FLORA & VEGETATION ASSESSMENT

ARROWSMITH NORTH TRANSPORT CORRIDOR SURVEY AREA

Prepared By

Mattiske Consulting Pty Ltd

Prepared For

VRX Silica Limited

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LIST OF ABBREVIATIONS

BAM Act:	*Biosecurity and Agriculture Management Act 2007* (WA)
BC Act:	*Biodiversity Conservation Act 2016* (WA)
BOM:	Bureau of Meteorology
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:	*Environmental Protection Act 1986* (WA)
EPA:	Environmental Protection Authority
EPBC Act:	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
IBRA:	Interim Biogeographical Regionalisation for Australia
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 May 2020 by VRX Silica Ltd to undertake a reconnaissance level flora and vegetation survey of the Arrowsmith North transport corridor survey area. This survey occurred between the 19th to 22nd of May 2020. The Arrowsmith North transport corridor survey area occupies an area of approximately 448 ha, and is located between the towns of Eneabba and Dongara, Western Australia. A total of 44 vegetation survey quadrats were established to sample all the apparent vegetation community types which were located within the Arrowsmith North transport corridor survey area.

Rainfall in the three months preceding the May 2020 survey was above the long term average rainfall for the area. Based on a range of factors including the proportion of potential flora recorded (estimated at 82 %), the proportion of annual taxa recorded (8.7 %), 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 126 vascular plant taxa, representative of 74 genera and 32 families, were recorded within survey quadrats within the Arrowsmith North transport corridor survey area. The majority of taxa recorded were representative of the Proteaceae (23 taxa), Myrtaceae (22 taxa) and Fabaceae (19 taxa) families. The majority of the taxa recorded were widespread both locally and more broadly within the associated biogeographical subregion. There were no species recorded within the Arrowsmith North transport corridor survey area which represented extensions to their current known distributions.

No threatened flora pursuant to Part 2, Division 1, and Subdivision 2 of the *Biodiversity Conservation Act 2016* were recorded in the Arrowsmith North transport corridor survey area. Three priority taxa, as listed by the Western Australian Herbarium were recorded in the survey area. These were *Hopkinsia anoectocolea* (P3), *Banksia elegans* (P4) and *Stawellia dimorphantha* (P4). *Banksia elegans* (P4) was recorded from 34 locations totalling 333 individuals, *Hopkinsia anoectocolea* (P3) one location totalling 3 plants and a single plant of *Stawellia dimorphantha* (P4) was recorded.

Vegetation mapping based upon the quadrat-based species data resulted in ten vegetation communities comprising two Heathland, one Scrub, four Thicket and three Woodland communities. The most dominant vegetation type was the W4 vegetation community which was present throughout the western portion of the Arrowsmith North transport corridor survey area. This community accounted for 21.91 % of the total area surveyed. The second most commonly represented vegetation was the T6 vegetation community which was present in the western and central southern portion of the survey area and accounting for 12.36 % of the total area surveyed. The remaining eight communities account for 41.95 % of the survey area. The most restricted vegetation community defined was the T3 community, accounting for 0.24 % of the survey area.

Overall, the vegetation communities mapped and species recorded in the Arrowsmith North transport corridor survey area were consistent with the historical mapping of Beard (1976, 1990). The majority of the survey area consists of thickets of *Acacia* spp., including *Acacia blakelyi*, *Acacia rostellifera* and *Acacia saligna*. 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 for threatened and priority flora species are undertaken in the spring months to give a more accurate idea of population numbers and extent to be impacted.

1. INTRODUCTION

Mattiske Consulting Pty Ltd (Mattiske Consulting) was commissioned in May 2020 by VRX Silica Ltd to undertake a reconnaissance level flora and vegetation survey of the Arrowsmith North transport corridor survey area. VRX Silica Ltd are currently exploring their Arrowsmith North tenements for construction sand and high quality silica sand.

1.1. Location and Scope of Survey

The Arrowsmith North transport corridor survey area is located between the towns of Eneabba and Dongara, Western Australia (Figure 1). The survey area falls within the Irwin Botanical District in the Northern Sandplains Region of the Southwest Province of Western Australia (Beard 1990), and the Lesueur Sandplain subregion of the Geraldton Sandplains Region of the Interim Biogeographic Regionalisation for Australia (IBRA) (DAWE 2020a). This report outlines the methodology and results from a detailed flora and vegetation survey and targeted threatened and priority flora survey carried out in agricultural land with remnant vegetation and native vegetation.

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)

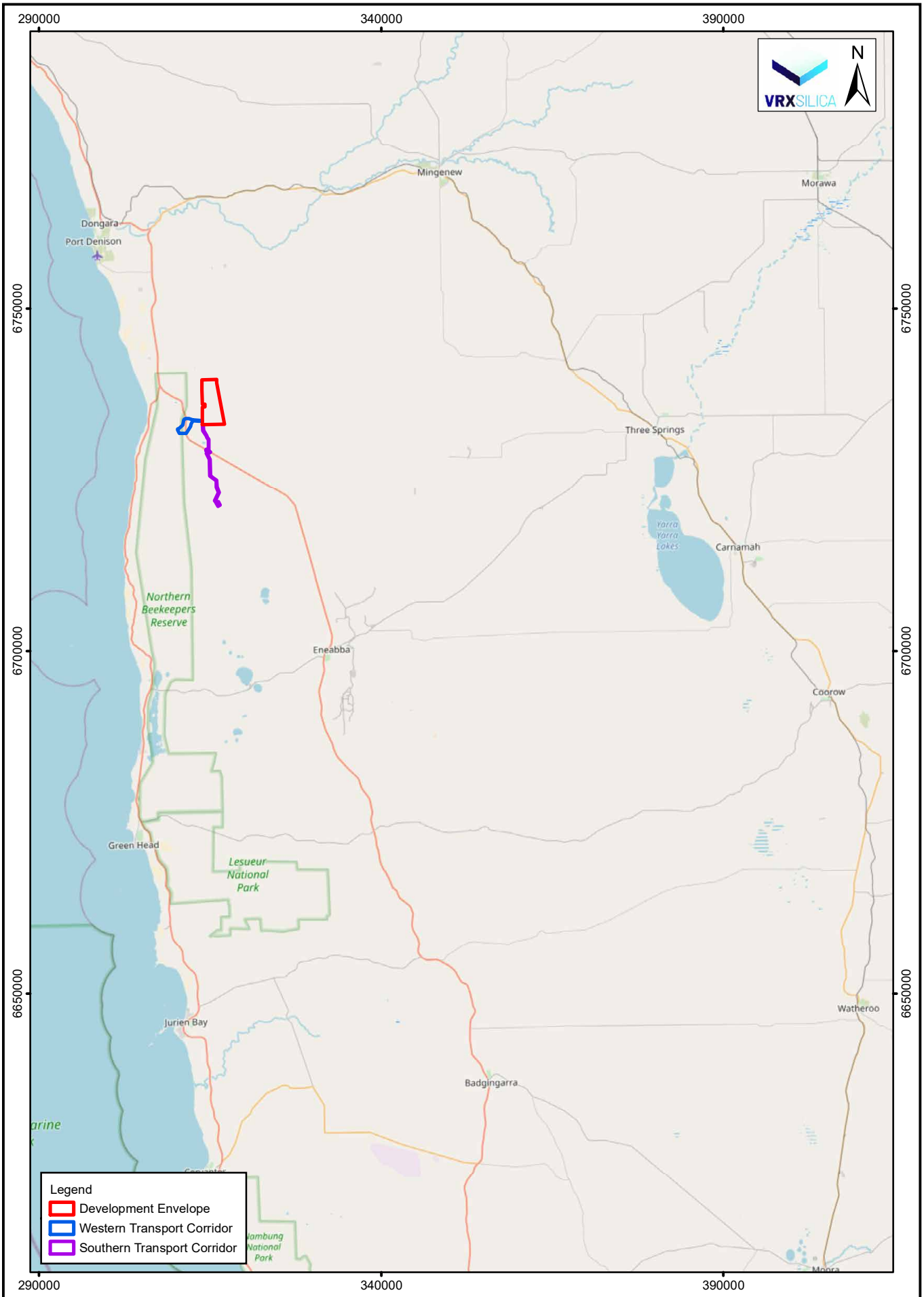
The following key Western Australian (state) legislation relevant to this survey include the:

