stawellia dimorphantha (P4) was recorded scattered in the south-western part of the Arrowsmith North survey area (Figure 10) from 8 locations totalling 14 plants. The 23 records held at the WAH indicates *Stawellia dimorphantha* (P4) ranges from Eneabba to Allanooka. *Stawellia dimorphantha* (P4) occurs on a wide range of habitat from white, grey and yellow sand. This species was mostly recorded within the T1 community and once within the S3 community

Taxa representing range extensions

Tricoryne sp. Mullewa (G.J. Keighery 12080) was recorded within the Arrowsmith North survey area at one survey quadrat. This represents an approximately 110 km southern extension to its currently known range. *Tricoryne* sp. Mullewa (G.J. Keighery 12080) was recorded in the H1 vegetation community in the Arrowsmith North survey area. Vegetation communities similar to H1 have the potential to occur throughout the Geraldton Sandplains IBRA regions where this taxon has previously been recorded.

Synaphea spinulosa subsp. *borealis* was recorded within the Arrowsmith North survey area at four survey quadrats. This represents a range extension of approximately 130 km to the south of its currently known range. *Synaphea spinulosa* subsp. *borealis* was recorded in the H2 and H3 vegetation communities in the Arrowsmith North survey area. Vegetation communities similar to H2 and H3 have the potential to occur throughout the Geraldton Sandplains IBRA regions where this taxon has previously been recorded.

6.3 Vegetation

No TECs, pursuant to Part 2, Division 2, and Subdivision 1 of the BC Act and as listed by the DBCA (2018b) or DAWE (2020d) were recorded within the Arrowsmith survey area. No PECs as listed by the DBCA (2019b) were recorded within the Northern Arrowsmith survey area.

The vegetation of the Arrowsmith North survey area ranged from Pristine to Excellent. The majority of the Arrowsmith North survey area was considered to be in pristine condition due to the absence of disturbance, tracks and weeds.

Vegetation mapping based upon the quadrat-based species data resulted in eight vegetation communities comprising one Low Open Woodland, one Thicket to Scrub, one Scrub and five Heath communities (Appendix H). The most dominant vegetation type was the H4 vegetation community which was present throughout the northern and central portion of the survey area. This community accounted for 30.00 % of the total area surveyed. The second most commonly represented vegetation was the H2 vegetation community which was present in the eastern, southern and central portion of the survey area and accounting for 18.19 % of the total area surveyed. The H1 community, primarily recorded in the south western portion of the survey area accounted for 16.48 % of the total area surveyed. The remaining five communities account for 35.33 % of the survey area. The most restricted vegetation community defined was the S3 community, accounting for 1.43 % of the survey area. Overall, the vegetation communities mapped and species recorded in the Arrowsmith North survey area were consistent with the historical mapping of Beard (1976, 1990).

7 CONCLUSION

Overall, the vegetation communities mapped and species recorded in the Arrowsmith North survey area were consistent with the historical mapping of Beard (1976, 1990). The majority of the survey area is situated on sand plains supporting mixed open to closed heath communities consisting of *Banksia attenuata*, *Banksia hookeriana*, *Melaleuca leuropoma* and *Conospermum triplinervium*, over mixed Myrtaceae, Restionaceae and Haemodoraceae species. The vegetation communities recorded within the survey area are not locally or regionally unique and are well represented in the wider area.

Eight priority flora species have been recorded in the current survey area, six of these priority species will be impacted within the total mine area. Within the 10 year mine area two priority species will be impacted, one of these priority species, *Comesperma rhadinocarpum* (P3), is only recorded in this portion of the development envelope; however from State Herbarium records it does extend further in a regional context.

It is recommended that more detailed and targeted searches are undertaken within the 10 year mine area to obtain an accurate idea of population numbers to be impacted and that further studies are undertaken within nearby areas to enable a more local and regional interpretation of the significance of the plants recorded within the survey areas.

8 ACKNOWLEDGEMENTS

The authors would like to thank taxonomists from the Western Australian Herbarium for their plant identification support.

9 PERSONNEL

The following Matiske Consulting Pty Ltd personnel were involved in this assessment.

NAME	POSITION	INVOLVEMENT	FLORA COLLECTION PERMITS
Dr EM Matiske	Managing Director & Principal Ecologist	Planning, managing, reporting	N/A
Dr S Ruoss	Experienced Ecologist	Planning, fieldwork, data analysis, reporting	FB62000031; DRF TFL 17-1819
Ms L Taaffe	Botanist	Fieldwork, data analysis, reporting	FB62000021
Ms J Rogers	Botanist	Fieldwork, data collation, reporting	FB62000032
Mr A Pereira	Botanist	Fieldwork	FB62000145
Mr B Ellery	Taxonomist	Plant identification	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 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 (Department of Biodiversity, Conservation and Attractions 2019a). 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 Department of Biodiversity, Conservation and Attractions (2019a).

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 <i>Wildlife Conservation (Rare Flora) Notice 2018</i>).
EN	Endangered	Species considered to be facing a very high risk of becoming extinct in the wild (listed under Schedule 2 of the <i>Wildlife Conservation (Rare Flora) Notice 2018</i>).
VU	Vulnerable	Species considered to be facing a high risk of becoming extinct in the wild (listed under Schedule 3 of the <i>Wildlife Conservation (Rare Flora) Notice 2018</i>).

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” (Department of Biodiversity, Conservation and Attractions 2019a). Priority species are not afforded additional protection under state or federal legislation, 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 Department of Biodiversity, Conservation and Attractions (2019a).

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.

The *Biodiversity Conservation Act 2016* (BC Act) provides for (amongst other things) some protection of ecological communities at risk of collapse in Western Australia under Part 3 (Division 2).

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; Department of Biodiversity, Conservation and Attractions 2018b). 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). 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	<p>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:</p> <ol style="list-style-type: none"> 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	<p>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:</p> <ol style="list-style-type: none"> 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	<p>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:</p> <ol style="list-style-type: none"> 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 Department of Biodiversity, Conservation and Attractions (2019b) in the *Priority Ecological Communities for Western Australia – Version 28 (17 January 2019)*. 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)	<ol style="list-style-type: none"> 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)	<ol style="list-style-type: none"> 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 2019).

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
<p style="text-align: center;">C1 (Exclusion)</p> <p>'(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.'</p> <p>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.</p>	<p>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.</p>
<p style="text-align: center;">C2 (Eradication)</p> <p>'(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.'</p> <p>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.</p>	<p>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.</p>
<p style="text-align: center;">C3 (Management)</p> <p>'(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:</p> <p>(i) alleviate the harmful impact of the declared pest in the area; or</p> <p>(ii) reduce the number or distribution of the declared pest in the area; or</p> <p>(iii) prevent or contain the spread of the declared pest in the area.'</p> <p>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.</p>	<p>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:</p> <p>(a) alleviate the harmful impact of the declared pest in the area for which it is declared; or</p> <p>(b) reduce the number or distribution of the declared pest in the area for which it is declared; or</p> <p>(c) prevent or contain the spread of the declared pest in the area for which it is declared.</p>

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: 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 A5.1 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 A6: NVIS STRUCTURAL FORMATION TERMINOLOGY

Note: Adapted from ESCAVI (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						
		closed forest	open forest	woodland	open woodland	isolated trees	isolated clumps of trees	trees
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	sparse 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 bryophyteland	bryophyteland	open bryophyteland	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 B: VASCULAR PLANT SPECIES WITH THE POTENTIAL TO OCCUR
WITHIN THE ARROWSMITH SURVEY AREA

Note: * denotes introduced species; T denotes threatened flora and P1-P4 denote priority flora species (DBCFA 2019a).
SCC= State conservation code; FCC = Federal conservation code; CE = Critically Endangered; E = Endangered; V = Vulnerable.

Family	Species	SCC	FCC	EPBC	Nature map	North
Aizoaceae	<i>Carpobrotus modestus</i>				x	x
Amaranthaceae	<i>Ptilotus manglesii</i> <i>Ptilotus stirlingii</i> subsp. <i>stirlingii</i>				x x	x
Anarthriaceae	<i>Hopkinsia anoectocolea</i> <i>Lyginia imberbis</i>	P3			x x	x
Apiaceae	<i>Eryngium pinnatifidum</i> <i>Eryngium pinnatifidum</i> subsp. <i>pinnatifidum</i> <i>Platysace xerophila</i>				x x x	x x
Araliaceae	<i>Trachymene coerulea</i> subsp. <i>leucopetala</i> <i>Trachymene pilosa</i>				x x	
Asparagaceae	* <i>Asparagus asparagoides</i> <i>Laxmannia omnifertillis</i> <i>Laxmannia sessiliflora</i> subsp. <i>drummondii</i> <i>Thysanotus asper</i> <i>Thysanotus manglesianus</i> <i>Thysanotus rectantherus</i> <i>Thysanotus spiniger</i> <i>Thysanotus thyrsoides</i> <i>Thysanotus triandrus</i>			x	x x x x x x x x x	x x x x x x x
Asphodelaceae	<i>Bulbine semibarbata</i>				x	x
Asteraceae	<i>Gnephosis angianthoides</i> <i>Gnephosis tenuissima</i> <i>Myriocephalus occidentalis</i> <i>Myriocephalus oldfieldii</i> <i>Olearia rudis</i> <i>Podolepis gracilis</i> <i>Podotrocha chrysantha</i> <i>Podotrocha gnaphalioides</i> <i>Rhodanthe oppositifolia</i> subsp. <i>oppositifolia</i> <i>Senecio pinnatifolius</i> var. <i>latilobus</i> <i>Waitzia podolepis</i>				x x x x x x x x x x x x	x x x x x x x x x x
Boraginaceae	<i>Halgania sericiflora</i>				x	x
Boryaceae	<i>Borya sphaerocephala</i>				x	x
Byblidaceae	<i>Byblis lamellata</i>				x	x

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Family	Species	SCC	FCC	EPBC	Nature map	North
Campanulaceae	<i>Lobelia rhytidosperma</i>				x	x
Casuarinaceae	<i>Allocasuarina humilis</i>				x	x
Celastraceae	<i>Stackhousia pubescens</i>				x	x
	<i>Tripterococcus brunonis</i>				x	x
Centrolepidaceae	<i>Centrolepis alepyroides</i>	P3			x	x
	<i>Centrolepis milleri</i>				x	
	<i>Centrolepis polygyna</i>				x	x
Colchicaceae	<i>Wurmbea monantha</i>	T	E	x	x	x
	<i>Wurmbea tubulosa</i>					x
Convolvulaceae	<i>Convolvulus remotus</i>				x	x
Cupressaceae	<i>Callitris arenaria</i>				x	x
	<i>Callitris pyramidalis</i>				x	x
Cyperaceae	<i>Lepidosperma scabrum</i>				x	
	<i>Lepidosperma</i> sp.				x	x
	<i>Mesomelaena pseudostygia</i>				x	
	<i>Schoenus curvifolius</i>				x	
	<i>Schoenus grandiflorus</i>				x	
	<i>Schoenus griffinianus</i>	P4			x	x
	<i>Schoenus odontocarpus</i>				x	x
	<i>Schoenus pleiostemoneus</i>				x	
	<i>Schoenus</i> sp. A3 Ciliate Sheaths (K.R. Newbey 9402)				x	x
	<i>Schoenus</i> sp. Eneabba (F. Obbens & C. Godden 1154)	P2			x	x
	<i>Schoenus unispiculatus</i>				x	x
	<i>Tetralia microcarpa</i>				x	
Dasypogonaceae	<i>Calectasia palustris</i>	P2			x	x
Dilleniaceae	<i>Hibbertia acerosa</i>				x	x
	<i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i>				x	x
	<i>Hibbertia hypericoides</i> subsp. <i>septentrionalis</i>				x	x
	<i>Hibbertia racemosa</i>				x	
	<i>Hibbertia robur</i>				x	x
Droseraceae	<i>Drosera drummondii</i>				x	x
	<i>Drosera echinoblastus</i>				x	x
	<i>Drosera eneabba</i>				x	x
	<i>Drosera erythrorhiza</i>				x	x
	<i>Drosera hirsuta</i>				x	x

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Family	Species	SCC	FCC	EPBC	Nature map	North
Droseraceae (cont.)	<i>Drosera humilis</i>				x	x
	<i>Drosera magna</i>				x	x
	<i>Drosera menziesii</i>				x	x
	<i>Drosera porrecta</i>				x	x
	<i>Drosera spilos</i>				x	x
Ecdeiocoleaceae	<i>Ecdeiocolea monostachya</i>				x	x
Elaeocarpaceae	<i>Tetratheca confertifolia</i>	T	CE	x	x	x
	<i>Tetratheca nephelioides</i>					x
Emblingiaceae	<i>Emblingia calceoliflora</i>				x	x
Ericaceae	<i>Andersonia heterophylla</i>				x	x
	<i>Astroloma microdonta</i>				x	x
	<i>Astroloma stomarrhena</i>				x	x
	<i>Astroloma xerophyllum</i>				x	x
	<i>Brachyloma preissii</i>				x	x
	<i>Leucopogon inflexus</i>				x	x
	<i>Leucopogon insularis</i>				x	x
	<i>Leucopogon obtectus</i>	T	E	x	x	x
	<i>Leucopogon planifolius</i>				x	x
	<i>Leucopogon prolatus</i>				x	
	<i>Leucopogon</i> sp. Northern ciliate (R. Davis 3393)				x	x
	<i>Lysinema pentapetalum</i>				x	x
	<i>Styphelia fillifolia</i>	P3			x	
	<i>Styphelia</i> sp. Eneabba (N. Marchant s.n. PERTH 01291777)				x	x
	Euphorbiaceae	<i>Beyeria gardneri</i>	P3			x
<i>Monotaxis bracteata</i>					x	x
<i>Stachystemon axillaris</i>					x	x
Fabaceae	<i>Acacia alata</i> var. <i>tetrantha</i>				x	x
	<i>Acacia auronitens</i>				x	
	<i>Acacia blakelyi</i>				x	x
	<i>Acacia cavealis</i>				x	x
	<i>Acacia dilatata</i>				x	x
	<i>Acacia fagonioides</i>				x	x
	<i>Acacia hopperiana</i>				x	x
	<i>Acacia idiomorpha</i>				x	x
	<i>Acacia lasiocarpa</i> var. <i>lasiocarpa</i>				x	
	<i>Acacia latipes</i> subsp. <i>latipes</i>				x	
	<i>Acacia latipes</i> subsp. <i>licina</i>	P3			x	x
	<i>Acacia neurophylla</i> subsp. <i>neurophylla</i>				x	x

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Family	Species	SCC	FCC	EPBC	Nature map	North
Fabaceae (cont.)	<i>Acacia pulchella</i> var. <i>glaberrima</i>				x	x
	<i>Acacia rostellifera</i>				x	x
	<i>Acacia saligna</i> subsp. <i>lindleyi</i>				x	x
	<i>Acacia spathulifolia</i>				x	x
	<i>Acacia vittata</i>	P2			x	x
	<i>Acacia xanthina</i>				x	
	<i>Cristonia stenophylla</i>				x	x
	<i>Daviesia divaricata</i> subsp. <i>divaricata</i>				x	x
	<i>Daviesia incrassata</i> subsp. <i>teres</i>				x	
	<i>Daviesia nudiflora</i> subsp. <i>hirtella</i>				x	x
	<i>Daviesia pedunculata</i>				x	x
	<i>Daviesia podophylla</i>				x	
	<i>Daviesia speciosa</i>	T	E	x		x
	<i>Gastrolobium callistachys</i>				x	x
	<i>Gastrolobium plicatum</i>				x	x
	<i>Gastrolobium polystachyum</i>				x	
	<i>Gompholobium muticum</i>				x	x
	<i>Gompholobium tomentosum</i>				x	x
	<i>Hovea stricta</i>				x	x
	<i>Isotropis cuneifolia</i>				x	x
	<i>Jacksonia floribunda</i>				x	
	<i>Jacksonia hakeoides</i>				x	x
	<i>Jacksonia lehmannii</i>				x	
	<i>Kennedia prostrata</i>				x	
	<i>Labichea lanceolata</i> subsp. <i>lanceolata</i>				x	x
	<i>Leptosema aphyllum</i>				x	
	<i>Mirbelia trichocalyx</i>				x	
<i>Sphaerolobium pulchellum</i>				x	x	
<i>Viminaria juncea</i>				x	x	
Gentianaceae	* <i>Cicendia filiformis</i>				x	x
Goodeniaceae	<i>Dampiera oligophylla</i>				x	x
	<i>Dampiera spicigera</i>				x	x
	<i>Dampiera tephrea</i>	P2			x	
	<i>Goodenia corynocarpa</i>				x	
	<i>Goodenia pulchella</i>				x	x
	<i>Goodenia trichophylla</i>				x	x
	<i>Lechenaultia biloba</i>				x	x
	<i>Lechenaultia floribunda</i>				x	x
	<i>Lechenaultia hirsuta</i>				x	x
	<i>Lechenaultia stenosepala</i>				x	x
	<i>Scaevola canescens</i>				x	x
	<i>Scaevola glandulifera</i>				x	x
	<i>Scaevola lanceolata</i>				x	x

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Family	Species	SCC	FCC	EPBC	Nature map	North
Goodeniaceae (cont.)	<i>Scaevola phlebopetala</i>				x	x
	<i>Scaevola repens</i> subsp. <i>Northern Sandplains</i>				x	x
	<i>Scaevola sericophylla</i>				x	
	<i>Scaevola thesioides</i> subsp. <i>thesioides</i>				x	x
	<i>Verreauxia reinwardtii</i>				x	x
Gyrostemonaceae	<i>Gyrostemon ramulosus</i>				x	x
	<i>Gyrostemon subnudus</i>				x	x
	<i>Tersonia cyathiflora</i>				x	x
Haemodoraceae	<i>Anigozanthos humilis</i> subsp. <i>humilis</i>				x	x
	<i>Anigozanthos manglesii</i> subsp. <i>quadrans</i>				x	x
	<i>Anigozanthos pulcherrimus</i>				x	x
	<i>Conostylis aculeata</i> subsp. <i>breviflora</i>				x	
	<i>Conostylis aurea</i>				x	x
	<i>Conostylis candicans</i> subsp. <i>candicans</i>				x	x
	<i>Conostylis canteriata</i>				x	x
	<i>Conostylis crassinerva</i> subsp. <i>absens</i>				x	x
	<i>Conostylis dielsii</i> subsp. <i>teres</i>	T	E	x		x
	<i>Conostylis hiemalis</i>				x	x
	<i>Conostylis micrantha</i>	T	E	x		x
	<i>Conostylis neocymosa</i>				x	x
	<i>Conostylis prolifera</i>				x	x
	<i>Conostylis resinosa</i>				x	x
	<i>Conostylis teretiuscula</i>				x	x
	<i>Conostylis tomentosa</i>				x	x
	<i>Haemodorum simulans</i>				x	x
<i>Haemodorum spicatum</i>				x	x	
<i>Phlebocarya filifolia</i>				x		
Haloragaceae	<i>Glischrocaryon angustifolium</i>				x	x
	<i>Gonocarpus confertifolius</i> var. <i>confertifolius</i>				x	x
Hemerocallidaceae	<i>Arnocrinum preissii</i>				x	x
	<i>Johnsonia pubescens</i> subsp. <i>pubescens</i>				x	x
	<i>Stawellia dimorphantha</i>	P4			x	x
	<i>Tricoryne humilis</i>				x	
Hypericaceae	<i>Hypericum japonicum</i>				x	x
Iridaceae	<i>Orthrosanthus laxis</i> var. <i>laxis</i>				x	x
	<i>Patersonia occidentalis</i> var. <i>latifolia</i>				x	x
Juncaginaceae	<i>Triglochin mucronata</i>				x	x
	<i>Triglochin protuberans</i>	P3			x	x