- *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.



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Arrowsmith North Project
Locality
Transport Corridors

Figure: 1

2. OBJECTIVES

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

- Undertake a desktop study of the flora and vegetation of the Arrowsmith North transport corridor 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 transport corridor survey area;
- Undertake a detailed survey of the Arrowsmith North transport corridor 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 transport corridor survey area;
- Define and map the location of any threatened and priority flora located within the Arrowsmith North transport corridor 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 (Western Australian Herbarium [WAH] 1998-), NatureMap (Department of Biodiversity, Conservation and Attractions [DBCA] 2007-) and Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) Protected Matters Search Tool (Department of Agriculture, Water and the Environment [DAWE] 2020a) databases to identify the possible occurrence of threatened and priority flora, threatened fauna and threatened and priority ecological communities within the Arrowsmith North transport corridor survey area. Search parameters used in the NatureMap search were 'by line' and encompassed the proposed access corridor polygons using a 5 km buffer. The coordinates for the access corridors were:

	Western Alignment			Southern Alignment	
	Latitude	Longitude		Latitude	Longitude
1	-29.513572	115.089166	1	-29.518478	115.080495
2	-29.513652	115.080047	2	-29.526111	115.080935
3	-29.512533	115.065249	3	-29.538064	115.088846
4	-29.512637	115.064289	4	-29.552594	115.088612
5	-29.517377	115.062409	5	-29.556091	115.085763
6	-29.518407	115.060344	6	-29.564334	115.090056
7	-29.518548	115.051271	7	-29.585818	115.090411
8	-29.521272	115.050971	8	-29.592355	115.099741
9	-29.522810	115.051802	9	-29.600865	115.099708
10	-29.529055	115.050158	10	-29.608098	115.102749
11	-29.529082	115.044654	11	-29.618603	115.096604
			12	-29.625520	115.101550

The aforementioned coordinates were also used in the EPBC Act Protected Matters Search Tool using a 5 km buffer (DAWE 2020b). 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 transport corridor survey area, was reviewed.

3.2. Field Survey

A reconnaissance level field assessment of the flora and vegetation of the Arrowsmith North transport corridor survey area was undertaken by two experienced botanists from Mattiske Consulting, between the 19th to 22nd of May 2020. The survey was conducted 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 transport corridor survey area were supplied by VRX Silica Ltd. Aerial photographic maps of the proposed Arrowsmith North transport corridor survey area were prepared and supplied by CAD Resources. Survey sites for the Arrowsmith North transport corridor survey area were selected using aerial photographic maps and field observations. A total of 44 survey sites were established in the Arrowsmith North transport corridor survey area, these survey sites were selected to sample all vegetation types, with replication, within the survey area.

Survey sites consisted of 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 foot traverses within the Arrowsmith North transport corridor survey area. Botanists used handheld Garmin GPS units loaded with the survey polygons. Botanists walked in 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 May, it falls outside this period. Rainfall in the three months preceding the survey (February to April) was above average, with 65 mm recorded compared to 54.3 mm of the long term average (Figure 2).

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. =>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 A6). 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 A5).

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 1). 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 1: 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 some 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.
Access restrictions within survey area	**Not a limitation:** Vehicle access to the Arrowsmith North transport corridor survey area and foot traverses were sufficient to allow access to the entirety of the survey area.
Survey timing, rainfall, season of survey	**Potential 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 May which falls outside this period. Rainfall in the three months preceding the survey however was above average (Figure 2).
Disturbances (fire/flood/clearing)	**Not a limitation:** The Arrowsmith North transport corridor 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 data from Green Grove and long term temperature data from Carnamah (Bureau of Meteorology [BOM] 2020) are illustrated in Figure 2. Above average rainfall was received in the 3 months prior to the survey (February to April; 54.3 mm cf. 65 mm) (Figure 2).