APPENDIX B: VASCULAR PLANT SPECIES WITH THE POTENTIAL TO OCCUR
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Family	Species	SCC	FCC	EPBC	Nature map	North
Juncaginaceae (cont.)	<i>Triglochin</i> sp. A Flora of Australia (G.J. Keighery 2477)				x	
Lamiaceae	<i>Hemiandra gardneri</i>	T	E	x		x
	<i>Hemiandra rubriflora</i>				x	x
	<i>Hemiandra</i> sp. Eneabba (H. Demarz 3687)	P3			x	x
	<i>Hemiphora bartlingii</i>				x	x
	<i>Pityrodia hemigenioides</i>				x	x
	<i>Quoya verbascina</i>				x	x
Lauraceae	<i>Cassytha glabella</i> forma <i>bicallosa</i>				x	x
	<i>Cassytha glabella</i> forma <i>glabella</i>				x	x
Loganiaceae	<i>Orianthera spermacocea</i>				x	x
Loranthaceae	<i>Amyema miquelii</i>				x	x
	<i>Amyema preissii</i>				x	x
	<i>Nuytsia floribunda</i>				x	x
Macarthuriaceae	<i>Macarthuria apetala</i>				x	x
Malvaceae	<i>Alyogyne hakeifolia</i>				x	x
	<i>Guichenotia alba</i>	P3			x	x
	<i>Guichenotia intermedia</i>				x	
	<i>Guichenotia ledifolia</i>				x	
	<i>Guichenotia macrantha</i>				x	x
	<i>Guichenotia micrantha</i>				x	x
	<i>Guichenotia quasicalva</i>	P2			x	x
	<i>Guichenotia sarotes</i>				x	x
	<i>Lasiopetalum drummondii</i>				x	x
	<i>Lasiopetalum ogilvieanum</i>	P1			x	x
	<i>Lasiopetalum</i> sp. Coorow (E. Ried 101)				x	x
	<i>Seringia hermanniifolia</i>				x	
	<i>Sida hookeriana</i>				x	x
Menyanthaceae	<i>Liparophyllum capitatum</i>				x	x
Montiaceae	<i>Calandrinia baccata</i>				x	x
	<i>Calandrinia calyptrata</i>				x	x
	<i>Calandrinia corrigioloides</i>				x	
	<i>Calandrinia granulifera</i>				x	
Myrtaceae	<i>Babingtonia grandiflora</i>				x	x
	<i>Beaufortia aestiva</i>				x	x
	<i>Beaufortia elegans</i>				x	x
	<i>Calothamnus longissimus</i>				x	x

APPENDIX B: VASCULAR PLANT SPECIES WITH THE POTENTIAL TO OCCUR
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Family	Species	SCC	FCC	EPBC	Nature map	North
Myrtaceae (cont.)	<i>Calothamnus quadrifidus</i> subsp. <i>angustifolius</i>				x	x
	<i>Calothamnus sanguineus</i>				x	x
	<i>Calothamnus torulosus</i>				x	
	<i>Calytrix chrysantha</i>	P4			x	x
	<i>Calytrix cravenii</i>				x	x
	<i>Calytrix depressa</i>				x	x
	<i>Calytrix ecalycata</i>				x	x
	<i>Calytrix eneabensis</i>	P4			x	x
	<i>Calytrix sapphirina</i>				x	x
	<i>Calytrix strigosa</i>				x	x
	<i>Calytrix superba</i>	P4			x	x
	<i>Darwinia speciosa</i>				x	x
	<i>Eremaea asterocarpa</i> subsp. <i>histoclada</i>				x	x
	<i>Eremaea atala</i>				x	x
	<i>Eremaea beaufortioides</i>				x	x
	<i>Eremaea beaufortioides</i> var. <i>microphylla</i>				x	x
	<i>Eremaea brevifolia</i>				x	x
	<i>Eremaea hadra</i>				x	x
	<i>Eremaea violacea</i> subsp. <i>raphiophylla</i>				x	
	<i>Eremaea violacea</i> subsp. <i>violacea</i>				x	x
	<i>Eremaea</i> x <i>phoenicea</i>				x	x
	<i>Eucalyptus camaldulensis</i> subsp. <i>obtusata</i>				x	x
	<i>Eucalyptus celastroides</i> subsp. <i>virella</i>				x	x
	<i>Eucalyptus crispata</i>	T	V	x		x
	<i>Eucalyptus decipiens</i>				x	
	<i>Eucalyptus erythrocorys</i>				x	x
	<i>Eucalyptus flocktoniae</i>				x	x
	<i>Eucalyptus horistes</i>				x	x
	<i>Eucalyptus impensa</i>	T	E	x		x
	<i>Eucalyptus leprophloia</i>	T	E	x		x
	<i>Eucalyptus macrocarpa</i> subsp. <i>elachantha</i>	P4			x	x
	<i>Eucalyptus macrocarpa</i> x <i>pyriformis</i>	P3			x	x
	<i>Eucalyptus pyriformis</i>				x	x
	<i>Eucalyptus rudis</i>				x	x
	<i>Eucalyptus todtiana</i>				x	x
	<i>Eucalyptus</i> x <i>balanites</i>	T	E	x		x
	<i>Hypocalymma angustifolium</i> subsp. Swan Coastal Plain (G.J. Keighery 16777)				x	x
	<i>Hypocalymma tetrapterum</i>	P3			x	x
	<i>Hypocalymma xanthopetalum</i>				x	x
	<i>Leptospermum oligandrum</i>				x	x
	<i>Malleostemon roseus</i>				x	x
	<i>Melaleuca caeca</i>				x	x
<i>Melaleuca concreta</i>				x		
<i>Melaleuca leuropoma</i>				x	x	

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Family	Species	SCC	FCC	EPBC	Nature map	North
Myrtaceae (cont.)	<i>Melaleuca raphiophylla</i>				x	x
	<i>Melaleuca ryeae</i>				x	x
	<i>Melaleuca systema</i>				x	
	<i>Melaleuca trichophylla</i>				x	x
	<i>Melaleuca urceolaris</i>				x	x
	<i>Melaleuca viminea</i> subsp. <i>viminea</i>				x	x
	<i>Pileanthus filifolius</i>				x	x
	<i>Scholtzia calcicola</i>	P2			x	x
	<i>Scholtzia chapmanii</i>				x	x
	<i>Scholtzia laxiflora</i>				x	x
	<i>Scholtzia trilocularis</i>				x	x
	<i>Scholtzia umbellifera</i>				x	x
	<i>Scholtzia uniovulata</i>				x	x
	<i>Thryptomene hyporhytis</i>				x	x
	<i>Thryptomene racemulosa</i>				x	x
	<i>Verticordia argentea</i>	P2			x	x
	<i>Verticordia blepharophylla</i>				x	x
	<i>Verticordia dasystylis</i> subsp. <i>oestopoia</i>	P1			x	x
	<i>Verticordia densiflora</i> var. <i>cespitosa</i>				x	x
	<i>Verticordia densiflora</i> var. <i>densiflora</i>				x	x
	<i>Verticordia fragrans</i>	P3			x	
	<i>Verticordia grandis</i>				x	x
	<i>Verticordia luteola</i> var. <i>rosea</i>	P1			x	x
<i>Verticordia monadelpha</i> var. <i>monadelpha</i>				x	x	
<i>Verticordia nobilis</i>				x	x	
<i>Verticordia ovalifolia</i>				x	x	
<i>Verticordia pennigera</i>				x	x	
Olacaceae	<i>Olax scalariformis</i>				x	x
Orchidaceae	<i>Caladenia crebra</i>				x	x
	<i>Caladenia denticulata</i> subsp. <i>albicans</i>	P1			x	x
	<i>Diuris septentrionalis</i>				x	x
	<i>Diuris setacea</i>				x	x
	<i>Paracaleana dixonii</i>	T	E	x	x	x
	<i>Paracaleana nigrata</i>				x	x
	<i>Pterostylis recurva</i>				x	x
<i>Thelymitra stellata</i>	T	E	x		x	
Phyllanthaceae	<i>Phyllanthus calycinus</i>				x	x
	<i>Poranthera asybosca</i>	P1			x	
	<i>Billardiera coriacea</i>				x	
	<i>Cheiranthra preissiana</i>				x	x
	<i>Marianthus erubescens</i>				x	x

APPENDIX B: VASCULAR PLANT SPECIES WITH THE POTENTIAL TO OCCUR
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Family	Species	SCC	FCC	EPBC	Nature map	North
Pittosporaceae (cont.)	<i>Marianthus ringens</i>				x	x
Plantaginaceae	* <i>Plantago coronopus</i> subsp. <i>commutata</i>				x	x
Poaceae	<i>Amphipogon turbinatus</i>				x	x
	* <i>Cenchrus ciliaris</i>			x		x
	* <i>Vulpia myuros</i>				x	x
Polygalaceae	<i>Comesperma calymega</i>				x	x
	<i>Comesperma drummondii</i>				x	x
	<i>Comesperma griffinii</i>	P2			x	x
	<i>Muehlenbeckia adpressa</i>				x	
Proteaceae	<i>Adenanthos cygnorum</i> subsp. <i>cygnorum</i>				x	x
	<i>Adenanthos drummondii</i>				x	x
	<i>Banksia candolleana</i>				x	x
	<i>Banksia dallanneyi</i>				x	
	<i>Banksia dallanneyi</i> subsp. <i>media</i>				x	x
	<i>Banksia elegans</i>	P4			x	x
	<i>Banksia fraseri</i> var. <i>crebra</i>	P3			x	x
	<i>Banksia grossa</i>				x	x
	<i>Banksia hewardiana</i>				x	
	<i>Banksia hookeriana</i>				x	x
	<i>Banksia incana</i>				x	
	<i>Banksia leptophylla</i>				x	x
	<i>Banksia leptophylla</i> var. <i>melletica</i>				x	
	<i>Banksia menziesii</i>				x	x
	<i>Banksia scabrella</i>	P4			x	x
	<i>Banksia shuttleworthiana</i>				x	x
	<i>Banksia tridentata</i>				x	
	<i>Conospermum boreale</i>				x	x
	<i>Conospermum boreale</i> subsp. <i>ascendens</i>				x	x
	<i>Conospermum boreale</i> subsp. <i>boreale</i>				x	x
	<i>Conospermum brachyphyllum</i>				x	x
	<i>Conospermum canaliculatum</i>				x	x
	<i>Conospermum crassinervium</i>				x	
	<i>Conospermum incurvum</i>				x	
	<i>Conospermum stoechadis</i>				x	x
	<i>Conospermum unilaterale</i>				x	x
	<i>Conospermum wycherleyi</i> subsp. <i>glabrum</i>				x	x
	<i>Conospermum wycherleyi</i> subsp. <i>wycherleyi</i>				x	
	<i>Conostephium preissii</i>				x	x
	<i>Grevillea biformis</i> subsp. <i>biformis</i>				x	x
	<i>Grevillea biternata</i>				x	x
	<i>Grevillea candelabroides</i>				x	

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Family	Species	SCC	FCC	EPBC	Nature map	North
Proteaceae (cont.)	<i>Grevillea didymobotrya</i> subsp. <i>didymobotrya</i>				x	x
	<i>Grevillea dielsiana</i>				x	x
	<i>Grevillea erinacea</i>	P3			x	x
	<i>Grevillea exposita</i>				x	x
	<i>Grevillea leucopteris</i>				x	x
	<i>Grevillea shuttleworthiana</i> subsp. <i>canarina</i>				x	x
	<i>Grevillea umbellulata</i>				x	
	<i>Hakea auriculata</i>				x	x
	<i>Hakea candolleana</i>				x	
	<i>Hakea costata</i>				x	x
	<i>Hakea cygna</i> subsp. <i>cygna</i>				x	x
	<i>Hakea eneabba</i>				x	x
	<i>Hakea incrassata</i>				x	
	<i>Hakea lissocarpha</i>				x	
	<i>Hakea marginata</i>				x	
	<i>Hakea neospathulata</i>				x	x
	<i>Hakea polyanthema</i>				x	x
	<i>Hakea prostrata</i>				x	x
	<i>Hakea ruscifolia</i>				x	
	<i>Isopogon divergens</i>				x	x
	<i>Isopogon tridens</i>				x	x
	<i>Persoonia acicularis</i>				x	x
	<i>Persoonia chapmaniana</i>	P3			x	x
	<i>Persoonia filiformis</i>	P3			x	x
	<i>Persoonia rudis</i>	P3			x	x
	<i>Petrophile brevifolia</i>				x	x
	<i>Petrophile conifera</i>				x	x
	<i>Petrophile drummondii</i>				x	x
	<i>Petrophile macrostachya</i>				x	x
	<i>Petrophile megalostegia</i>				x	x
<i>Petrophile scabriuscula</i>				x	x	
<i>Stirlingia latifolia</i>				x	x	
<i>Synaphea aephynsa</i>				x	x	
<i>Synaphea oulopha</i>	P3			x	x	
Restionaceae	<i>Alexgeorgea nitens</i>				x	x
	<i>Chordifex sinuosus</i>				x	x
	<i>Desmocladus semiplanus</i>				x	
	<i>Lepidobolus preissianus</i> subsp. <i>preissianus</i>				x	x
Rhamnaceae	<i>Cryptandra pungens</i>				x	x
	<i>Cryptandra scoparia</i>				x	x
	<i>Stenanthemum notiale</i> subsp. <i>notiale</i>				x	x
Rubiaceae	<i>Opercularia vaginata</i>				x	x

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Rutaceae	<i>Boronia busselliana</i>				x	x
	<i>Boronia cymosa</i>				x	x
	<i>Diplolaena ferruginea</i>				x	x
	<i>Diplolaena leemania</i>				x	x
	<i>Diplopeltis huegelii</i>				x	x
	<i>Diplopeltis huegelii</i> subsp. <i>lehmannii</i>				x	x
	<i>Diplopeltis huegelii</i> subsp. <i>subintegra</i>				x	x
	<i>Geleznovia verrucosa</i>				x	x
Santalaceae	<i>Exocarpos sparteus</i>				x	x
	<i>Leptomeria empetrififormis</i>				x	x
	<i>Santalum acuminatum</i>				x	x
Scrophulariaceae	<i>Eremophila oldfieldii</i> subsp. <i>oldfieldii</i>				x	x
Selaginellaceae	<i>Selaginella gracillima</i>				x	x
Solanaceae	<i>Anthocercis ilicifolia</i> subsp. <i>ilicifolia</i>				x	x
	<i>Anthocercis littorea</i>				x	x
Stylidiaceae	* <i>Lycium ferocissimum</i>			x		x
	<i>Levenhookia octomaculata</i>				x	x
	<i>Levenhookia stipitata</i>				x	x
	<i>Stylidium adpressum</i>				x	x
	<i>Stylidium bicolor</i>				x	x
	<i>Stylidium carnosum</i> subsp. <i>Narrow leaves</i> (J.A. Wege 490)	P1			x	x
	<i>Stylidium crossocephalum</i>				x	x
	<i>Stylidium despectum</i>				x	x
	<i>Stylidium dichotomum</i>				x	
	<i>Stylidium diuroides</i> subsp. <i>paucifoliatum</i>				x	x
	<i>Stylidium ecorne</i>				x	
	<i>Stylidium flagellum</i>				x	
	<i>Stylidium kalbarriense</i>				x	x
	<i>Stylidium longitubum</i>	P4			x	x
	<i>Stylidium maitlandianum</i>				x	x
<i>Stylidium ponticulus</i>				x	x	
<i>Stylidium pseudocaespitosum</i>	P2			x	x	
<i>Stylidium purpureum</i>				x	x	
<i>Stylidium repens</i>				x	x	
<i>Stylidium rigidulum</i>				x	x	
<i>Stylidium torticarpum</i>	P3			x	x	
<i>Stylidium udusicola</i>				x		
<i>Stylidium</i> sp.				x	x	
Tamaricaceae	* <i>Tamarix aphylla</i>			x		x

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Family	Species	SCC	FCC	EPBC	Nature map	North
Thymelaeaceae	<i>Pimelea angustifolia</i>				x	x
	<i>Pimelea imbricata</i> var. <i>piligera</i>				x	x
	<i>Pimelea leucantha</i>				x	x
	<i>Pimelea rosea</i>				x	
Violaceae	<i>Hybanthus calycinus</i>				x	x
Xanthorrhoeaceae	<i>Chamaescilla versicolor</i>				x	x
	<i>Xanthorrhoea drummondii</i>				x	x
	<i>Xanthorrhoea</i> sp. Lesueur (G.J. Keighery 16404)				x	x

APPENDIX C: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT IN THE ARROWSMITH SURVEY AREA

Note: 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; CAR – Carnarvon; ESP – Esperance Plains; GAS – Gascoyne; GES – Geraldton Sandplains; JAF – Jarrah Forest; MAL – Mallee; MUR – Murchison; SWA – Swan Coastal Plain; YAL – Yalgoo. Likelihood of occurrence in survey area is based on a Low, Moderate or High ranking.

Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence																								
<i>Conostylis dielsii</i> subsp. <i>teres</i>	Haemodoraceae	T	Endangered	<p>Habit: Shortly rhizomatous, tufted perennial, grass-like or herb, 0.13-0.33 m high, leaves terete.</p> <p>Flower colour: cream-yellow</p> <p>Flowering period (indicated in green):</p> <table border="1"> <tr> <td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>▲</td><td>▲</td><td></td> </tr> </table> <p style="text-align: right;">Survey (▲)</p> <p>Soils: White, grey or yellow sand, gravel. Low open woodland.</p> <p>IBRA Distribution: GES</p> <p>Florabase records: 24</p>	J	F	M	A	M	J	J	A	S	O	N	D										▲	▲		High
J	F	M	A	M	J	J	A	S	O	N	D																		
									▲	▲																			
<i>Conostylis micrantha</i>	Haemodoraceae	T	Endangered	<p>Habit: Rhizomatous, tufted perennial, grass-like or herb, 0.13-0.24 m high.</p> <p>Flower colour: yellow-cream/red</p> <p>Flowering period (indicated in green):</p> <table border="1"> <tr> <td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>▲</td><td>▲</td><td></td> </tr> </table> <p style="text-align: right;">Survey (▲)</p> <p>Soils: White or grey sand. Sandplains.</p> <p>IBRA Distribution: AVW, GES</p> <p>Florabase records: 22</p>	J	F	M	A	M	J	J	A	S	O	N	D										▲	▲		High
J	F	M	A	M	J	J	A	S	O	N	D																		
									▲	▲																			
<i>Daviesia speciosa</i>	Fabaceae	T	Endangered	<p>Habit: Many-stemmed shrub, 0.3-0.8 m high.</p> <p>Flower colour: red</p> <p>Flowering period (indicated in green):</p> <table border="1"> <tr> <td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>▲</td><td>▲</td><td></td> </tr> </table> <p style="text-align: right;">Survey (▲)</p> <p>Soils: Gravelly lateritic soils. Undulating plains, rises.</p> <p>IBRA Distribution: AVW, GES</p> <p>Florabase records: 19</p>	J	F	M	A	M	J	J	A	S	O	N	D										▲	▲		Moderate
J	F	M	A	M	J	J	A	S	O	N	D																		
									▲	▲																			

APPENDIX C: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT IN THE ARROWSMITH SURVEY AREA

Note: 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; CAR – Carnarvon; ESP – Esperance Plains; GAS – Gascoyne; GES – Geraldton Sandplains; JAF – Jarrah Forest; MAL – Mallee; MUR – Murchison; SWA – Swan Coastal Plain; YAL – Yalgoo. Likelihood of occurrence in survey area is based on a Low, Moderate or High ranking.

Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence																								
<i>Eucalyptus crispata</i>	Myrtaceae	T	Vulnerable	<p>Habit: (Mallee), 3-7 m high, bark rough on the trunk, in partly decorticated curls.</p> <p>Flower colour: yellow-cream</p> <p>Flowering period (indicated in green):</p> <table border="1"> <tr> <td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>▲</td><td>▲</td><td></td> </tr> </table> <p style="text-align: right;">Survey (▲)</p> <p>Soils: Sand, loam with lateritic gravel. Lateritic breakaways.</p> <p>IBRA Distribution: GES</p> <p>Florabase records: 25</p>	J	F	M	A	M	J	J	A	S	O	N	D										▲	▲		Moderate
J	F	M	A	M	J	J	A	S	O	N	D																		
									▲	▲																			
<i>Eucalyptus impensa</i>	Myrtaceae	T	Endangered	<p>Habit: (Straggly mallee), to 1.5 m high, bark smooth.</p> <p>Flower colour: pink</p> <p>Flowering period (indicated in green):</p> <table border="1"> <tr> <td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>▲</td><td>▲</td><td></td> </tr> </table> <p style="text-align: right;">Survey (▲)</p> <p>Soils: Yellow sand. Lateritic hills.</p> <p>IBRA Distribution: GES</p> <p>Florabase records: 10</p>	J	F	M	A	M	J	J	A	S	O	N	D										▲	▲		Moderate
J	F	M	A	M	J	J	A	S	O	N	D																		
									▲	▲																			
<i>Eucalyptus leprophloia</i>	Myrtaceae	T	Endangered	<p>Habit: (Mallee), 2-5(-8) m high, bark rough loose & flaky to 1 m.</p> <p>Flower colour: cream-white</p> <p>Flowering period (indicated in green):</p> <table border="1"> <tr> <td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>▲</td><td>▲</td><td></td> </tr> </table> <p style="text-align: right;">Survey (▲)</p> <p>Soils: White or grey sand over laterite. Valley slopes.</p> <p>IBRA Distribution: AVW, GES</p> <p>Florabase records: 22</p>	J	F	M	A	M	J	J	A	S	O	N	D										▲	▲		Moderate
J	F	M	A	M	J	J	A	S	O	N	D																		
									▲	▲																			

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence																								
<i>Eucalyptus x balanites</i>	Myrtaceae	T	Endangered	Habit: (Mallee), to 5 m high, bark rough, flaky. Flower colour: white Flowering period (indicated in green): <table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>▲</td><td>▲</td><td></td> </tr> </table> Survey (▲) Soils: Sandy soils with lateritic gravel. IBRA Distribution: GES, SWA Florabase records: 11	J	F	M	A	M	J	J	A	S	O	N	D										▲	▲		Moderate
J	F	M	A	M	J	J	A	S	O	N	D																		
									▲	▲																			
<i>Hemiandra gardneri</i>	Lamiaceae	T	Endangered	Habit: Prostrate, pungent shrub, 0.1-0.2 m high, to 1 m wide. Flower colour: red/pink-red Flowering period (indicated in green): <table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>▲</td><td>▲</td><td></td> </tr> </table> Survey (▲) Soils: Grey or yellow sand, clayey sand. Sandplains. IBRA Distribution: AVW, GES Florabase records: 21	J	F	M	A	M	J	J	A	S	O	N	D										▲	▲		High
J	F	M	A	M	J	J	A	S	O	N	D																		
									▲	▲																			
<i>Leucopogon obtectus</i>	Ericaceae	T	Endangered	Habit: Erect shrub, 0.5-1.7 m high. Flower colour: cream-yellow Flowering period (indicated in green): <table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>▲</td><td>▲</td><td></td> </tr> </table> Survey (▲) Soils: Grey sand. IBRA Distribution: GES Florabase records: 19	J	F	M	A	M	J	J	A	S	O	N	D										▲	▲		Moderate
J	F	M	A	M	J	J	A	S	O	N	D																		
									▲	▲																			

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Species	Family	SC C	FCC	Description and Habitat	Likelihood of Occurrence																								
<i>Paracaleana dixonii</i>	Orchidaceae	T	Endangered	Habit: Tuberos, perennial, herb, 0.09-0.2 m high. Flower colour: yellow-brown Flowering period (indicated in green): <table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>▲</td><td>▲</td><td></td> </tr> </table> Survey (▲) Soils: Grey sand over granite IBRA Distribution: GES, SWA Florabase records: 19	J	F	M	A	M	J	J	A	S	O	N	D										▲	▲		High
J	F	M	A	M	J	J	A	S	O	N	D																		
									▲	▲																			
<i>Tetratheca nephelioides</i>	Elaeocarpaceae	T	Critically Endangered	Habit: Caespitose, dwarf shrub, to 0.3 m high. Flower colour: purple Flowering period (indicated in green): <table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>▲</td><td>▲</td><td></td> </tr> </table> Survey (▲) Soils: White-grey sand, yellow-brown clayey sand, gravel, laterite. Outcrops, undulating hills, ridges. IBRA Distribution: AVW, GES Florabase records: 17	J	F	M	A	M	J	J	A	S	O	N	D										▲	▲		Moderate
J	F	M	A	M	J	J	A	S	O	N	D																		
									▲	▲																			
<i>Thelymitra stellata</i>	Orchidaceae	T	Endangered	Habit: Tuberos, perennial, herb, 0.15-0.25 m high. Flower colour: yellow & brown Flowering period (indicated in green): <table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>▲</td><td>▲</td><td></td> </tr> </table> Survey (▲) Soils: Sand, gravel, lateritic loam. IBRA Distribution: GES, JAF, SWA Florabase records: 20	J	F	M	A	M	J	J	A	S	O	N	D										▲	▲		Moderate
J	F	M	A	M	J	J	A	S	O	N	D																		
									▲	▲																			

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Species	Family	SC C	FCC	Description and Habitat	Likelihood of Occurrence																								
<i>Wurmbea tubulosa</i>	Colchicaceae	T	Endangered	Habit: Cormous, perennial, herb, 0.01-0.03 m high Flower colour: white-pink Flowering period (indicated in green): <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>▲</td><td>▲</td><td></td> </tr> </table> Survey (▲) Soils: Clay, loam. River banks, seasonally-wet places. IBRA Distribution: AVW, GES Florabase records: 19	J	F	M	A	M	J	J	A	S	O	N	D										▲	▲		Low
J	F	M	A	M	J	J	A	S	O	N	D																		
									▲	▲																			
<i>Caladenia denticulata</i> subsp. <i>albicans</i>	Orchidaceae	P1	-	Habit: Tuberos herb to 0.30 m high. Flower colour: creamy white Flowering period (indicated in green): <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>▲</td><td>▲</td><td></td> </tr> </table> Survey (▲) Soils: Sand, moist depressions. Undulating limestone country. IBRA Distribution: GES, SWA Florabase records: 4	J	F	M	A	M	J	J	A	S	O	N	D										▲	▲		Moderate
J	F	M	A	M	J	J	A	S	O	N	D																		
									▲	▲																			
<i>Lasiopetalum ogilvieanum</i>	Malvaceae	P1	-	Habit: Shrub, 0.45-1.5 m high. Flower colour: pink-white Flowering period (indicated in green): <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>▲</td><td>▲</td><td></td> </tr> </table> Survey (▲) Soils: White/grey or yellow sand, stony loam. Undulating plains, lateritic rises. IBRA Distribution: AVW, GES Florabase records: 16	J	F	M	A	M	J	J	A	S	O	N	D										▲	▲		Moderate
J	F	M	A	M	J	J	A	S	O	N	D																		
									▲	▲																			

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Species	Family	SC C	FCC	Description and Habitat	Likelihood of Occurrence																								
<i>Poranthera asybosca</i>	Phyllanthaceae	P1	-	Habit: Erect herb, 0.2-0.45 m high. Flower colour: pink-green Flowering period (indicated in green): <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>▲</td><td>▲</td><td></td> </tr> </table> Survey (▲) Soils: White sand over laterite. IBRA Distribution: GES Florabase records: 1	J	F	M	A	M	J	J	A	S	O	N	D										▲	▲		Moderate
J	F	M	A	M	J	J	A	S	O	N	D																		
									▲	▲																			
<i>Stylidium carnosum</i> subsp. <i>Narrow leaves</i> (J.A. Wege 490)	Stylidiaceae	P1	-	Habit: Perennial herb, to 0.7 m high. Flower colour: white Flowering period (indicated in green): <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>▲</td><td>▲</td><td></td> </tr> </table> Survey (▲) Soils: Sand over laterite. Lateritic hills, lower and mid slopes. IBRA Distribution: GES, SWA Florabase records: 9	J	F	M	A	M	J	J	A	S	O	N	D										▲	▲		Moderate
J	F	M	A	M	J	J	A	S	O	N	D																		
									▲	▲																			
<i>Verticordia dasystylis</i> subsp. <i>oestopola</i>	Myrtaceae	P1	-	Habit: Spreading shrub, 0.1-0.4 m high. Flower colour: cream-yellow Flowering period (indicated in green): <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>▲</td><td>▲</td><td></td> </tr> </table> Survey (▲) Soils: Gritty soils over granite. Outcrops. IBRA Distribution: AVW, GES Florabase records: 15	J	F	M	A	M	J	J	A	S	O	N	D										▲	▲		Moderate
J	F	M	A	M	J	J	A	S	O	N	D																		
									▲	▲																			

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Species	Family	SC C	FCC	Description and Habitat	Likelihood of Occurrence																								
<i>Verticordia luteola</i> var. <i>rosea</i>	Myrtaceae	P1	-	Habit: Slender shrub, 0.3-2 m high. Flower colour: pink/green-cream-brown Flowering period (indicated in green): <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>▲</td><td>▲</td><td></td> </tr> </table> Survey (▲) Soils: White sand. Flats. IBRA Distribution: GES Florabase records: 17	J	F	M	A	M	J	J	A	S	O	N	D										▲	▲		High
J	F	M	A	M	J	J	A	S	O	N	D																		
									▲	▲																			
<i>Acacia vittata</i>	Fabaceae	P2	-	Habit: Dense, rounded shrub, 1-4 m high. Flower colour: yellow Flowering period (indicated in green): <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>▲</td><td>▲</td><td></td> </tr> </table> Survey (▲) Soils: Grey sand, sandy clay. Margins of seasonal lakes. IBRA Distribution: AVW, GES Florabase records: 15	J	F	M	A	M	J	J	A	S	O	N	D										▲	▲		Moderate
J	F	M	A	M	J	J	A	S	O	N	D																		
									▲	▲																			
<i>Calectasia palustris</i>	Dasygongonaceae	P2	-	Habit: Dense, rounded shrub, 1-4 m high. Flower colour: yellow Flowering period (indicated in green): <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>▲</td><td>▲</td><td></td> </tr> </table> Survey (▲) Soils: Grey sand, sandy clay. Margins of seasonal lakes. IBRA Distribution: AVW, GES Florabase records: 15	J	F	M	A	M	J	J	A	S	O	N	D										▲	▲		Moderate
J	F	M	A	M	J	J	A	S	O	N	D																		
									▲	▲																			

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Note: 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; CAR – Carnarvon; ESP – Esperance Plains; GAS – Gascoyne; GES – Geraldton Sandplains; JAF – Jarrah Forest; MAL – Mallee; MUR – Murchison; SWA – Swan Coastal Plain; YAL – Yalgoo. Likelihood of occurrence in survey area is based on a Low, Moderate or High ranking.

Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence																								
<i>Comesperma griffinii</i>	Polygalaceae	P2	-	<p>Habit: Annual or perennial, herb, to 0.15 m high.</p> <p>Flower colour: white</p> <p>Flowering period (indicated in green):</p> <table border="1"> <tr> <td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>▲</td><td>▲</td><td></td> </tr> </table> <p style="text-align: right;">Survey (▲)</p> <p>Soils: Yellow or grey sand. Plains.</p> <p>IBRA Distribution: AVW, ESP, GES, MAL, SWA</p> <p>Florabase records: 14</p>	J	F	M	A	M	J	J	A	S	O	N	D										▲	▲		High
J	F	M	A	M	J	J	A	S	O	N	D																		
									▲	▲																			
<i>Dampiera tephrea</i>	Goodeniaceae	P2	-	<p>Habit: Ascending to erect perennial, herb or shrub, 0.3-0.6 m high.</p> <p>Flower colour: blue</p> <p>Flowering period (indicated in green):</p> <table border="1"> <tr> <td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>▲</td><td>▲</td><td></td> </tr> </table> <p style="text-align: right;">Survey (▲)</p> <p>Soils: Sand, gravelly loam.</p> <p>IBRA Distribution: GES, SWA</p> <p>Florabase records: 27</p>	J	F	M	A	M	J	J	A	S	O	N	D										▲	▲		Low
J	F	M	A	M	J	J	A	S	O	N	D																		
									▲	▲																			
<i>Guichenotia quasicalva</i>	Malvaceae	P2	-	<p>Habit: Erect, compact shrub, to 0.5 m high.</p> <p>Flower colour: blue-purple</p> <p>Flowering period (indicated in green):</p> <table border="1"> <tr> <td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>▲</td><td>▲</td><td></td> </tr> </table> <p style="text-align: right;">Survey (▲)</p> <p>Soils: Sandy clay over laterite. Drainage line.</p> <p>IBRA Distribution: AVW, GES</p> <p>Florabase records: 20</p>	J	F	M	A	M	J	J	A	S	O	N	D										▲	▲		Moderate
J	F	M	A	M	J	J	A	S	O	N	D																		
									▲	▲																			

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Species	Family	SC C	FCC	Description and Habitat	Likelihood of Occurrence																								
<i>Schoenus</i> sp. Eneabba (F. Obbens & C. Godden 1154)	Cyperaceae	P2	-	<p>Habit: Erect, clumped rhizomatous, perennial, grass-like or herb (sedge), to 0.75 m high.</p> <p>Flower colour: -</p> <p>Flowering period (indicated in green):</p> <table border="1"> <tr> <td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>▲</td><td>▲</td><td></td> </tr> </table> <p style="text-align: right;">Survey (▲)</p> <p>Soils: Grey, yellow or white sand. Undulating sandplains, mid slopes, tops of rises.</p> <p>IBRA Distribution: GES</p> <p>Florabase records: 13</p>	J	F	M	A	M	J	J	A	S	O	N	D										▲	▲		Moderate
J	F	M	A	M	J	J	A	S	O	N	D																		
									▲	▲																			
<i>Scholtzia calcicola</i>	Myrtaceae	P2	-	<p>Habit: Perennial shrub to 1.10 m high.</p> <p>Flower colour: pink</p> <p>Flowering period (indicated in green):</p> <table border="1"> <tr> <td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>▲</td><td>▲</td><td></td> </tr> </table> <p style="text-align: right;">Survey (▲)</p> <p>Soils: Sand. Slopes.</p> <p>IBRA Distribution: GES</p> <p>Florabase records: 5</p>	J	F	M	A	M	J	J	A	S	O	N	D										▲	▲		High
J	F	M	A	M	J	J	A	S	O	N	D																		
									▲	▲																			

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence																								
<i>Stylidium pseudocaespitosum</i>	Stylidiaceae	P2	-	<p>Habit: Rosetted perennial, herb, 0.1-0.3 m high.</p> <p>Flower colour: yellow</p> <p>Flowering period (indicated in green):</p> <table border="1"> <tr> <td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>▲</td><td>▲</td><td></td> </tr> </table> <p style="text-align: right;">Survey (▲)</p> <p>Soils: White, grey or yellow sand over laterite. Breakaways and hillslopes.</p> <p>IBRA Distribution: AVW, GES</p> <p>Florabase records: 20</p>	J	F	M	A	M	J	J	A	S	O	N	D										▲	▲		Moderate
J	F	M	A	M	J	J	A	S	O	N	D																		
									▲	▲																			
<i>Verticordia argentea</i>	Myrtaceae	P2	-	<p>Habit: Erect, open shrub, 0.9-2 m high.</p> <p>Flower colour: pink & white</p> <p>Flowering period (indicated in green):</p> <table border="1"> <tr> <td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>▲</td><td>▲</td><td></td> </tr> </table> <p style="text-align: right;">Survey (▲)</p> <p>Soils: White, grey or yellow sand. Sand ridges, undulating plains.</p> <p>IBRA Distribution: GES</p> <p>Florabase records: 39</p>	J	F	M	A	M	J	J	A	S	O	N	D										▲	▲		High
J	F	M	A	M	J	J	A	S	O	N	D																		
									▲	▲																			
<i>Acacia latipes</i> subsp. <i>licina</i>	Fabaceae	P3	-	<p>Habit: Pungent shrub, 0.4-1.2 m high.</p> <p>Flower colour: yellow</p> <p>Flowering period (indicated in green):</p> <table border="1"> <tr> <td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>▲</td><td>▲</td><td></td> </tr> </table> <p style="text-align: right;">Survey (▲)</p> <p>Soils: White sand, granitic soils. Limestone hills, sandplains.</p> <p>IBRA Distribution: AVW, GES</p> <p>Florabase records: 21</p>	J	F	M	A	M	J	J	A	S	O	N	D										▲	▲		Moderate
J	F	M	A	M	J	J	A	S	O	N	D																		
									▲	▲																			

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence																								
<i>Banksia fraseri</i> var. <i>crebra</i>	Proteaceae	P3	-	Habit: Shrub to 0.7 m high. Flower colour: cream, pale-golden yellow, yellow & brown Flowering period (indicated in green): <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>▲</td><td>▲</td><td></td> </tr> </table> Survey (▲) Soils: Sand, sandy clay, sandy gravel, gravelly loam. Slopes, lateritic hilltop, sandplain. IBRA Distribution: GES, SWA Florabase records: 15	J	F	M	A	M	J	J	A	S	O	N	D										▲	▲		Moderate
J	F	M	A	M	J	J	A	S	O	N	D																		
									▲	▲																			
<i>Beyeria gardneri</i>	Euphorbiaceae	P3	-	Habit: Shrub, 0.25-0.5 m high. Flower colour: yellow Flowering period (indicated in green): <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>▲</td><td>▲</td><td></td> </tr> </table> Survey (▲) Soils: Yellow sand. IBRA Distribution: AVW, GES, SWA, YAL Florabase records: 36	J	F	M	A	M	J	J	A	S	O	N	D										▲	▲		Moderate
J	F	M	A	M	J	J	A	S	O	N	D																		
									▲	▲																			
<i>Centrolepis milleri</i>	Centrolepidaceae	P3	-	Habit: Annual, to 6 cm tall Flower colour: - Flowering period (indicated in green): *Flowering period unknown <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>▲</td><td>▲</td><td></td> </tr> </table> Survey (▲) Soils: Sand, sandy clay. Sandplain. IBRA Distribution: ESP, GES Florabase records: 7	J	F	M	A	M	J	J	A	S	O	N	D										▲	▲		Low
J	F	M	A	M	J	J	A	S	O	N	D																		
									▲	▲																			