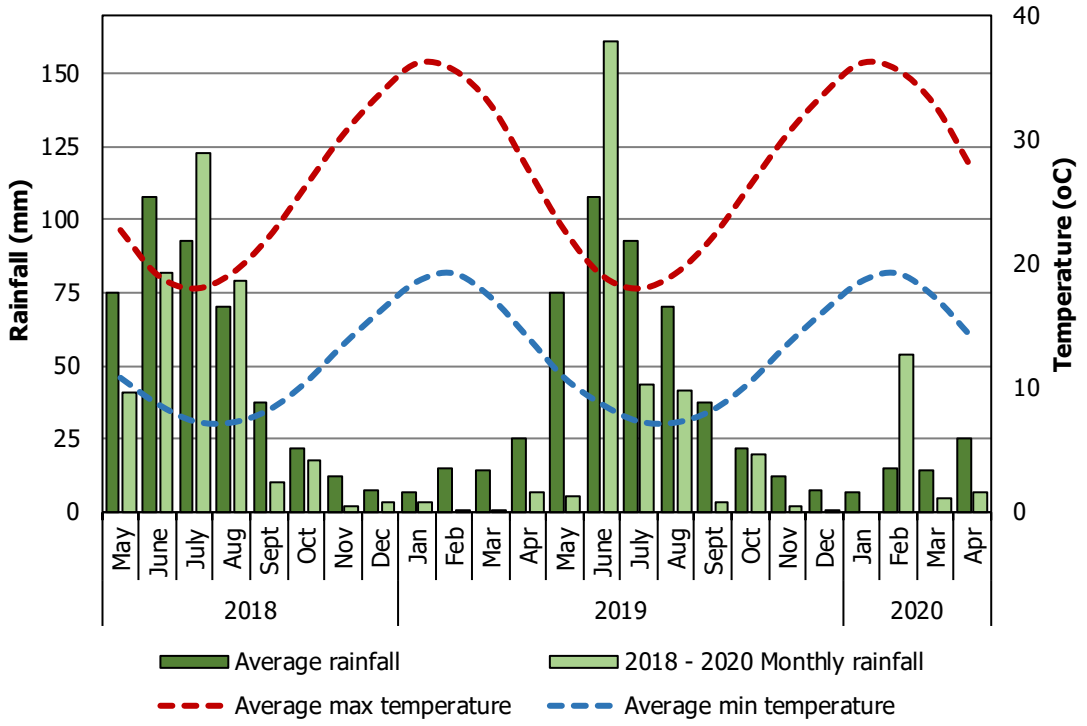


Figure 2: Rainfall and temperature data for Green Grove and Carnamah

Note: Long-term average monthly rainfall (1951-20120) and monthly rainfall data from Green Grove. Long-term average temperature data (1940-2020) from Carnamah (BOM 2020).

4.2. Managed Lands

The Yardanogo Nature Reserve (R 36203) and Beekeepers Nature Reserve (R 24496) are located in close proximity to the Arrowsmith North transport corridor survey area (Figure 3). The Yardanogo Nature Reserve (R 36203) is located 6 km away from the start of the western alignment and 6.5 km from the start of the southern alignment. The Beekeepers Nature Reserve (R 24496) is located 1.5 km away from the end of the western alignment and 50 m away from the southern alignment at its closest point (point of intersection with the Dongara-Eneabba railway).

The southern alignment overlaps with File Notation Areas FNA11507 and FNA2140 and as such are managed by DMIRS/LANDGATE and Department Biodiversity, Conservation and Attractions respectively. FNA2140 which is associated with Arrowsmith Lake is an EPA recommendation for an "A" class Nature Reserve.

The western alignment areas overlaps Freehold and Crown land areas, see Figure 3.

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 transport corridor survey area (Figure 4, Table 2) includes:

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.

221Ta4 - Low hills with relict dunes and some limestone outcrop; yellow shallow sand with limestone outcrops and yellow deep sand

221Ta7 - Level to gently undulating sandplain; Yellow deep sand

Correy System (221Cy): Broad sandy alluvial fan of the lower Arrowsmith River. Pale deep sands predominate, with grey shallow sandy duplexes, moderately deep sandy gravels and yellow deep sands less common. *Banksia* woodlands and heathlands.

221Cy1 - Alluvial plain; Pale deep sands dominate with yellow deep sands and shallow and deep sandy duplexes

221Cy3 - Rarely inundated flats and depressions; Cracking and non-cracking clays and pale sandy earths

Table 2: Extent of Land Systems intersecting Arrowsmith North transport corridor 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	154103.48	397.96	0.26
Correy System	221Cy	27768.43	50.28	0.18

The Arrowsmith North transport corridor survey area consists of the Tamala South and Correy Land Systems (Figure 4). The proportion of the current statewide extent is 0.26 and 0.18 % respectively (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 transport corridor survey area (Figure 5, Table 3) 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.

   Vegetation Association 378.1: Mixed heath with scattered tall shrubs *Acacia* spp., Proteaceae and Myrtaceae.

2. **Illyarrie System:** The majority of the area consists of sandplains with scrub heath and the occasional thickets, scattered trees or woodland.

   Vegetation Association 377.1: Mixed heath with scattered tall shrubs Acacia spp., Proteaceae and Myrtaceae.
   Vegetation Association 352: Riverine; rivergum *E. camaldulensis* and Eucalypt woodlands.
   Vegetation Association 433.1: Low Woodland/ Scrub.

Table 3: Extent of pre-European vegetation associations intersecting the Arrowsmith North transport corridor survey area

VEGETATION ASSOCIATION	STATE-WIDE PRE-EUROPEAN EXTENT (ha)	SURVEY AREA	
		AREA OF INTERSECTION (ha)	PROPORTION OF CURRENT EXTENT (%)
Vegetation Association 378.1	124192.68	65.32	0.05
Vegetation Association 377.1	84046.50	40.41	0.05
Vegetation Association 352	1123.06	26.05	2.32
Vegetation Association 433.1	41651.05	316.05	0.76

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 280 vascular plant taxa, representative of 139 genera and 65 families, have the potential to occur within the Arrowsmith North transport corridor survey area (based on NatureMap (DBCA 2007-) and EPBC Act (DAWE 2020b) search results, included in Appendix B). The most commonly represented families were Myrtaceae (48 taxa), Proteaceae (31 taxa) and Fabaceae (19 taxa). The most commonly represented genera were *Stylidium* (14 taxa), *Acacia* (13 taxa), *Eucalyptus* (10 taxa) and *Verticordia* (9 taxa).

Separated per alignment; a total of 77 vascular plant taxa have the potential to occur in the western alignment, representative of 57 genera and 37 families. Within the southern alignment a total of 278 vascular plant taxa have the potential to occur, representative of 137 genera and 63 families (Appendix B).

4.6. Potential Threatened and Priority Flora

Seven threatened flora species, pursuant to Part 2, Division 1, Subdivision 2 of the *Biodiversity Conservation Act 2016* (BC Act) and as listed by the DBCA (2018a) have the potential to occur in the Arrowsmith North transport corridor survey area (Figure 5). Four have the potential to occur in the western alignment, while seven have the potential to occur in the southern alignment. All of these species are pursuant to section 179 of the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) or are listed by the DAWE (2020c) (Appendix B).

A total of 20 priority flora species, including four priority one, three priority two, eight priority three and five priority four species as listed by the Western Australian Herbarium [WAH] (1998-) have the potential

to occur in the Arrowsmith North transport corridor survey area. Two of these have the potential to occur in the western alignment and 20 in the southern alignment.