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Species	Family	SC C	FCC	Description and Habitat	Likelihood of Occurrence																								
<i>Eucalyptus macrocarpa x pyriformis</i>	Myrtaceae	P3	-	<p>Habit: Erect, open mallee tree, 1.2-6 m high.</p> <p>Flower colour: red</p> <p>Flowering period: April or August to October</p> <p>Flowering period (indicated in green):</p> <table border="1"> <tr> <td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>▲</td><td>▲</td><td></td> </tr> </table> <p style="text-align: right;">Survey (▲)</p> <p>Soils: Sand, lateritic sandy soils. Hills, rocky ironstone ridges, sandplains.</p> <p>IBRA Distribution: AVW, GES, JAF, SWA</p> <p>Florabase records: 39</p>	J	F	M	A	M	J	J	A	S	O	N	D										▲	▲		Moderate
J	F	M	A	M	J	J	A	S	O	N	D																		
									▲	▲																			
<i>Guichenotia alba</i>	Malvaceae	P3	-	<p>Habit: Slender, lax, few-branched shrub, 0.1-0.45 m high.</p> <p>Flower colour: white</p> <p>Flowering period: July to August</p> <p>Flowering period (indicated in green):</p> <table border="1"> <tr> <td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>▲</td><td>▲</td><td></td> </tr> </table> <p style="text-align: right;">Survey (▲)</p> <p>Soils: Sandy & gravelly soils. Low-lying flats, depressions.</p> <p>IBRA Distribution: AVW, GES, SWA</p> <p>Florabase records: 38</p>	J	F	M	A	M	J	J	A	S	O	N	D										▲	▲		High
J	F	M	A	M	J	J	A	S	O	N	D																		
									▲	▲																			

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Species	Family	SC C	FCC	Description and Habitat	Likelihood of Occurrence																								
<i>Grevillea erinacea</i>	Proteaceae	P3	-	<p>Habit: Spindly, prickly, sparingly branched shrub, (0.3-) 0.6-1.8 m high.</p> <p>Flower colour: green-white-cream</p> <p>Flowering period (indicated in green):</p> <table border="1"> <tr> <td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>▲</td><td>▲</td> </tr> </table> <p style="text-align: right;">Survey (▲)</p> <p>Soils: White, grey or yellow sand, often with lateritic gravel.</p> <p>IBRA Distribution: AVW, GES</p> <p>Florabase records: 35</p>	J	F	M	A	M	J	J	A	S	O	N	D											▲	▲	High
J	F	M	A	M	J	J	A	S	O	N	D																		
										▲	▲																		
<i>Hemiandra</i> sp. Eneabba (H. Demarz 3687)	Lamiaceae	P3	-	<p>Habit: Straggly, erect shrub, 0.5-0.9 m high, to 0.4 m wide.</p> <p>Flower colour: blue/violet</p> <p>Flowering period (indicated in green):</p> <table border="1"> <tr> <td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>▲</td><td>▲</td> </tr> </table> <p style="text-align: right;">Survey (▲)</p> <p>Soils: Sand. Disturbed sites.</p> <p>IBRA Distribution: GES</p> <p>Florabase records: 33</p>	J	F	M	A	M	J	J	A	S	O	N	D											▲	▲	High
J	F	M	A	M	J	J	A	S	O	N	D																		
										▲	▲																		

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Species	Family	SC C	FCC	Description and Habitat	Likelihood of Occurrence																								
<i>Hopkinsia anoetocolea</i>	Anarthriaceae	P3	-	<p>Habit: Rhizomatous, tufted perennial, herb, 0.5-1 m high, to 1 m in diameter.</p> <p>Flower colour: brown</p> <p>Flowering period (indicated in green):</p> <table border="1"> <tr> <td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>▲</td><td>▲</td><td></td> </tr> </table> <p style="text-align: right;">Survey (▲)</p> <p>Soils: White or grey sand, often saline. Winter-wet depressions, floodplains, salt-lakes.</p> <p>IBRA Distribution: AVW, GES, SWA</p> <p>Florabase records: 47</p>	J	F	M	A	M	J	J	A	S	O	N	D										▲	▲		Moderate
J	F	M	A	M	J	J	A	S	O	N	D																		
									▲	▲																			
<i>Hypocalymma tetrapterum</i>	Myrtaceae	P3	-	<p>Habit: Shrub, 0.4-0.9 m high.</p> <p>Flower colour: white</p> <p>Flowering period (indicated in green):</p> <table border="1"> <tr> <td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>▲</td><td>▲</td><td></td> </tr> </table> <p style="text-align: right;">Survey (▲)</p> <p>Soils: Grey sand, loam, lateritic gravel. Riverbanks, breakaways.</p> <p>IBRA Distribution: GES, SWA</p> <p>Florabase records: 24</p>	J	F	M	A	M	J	J	A	S	O	N	D										▲	▲		Moderate
J	F	M	A	M	J	J	A	S	O	N	D																		
									▲	▲																			

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Species	Family	SC C	FCC	Description and Habitat	Likelihood of Occurrence																								
<i>Persoonia chapmaniana</i>	Proteaceae	P3	-	Habit: Erect, spreading shrub, 1-2 m high. Flower colour: yellow Flowering period (indicated in green): <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>▲</td><td>▲</td><td></td> </tr> </table> Survey (▲) Soils: White sandy clay, yellow sand. Vicinity of salt lakes. IBRA Distribution: x Florabase records: 26	J	F	M	A	M	J	J	A	S	O	N	D										▲	▲		Moderate
J	F	M	A	M	J	J	A	S	O	N	D																		
									▲	▲																			
<i>Persoonia filliformis</i>	Proteaceae	P3	-	Habit: Erect, spreading, lignotuberous shrub, 0.07-0.4 m high. Flower colour: yellow Flowering period (indicated in green): <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>▲</td><td>▲</td><td></td> </tr> </table> Survey (▲) Soils: Yellow or white sand over laterite. IBRA Distribution: GES Florabase records: 21	J	F	M	A	M	J	J	A	S	O	N	D										▲	▲		Moderate
J	F	M	A	M	J	J	A	S	O	N	D																		
									▲	▲																			
<i>Persoonia rudis</i>	Proteaceae	P3	-	Habit: Erect, often spreading shrub, 0.2-1 m high. Flower colour: yellow Flowering period (indicated in green): <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>▲</td><td>▲</td><td></td> </tr> </table> Survey (▲) Soils: White, grey or yellow sand, often over laterite. IBRA Distribution: GES, JAF, SWA Florabase records: 40	J	F	M	A	M	J	J	A	S	O	N	D										▲	▲		High
J	F	M	A	M	J	J	A	S	O	N	D																		
									▲	▲																			

APPENDIX C: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT IN THE ARROWSMITH SURVEY AREA

Note: 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; CAR – Carnarvon; ESP – Esperance Plains; GAS – Gascoyne; GES – Geraldton Sandplains; JAF – Jarrah Forest; MAL – Mallee; MUR – Murchison; SWA – Swan Coastal Plain; YAL – Yalgoo. Likelihood of occurrence in survey area is based on a Low, Moderate or High ranking.

Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence																								
<i>Stylidium torticarpum</i>	Stylidiaceae	P3	-	<p>Habit: Caespitose perennial, herb, 0.12-0.27 m high.</p> <p>Flower colour: pink</p> <p>Flowering period (indicated in green):</p> <table border="1"> <tr> <td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>▲</td><td>▲</td><td></td> </tr> </table> <p style="text-align: right;">Survey (▲)</p> <p>Soils: Sandy clay and clay loam over laterite. Adjacent to creeklines, depressions, and beneath breakaways.</p> <p>IBRA Distribution: AVW, GES, SWA</p> <p>Florabase records: 48</p>	J	F	M	A	M	J	J	A	S	O	N	D										▲	▲		Moderate
J	F	M	A	M	J	J	A	S	O	N	D																		
									▲	▲																			
<i>Styphelia filifolia</i>	Ericaceae	P3	-	<p>Habit: Shrub, to 0.7 m high, to 0.9 m wide.</p> <p>Flower colour: white, cream</p> <p>Flowering period (indicated in green):</p> <table border="1"> <tr> <td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>▲</td><td>▲</td><td></td> </tr> </table> <p style="text-align: right;">Survey (▲)</p> <p>Soils: Sand, sandy soil. Swamp, seasonally wet area, drainage line, flat, slopes.</p> <p>IBRA Distribution: GES, SWA</p> <p>Florabase records: 36</p>	J	F	M	A	M	J	J	A	S	O	N	D										▲	▲		Low
J	F	M	A	M	J	J	A	S	O	N	D																		
									▲	▲																			

APPENDIX C: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT IN THE ARROWSMITH SURVEY AREA

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Species	Family	SC C	FCC	Description and Habitat	Likelihood of Occurrence																								
<i>Synaphea oulopha</i>	Proteaceae	P3	-	Habit: Compact shrub, ca 0.2 m high. Flower colour: yellow Flowering period (indicated in green): <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>▲</td><td>▲</td><td></td> </tr> </table> Survey (▲) Soils: Grey sand, gravelly loam, clay. Lateritic breakaways & rises. IBRA Distribution: GES Florabase records: 16	J	F	M	A	M	J	J	A	S	O	N	D										▲	▲		Moderate
J	F	M	A	M	J	J	A	S	O	N	D																		
									▲	▲																			
<i>Triglochin protuberans</i>	Juncaginaceae	P3	-	Habit: Annual, herb, 0.03-0.13 m high. Flower colour: - Flowering period (indicated in green): <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>▲</td><td>▲</td><td></td> </tr> </table> Survey (▲) Soils: Red loam, grey mud over clay. Winter-wet sites, claypans, near salt lakes, margins of pools. IBRA Distribution: AVW, GES, MUR, YAL Florabase records: 10	J	F	M	A	M	J	J	A	S	O	N	D										▲	▲		Low
J	F	M	A	M	J	J	A	S	O	N	D																		
									▲	▲																			

APPENDIX C: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT IN THE ARROWSMITH SURVEY AREA

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Species	Family	SC C	FCC	Description and Habitat	Likelihood of Occurrence																								
<i>Verticordia fragrans</i>	Myrtaceae	P3	-	<p>Habit: Openly branched shrub, 1-3 m high.</p> <p>Flower colour: pink-white</p> <p>Flowering period (indicated in green):</p> <table border="1"> <tr> <td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>▲</td><td>▲</td><td></td> </tr> </table> <p style="text-align: right;">Survey (▲)</p> <p>Soils: White, grey or yellow sand, clay loam. Low-lying areas, sandplains.</p> <p>IBRA Distribution: GES</p> <p>Florabase records: 29</p>	J	F	M	A	M	J	J	A	S	O	N	D										▲	▲		High
J	F	M	A	M	J	J	A	S	O	N	D																		
									▲	▲																			
<i>Banksia elegans</i>	Proteaceae	P4	-	<p>Habit: Shrub (with fire-tolerant rootstock, often suckering), 1-4 m high.</p> <p>Flower colour: yellow/green-yellow</p> <p>Flowering period (indicated in green):</p> <table border="1"> <tr> <td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>▲</td><td>▲</td><td></td> </tr> </table> <p style="text-align: right;">Survey (▲)</p> <p>Soils: Yellow, white or red sand. Sandplains, low consolidated dunes.</p> <p>IBRA Distribution: AVW, GES</p> <p>Florabase records: 42</p>	J	F	M	A	M	J	J	A	S	O	N	D										▲	▲		High
J	F	M	A	M	J	J	A	S	O	N	D																		
									▲	▲																			

APPENDIX C: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT IN THE ARROWSMITH SURVEY AREA

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence																								
<i>Banksia scabrella</i>	Proteaceae	P4	-	<p>Habit: Much-branched, lignotuberous shrub, 0.6-2 m high.</p> <p>Flower colour: yellow & cream & purple</p> <p>Flowering period (indicated in green):</p> <table border="1"> <tr> <td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>▲</td><td>▲</td><td></td> </tr> </table> <p style="text-align: right;">Survey (▲)</p> <p>Soils: White, grey or yellow sand, sometimes with lateritic gravel. Sandplains, lateritic ridges.</p> <p>IBRA Distribution: GES</p> <p>Florabase records: 51</p>	J	F	M	A	M	J	J	A	S	O	N	D										▲	▲		High
J	F	M	A	M	J	J	A	S	O	N	D																		
									▲	▲																			
<i>Calytrix chrysantha</i>	Myrtaceae	P4	-	<p>Habit: Shrub, 0.3-1.3 m high.</p> <p>Flower colour: yellow</p> <p>Flowering period (indicated in green):</p> <table border="1"> <tr> <td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>▲</td><td>▲</td><td></td> </tr> </table> <p style="text-align: right;">Survey (▲)</p> <p>Soils: White, grey or yellow/brown sand. Flats.</p> <p>IBRA Distribution: AVW, GES</p> <p>Florabase records: 37</p>	J	F	M	A	M	J	J	A	S	O	N	D										▲	▲		High
J	F	M	A	M	J	J	A	S	O	N	D																		
									▲	▲																			
<i>Calytrix eneabensis</i>	Myrtaceae	P4	-	<p>Habit: Shrub, 0.3-1 m high.</p> <p>Flower colour: purple & pink & yellow</p> <p>Flowering period (indicated in green):</p> <table border="1"> <tr> <td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>▲</td><td>▲</td><td></td> </tr> </table> <p style="text-align: right;">Survey (▲)</p> <p>Soils: White, grey or yellow sand over laterite. Sandplains.</p> <p>IBRA Distribution: GES</p> <p>Florabase records: 29</p>	J	F	M	A	M	J	J	A	S	O	N	D										▲	▲		High
J	F	M	A	M	J	J	A	S	O	N	D																		
									▲	▲																			

APPENDIX C: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT IN THE ARROWSMITH SURVEY AREA

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Species	Family	SC C	FCC	Description and Habitat	Likelihood of Occurrence																								
<i>Calytrix superba</i>	Myrtaceae	P4	-	Habit: Shrub, 0.2-1 m high. Flower colour: pink-red Flowering period (indicated in green): <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>▲</td><td>▲</td><td></td> </tr> </table> Survey (▲) Soils: Sand over laterite. Flats. IBRA Distribution: GES Florabase records: 37	J	F	M	A	M	J	J	A	S	O	N	D										▲	▲		High
J	F	M	A	M	J	J	A	S	O	N	D																		
									▲	▲																			
<i>Eucalyptus macrocarpa</i> subsp. <i>elachantha</i>	Myrtaceae	P4	-	Habit: (Spreading or sprawling mallee), 0.8-4 m high, bark smooth, grey over salmon pink. Flower colour: red-pink Flowering period (indicated in green): <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>▲</td><td>▲</td><td></td> </tr> </table> Survey (▲) Soils: White or grey sand over laterite. Hillslopes. Ridges sandplains. IBRA Distribution: GES, SWA Florabase records: 54	J	F	M	A	M	J	J	A	S	O	N	D										▲	▲		High
J	F	M	A	M	J	J	A	S	O	N	D																		
									▲	▲																			

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Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence																								
<i>Schoenus griffinianus</i>	Cyperaceae	P4	-	<p>Habit: Small, tufted perennial, grass-like or herb (sedge), to 0.1 m high.</p> <p>Flower colour: -</p> <p>Flowering period (indicated in green):</p> <table border="1"> <tr> <td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>▲</td><td>▲</td><td></td> </tr> </table> <p style="text-align: right;">Survey (▲)</p> <p>Soils: White sand.</p> <p>IBRA Distribution: AVW, GES, SWA</p> <p>Florabase records: 38</p>	J	F	M	A	M	J	J	A	S	O	N	D										▲	▲		High
J	F	M	A	M	J	J	A	S	O	N	D																		
									▲	▲																			
<i>Stawellia dimorphantha</i>	Hemerocallidaceae	P4	-	<p>Habit: Stilt-rooted perennial, herb, 0.05-0.2 m high.</p> <p>Flower colour: purple/cream</p> <p>Flowering period (indicated in green):</p> <table border="1"> <tr> <td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>▲</td><td>▲</td><td></td> </tr> </table> <p style="text-align: right;">Survey (▲)</p> <p>Soils: White, grey, yellow sand.</p> <p>IBRA Distribution: GES</p> <p>Florabase records: 23</p>	J	F	M	A	M	J	J	A	S	O	N	D										▲	▲		High
J	F	M	A	M	J	J	A	S	O	N	D																		
									▲	▲																			
<i>Stylidium longitubum</i>	Stylidiaceae	P4	-	<p>Habit: Erect annual (ephemeral), herb, 0.05-0.12 m high.</p> <p>Flower colour: pink</p> <p>Flowering period (indicated in green):</p> <table border="1"> <tr> <td>J</td><td>F</td><td>M</td><td>A</td><td>M</td><td>J</td><td>J</td><td>A</td><td>S</td><td>O</td><td>N</td><td>D</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>▲</td><td>▲</td><td></td> </tr> </table> <p style="text-align: right;">Survey (▲)</p> <p>Soils: Sandy clay, clay. Seasonal wetlands</p> <p>IBRA Distribution: GES, JAF, SWA</p> <p>Florabase records: 43</p>	J	F	M	A	M	J	J	A	S	O	N	D										▲	▲		Moderate
J	F	M	A	M	J	J	A	S	O	N	D																		
									▲	▲																			

APPENDIX D: LOCATION OF VEGETATION SURVEY QUADRATS ESTABLISHED IN THE
ARROWSMITH NORTH SURVEY AREA, OCTOBER/NOVEMBER
2018 AND OCTOBER/NOVEMBER 2019

QUADRAT	LOCATION (GDA94, Zone 50)	
	EASTING (mE)	NORTHING (mN)
AR42	315898	6733800
AR43	314297	6733800
AR44	314502	6733844
AR45	314292	6734612
AR46	315090	6734604
AR47	314701	6734600
AR48	314300	6736197
AR49	314703	6736202
AR50	315097	6736197
AR51	315100	6735803
AR52	314699	6735798
AR53	314308	6735805
AR54	315095	6737000
AR55	314700	6737000
AR56	314296	6738202
AR57	314692	6738200
AR58	315094	6738199
AR59	315898	6733401
AR60	315500	6733400
AR61	314302	6733400
AR62	314701	6733400
AR63	315100	6733396
AR64	315102	6733801
AR65	314288	6734207
AR66	314630	6734224
AR67	315100	6734198
AR68	314298	6734996
AR69	314700	6735000
AR70	315099	6734999
AR71	315101	6735401
AR72	314701	6735403
AR73	314276	6735459
AR74	314301	6736600
AR75	314697	6736603
AR77	315100	6736596
AR78	314300	6737403
AR79	314720	6737390
AR80	316698	6733399
AR81	316299	6733797
AR82	315900	6734199
AR83	315504	6733800
AR84	315502	6734199
AR85	315899	6734599
AR86	315500	6734596
AR87	315503	6735000
AR88	315904	6735405
AR89	315503	6735394
AR90	315503	6735795
AR91	315904	6735800
AR92	315900	6736199
AR93	315506	6736201
AR94	315498	6736604