An assessment of the likelihood of recording any of the listed threatened and priority taxa within the Arrowsmith North transport corridor survey area, based on factors including soil type, topography and distribution, is presented in Appendix C. Based on this assessment, within the western access corridor alignment, one priority flora species *Stawellia dimorphantha* (P4) had a high likelihood of occurrence. A further four species had a moderate likelihood and one had a low likelihood. Within the southern access corridor alignment, four species had a high likelihood of occurrence (*Hemiandra* sp. Eneabba (H. Demarz 3687) (P3), *Banksia elegans* (P4), *Schoenus griffinianus* (P4) and *Stawellia dimorphantha* (P4)). A further 13 species had a moderate likelihood of occurring and 10 had a low likelihood of occurring within the proposed southern access corridor alignment.

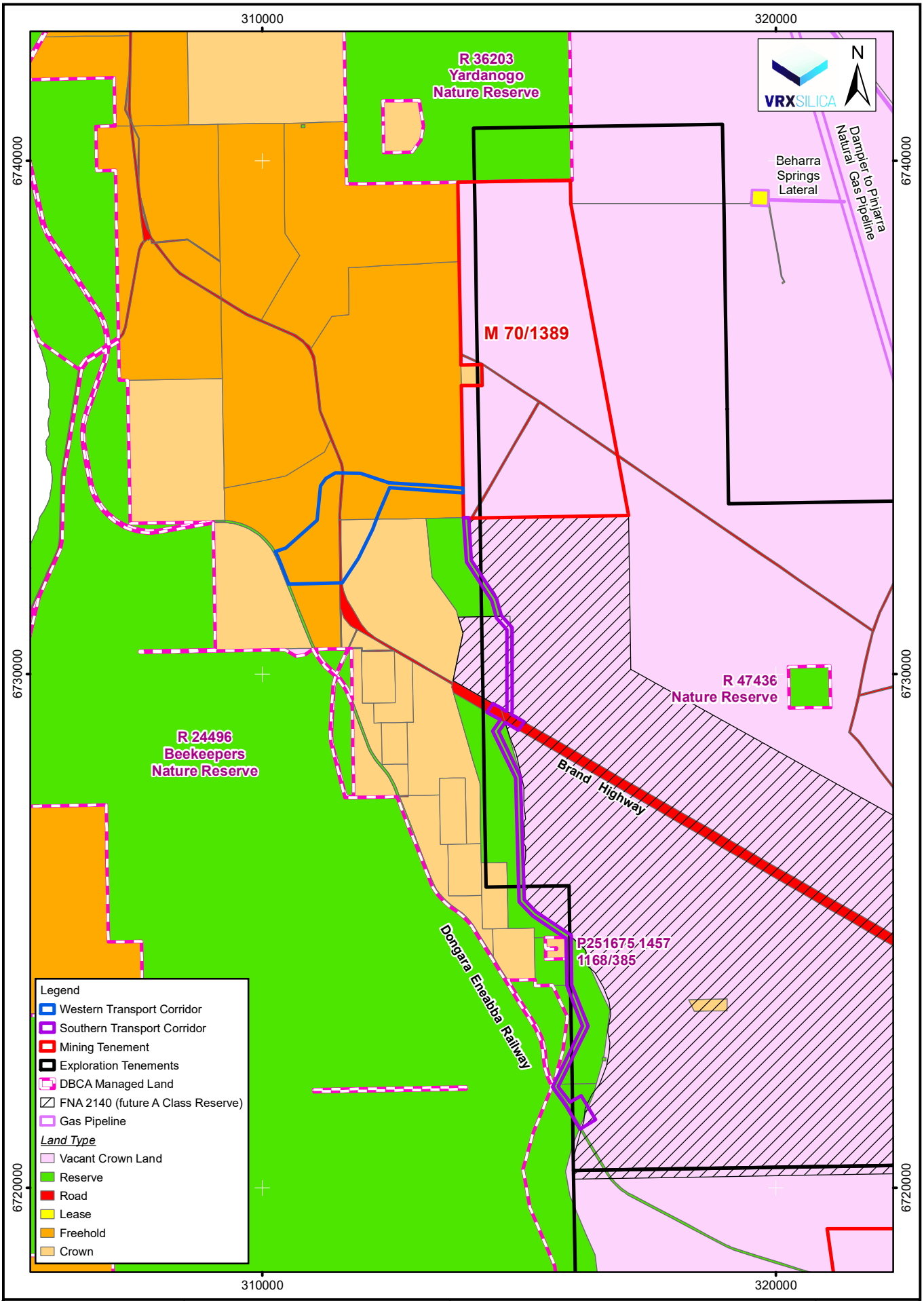
4.7. Potential Introduced (Weed) Species and Declared Pest (Plant) Organisms

Nine introduced flora species have the potential to occur in the Arrowsmith North transport corridor survey area (Appendix B). Two of these species, **Asparagus asparagoides* and **Tamarix aphylla*, are declared pest organisms pursuant to section 22 of the Biosecurity and Agriculture Management Act 2007 (BAM Act). **Asparagus asparagoides* and **Tamarix aphylla* both have a declared pest organism keeping category of Exempt for the whole of Western Australia (Department of Primary Industries and Regional Development [DPIRD] 2020). A declared pest category of Exempt requires no permits or conditions for keeping, although there may be other requirements under the BAM Act.

Separated per alignment; the western alignment has the potential to contain five introduced flora species including **Tamarix aphylla*. Within the southern alignment all nine introduced flora species have the potential to occur.

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 (2020) that potentially occur within the Arrowsmith North transport corridor survey area (Figure 6).



Source: Aerial Photography: Landgate (Nov 2016), Tenements: DMIRS, Gas Pipelines: DMIRS, Topography: Landgate (Nov 2016), Cadasta: Landgate, Managed Lands: DBCA

0 2.2 km
Scale: 1:100,000
MGA94 (Zone 50)