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ARROWSMITH NORTH SURVEY AREA, OCTOBER/NOVEMBER
2018 AND OCTOBER/NOVEMBER 2019

QUADRAT	LOCATION (GDA94, Zone 50)	
	EASTING (mE)	NORTHING (mN)
AR95	315901	6736997
AR96	315499	6736993
AR97	315500	6737399
AR98	315909	6738203
AR99	315901	6738595
AR100	315479	6738548
AR101	315104	6738605
AR102	314707	6738599
AR103	314300	6738603
AR104	314303	6739396
AR105	314700	6739403
AR106	315080	6737819
AR107	316298	6733401
AR108	316701	6733802
AR109	316299	6734200
AR110	316697	6734196
AR111	316701	6734602
AR112	316300	6734601
AR113	316301	6735001
AR114	316703	6735000
AR115	315904	6735000
AR116	316301	6735406
AR117	316700	6735399
AR118	316306	6735804
AR119	316300	6736202
AR120	316302	6736603
AR121	315904	6736600
AR122	316300	6737000
AR123	316303	6737401
AR124	315899	6737398
AR125	315901	6737801
AR126	315501	6737794
AR127	315499	6738199
AR128	315500	6739398
AR129	315500	6738998
AR130	315099	6737400
AR131	314710	6737796
AR132	314301	6737799
AR133	314308	6738997
AR134	314700	6739000
AR135	315089	6738995
AR136	314301	6737000
AR137	315102	6739402
AR138	315900	6739399
AR139	315901	6739002
AR140	315967	6738520
AR218	313918	6739368
AR219	313908	6738965
AR220	313911	6738569
AR221	313997	6738148
AR222	314002	6737762
AR223	314009	6737364

APPENDIX D: LOCATION OF VEGETATION SURVEY QUADRATS ESTABLISHED IN THE
ARROWSMITH NORTH SURVEY AREA, OCTOBER/NOVEMBER
2018 AND OCTOBER/NOVEMBER 2019

QUADRAT	LOCATION (GDA94, Zone 50)	
	EASTING (mE)	NORTHING (mN)
AR224	314017	6736976
AR225	313994	6736640
AR226	313945	6736202
AR227	313995	6735378
AR228	314034	6734979
AR229	314047	6734573
AR230	314077	6734180
AR231	314073	6733789
AR232	314064	6733400

APPENDIX E: SUMMARY OF VASCULAR PLANT SPECIES RECORDED WITHIN THE ARROWSMITH NORTH SURVEY AREA, OCTOBER/NOVEMBER 2018 AND OCTOBER/NOVEMBER 2019

Note: * denotes introduced species; T denotes threatened flora and P1-P4 denote priority flora species (DBCA 2019a)

Family	Species
Amaranthaceae	<i>Ptilotus stirlingii</i> subsp. <i>stirlingii</i>
Anarthriaceae	<i>Lyginia imberbis</i>
Apiaceae	<i>Xanthosia huegelii</i>
Araliaceae	<i>Trachymene pilosa</i>
Asparagaceae	<i>Acanthocarpus ?canaliculatus</i> <i>Acanthocarpus preissii</i> <i>Laxmannia omnifertilis</i> <i>Laxmannia sessiliflora</i> subsp. <i>drummondii</i> <i>Lomandra hastilis</i> <i>Thysanotus rectantherus</i> <i>Thysanotus sparteus</i> <i>Thysanotus spiniger</i> <i>Thysanotus</i> sp. <i>Thysanotus</i> sp. (Climbing)
Asteraceae	<i>Asteridea pulverulenta</i> <i>Hyalosperma cotula</i> * <i>Hypochaeris glabra</i> <i>Olearia ?sp.</i> Eremicola (Diels & Pritzel s.n. PERTH 00449628) <i>Podotheca angustifolia</i> <i>Podotheca gnaphalioides</i> <i>Pterochaeta paniculata</i> * <i>Ursinia anthemoides</i> <i>Waitzia acuminata</i> var. <i>acuminata</i> <i>Waitzia acuminata</i> var. <i>albicans</i>
Campanulaceae	<i>Isotoma hypocrateriformis</i> <i>Lobelia ?rarifolia</i> <i>Lobelia rhytidosperra</i> * <i>Wahlenbergia capensis</i> <i>Wahlenbergia gracilentia</i>
Casuarinaceae	<i>Allocasuarina campestris</i> <i>Allocasuarina humilis</i> <i>Allocasuarina microstachya</i> <i>Allocasuarina</i> sp.
Celastraceae	<i>Tripterococcus brunonis</i>
Centrolepidaceae	<i>Centrolepis pilosa</i>
Colchicaceae	<i>Burchardia congesta</i>
Crassulaceae	<i>Crassula colorata</i>
Cupressaceae	<i>Callitris arenaria</i>
Cyperaceae	<i>Lepidosperma apricola</i> sens. lat.

APPENDIX E: SUMMARY OF VASCULAR PLANT SPECIES RECORDED WITHIN THE ARROWSMITH
NORTH SURVEY AREA, OCTOBER/NOVEMBER 2018 AND
OCTOBER/NOVEMBER 2019

Note: * denotes introduced species; T denotes threatened flora and P1-P4 denote priority flora species (DBCA 2019a)

Family	Species
Cyperaceae (cont.)	<i>Lepidosperma scabrum</i> sens. lat. <i>Lepidosperma squamatum</i> sens. lat. <i>Lepidosperma tenue</i> sens. lat. <i>Mesomelaena pseudostygia</i> <i>Schoenus brevisetis</i> <i>Schoenus clandestinus</i> <i>Schoenus griffinianus</i> (P4) <i>Schoenus nanus</i> <i>Schoenus pleiostemoneus</i> <i>Schoenus</i> sp. Cyperaceae sp.
Dasypogonaceae	<i>Calectasia</i> sp.
Dilleniaceae	<i>Hibbertia crassifolia</i> <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> <i>Hibbertia striata</i>
Droseraceae	<i>Drosera eneabba</i> <i>Drosera</i> sp. <i>Drosera</i> sp. (Climbing)
Ecdeiocoleaceae	<i>Ecdeiocolea monostachya</i> <i>Georgeantha hexandra</i>
Ericaceae	<i>Astroloma glaucescens</i> <i>Astroloma microdonta</i> <i>Conostephium preissii</i> <i>Conostephium</i> sp. <i>Leucopogon hamulosus</i> <i>Leucopogon inflexus</i> <i>Leucopogon leptanthus</i> <i>Leucopogon</i> sp. Northern ciliate (R. Davis 3393) <i>Leucopogon</i> sp. <i>Lysinema pentapetalum</i> <i>Styphelia xerophylla</i>
Euphorbiaceae	<i>Monotaxis grandiflora</i>
Fabaceae	<i>Acacia blakelyi</i> <i>Acacia cavealis</i> <i>Acacia ?lineolata</i> <i>Acacia pulchella</i> <i>Acacia pulchella</i> var. <i>glaberrima</i> <i>Acacia rostellifera</i> <i>Acacia saligna</i> <i>Acacia scirpifolia</i> <i>Acacia spathulifolia</i> <i>Acacia</i> sp. <i>Daviesia divaricata</i> subsp. <i>divaricata</i> <i>Daviesia nudiflora</i> <i>Daviesia triflora</i> <i>Daviesia</i> sp.

APPENDIX E: SUMMARY OF VASCULAR PLANT SPECIES RECORDED WITHIN THE ARROWSMITH
NORTH SURVEY AREA, OCTOBER/NOVEMBER 2018 AND
OCTOBER/NOVEMBER 2019

Note: * denotes introduced species; T denotes threatened flora and P1-P4 denote priority flora species (DBCA 2019a)

Family	Species
Fabaceae (cont.)	<i>Gompholobium tomentosum</i> <i>Isotropis cuneifolia</i> <i>Jacksonia hakeoides</i> <i>Jacksonia ?nutans</i> <i>Jacksonia</i> sp. <i>Sphaerolobium gracile</i> * <i>Trifolium arvense</i> var. <i>arvense</i>
Goodeniaceae	<i>Dampiera spicigera</i> <i>Dampiera</i> sp. <i>Lechenaultia juncea</i> (P3) <i>Lechenaultia linarioides</i> <i>Scaevola canescens</i> <i>Scaevola repens</i> subsp. Northern Sandplains (R.J. Cranfield & P.J. Spencer 8445) <i>Scaevola spinescens</i> <i>Verreauxia reinwardtii</i>
Gyrostemonaceae	<i>Gyrostemon ramulosus</i> <i>Gyrostemon</i> sp.
Haemodoraceae	<i>Anigozanthos humilis</i> <i>Anigozanthos pulcherrimus</i> <i>Conostylis aurea</i> <i>Conostylis candicans</i> subsp. <i>calcicola</i> <i>Conostylis candicans</i> subsp. <i>candicans</i> <i>Conostylis candicans</i> subsp. <i>procumbens</i> <i>Conostylis neocymosa</i> <i>Conostylis resinosa</i> <i>Conostylis</i> sp.
Hemerocallidaceae	<i>Arnocrinum preissii</i> <i>Dianella revoluta</i> <i>Stawellia dimorphantha</i> (P4) <i>Tricoryne elatior</i> <i>Tricoryne ?humilis</i> <i>Tricoryne</i> sp. Mullewa (G.J. Keighery 12080) <i>Tricoryne</i> sp.
Lamiaceae	<i>Hemiandra</i> sp. Eneabba (H. Demarz 3687) (P3) <i>Quoya verbascina</i>
Lauraceae	<i>Cassytha flava</i> <i>Cassytha glabella</i> forma <i>bicallosa</i> <i>Cassytha pomiformis</i> <i>Cassytha</i> sp.
Loganiaceae	<i>Orianthera spermacocea</i>
Malvaceae	<i>Guichenotia ledifolia</i> <i>Guichenotia</i> sp. <i>Lasiopetalum drummondii</i>
Myrtaceae	<i>Babingtonia grandiflora</i>

APPENDIX E: SUMMARY OF VASCULAR PLANT SPECIES RECORDED WITHIN THE ARROWSMITH
NORTH SURVEY AREA, OCTOBER/NOVEMBER 2018 AND
OCTOBER/NOVEMBER 2019

Note: * denotes introduced species; T denotes threatened flora and P1-P4 denote priority flora species (DBCA 2019a)

Family	Species
Myrtaceae (cont.)	<i>Beaufortia elegans</i> <i>Calothamnus blepharospermus</i> <i>Calothamnus quadrifidus</i> subsp. <i>angustifolius</i> <i>Calothamnus sanguineus</i> <i>Calytrix sapphirina</i> <i>Calytrix strigosa</i> <i>Calytrix</i> sp. <i>Darwinia pauciflora</i> <i>Darwinia speciosa</i> <i>Eremaea beaufortioides</i> var. <i>beaufortioides</i> <i>Eremaea ectadioclada</i> <i>Eremaea violacea</i> subsp. <i>violacea</i> <i>Eucalyptus todtiana</i> <i>Hypocalymma gardneri</i> (P3) <i>Leptospermum oligandrum</i> <i>Leptospermum spinescens</i> <i>Melaleuca concreta</i> <i>Melaleuca huegelii</i> subsp. <i>huegelii</i> <i>Melaleuca leuropoma</i> <i>Melaleuca ?systema</i> <i>Melaleuca viminea</i> subsp. <i>viminea</i> <i>Pileanthus filifolius</i> <i>Scholtzia laxiflora</i> <i>Verticordia densiflora</i> var. <i>densiflora</i> <i>Verticordia grandis</i> <i>Verticordia ovalifolia</i>
Olacaceae	<i>Olax scalariformis</i>
Orchidaceae	<i>Pterostylis</i> sp.
Phyllanthaceae	<i>Poranthera microphylla</i>
Poaceae	* <i>Aira caryophyllea</i> <i>Amphipogon turbinatus</i> <i>Amphipogon</i> sp. <i>Austrostipa ?crinita</i> <i>Austrostipa macalpinei</i> <i>Austrostipa</i> sp. <i>Neurachne alopecuroidea</i> Poaceae sp.
Polygalaceae	<i>Comesperma calymega</i>
Polygonaceae	<i>Muehlenbeckia adpressa</i>
Primulaceae	* <i>Lysimachia arvensis</i>
Proteaceae	<i>Banksia attenuata</i> <i>Banksia elegans</i> (P4) <i>Banksia hookeriana</i> <i>Banksia leptophylla</i> var. <i>melletica</i> <i>Banksia menziesii</i>

APPENDIX E: SUMMARY OF VASCULAR PLANT SPECIES RECORDED WITHIN THE ARROWSMITH
NORTH SURVEY AREA, OCTOBER/NOVEMBER 2018 AND
OCTOBER/NOVEMBER 2019

Note: * denotes introduced species; T denotes threatened flora and P1-P4 denote priority flora species (DBCA 2019a)

Family	Species
Proteaceae (cont.)	<i>Banksia prionotes</i> <i>Banksia shuttleworthiana</i> <i>Conospermum brachyphyllum</i> <i>Conospermum triplinervium</i> <i>Grevillea candelabroides</i> <i>Grevillea eriostachya</i> <i>Grevillea leucopteris</i> <i>Hakea costata</i> <i>Hakea polyanthema</i> <i>Persoonia acicularis</i> <i>Petrophile axillaris</i> <i>Petrophile brevifolia</i> <i>Petrophile drummondii</i> <i>Petrophile macrostachya</i> <i>Stirlingia latifolia</i> <i>Synaphea spinulosa</i> subsp. <i>borealis</i> <i>Synaphea spinulosa</i> subsp. <i>spinulosa</i> <i>Synaphea</i> sp. <i>Xylomelum angustifolium</i> Proteaceae sp.
Restionaceae	<i>Alexgeorgea nitens</i> <i>Chordifex sinuosus</i> <i>Lepidobolus preissianus</i> subsp. <i>preissianus</i> <i>Lepidobolus</i> sp. ? <i>Loxocarya striata</i> Restionaceae sp.
Rhamnaceae	<i>Cryptandra myriantha</i> <i>Stenanthemum notiale</i> subsp. <i>notiale</i>
Rutaceae	<i>Boronia ramosa</i> subsp. <i>anethifolia</i> <i>Geleznovia verrucosa</i>
Stylidiaceae	<i>Levenhookia octomaculata</i> <i>Levenhookia pusilla</i> <i>Levenhookia stipitata</i> <i>Stylidium adpressum</i> <i>Stylidium crossocephalum</i> <i>Stylidium dichotomum</i> <i>Stylidium diuroides</i> subsp. <i>paucifoliatum</i> <i>Stylidium ponticulus</i> <i>Stylidium purpureum</i> <i>Stylidium repens</i> <i>Stylidium rigidulum</i> <i>Stylidium</i> sp.
Thymelaeaceae	<i>Pimelea angustifolia</i> <i>Pimelea</i> sp.
Xanthorrhoeaceae	<i>Xanthorrhoea drummondii</i>

APPENDIX F: SUMMARY OF VASCULAR PLANT SPECIES RECORDED IN EACH SURVEY QUADRAT IN THE ARROWSMITH NORTH SURVEY AREA

Note: * denotes introduced species; T denotes threatened flora and P1-P4 denote priority flora (DBCA 2019a)

SPECIES	AR42	AR43	AR44	AR45	AR46	AR47	AR48	AR49	AR50	AR51	AR52	AR53	AR54	AR55	AR56	AR57	AR58	AR59	AR60	AR61	AR62	AR63	AR64	AR65	AR66	AR67	AR68	AR69	AR70	AR71	AR72
<i>Melaleuca leuropoma</i>	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	X	X	X	
<i>Melaleuca viminea</i> subsp. <i>viminea</i>																															
<i>Mesomelaena pseudostygia</i>	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	X	X	
<i>Monotaxis grandiflora</i>	X	X	X		X	X		X	X	X	X	X	X	X			X	X	X	X	X	X				X		X	X	X	
<i>Muehlenbeckia adpressa</i>																															
<i>Neurachne alopecuroidea</i>	X	X	X		X					X			X							X	X			X		X					
<i>Olax scalariformis</i>		X																													
<i>Olearia ?sp. Eremicola</i> (Diels & Pritzel s.n. PERTH 00449628)																								X							
<i>Orianthera spermacocea</i>																												X			
<i>Persoonia acicularis</i>	X	X			X	X	X				X	X	X	X		X	X	X	X	X	X	X		X		X	X	X	X	X	
<i>Petrophile axillaris</i>			X																												
<i>Petrophile brevifolia</i>				X							X	X		X						X	X						X	X			
<i>Petrophile drummondii</i>					X	X	X	X	X	X				X	X		X				X	X						X			
<i>Petrophile macrostachya</i>	X	X	X		X	X	X	X	X	X	X		X		X	X	X	X		X	X	X						X		X	
<i>Pileanthus filifolius</i>	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	X	X	X	
<i>Pimelea angustifolia</i>			X		X	X	X				X		X		X		X					X							X		
<i>Pimelea</i> sp.																															
Poaceae sp.																															
<i>Podotheca angustifolia</i>																															
<i>Podotheca gnaphalioides</i>	X																										X				
<i>Poranthera microphylla</i>							X	X				X																			
Proteaceae sp.																															
<i>Pterochaeta paniculata</i>																											X				
<i>Pterostylis</i> sp.		X																													
<i>Ptilotus stirlingii</i> subsp. <i>stirlingii</i>								X	X											X											
<i>Quoya verbascina</i>																															
Restionaceae sp.																									X						
<i>Scaevola canescens</i>																		X													
<i>Scaevola repens</i> subsp. <i>Northern Sandplains</i> (R.J. Cranfield & P.J. Spencer 8445)	X	X	X		X	X							X					X	X	X	X	X			X	X	X	X	X	X	
<i>Scaevola spinescens</i>																															
<i>Schoenus brevisetis</i>																															
<i>Schoenus clandestinus</i>	X		X		X	X		X	X	X	X		X					X	X	X	X	X	X			X		X	X	X	
<i>Schoenus griffinianus</i> (P4)																															
<i>Schoenus nanus</i>																X															
<i>Schoenus pleiostemoneus</i>										X				X		X	X														
<i>Schoenus</i> sp.																															
<i>Scholtzia laxiflora</i>	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	
<i>Sphaerolobium gracile</i>																															
<i>Stawellia dimorphantha</i> (P4)				X																											
<i>Stenanthemum notiale</i> subsp. <i>notiale</i>		X	X	X	X			X	X	X	X		X					X	X	X	X			X				X	X	X	
<i>Stirlingia latifolia</i>																															
<i>Stylidium adpressum</i>																						X					X				
<i>Stylidium crossocephalum</i>	X						X	X	X	X	X		X	X	X	X												X			
<i>Stylidium dichotomum</i>	X																														
<i>Stylidium diuroides</i> subsp. <i>paucifoliatum</i>	X					X		X	X	X	X		X						X									X	X	X	
<i>Stylidium ponticulus</i>	X							X	X	X			X	X												X		X	X	X	
<i>Stylidium purpureum</i>							X	X	X	X				X			X				X					X					

APPENDIX F: SUMMARY OF VASCULAR PLANT SPECIES RECORDED IN EACH SURVEY QUADRAT IN THE ARROWSMITH NORTH SURVEY AREA

Note: * denotes introduced species; T denotes threatened flora and P1-P4 denote priority flora (DBCA 2019a)

SPECIES	AR73	AR74	AR75	AR77	AR78	AR79	AR80	AR81	AR82	AR83	AR84	AR85	AR86	AR87	AR88	AR89	AR90	AR91	AR92	AR93	AR94	AR95	AR96	AR97	AR98	AR99	AR100	AR101	AR102	AR103	AR104
<i>Acacia blakelyi</i>	X				X	X																									
<i>Acacia cavealis</i>										X	X																				
<i>Acacia ?lineolata</i>																															
<i>Acacia pulchella</i>						X																			X						
<i>Acacia pulchella</i> var. <i>glaberrima</i>																															
<i>Acacia rostellifera</i>																															
<i>Acacia saligna</i>																															
<i>Acacia scirpifolia</i>																															
<i>Acacia</i> sp.											X																				
<i>Acacia spathulifolia</i>																															
<i>Acanthocarpus ?canaliculatus</i>	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	X	X	X	
<i>Acanthocarpus preissii</i>																															
* <i>Aira caryophylla</i>																															
<i>Alexgeorgea nitens</i>						X																									
<i>Allocasuarina campestris</i>											X		X													X	X				
<i>Allocasuarina humilis</i>				X	X																									X	
<i>Allocasuarina microstachya</i>																														X	
<i>Allocasuarina</i> sp.																														X	
<i>Amphipogon</i> sp.																															
<i>Amphipogon turbinatus</i>								X																						X	
<i>Anigozanthos humilis</i>			X		X	X		X														X	X	X		X		X	X	X	
<i>Anigozanthos pulcherrimus</i>																															
<i>Arnocrinum preissii</i>																															
<i>Asteridea pulverulenta</i>										X																					
<i>Astroloma glaucescens</i>								X																							
<i>Astroloma microdonta</i>			X						X			X	X		X	X					X		X								
<i>Austrostipa ?crinita</i>																															
<i>Austrostipa macalpinei</i>											X																		X		
<i>Austrostipa</i> sp.						X																									
<i>Babingtonia grandiflora</i>																X															
<i>Banksia attenuata</i>	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	X	X	X	
<i>Banksia elegans</i> (P4)	X	X	X											X					X							X			X	X	
<i>Banksia hookeriana</i>	X	X	X	X	X		X		X			X	X	X	X	X			X	X	X	X	X	X	X	X	X	X	X	X	
<i>Banksia leptophylla</i> var. <i>melletica</i>																															
<i>Banksia menziesii</i>							X		X														X			X		X	X		
<i>Banksia prionotes</i>																															
<i>Banksia shuttleworthiana</i>			X		X			X	X			X	X	X		X	X	X	X	X	X	X	X	X							
<i>Beaufortia elegans</i>		X	X	X	X	X		X	X			X	X		X	X	X		X		X	X	X	X				X		X	
<i>Boronia ramosa</i> subsp. <i>anethifolia</i>						X																								X	
<i>Burchardia congesta</i>							X			X			X															X			
<i>Calectasia</i> sp.																												X			
<i>Callitris arenaria</i>																															
<i>Calothamnus blepharospermus</i>				X			X	X		X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
<i>Calothamnus quadrifidus</i> subsp. <i>angustifolius</i>											X																				
<i>Calothamnus sanguineus</i>																												X			
<i>Calytrix sapphirina</i>		X				X											X											X			
<i>Calytrix</i> sp.																												X			

APPENDIX F: SUMMARY OF VASCULAR PLANT SPECIES RECORDED IN EACH SURVEY QUADRAT IN THE ARROWSMITH NORTH SURVEY AREA

Note: * denotes introduced species; T denotes threatened flora and P1-P4 denote priority flora (DBCA 2019a)

SPECIES	AR73	AR74	AR75	AR77	AR78	AR79	AR80	AR81	AR82	AR83	AR84	AR85	AR86	AR87	AR88	AR89	AR90	AR91	AR92	AR93	AR94	AR95	AR96	AR97	AR98	AR99	AR100	AR101	AR102	AR103	AR104
<i>Melaleuca leuropoma</i>	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	X	X	X	X	X	
<i>Melaleuca viminea</i> subsp. <i>viminea</i>																															
<i>Mesomelaena pseudostygia</i>		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	X	X	X	
<i>Monotaxis grandiflora</i>		X	X	X	X		X	X	X		X	X	X	X	X	X	X	X	X	X		X	X	X	X	X					
<i>Muehlenbeckia adpressa</i>																															
<i>Neurachne alopecuroidea</i>				X				X	X	X	X	X						X									X			X	
<i>Olax scalariformis</i>																															
<i>Olearia ?sp. Eremicola</i> (Diels & Pritzel s.n. PERTH 00449628)																															
<i>Orianthera spermacocea</i>																						X			X		X				
<i>Persoonia acicularis</i>	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	X	X	X	X	
<i>Petrophile axillaris</i>																															
<i>Petrophile brevifolia</i>	X	X	X						X													X	X	X	X	X					
<i>Petrophile drummondii</i>	X	X	X	X	X			X	X			X		X	X	X	X		X	X	X	X	X	X	X	X	X		X	X	
<i>Petrophile macrostachya</i>		X	X	X		X		X	X		X	X	X	X		X	X	X	X	X	X	X	X	X	X	X		X	X	X	
<i>Pileanthus filifolius</i>	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	X	X	X	X	X	
<i>Pimelea angustifolia</i>	X	X			X											X			X				X		X		X	X	X		
<i>Pimelea</i> sp.																															
Poaceae sp.																															
<i>Podotheca angustifolia</i>										X																					
<i>Podotheca gnaphalioides</i>																															
<i>Poranthera microphylla</i>																															
Proteaceae sp.																															
<i>Pterochaeta paniculata</i>										X																					
<i>Pterostylis</i> sp.																															
<i>Ptilotus stirlingii</i> subsp. <i>stirlingii</i>																															
<i>Quoya verbascina</i>																															
Restionaceae sp.																															
<i>Scaevola canescens</i>																															
<i>Scaevola repens</i> subsp. <i>Northern Sandplains</i> (R.J. Cranfield & P.J. Spencer 8445)							X	X	X	X	X		X	X			X	X	X			X	X	X	X	X	X				
<i>Scaevola spinescens</i>																															
<i>Schoenus brevisetis</i>																															
<i>Schoenus clandestinus</i>		X	X	X	X			X										X	X	X	X	X	X	X			X				
<i>Schoenus griffinianus</i> (P4)																															
<i>Schoenus nanus</i>																															
<i>Schoenus pleiostemoneus</i>								X							X					X		X		X		X		X	X	X	
<i>Schoenus</i> sp.									X								X														
<i>Scholtzia laxiflora</i>		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	X	X	X	X	
<i>Sphaerolobium gracile</i>																															
<i>Stawellia dimorphantha</i> (P4)																															
<i>Stenanthemum notiale</i> subsp. <i>notiale</i>					X		X				X					X		X				X	X			X	X			X	
<i>Stirlingia latifolia</i>						X																									
<i>Stylidium adpressum</i>																															
<i>Stylidium crossocephalum</i>	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	X	X	
<i>Stylidium dichotomum</i>														X																	
<i>Stylidium diuroides</i> subsp. <i>paucifoliatum</i>								X	X			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
<i>Stylidium ponticulus</i>														X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
<i>Stylidium purpureum</i>		X	X																								X		X	X	

APPENDIX F: SUMMARY OF VASCULAR PLANT SPECIES RECORDED IN EACH SURVEY QUADRAT IN THE ARROWSMITH NORTH SURVEY AREA

Note: * denotes introduced species; T denotes threatened flora and P1-P4 denote priority flora (DBCA 2019a)

SPECIES	AR105	AR106	AR107	AR108	AR109	AR110	AR111	AR112	AR113	AR114	AR115	AR116	AR117	AR118	AR119	AR120	AR121	AR122	AR123	AR124	AR125	AR126	AR127	AR128	AR129	AR130	AR131	AR132	AR133	AR134	AR135
<i>Melaleuca leuropoma</i>	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	X	X	X	X	X	
<i>Melaleuca viminea</i> subsp. <i>viminea</i>																															
<i>Mesomelaena pseudostygia</i>	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	X	X	X	X	X	
<i>Monotaxis grandiflora</i>			X	X	X		X	X	X	X		X			X	X	X		X	X	X	X	X			X	X			X	
<i>Muehlenbeckia adpressa</i>																															
<i>Neurachne alopecuroidea</i>		X	X		X	X									X						X			X							
<i>Olax scalariformis</i>																															
<i>Olearia ?sp. Eremicola</i> (Diels & Pritzel s.n. PERTH 00449628)																															
<i>Orianthera spermacocea</i>																															
<i>Persoonia acicularis</i>	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	X	X	X	X	X	
<i>Petrophile axillaris</i>																															
<i>Petrophile brevifolia</i>		X			X									X						X	X	X	X			X	X			X	
<i>Petrophile drummondii</i>	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	
<i>Petrophile macrostachya</i>		X	X	X		X	X	X	X		X		X		X		X		X		X	X	X					X	X	X	
<i>Pileanthus filifolius</i>	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	X	X	X	
<i>Pimelea angustifolia</i>		X																			X			X	X	X		X	X	X	
<i>Pimelea</i> sp.																															
Poaceae sp.																															
<i>Podotheca angustifolia</i>																															
<i>Podotheca gnaphalioides</i>																															
<i>Poranthera microphylla</i>																											X				
Proteaceae sp.																															
<i>Pterochaeta paniculata</i>																															
<i>Pterostylis</i> sp.																															
<i>Ptilotus stirlingii</i> subsp. <i>stirlingii</i>																															
<i>Quoya verbascina</i>																									X						
Restionaceae sp.																						X	X								
<i>Scaevola canescens</i>																															
<i>Scaevola repens</i> subsp. <i>Northern Sandplains</i> (R.J. Cranfield & P.J. Spencer 8445)			X			X			X							X	X		X	X		X	X								
<i>Scaevola spinescens</i>																															
<i>Schoenus brevisetis</i>																													X	X	
<i>Schoenus clandestinus</i>	X		X	X	X	X	X	X	X	X				X	X	X	X		X	X	X	X			X						
<i>Schoenus griffinianus</i> (P4)																															
<i>Schoenus nanus</i>																															
<i>Schoenus pleiostemoneus</i>		X	X	X	X	X	X	X	X				X	X						X	X		X	X							
<i>Schoenus</i> sp.																															
<i>Scholtzia laxiflora</i>		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	X	X	X	X	
<i>Sphaerolobium gracile</i>																															
<i>Stawellia dimorphantha</i> (P4)																															
<i>Stenanthemum notiale</i> subsp. <i>notiale</i>																				X		X				X	X				
<i>Stirlingia latifolia</i>		X																						X	X			X			
<i>Stylidium adpressum</i>																															
<i>Stylidium crossocephalum</i>	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	X	X	X	
<i>Stylidium dichotomum</i>																															
<i>Stylidium diuroides</i> subsp. <i>paucifoliatum</i>			X	X		X	X	X	X	X	X		X	X	X																
<i>Stylidium ponticulus</i>		X			X				X	X	X				X	X															
<i>Stylidium purpureum</i>	X																	X							X	X					

APPENDIX F: SUMMARY OF VASCULAR PLANT SPECIES RECORDED IN EACH SURVEY QUADRAT IN THE ARROWSMITH NORTH SURVEY AREA

Note: * denotes introduced species; T denotes threatened flora and P1-P4 denote priority flora (DBCA 2019a)

SPECIES	AR136	AR137	AR138	AR139	AR140	AR218	AR219	AR220	AR221	AR222	AR223	AR224	AR225	AR226	AR227	AR228	AR229	AR230	AR231	AR232
<i>Calytrix strigosa</i>						X											X	X	X	X
<i>Cassytha flava</i>																				
<i>Cassytha glabella forma bicallosa</i>						X				X		X								
<i>Cassytha pomiformis</i>																	X			X
<i>Cassytha</i> sp.	X	X		X	X										X	X				
<i>Centrolepis pilosa</i>																				
<i>Chordifex sinuosus</i>					X						X	X								
<i>Comesperma calymega</i>													X							
<i>Conospermum brachyphyllum</i>	X	X	X																	
<i>Conospermum triplinervium</i>	X	X	X	X		X				X		X			X	X		X		
<i>Conostephium preissii</i>					X					X	X									X
<i>Conostephium</i> sp.																				
<i>Conostylis aurea</i>						X														
<i>Conostylis candicans</i> subsp. <i>calcicola</i>					X															
<i>Conostylis candicans</i> subsp. <i>candicans</i>			X			X	X	X			X	X	X	X					X	X
<i>Conostylis candicans</i> subsp. <i>procumbens</i>																				
<i>Conostylis neocymosa</i>															X	X				
<i>Conostylis resinosa</i>	X	X	X	X												X				
<i>Conostylis</i> sp.																	X	X		
<i>Crassula colorata</i>														X						
<i>Cryptandra myriantha</i>																				
Cyperaceae sp.																				
<i>Dampiera spicigera</i>	X	X	X	X		X				X	X	X						X		X
<i>Dampiera</i> sp.											X									
<i>Darwinia pauciflora</i>																				X
<i>Darwinia speciosa</i>			X		X															
<i>Daviesia divaricata</i> subsp. <i>divaricata</i>		X	X	X		X					X	X								X
<i>Daviesia nudiflora</i>																				X
<i>Daviesia</i> sp.																				
<i>Daviesia triflora</i>			X		X					X										
<i>Dianella revoluta</i>							X											X		
<i>Drosera eneabba</i>			X		X							X				X				
<i>Drosera</i> sp.										X										
<i>Drosera</i> sp. (climbing)	X											X						X		
<i>Ecdeiocolea monostachya</i>		X												X	X	X	X	X	X	
<i>Eremaea beaufortioides</i> var. <i>beaufortioides</i>	X	X	X	X	X	X				X	X	X			X	X	X	X	X	X
<i>Eremaea ectadioclada</i>		X	X	X	X															X
<i>Eremaea violacea</i> subsp. <i>violacea</i>																X	X			X
<i>Eucalyptus todtiana</i>														X						
<i>Geleznowia verrucosa</i>																		X		
<i>Georgeantha hexandra</i>																				
<i>Gompholobium tomentosum</i>					X				X	X	X	X								X
<i>Grevillea candelabroides</i>																				
<i>Grevillea eriostachya</i>																				
<i>Grevillea leucopteris</i>						X	X	X		X	X	X		X	X		X		X	
<i>Guichenotia ledifolia</i>							X	X	X				X	X	X					
<i>Guichenotia</i> sp.													X	X	X					

APPENDIX G: LOCATION OF THREATENED AND PRIORITY FLORA RECORDED WITHIN
ARROWSMITH NORTH SURVEY AREA, OCTOBER/NOVEMBER 2018
AND OCTOBER/NOVEMBER 2019

Conservation Code	Species	GDA94_Z50		No. Plants
		Easting (mE)	Northing (mN)	
P3	<i>Comesperma rhadinocarpum</i>	314773	6733842	1
		314956	6733834	1
		314963	6733842	2
		315098	6733863	1
		315513	6734205	1
	<i>Hemiandra sp. Eneabba (H. Demarz 3687)</i>	314122	6736716	1
		314262	6736656	1
		314265	6736654	1
		314295	6739476	1
		314369	6736595	1
		314409	6738977	1
		314644	6739427	1
		314707	6737008	1
		314713	6737836	1
		314718	6736211	1
		314772	6738618	1
		314864	6738065	1
		314892	6737410	1
		314894	6738111	1
		314977	6738114	1
		315010	6738115	1
		315014	6737557	1
		315050	6739418	1
		315056	6738596	1
		315078	6739516	1
		315080	6737819	1
		315093	6738116	1
		315094	6738199	1
		315100	6736596	2
		315103	6739562	1
		315111	6738116	1
		315118	6738125	2
		315147	6736824	4
		315479	6738548	5
		315481	6737884	1
		315498	6736604	1
		315499	6738199	1
		315500	6737929	2
		315500	6738539	1
		315500	6738998	1
		315500	6739398	1
		315501	6737794	3
		315508	6737804	1
		315510	6737245	6
		315512	6737806	1
		315534	6739401	1
		315535	6738216	2
		315543	6739502	2
		315549	6738501	2
		315550	6738585	1
315555	6738495	3		
315570	6738492	1		
315601	6738245	1		
315622	6738477	11		
315637	6737393	1		
315639	6737832	2		
315640	6739395	3		
315678	6737409	1		
315684	6739006	1		
315718	6737820	1		
315737	6738587	4		
315751	6738583	8		
315752	6737822	1		

APPENDIX G: LOCATION OF THREATENED AND PRIORITY FLORA RECORDED WITHIN
ARROWSMITH NORTH SURVEY AREA, OCTOBER/NOVEMBER 2018
AND OCTOBER/NOVEMBER 2019

Conservation Code	Species	GDA94_Z50		No. Plants
		Easting (mE)	Northing (mN)	
P3	<i>Hemiandra sp. Eneabba (H. Demarz 3687)</i>	315778	6737830	2
		315782	6738240	2
		315790	6737828	1
		315842	6738229	1
		315861	6738213	1
		315872	6738210	1
		315873	6737810	1
		315889	6737810	2
		315898	6737803	4
		315900	6739042	1
		315901	6737801	3
		315904	6735405	2
		316044	6735002	2
		316048	6737859	1
		316105	6736400	1
		316231	6735730	1
		316300	6734601	3
		316411	6735033	1
		316432	6734970	1
		316491	6735642	1
		316542	6735523	1
		316591	6735018	1
		316700	6735399	1
		316703	6735000	1
		313918	6739368	2
		314307	6739396	1
		314601	6737773	1
		314734	6736212	1
	314971	6739406	1	
	315481	6737872	1	
	315483	6737886	1	
	315500	6737096	1	
	315504	6737088	2	
	315504	6737090	2	
	315505	6736205	1	
	315505	6737112	4	
	315505	6738072	1	
	315506	6737279	1	
	315507	6736604	1	
	315508	6737118	1	
	315509	6737282	1	
	315512	6737244	2	
	315512	6738016	1	
	315517	6737305	2	
	315532	6735789	2	
	315536	6736989	2	
	315539	6735791	1	
	315541	6736607	1	
	315548	6736609	1	
	315548	6736988	1	
	315557	6736608	1	
	315562	6736611	1	
	315563	6736988	9	
315580	6738230	1		
315581	6736603	1		
315592	6737004	1		
315593	6737820	1		
315596	6736599	1		
315599	6738481	1		
315619	6737012	3		
315622	6736602	1		
315629	6738474	1		
315634	6736602	7		
	<i>Hypocalymma gardneri</i>			

APPENDIX G: LOCATION OF THREATENED AND PRIORITY FLORA RECORDED WITHIN
ARROWSMITH NORTH SURVEY AREA, OCTOBER/NOVEMBER 2018
AND OCTOBER/NOVEMBER 2019