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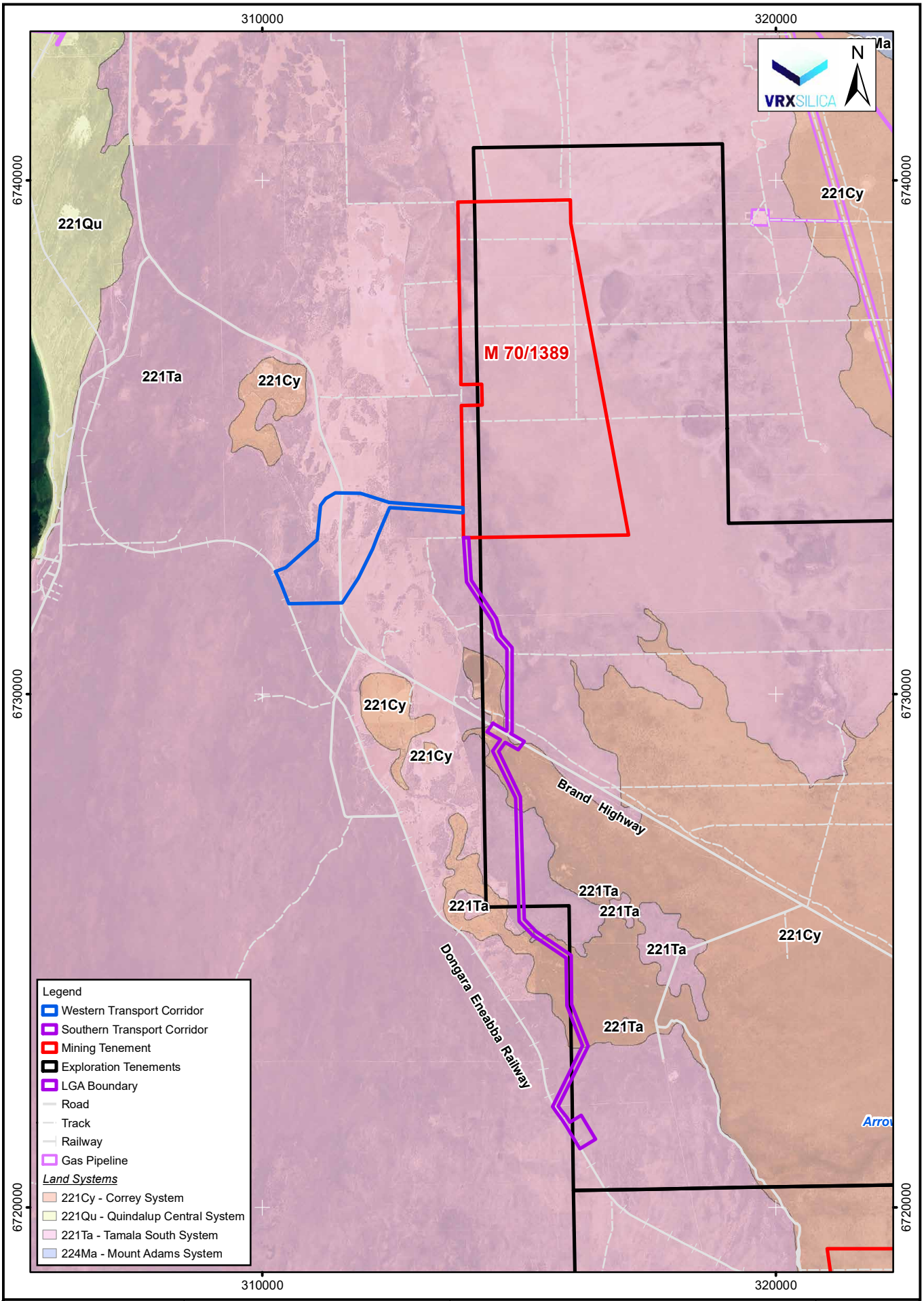
Arrowsmith North Project
Managed Lands

Figure: **3**



Source: Aerial Photography: Landgate (Nov 2016), Tenements: DMIRS, Gas Pipelines: DMIRS, Topography: Landgate (Nov 2016), Land systems: DPIRD

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

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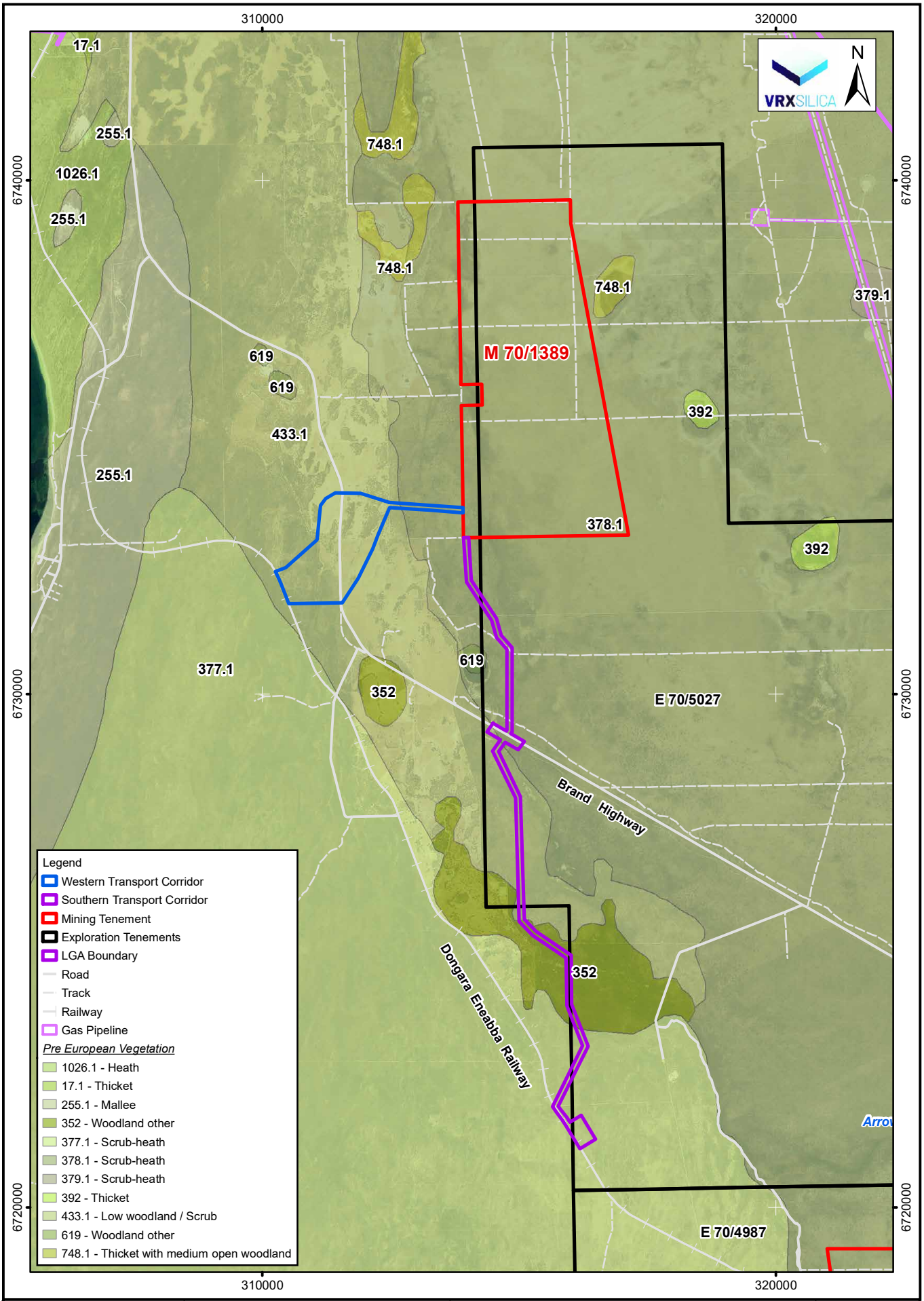
Arrowsmith North Project
Land Systems

Figure: **4**



Source: Aerial Photography: Landgate (Nov 2016), Tenements: DMIRS, Gas Pipelines: DMIRS, Topography: Landgate (Nov 2016), Pre European Veg: DPIRD

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MGA94 (Zone 50)

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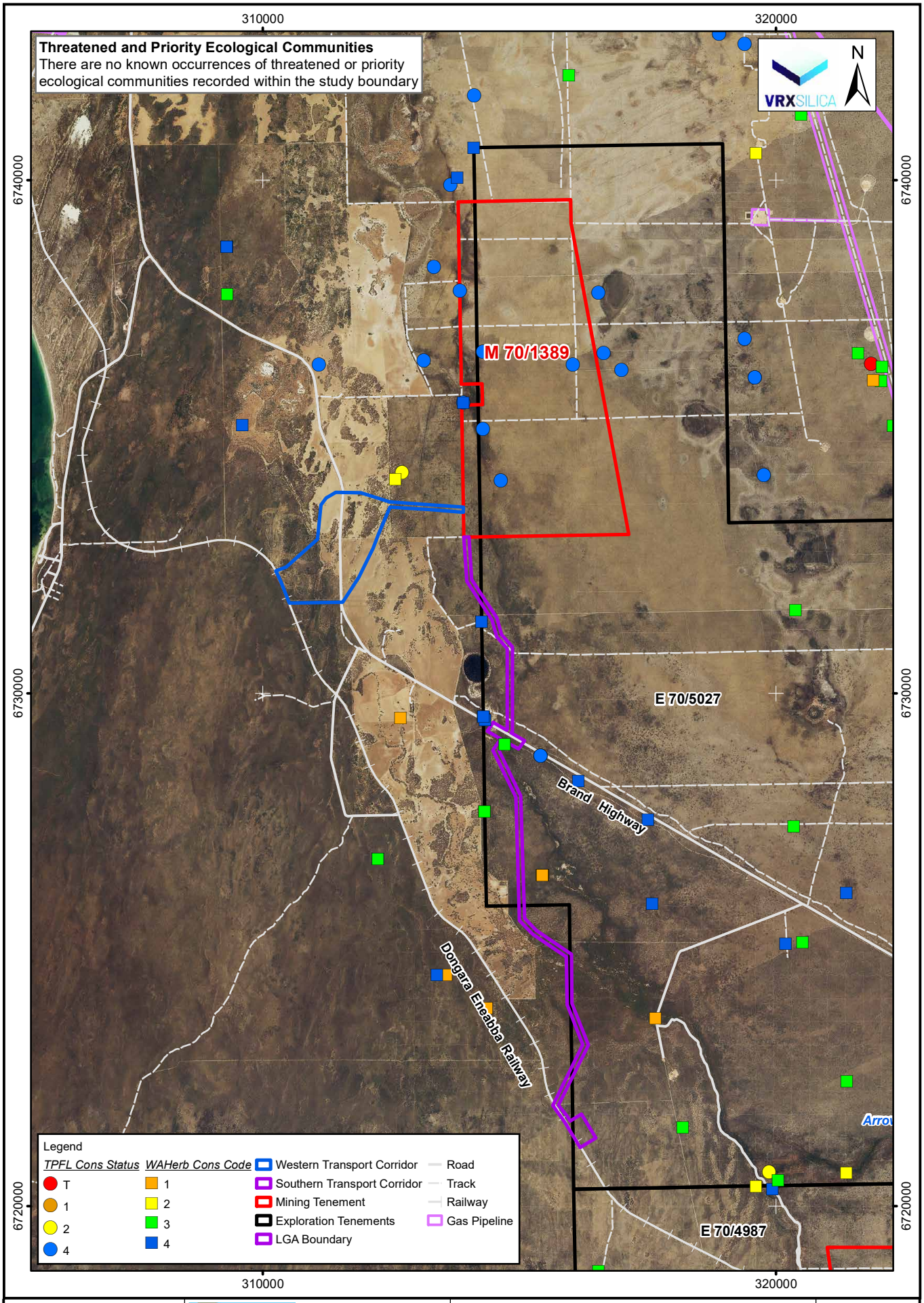
Arrowsmith North Project
Pre European Vegetation

Figure: **5**



Source: Aerial Photography: Landgate (Nov 2016), Tenements: DMIRS, Gas Pipelines: DMIRS, Topography: Landgate (Nov 2016), Soils: DPIRD

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

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Arrowsmith North Project
Threatened & Priority Species
Desktop Results

Figure: **6**

4 FIELD SURVEY RESULTS

A total of 44 survey quadrats were used to assess the flora and vegetation of the Arrowsmith North transport corridor 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 transport survey area is set out in Appendix F.

5.1 Flora

A total of 126 vascular plant taxa, representative of 74 genera and 32 families, were recorded within survey quadrats within the Arrowsmith North transport corridor survey area. The majority of taxa recorded were representative of the Proteaceae (23 taxa), Myrtaceae (22 taxa) and Fabaceae (19 taxa) families (see Appendix E for a complete species list). Eleven annual plant species were recorded during the survey of the Arrowsmith North transport corridor survey area, representing 8.7 % of all taxa recorded, four 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 *Scholtzia* 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 7. The incidence based coverage estimator (ICE) of species richness was 156.05. Based on this value and the total of 126 species recorded (in vegetation mapping sites *only*), approximately 82 % of the flora species potentially present within the Arrowsmith North transport corridor survey area were recorded.