Conservation Code	Species	GDA94_Z50		No. Plants
		Easting (mE)	Northing (mN)	
P3	<i>Hypocalymma gardneri</i>	315638	6737395	1
		315639	6738250	1
		315657	6736598	2
		315660	6739009	2
		315662	6736598	1
		315674	6737406	1
		315678	6737406	1
		315680	6736603	4
		315682	6737001	2
		315687	6737000	1
		315687	6737001	1
		315690	6736999	8
		315695	6736998	2
		315698	6737002	8
		315712	6736607	1
		315718	6737820	1
		315728	6736606	1
		315732	6736604	3
		315732	6737821	1
		315737	6737009	4
		315744	6736606	2
		315749	6738266	3
		315751	6738583	1
		315755	6736607	1
		315760	6736608	1
		315764	6738250	1
		315770	6736609	1
		315779	6738411	1
		315781	6736610	2
		315789	6739023	2
		315797	6738236	1
		315817	6739017	3
		315822	6736607	1
		315829	6737002	2
		315849	6739017	3
		315879	6736600	1
		315885	6739014	1
		315886	6736191	1
		315898	6737803	1
		315916	6736605	1
		315936	6736591	1
		315936	6737806	1
		315960	6736611	1
		315968	6736592	1
		315976	6736593	1
		316026	6737864	1
		316032	6736594	2
		316034	6736595	1
		316052	6737272	1
		316062	6736996	3
316074	6737305	1		
316078	6736609	1		
316078	6737330	1		
316079	6737252	3		
316082	6737112	1		
316083	6736359	2		
316083	6737088	8		
316083	6737114	1		
316084	6737352	1		
316084	6737378	2		
316085	6736606	1		
316085	6737080	3		
316086	6737308	1		

APPENDIX G: LOCATION OF THREATENED AND PRIORITY FLORA RECORDED WITHIN
ARROWSMITH NORTH SURVEY AREA, OCTOBER/NOVEMBER 2018
AND OCTOBER/NOVEMBER 2019

Conservation Code	Species	GDA94_Z50		No. Plants
		Easting (mE)	Northing (mN)	
P3	<i>Hypocalymma gardneri</i>	316086	6737329	1
		316087	6737053	2
		316088	6737269	1
		316089	6737251	1
		316090	6737223	2
		316091	6737208	1
		316092	6737133	1
		316094	6737177	2
		316105	6736399	2
		316106	6736533	2
		316108	6736327	3
		316109	6736541	1
		316109	6736595	1
		316110	6736576	4
		316111	6736508	1
		316111	6736527	1
		316111	6736533	1
		316112	6736516	1
		316113	6736475	1
		316113	6736482	1
		316114	6736420	1
		316114	6736438	1
		316117	6736331	1
316119	6736280	1		
316135	6737007	1		
316159	6736576	1		
316195	6736592	1		
316304	6736450	1		
	<i>Lechenaultia juncea</i>	315501	6737794	1
	<i>Persoonia rudis</i>	313993	6737271	1
P4	<i>Banksia elegans</i>	313871	6736719	3
		313875	6736437	13
		313875	6736464	8
		313876	6736419	14
		313878	6736244	1
		313880	6736534	10
		313882	6736230	3
		313889	6736231	5
		313889	6736712	1
		313896	6736243	3
		313899	6736237	1
		313904	6736234	1
		313914	6736243	1
		313924	6736235	3
		313938	6736236	23
		313941	6736210	1
		314152	6736724	12
		314166	6736695	25
		314168	6738996	7
		314189	6736709	32
		314190	6736702	32
		314204	6736711	18
		314207	6736712	33
		314233	6736716	13
		314259	6736659	8
		314276	6735459	3
		314296	6739398	1
		314298	6739388	1
		314300	6738603	1
		314301	6736600	2
314303	6739396	1		
314305	6739512	1		
314307	6739396	2		

APPENDIX G: LOCATION OF THREATENED AND PRIORITY FLORA RECORDED WITHIN
ARROWSMITH NORTH SURVEY AREA, OCTOBER/NOVEMBER 2018
AND OCTOBER/NOVEMBER 2019

Conservation Code	Species	GDA94_Z50		No. Plants
		Easting (mE)	Northing (mN)	
P4	<i>Banksia elegans</i>	314318	6735401	4
		314349	6735389	7
		314356	6736600	6
		314369	6738988	3
		314398	6738627	1
		314438	6736595	9
		314452	6737824	2
		314490	6738234	2
		314505	6738242	1
		314544	6738277	1
		314553	6736592	3
		314563	6738632	1
		314588	6734519	1
		314642	6735599	5
		314655	6738600	2
		314687	6736184	1
		314690	6738194	1
		314695	6738200	1
		314697	6736603	2
		314710	6737796	4
		314730	6738168	1
		314773	6737791	1
		314795	6738621	2
		314797	6737692	8
		314826	6735590	3
		314835	6738628	1
		314860	6737655	3
		314871	6738632	1
		314935	6738617	1
		314960	6737380	3
		314989	6737402	12
		315082	6737461	9
		315091	6739441	3
		315097	6738814	1
		315117	6736056	1
		315499	6737072	1
		315499	6737388	1
		315501	6737096	5
		315501	6737794	2
		315503	6735000	1
		315503	6735005	4
		315504	6737082	1
		315507	6734982	7
		315510	6734977	6
		315515	6739452	3
		315518	6738038	2
		315526	6736265	4
		315545	6739528	10
		315586	6739400	5
		315603	6736214	12
315603	6739568	18		
315616	6739410	3		
315634	6736602	6		
315653	6736199	8		
315655	6738462	2		
315670	6734226	18		
315689	6734241	4		
315693	6736181	26		
315695	6739310	4		
315697	6738452	3		
315704	6734248	12		
315714	6738443	5		
315721	6739397	6		

APPENDIX G: LOCATION OF THREATENED AND PRIORITY FLORA RECORDED WITHIN
ARROWSMITH NORTH SURVEY AREA, OCTOBER/NOVEMBER 2018
AND OCTOBER/NOVEMBER 2019

Conservation Code	Species	GDA94_Z50		No. Plants
		Easting (mE)	Northing (mN)	
P4	<i>Banksia elegans</i>	315725	6736216	17
		315731	6734235	23
		315740	6739373	20
		315765	6738423	12
		315766	6736220	25
		315783	6734216	11
		315783	6738585	8
		315784	6734250	5
		315792	6738402	8
		315810	6736224	9
		315811	6738595	5
		315812	6738387	13
		315824	6734204	2
		315838	6738376	9
		315853	6737812	4
		315866	6736208	26
		315868	6738522	9
		315873	6736186	50
		315876	6738505	4
		315877	6738360	8
		315881	6737809	5
		315881	6738592	19
		315885	6738548	8
		315886	6736206	12
		315887	6733801	3
		315894	6738601	7
		315895	6739228	7
		315898	6739346	24
		315898	6739365	13
		315900	6736199	1
		315900	6739399	1
		315901	6738595	2
		315909	6738513	6
		315920	6738308	1
		315920	6738321	1
		315923	6736196	5
		315923	6737398	2
		315928	6739394	9
		315930	6738346	10
		315931	6738404	23
		315935	6733402	4
		315970	6739408	17
		315977	6738307	5
		315982	6739415	6
		315989	6736996	1
		315995	6738290	1
		315997	6739344	19
		315998	6739242	12
		315999	6735829	4
		315999	6739416	4
316003	6739387	7		
316005	6739305	6		
316006	6739206	14		
316007	6739412	1		
316014	6733405	8		
316016	6736999	1		
316021	6736221	3		
316026	6737864	3		
316031	6736991	1		
316045	6736990	5		
316047	6737868	3		
316050	6737274	1		
316055	6737855	7		

APPENDIX G: LOCATION OF THREATENED AND PRIORITY FLORA RECORDED WITHIN
ARROWSMITH NORTH SURVEY AREA, OCTOBER/NOVEMBER 2018
AND OCTOBER/NOVEMBER 2019

Conservation Code	Species	GDA94_Z50		No. Plants
		Easting (mE)	Northing (mN)	
P4	<i>Banksia elegans</i>	316058	6734264	2
		316059	6737423	3
		316063	6736397	4
		316065	6737383	6
		316066	6736995	16
		316066	6737312	1
		316067	6737279	1
		316068	6735830	5
		316071	6737018	13
		316071	6737027	5
		316076	6737041	1
		316076	6737284	1
		316077	6737219	1
		316078	6735848	7
		316079	6737032	1
		316082	6737023	2
		316084	6737047	2
		316084	6737382	1
		316086	6737007	2
		316088	6737273	2
		316096	6737191	2
		316100	6737117	1
		316101	6737245	1
		316104	6737390	1
		316106	6735846	1
		316108	6737014	12
		316118	6736178	3
		316119	6735933	14
		316119	6736138	6
		316120	6735992	26
		316120	6736062	21
		316125	6737392	2
		316130	6734383	3
		316141	6733243	1
		316143	6736995	8
		316147	6737388	3
		316176	6736994	10
		316207	6736995	20
		316223	6737374	1
		316232	6737407	2
		316259	6737278	4
		316264	6737004	18
		316278	6737262	3
		316298	6733401	2
		316298	6737333	3
		316299	6737006	20
		316300	6737000	11
		316303	6737248	10
		316305	6737059	33
		316307	6737412	4
316318	6736562	3		
316322	6737100	14		
316326	6737207	10		
316334	6737129	35		
316346	6736550	4		
316347	6736505	7		
316388	6737167	20		
316399	6733396	6		
316409	6733419	2		
316417	6733410	5		
316437	6733371	1		
316446	6733359	5		
316463	6733371	1		

APPENDIX G: LOCATION OF THREATENED AND PRIORITY FLORA RECORDED WITHIN
ARROWSMITH NORTH SURVEY AREA, OCTOBER/NOVEMBER 2018
AND OCTOBER/NOVEMBER 2019

Conservation Code	Species	GDA94_Z50		No. Plants
		Easting (mE)	Northing (mN)	
P4	<i>Banksia elegans</i>	316492	6733393	1
		316648	6734604	8
		316658	6734262	8
		316664	6734611	10
		316668	6734207	3
		316694	6734574	2
	<i>Schoenus griffinianus</i>	316704	6733457	2
		314017	6736976	1
		316124	6735637	4
		316177	6735640	2
	<i>Stawellia dimorphantha</i>	316338	6737167	1
		314064	6733400	1
		314265	6734544	1
		314291	6734472	1
		314292	6734612	1
		314298	6734996	7
		314328	6734577	1
		314375	6734502	1
314531	6734481	1		

APPENDIX H: VASCULAR PLANT SPECIES RECORDED IN EACH VEGETATION COMMUNITY
IN THE ARROWSMITH NORTH SURVEY AREA, 2018-2019

Note: * denotes introduced species; T denotes threatened flora and P1-P4 denote priority flora species (DBCA 2019a).

SPECIES	VEGETATION COMMUNITY							
	H1	H2	H3	H4	H5	S3	T1	W2
<i>Acacia blakelyi</i>	x	x		x	x	x	x	x
<i>Acacia cavealis</i>	x	x			x			
<i>Acacia ?lineolata</i>						x	x	x
<i>Acacia pulchella</i>				x				x
<i>Acacia pulchella</i> var. <i>glaberrima</i>								x
<i>Acacia rostellifera</i>							x	
<i>Acacia saligna</i>							x	
<i>Acacia scirpifolia</i>		x						
<i>Acacia spathulifolia</i>	x				x	x	x	
<i>Acacia</i> sp.	x							
<i>Acanthocarpus ?canaliculatus</i>	x	x	x	x		x		
<i>Acanthocarpus preissii</i>	x	x		x	x	x		x
* <i>Aira caryophyllea</i>							x	
<i>Alexgeorgea nitens</i>		x		x	x			x
<i>Allocasuarina campestris</i>	x	x	x	x		x	x	
<i>Allocasuarina humilis</i>	x	x	x	x	x	x		x
<i>Allocasuarina microstachya</i>		x						
<i>Allocasuarina</i> sp.		x	x	x				
<i>Amphipogon turbinatus</i>	x	x	x	x	x	x		x
<i>Amphipogon</i> sp.		x						
<i>Anigozanthos humilis</i>	x	x	x	x	x			x
<i>Anigozanthos pulcherrimus</i>								x
<i>Arnocrinum preissii</i>				x	x			
<i>Asteridea pulverulenta</i>	x						x	
<i>Astroloma glaucescens</i>	x	x	x		x	x		
<i>Astroloma microdonta</i>		x	x	x		x		
<i>Austrostipa ?crinita</i>							x	
<i>Austrostipa macalpinei</i>	x				x			x
<i>Austrostipa</i> sp.	x						x	x
<i>Babingtonia grandiflora</i>			x					
<i>Banksia attenuata</i>	x	x	x	x	x	x	x	x
<i>Banksia elegans</i>			x	x				x
<i>Banksia hookeriana</i>	x	x	x	x	x	x		x
<i>Banksia leptophylla</i> var. <i>melletica</i>	x					x		
<i>Banksia menziesii</i>		x	x	x	x		x	x
<i>Banksia prionotes</i>				x			x	
<i>Banksia shuttleworthiana</i>		x	x	x	x			
<i>Beaufortia elegans</i>	x	x	x	x	x	x		x
<i>Boronia ramosa</i> subsp. <i>anethifolia</i>		x		x				x
<i>Burchardia congesta</i>	x	x	x	x	x	x		
<i>Calectasia</i> sp.		x						
<i>Callitris arenaria</i>				x				
<i>Calothamnus blepharospermus</i>	x	x	x	x	x	x	x	
<i>Calothamnus quadrifidus</i> subsp. <i>angustifolius</i>	x	x				x	x	
<i>Calothamnus sanguineus</i>			x	x				
<i>Calytrix sapphirina</i>		x		x				x
<i>Calytrix</i> sp.						x		
<i>Calytrix strigosa</i>	x	x	x	x	x	x		x
<i>Cassytha flava</i>		x		x	x	x		x
<i>Cassytha glabella</i> forma <i>bicallosa</i>						x		x
<i>Cassytha pomiformis</i>	x			x		x	x	x

APPENDIX H: VASCULAR PLANT SPECIES RECORDED IN EACH VEGETATION COMMUNITY
IN THE ARROWSMITH NORTH SURVEY AREA, 2018-2019

Note: * denotes introduced species; T denotes threatened flora and P1-P4 denote priority flora species (DBCA 2019a).

SPECIES	VEGETATION COMMUNITY							
	H1	H2	H3	H4	H5	S3	T1	W2
<i>Cassytha</i> sp.	x	x	x	x	x			x
<i>Centrolepis pilosa</i>	x							
<i>Chordifex sinuosus</i>				x				x
<i>Comesperma calymega</i>							x	
<i>Conospermum brachyphyllum</i>		x		x				
<i>Conospermum triplinervium</i>	x	x	x	x	x	x	x	x
<i>Conostephium preissii</i>		x		x		x		x
<i>Conostephium</i> sp.								x
<i>Conostylis aurea</i>						x		
<i>Conostylis candicans</i> subsp. <i>calcicola</i>	x			x				x
<i>Conostylis candicans</i> subsp. <i>candicans</i>	x	x	x	x		x	x	x
<i>Conostylis candicans</i> subsp. <i>procumbens</i>		x		x			x	x
<i>Conostylis neocymosa</i>	x	x	x	x		x		
<i>Conostylis resinosa</i>	x	x	x	x	x			
<i>Conostylis</i> sp.	x	x						
<i>Crassula colorata</i>							x	x
<i>Cryptandra myriantha</i>					x			
Cyperaceae sp.			x					
<i>Dampiera spicigera</i>	x	x	x	x	x	x		x
<i>Dampiera</i> sp.								x
<i>Darwinia pauciflora</i>	x	x	x	x	x	x		
<i>Darwinia speciosa</i>				x				x
<i>Daviesia divaricata</i> subsp. <i>divaricata</i>	x	x	x	x	x	x		x
<i>Daviesia nudiflora</i>						x		
<i>Daviesia triflora</i>			x	x				x
<i>Daviesia</i> sp.		x	x	x				x
<i>Dianella revoluta</i>	x						x	
<i>Drosera eneabba</i>	x	x	x	x	x	x		x
<i>Drosera</i> sp.		x	x	x	x			x
<i>Drosera</i> sp. (climbing)	x			x	x			x
<i>Ecdeiocolea monostachya</i>	x	x	x	x	x	x	x	
<i>Eremaea beaufortioides</i> var. <i>beaufortioides</i>	x	x	x	x	x	x		x
<i>Eremaea ectadioclada</i>		x	x	x	x	x		x
<i>Eremaea violacea</i> subsp. <i>violacea</i>	x	x	x	x	x	x		
<i>Eucalyptus todtiana</i>	x						x	
<i>Geleznovia verrucosa</i>	x							
<i>Georgeantha hexandra</i>	x	x						
<i>Gompholobium tomentosum</i>	x			x		x	x	x
<i>Grevillea candelabroides</i>	x	x	x	x			x	x
<i>Grevillea eriostachya</i>		x	x					
<i>Grevillea leucopteris</i>	x			x	x	x	x	x
<i>Guichenotia ledifolia</i>	x						x	
<i>Guichenotia</i> sp.	x						x	
<i>Gyrostemon ramulosus</i>				x			x	
<i>Gyrostemon</i> sp.							x	
<i>Hakea costata</i>	x	x	x	x	x	x		
<i>Hakea polyanthema</i>	x	x	x	x	x	x	x	x
<i>Hemiandra</i> sp. Eneabba (H. Demarx 3687)		x	x	x				
<i>Hibbertia crassifolia</i>	x	x	x	x	x	x		x
<i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i>	x	x	x	x	x	x	x	x
<i>Hibbertia striata</i>	x	x		x		x		

APPENDIX H: VASCULAR PLANT SPECIES RECORDED IN EACH VEGETATION COMMUNITY
IN THE ARROWSMITH NORTH SURVEY AREA, 2018-2019

Note: * denotes introduced species; T denotes threatened flora and P1-P4 denote priority flora species (DBCA 2019a).