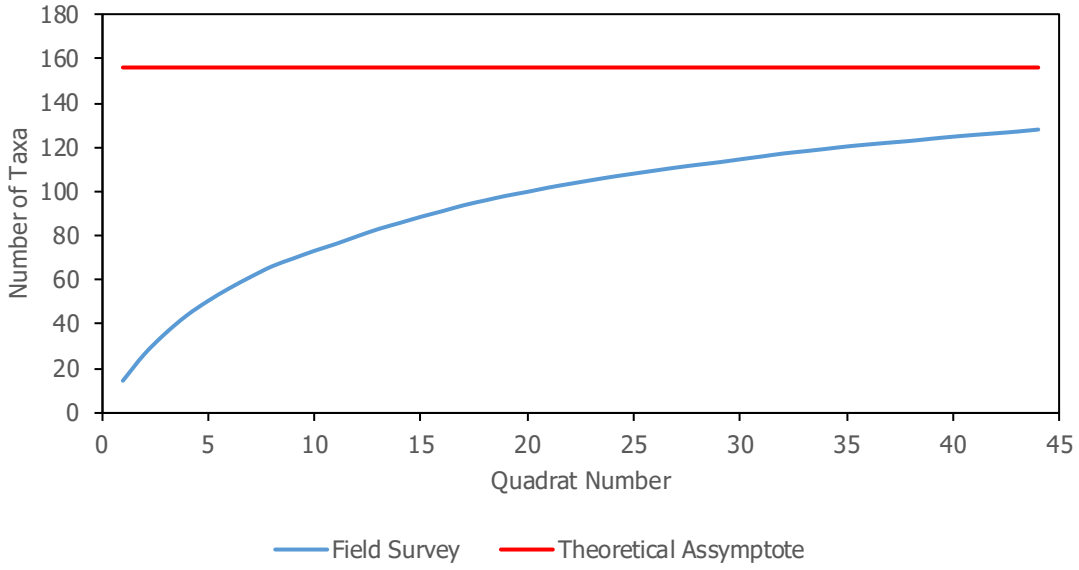


Figure 7: Average randomised species accumulation curve

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 (2020c), were recorded within the Arrowsmith North transport corridor survey area.

Three priority flora species, *Hopkinsia anoectocolea* (P3), *Banksia elegans* (P4) and *Stawellia dimorphantha* (P4), as listed by the WAH (1998-), were recorded within the Arrowsmith North transport corridor survey area (Table 4). *Banksia elegans* (P4) was recorded from 34 locations totalling 333 individuals, a single plant of *Hopkinsia anoectocolea* (P3) and *Stawellia dimorphantha* (P4) was recorded. The geographic locations of priority flora species are presented in Figure 8 and Appendix G.

A brief description of priority species recorded is provided below:

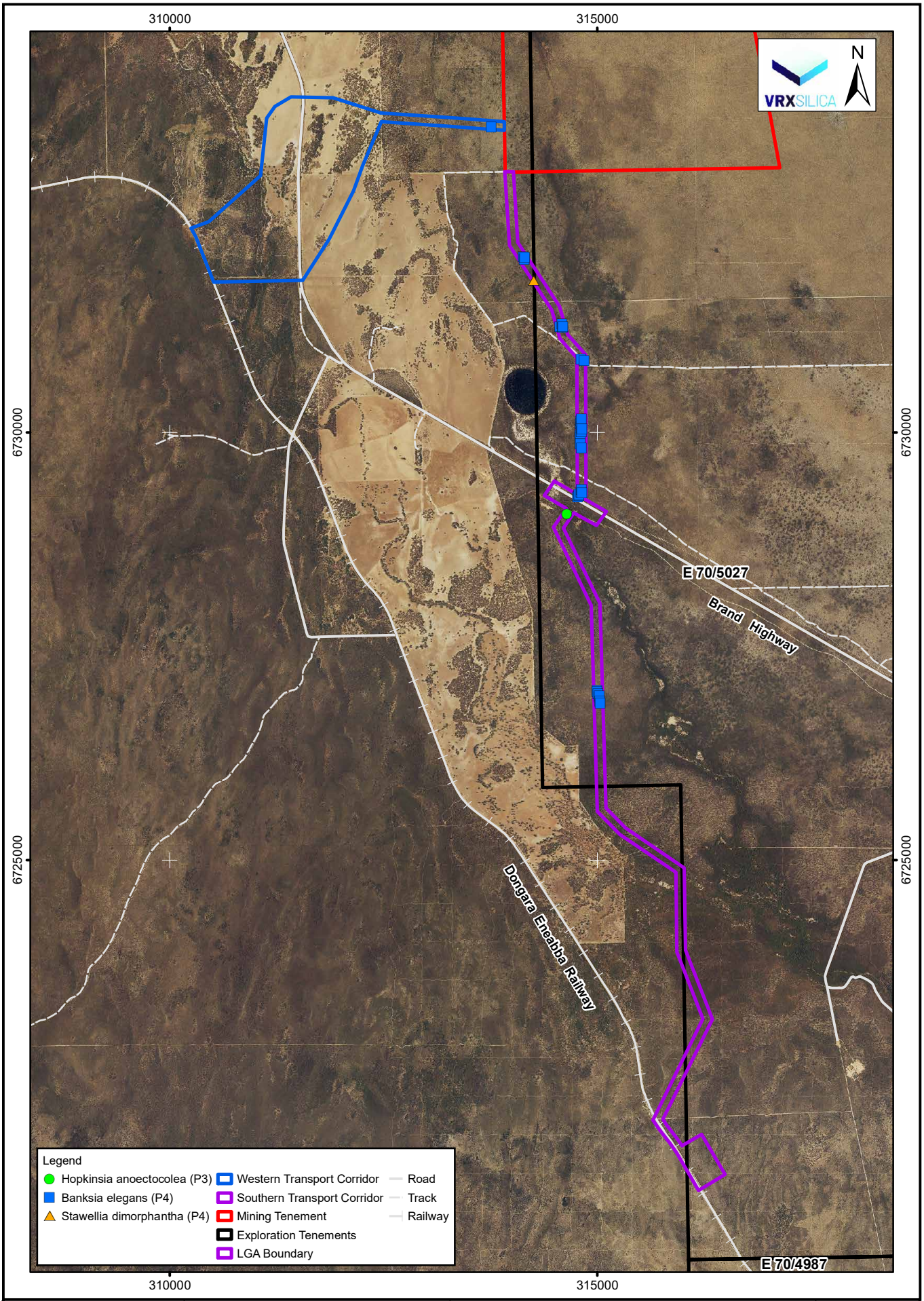
- **PRIORITY 3:**

  Hopkinsia anoectocolea **– ANARTHIACEAE** – Rhizomatous, tufted perennial herb 0.5 to 1 m tall. Brown flowers from September to December. Occurs in white or grey sand, winter wet depressions, floodplains and salt lakes. WAH houses 47 records from the Shire of Carnamah, Shire of Cunderdin, Shire of Dandaragan, Shire of Irwin, Shire of Tammin and Shire of York (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 44 records from the Shire of Carnamah, Shire of Dandaragan, City of Greater Geraldton, Shire of Irwin and the Shire of Three Springs (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), Tenements: DMIRS, Gas Pipelines: DMIRS, Topography: Landgate (Nov 2016), Soils: DPIRD