SPECIES	VEGETATION COMMUNITY							
	H1	H2	H3	H4	H5	S3	T1	W2
<i>Petrophile drummondii</i>	X	X	X	X	X	X		X
<i>Petrophile macrostachya</i>	X	X	X	X	X	X		X
<i>Pileanthus fillifolius</i>	X	X	X	X	X	X		X
<i>Pimelea angustifolia</i>	X	X	X	X	X	X		X
<i>Pimelea</i> sp.						X		X
Poaceae sp.						X	X	
<i>Podotheca angustifolia</i>	X							
<i>Podotheca gnaphaloides</i>	X				X		X	
<i>Poranthera microphylla</i>		X		X	X	X	X	
Proteaceae sp.							X	
<i>Pterochaeta paniculata</i>	X						X	
<i>Pterostylis</i> sp.	X							
<i>Ptilotus stirlingii</i> subsp. <i>stirlingii</i>	X			X	X			
<i>Quoya verbascina</i>				X				
Restionaceae sp.	X			X				
<i>Scaevola canescens</i>	X	X						
<i>Scaevola repens</i> subsp. Northern Sandplains (R.J. Cranfield & P.J. Spencer 8445)	X	X	X	X	X	X		
<i>Scaevola spinescens</i>	X							
<i>Schoenus brevisetis</i>				X				
<i>Schoenus clandestinus</i>	X	X	X	X	X			
<i>Schoenus griffinianus</i>								X
<i>Schoenus nanus</i>								X
<i>Schoenus pleiostemoneus</i>		X	X	X	X			
<i>Schoenus</i> sp.			X					
<i>Scholtzia laxiflora</i>	X	X	X	X	X	X		X
<i>Sphaerolobium gracile</i>	X							
<i>Stawellia dimorphantha</i>						X	X	
<i>Stenanthemum notiale</i> subsp. <i>notiale</i>	X	X	X	X	X	X	X	
<i>Stirlingia latifolia</i>				X			X	X
<i>Stylidium adpressum</i>		X						
<i>Stylidium crossocephalum</i>	X	X	X	X	X	X		X
<i>Stylidium dichotomum</i>			X		X			
<i>Stylidium diuroides</i> subsp. <i>paucifoliatum</i>		X	X	X	X			
<i>Stylidium ponticulus</i>		X	X	X	X			
<i>Stylidium purpureum</i>	X	X		X	X	X		X
<i>Stylidium repens</i>	X	X	X	X	X	X		X
<i>Stylidium rigidulum</i>		X		X				X
<i>Stylidium</i> sp.			X	X	X	X		
<i>Styphelia xerophylla</i>		X		X		X		X
<i>Synaphea spinulosa</i> subsp. <i>borealis</i>		X	X					
<i>Synaphea spinulosa</i> subsp. <i>spinulosa</i>	X	X		X		X		X
<i>Synaphea</i> sp.					X			
<i>Thysanotus rectantherus</i>	X	X	X	X	X	X		
<i>Thysanotus sparteus</i>	X						X	
<i>Thysanotus spiniger</i>	X							
<i>Thysanotus</i> sp.	X	X	X	X			X	
<i>Thysanotus</i> sp. (Climbing)	X			X	X		X	
<i>Trachymene pilosa</i>	X						X	
<i>Tricoryne elatior</i>	X							

APPENDIX H: VASCULAR PLANT SPECIES RECORDED IN EACH VEGETATION COMMUNITY
IN THE ARROWSMITH NORTH SURVEY AREA, 2018-2019

Note: * denotes introduced species; T denotes threatened flora and P1-P4 denote priority flora species (DBCA 2019a).

SPECIES	VEGETATION COMMUNITY							
	H1	H2	H3	H4	H5	S3	T1	W2
<i>Tricoryne ?humilis</i>		X	X	X				
<i>Tricoryne</i> sp. Mullewa (G.J. Keighery 12080)	X							
<i>Tricoryne</i> sp.	X							
* <i>Trifolium arvense</i> var. <i>arvense</i>							X	
<i>Tripterococcus brunonis</i>				X				X
* <i>Ursinia anthemoides</i>	X						X	
<i>Verreauxia reinwardtii</i>	X				X	X		
<i>Verticordia densiflora</i> var. <i>densiflora</i>	X	X	X	X	X	X	X	X
<i>Verticordia grandis</i>	X	X	X	X	X			X
<i>Verticordia ovalifolia</i>								X
* <i>Wahlenbergia capensis</i>	X							X
<i>Wahlenbergia gracilentia</i>							X	
<i>Waitzia acuminata</i> var. <i>acuminata</i>							X	
<i>Waitzia acuminata</i> var. <i>albicans</i>	X				X		X	
<i>Xanthorrhoea drummondii</i>	X					X		X
<i>Xanthosia huegelii</i>	X		X	X				X
<i>Xylomelum angustifolium</i>	X	X	X	X				

APPENDIX I: SUMMARY OF VEGETATION COMMUNITIES RECORDED IN ARROWSMITH NORTH SURVEY AREA

Vegetation Community Description	
Vegetation map code: W2	
Structural	
Low Open Woodland of <i>Banksia attenuata</i> and <i>Banksia menziesii</i> over open shrubland of <i>Melaleuca leuropoma</i> , <i>Eremaea beaufortioides</i> var. <i>beaufortioides</i> , <i>Daviesia triflora</i> , <i>Styphelia xerophylla</i> , <i>Pileanthus filifolius</i> and <i>Stirlingia latifolia</i> over <i>Alexgeorgea nitens</i> , <i>Lyginia imberbis</i> and <i>Stylidium crossocephalum</i> .	
Associated species	
<i>Gompholobium tomentosum</i> , <i>Leucopogon</i> sp. Northern ciliate (R. Davis 3393), <i>Scholtzia laxiflora</i> , <i>Leucopogon inflexus</i> , <i>Acacia pulchella</i> .	
Soils and Landforms: cream to white sands on plains	
Outcropping: absent	
Condition: pristine	
Area: 95.5 ha	Proportion of survey area: 5.5 %
Number of Quadrats: 9	Species richness: 29.8 ± 1.8 (SE)
Representative Photographs	
	
Site AR56	

APPENDIX I: SUMMARY OF VEGETATION COMMUNITIES RECORDED IN ARROWSMITH NORTH SURVEY AREA

Vegetation Community Description (continued)

Vegetation map code: W2

Representative Photographs (continued)



Site AR79



Site AR223

APPENDIX I: SUMMARY OF VEGETATION COMMUNITIES RECORDED IN ARROWSMITH NORTH SURVEY AREA

Vegetation Community Description	
Vegetation map code: H1	
Structural	
Open Heath to Closed Heath of <i>Hakea polyanthema</i> , <i>Calothamnus blepharospermus</i> , <i>Conospermum triplinervium</i> , <i>Petrophile macrostachya</i> and <i>Melaleuca leuropoma</i> with emergent <i>Banksia attenuata</i> over <i>Acanthocarpus preissii</i> and <i>Ecdeiocolea monostachya</i> .	
Associated species	
<i>Acacia cavealis</i> , <i>Eremaea beaufortioides</i> var. <i>beaufortioides</i> , <i>Scholtzia laxiflora</i> , <i>Persoonia acicularis</i> , <i>Verticordia grandis</i> , <i>Verticordia densiflora</i> var. <i>densiflora</i> .	
Soils and Landforms: cream and white surface sands.	
Outcropping: absent	
Condition: excellent-pristine	
Area: 194.7 ha	Proportion of survey area: 11.2 %
Number of Quadrats: 14	Species richness: 28.1 ± 1.7 (SE)
Representative Photograph	
	
Site AR66	

APPENDIX I: SUMMARY OF VEGETATION COMMUNITIES RECORDED IN ARROWSMITH NORTH SURVEY AREA

Vegetation Community Description (continued)

Vegetation map code: H1

Representative Photographs (continued)




Site AR230



Site AR65

APPENDIX I: SUMMARY OF VEGETATION COMMUNITIES RECORDED IN ARROWSMITH NORTH SURVEY AREA

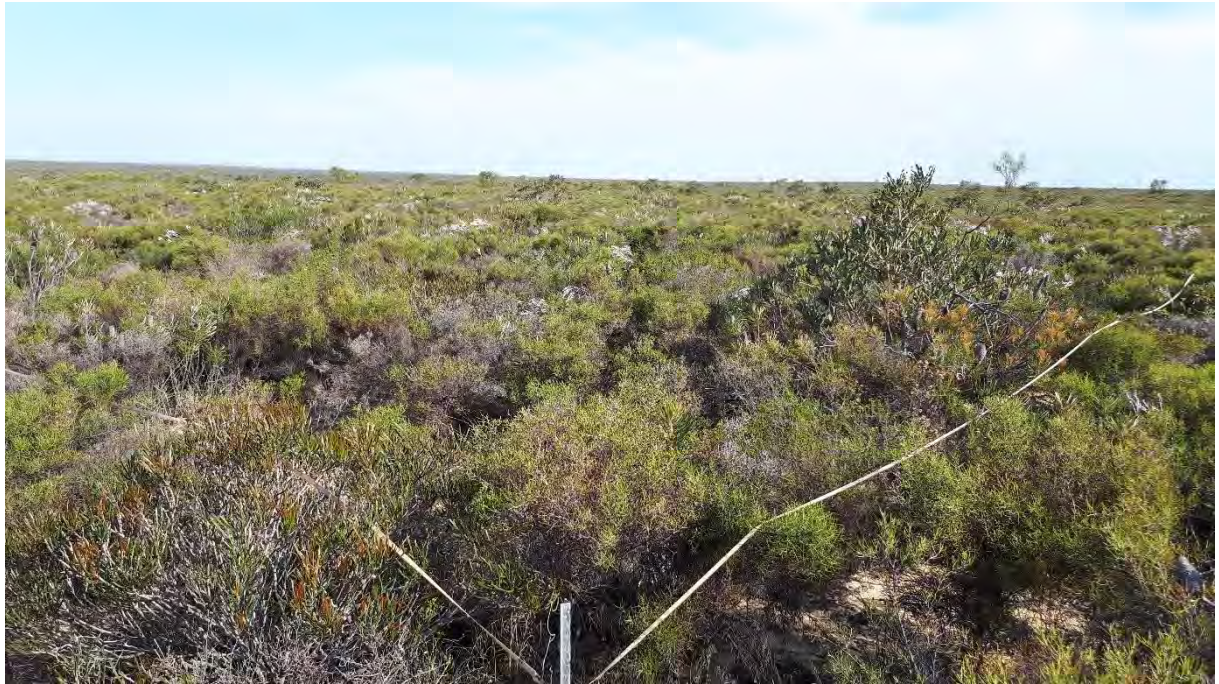
Vegetation Community Description	
Vegetation map code: H2	
Structural	
Open Heath to Closed Heath of <i>Banksia hookeriana</i> , <i>Banksia attenuata</i> with occasional <i>Banksia menziesii</i> over <i>Melaleuca leuropoma</i> , <i>Eremaea beaufortioides</i> var. <i>beaufortioides</i> , <i>Scholtzia laxiflora</i> , <i>Conospermum triplinervium</i> , <i>Eremaea violacea</i> subsp. <i>violacea</i> over <i>Mesomelaena pseudostygia</i> .	
Associated species	
<i>Calothamnus blepharospermus</i> , <i>Acanthocarpus ?canaliculatus</i> , <i>Scaevola repens</i> subsp. Northern Sandplains (R.J. Cranfield & P.J. Spencer 8445) and <i>Schoenus clandestinus</i> .	
Soils and Landforms: white sands on plains	
Outcropping: absent	
Condition: pristine	
Area: 406.5 ha	Proportion of survey area: 23.3 %
Number of Quadrats: 25	Species richness: 31.9 ± 0.7 (SE)
Representative Photographs	
	
Site AR72	

APPENDIX I: SUMMARY OF VEGETATION COMMUNITIES RECORDED IN ARROWSMITH NORTH SURVEY AREA

Vegetation Community Description (continued)

Vegetation map code: H2

Representative Photographs (continued)




Site AR60



Site AR67

APPENDIX I: SUMMARY OF VEGETATION COMMUNITIES RECORDED IN ARROWSMITH NORTH SURVEY AREA

Vegetation Community Description	
Vegetation map code: H3	
Structural	
Open Heath of <i>Melaleuca leuropoma</i> , <i>Leptospermum oligandrum</i> , <i>Hakea polyanthema</i> , <i>Conospermum triplinervium</i> , <i>Beaufortia elegans</i> and <i>Pileanthus filifolius</i> , with isolated trees of <i>Banksia attenuata</i> and <i>Xylomelum angustifolium</i> , over <i>Mesomelaena pseudostygia</i> and <i>Ecdeiocolea monostachya</i> .	
Associated species	
<i>Persoonia acicularis</i> , <i>Leptospermum spinescens</i> , <i>Calothamnus blepharospermus</i> , <i>Daviesia divaricata</i> subsp. <i>divaricata</i> and <i>Petrophile drummondii</i> .	
Soils and Landforms: cream/grey sand on plains	
Outcropping: absent	
Condition: pristine	
Area: 258.2 ha	Proportion of survey area: 14.8 %
Number of Quadrats: 16	Species richness: 36.6 ± 1.0 (SE)
Representative Photograph	
	
Site AR107	

APPENDIX I: SUMMARY OF VEGETATION COMMUNITIES RECORDED IN ARROWSMITH NORTH SURVEY AREA

Vegetation Community Description (continued)

Vegetation map code: H3

Representative Photographs (continued)




Site AR87



Site AR89

APPENDIX I: SUMMARY OF VEGETATION COMMUNITIES RECORDED IN ARROWSMITH NORTH SURVEY AREA

Vegetation Community Description	
Vegetation map code: H4	
Structural	
Open Heath of <i>Conospermum triplinervium</i> , <i>Banksia attenuata</i> , <i>Banksia hookeriana</i> , <i>Melaleuca leuropoma</i> , <i>Daviesia divaricata</i> subsp. <i>divaricata</i> and <i>Eremaea beaufortioides</i> var. <i>beaufortioides</i> over <i>Mesomelaena pseudostygia</i> and <i>Dampiera spicigera</i> .	
Associated species	
<i>Pileanthus fillifolius</i> , <i>Scholtzia laxiflora</i> , <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> , <i>Verticordia grandis</i> , <i>Verticordia densiflora</i> var. <i>densiflora</i> , <i>Leptospermum spinescens</i> , <i>Beaufortia elegans</i> , <i>Eremaea ectadioclada</i> , <i>Lasiopetalum drummondii</i> , <i>Daviesia triflora</i> , <i>Stylidium crossocephalum</i> , <i>Persoonia acicularis</i> , <i>Acanthocarpus preissii</i> , <i>Anigozanthos humilis</i> .	
Soils and Landforms: yellow-cream/white sand on flats	
Outcropping: absent	
Condition: pristine	
Area: 518.1 ha	Proportion of survey area: 29.7 %
Number of Quadrats: 31	Species richness: 37.1 ± 0.8 (SE)
Representative Photograph	
	
Site AR101	

APPENDIX I: SUMMARY OF VEGETATION COMMUNITIES RECORDED IN ARROWSMITH NORTH SURVEY AREA

Vegetation Community Description (continued)

Vegetation map code: H4

Representative Photographs (continued)




Site AR102



Site AR58

APPENDIX I: SUMMARY OF VEGETATION COMMUNITIES RECORDED IN ARROWSMITH NORTH SURVEY AREA

Vegetation Community Description	
Vegetation map code: H5	
Structural	
Open Heath to Closed Heath of <i>Banksia shuttleworthiana</i> , <i>Banksia attenuata</i> with occasional <i>Banksia menziesii</i> over <i>Melaleuca leuropoma</i> , <i>Eremaea beaufortoides</i> var. <i>beaufortoides</i> , <i>Conospermum triplinervium</i> , <i>Scholtzia laxiflora</i> and <i>Verticordia grandis</i> over <i>Mesomelaena pseudostygia</i> , <i>Ecdeiocola monostachya</i> and <i>Lepidobolus preissianus</i> subsp. <i>preissianus</i> .	
Associated species	
<i>Hakea polyanthema</i> , <i>Banksia hookeriana</i> , <i>Beaufortia elegans</i> , <i>Pileanthus filifolius</i> , <i>Daviesia divaricata</i> subsp. <i>divaricata</i> , <i>Petrophile drummondii</i> , <i>Leptospermum oligandrum</i> , <i>Petrophile macrostachya</i> , <i>Calothamnus blepharospermus</i> , <i>Darwinia pauciflora</i> , <i>Leptospermum spinescens</i> , <i>Conostylis resinosa</i> , <i>Schoenus clandestinus</i> , <i>Monotaxis grandiflora</i> .	
Soils and Landforms: pale yellow sandy flats	
Outcropping: absent	
Condition: pristine	
Area: 112.4 ha	Proportion of survey area: 6.4 %
Number of Quadrats: 7	Species richness: 38.6 ± 1.7 (SE)
Representative Photograph	
	
Site AR49	

APPENDIX I: SUMMARY OF VEGETATION COMMUNITIES RECORDED IN ARROWSMITH NORTH SURVEY AREA

Vegetation Community Description (continued)

Vegetation map code: H5

Representative Photographs (continued)



Site AR50



Site AR52

APPENDIX I: SUMMARY OF VEGETATION COMMUNITIES RECORDED IN ARROWSMITH NORTH SURVEY AREA

Vegetation Community Description	
Vegetation map code: T1	
Structural	
Thicket to Scrub of <i>Allocasuarina campestris</i> , <i>Grevillea leucopteris</i> , <i>Guichenotia ledifolia</i> , <i>Acacia ?lineolata</i> , <i>Calothamnus quadrifidus</i> subsp. <i>quadrifidus</i> with occasional <i>Eucalyptus tottiana</i> and <i>Banksia attenuata</i> over <i>Dianella revoluta</i> and <i>Ecdeiocolea monostachya</i> .	
Associated species	
<i>Acacia blakelyi</i> , <i>Hibbertia hypericoides</i> subsp. <i>hypericoides</i> , <i>Melaleuca leuropoma</i> , <i>Conostylis candidans</i> .	
Soils and Landforms: grey/cream/orange/red sand on flats and slopes	
Outcropping: absent	
Condition: excellent-pristine	
Area: 132.4 ha	Proportion of survey area: 7.6 %
Number of Quadrats: 7	Species richness: 10.3 ± 1.3 (SE)
Representative Photograph	
	
Site AR220	

APPENDIX I: SUMMARY OF VEGETATION COMMUNITIES RECORDED IN ARROWSMITH NORTH SURVEY AREA

Vegetation Community Description (continued)

Vegetation map code: T1

Representative Photographs (continued)




Site AR221



Site AR225

APPENDIX I: SUMMARY OF VEGETATION COMMUNITIES RECORDED IN ARROWSMITH NORTH SURVEY AREA

Vegetation Community Description	
Vegetation map code: S3	
Structural	
Scrub of <i>Banksia attenuata</i> , <i>Banksia leptophylla</i> var. <i>melletica</i> , <i>Hakea polyanthema</i> and <i>Melaleuca leuropoma</i> over <i>Scholtzia laxiflora</i> , <i>Petrophila macrostachya</i> , <i>Petrophile drummondii</i> , <i>Allocasuarina humilis</i> , <i>Hakea costata</i> and <i>Acacia spathulifolia</i> over <i>Scaevola repens</i> subsp. Northern Sandplains (R.J. Cranfield & P.J. Spencer 8445) and <i>Mesomelaena pseudostygia</i> .	
Associated species	
<i>Banksia hookeriana</i> , <i>Conospermum triplinervium</i> , <i>Eremaea beaufortioides</i> var. <i>beaufortioides</i> , <i>Pileanthus filifolius</i> , <i>Conostylis candicans</i> , <i>Lepidobolus preissianus</i> subsp. <i>preissianus</i> , <i>Acacia blakelyi</i> , <i>Eremaea violacea</i> subsp. <i>violacea</i> , <i>Conostylis neocymosa</i> , <i>Stenanthemum notiale</i> subsp. <i>notiale</i> .	
Soils and Landforms: white-yellow sand on flats and slopes	
Outcropping: absent	
Condition: excellent-pristine	
Area: 25.4 ha	Proportion of survey area: 1.5 %
Number of Quadrats: 4	Species richness: 32.8 ± 4.2 (SE)
Representative Photograph	
	
Site AR116	

APPENDIX I: SUMMARY OF VEGETATION COMMUNITIES RECORDED IN ARROWSMITH NORTH SURVEY AREA

Vegetation Community Description (continued)

Vegetation map code: S3

Representative Photographs (continued)



Site AR218



Site AR232