0 1.2 km

Scale: 1:60,000
MGA94 (Zone 50)

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Arrowsmith North Project
Threatened & Priority Species
Field Results

Figure: **8**

Table 4: Priority flora species recorded within the Arrowsmith North transport survey area

Conservation Code	Species	Easting	Northing	Number of Plants
P3	*Hopkinsia anoectocolea*	314642	6729044	1
P4	*Banksia elegans*	313758	6733564	5
		314134	6732051	2
		314145	6732017	1
		314150	6732035	1
		314559	6731228	3
		314589	6731262	2
		314591	6731224	6
		314599	6731235	4
		314771	6729238	10
		314784	6729254	6
		314787	6729269	5
		314796	6729967	5
		314800	6729935	20
		314800	6730099	21
		314802	6729862	4
		314802	6729863	10
		314806	6730126	20
		314810	6730852	9
		314811	6729303	17
		314811	6730061	20
		314814	6730153	22
		314815	6730001	38
		314816	6729813	8
		314817	6729327	9
		314820	6729292	8
		314821	6730033	43
		314846	6730832	6
		314997	6726983	3
		314999	6726963	4
		315008	6726943	3
		315021	6726905	2
		315025	6726920	4
		315030	6726859	8
		315035	6726834	4
	Stawellia dimorphantha	314256	6731773	1

5.3 Flora Range Extensions

There were no species recorded within the Arrowsmith North transport corridor survey area which represented extensions to their current known distributions (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 four introduced (weed) species were recorded within the Arrowsmith North transport corridor survey area (Table 5). None of these species, **Aira caryophyllea*, *Brassicaceae sp., **Briza maxima* and **Ursinia anthemoides* are declared pest organisms pursuant to section 22 of the BAM Act.

None are listed as Weeds of National Significance (DAWE 2020e). All species recorded, with the exception of *Brassicaceae sp., are listed in the Midwest region impact and invasiveness ratings (DPaW 2013). Two are listed as having high ecological impact and one is listed as having unknown ecological impact (DPaW 2013). These three weed species were described as having rapid invasiveness (DPaW 2013).

Table 5: Location of Introduced (Weed) Species within Arrowsmith North transport corridor survey area

Species	DPAW[1]		WAOL[2]	WONS[3]	GDA94_Z50	
	Ecological Impact	Invasiveness			Easting	Northing
**Aira caryophyllea*	H	R	Permitted - s11	No	311374 311068 310625	6732845 6732156 6732155
*Brassicaceae sp.	N/A	N/A	N/A	No	315495 316144	6725190 6723488
** Briza maxima*	U	R	Permitted - s11	No	315495 311374 311272	6725190 6732845 6732009
**Ursinia anthemoides*	H	R	Permitted - s11	No	315946 316144	6724800 6723488

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 2020); 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 2020e)

5.5 Vegetation

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

5.5.1 Statistical Analysis

SIMPROF analysis of the 44 survey quadrats identified ten significantly associated groups of quadrats. Ten significantly dissimilar vegetation communities were delineated within the Arrowsmith North transport corridor survey area. The dendrogram representing the results of the cluster analysis, and the corresponding ten vegetation communities is illustrated in Figure 9.

5.5.2 Vegetation Communities

Based on statistical analysis (Section 5.2.1.), ten vegetation communities were defined and mapped across the Arrowsmith North transport corridor 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 transport corridor survey area. The vegetation mapped is presented in Figure 10. 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 6.

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.

H7: Open Heath to Closed Heath of *Banksia leptophylla* var. *melletica*, *Melaleuca leuropoma* and *Hakea trifurcata* over *Ecdeiocolea monostachya*, *Lepidobolus preissianus* and *Stenanthemum notiale* subsp. *notiale* on cream sand on lower slopes.

S6: Open shrubland of *Acacia blakelyi* and *Allocasuarina campestris*, over *Ecdeiocolea monostachya*, *Jacksonia hakeoides* and *Lepidobolus preissianus* on cream/grey sand on flats to lower slopes.

T3: Thicket of *Allocasuarina campestris, Acacia spathulifolia, Melaleuca ?systena, Callitris arenaria* over *Ecdeiocolea monostachya, Lechenaultia linarioides* and *Acanthocarpus preissii* on cream sand on flats.

T4: Thicket to Scrub of *Acacia blakelyi* and *Acacia rostellifera* over *Lepidosperma* aff. *apricola*, *Scholtzia laxiflora, Hakea lissocarpha* and *Verticordia densiflora* on grey sand on flats.

T5: Thicket of *Acacia blakelyi* and *Acacia saligna* and *Macrozamia fraseri* over *Waitzia acuminata* and Poaceae sp. on sandy loam/clay on low lying flats.

T6: Thicket of *Acacia blakelyi*, *Macrozamia fraseri* with occasional *Grevillea leucopteris* over *Conostylis candicans*, *Waitzia acuminata* and *Aira caryophyllea* on cream/grey sand on flats.

W3: Open mallee woodland of *Eucalyptus drummondii,* over shrubland of *Acacia saligna,* over isolated *Solanum* ?*lasiophyllum* and Poaceae sp. on grey clay loam on flats.

W4: Woodland to isolated trees of *Eucalyptus erythrocorys*, over sparse to closed shrubland of *Acacia spathulifolia* and *Acacia rostellifera*, over *Melaleuca leuropoma*, *Conostylis* ?*candicans* subsp. *procumbens*, and *Ecdeiocolea monostachya* on cream sand with limestone outcropping on slopes.

W5: Isolated trees of *Eucalyptus erythrocorys,* over open shrubland of *Melaleuca ?systena*, *Banksia sessilis* and *Labichea cassioides*, over *Hibbertia hypericoides* subsp. *hypericoides* and *Desmocladus asper* on grey/brown sand with limestone outcropping on flats and slopes.

Table 6: Area of Vegetation Communities within Arrowsmith North transport corridor survey area

Vegetation Community	Southern Alignment (ha)	Southern Alignment (%)	Western Alignment (ha)	Western Alignment (%)	Number of survey quadrats
H1	28.146	17.894	8.423	2.895	10
H7	24.086	15.312	-	-	4
S6	42.634	27.104	1.755	0.603	7
T3	-	-	1.067	0.367	1
T4	9.880	6.281	-	-	1
T5	14.140	8.990	12.597	4.330	3
T6	7.205	4.580	48.175	16.558	5
W3	13.280	8.443	-	-	2
W4	16.031	10.191	82.195	28.252	7
W5	-	-	32.033	11.010	4
CL	1.896	1.205	104.696	35.985	-
Total	**157.297**	**100**	**290.941**	**100**	**44**

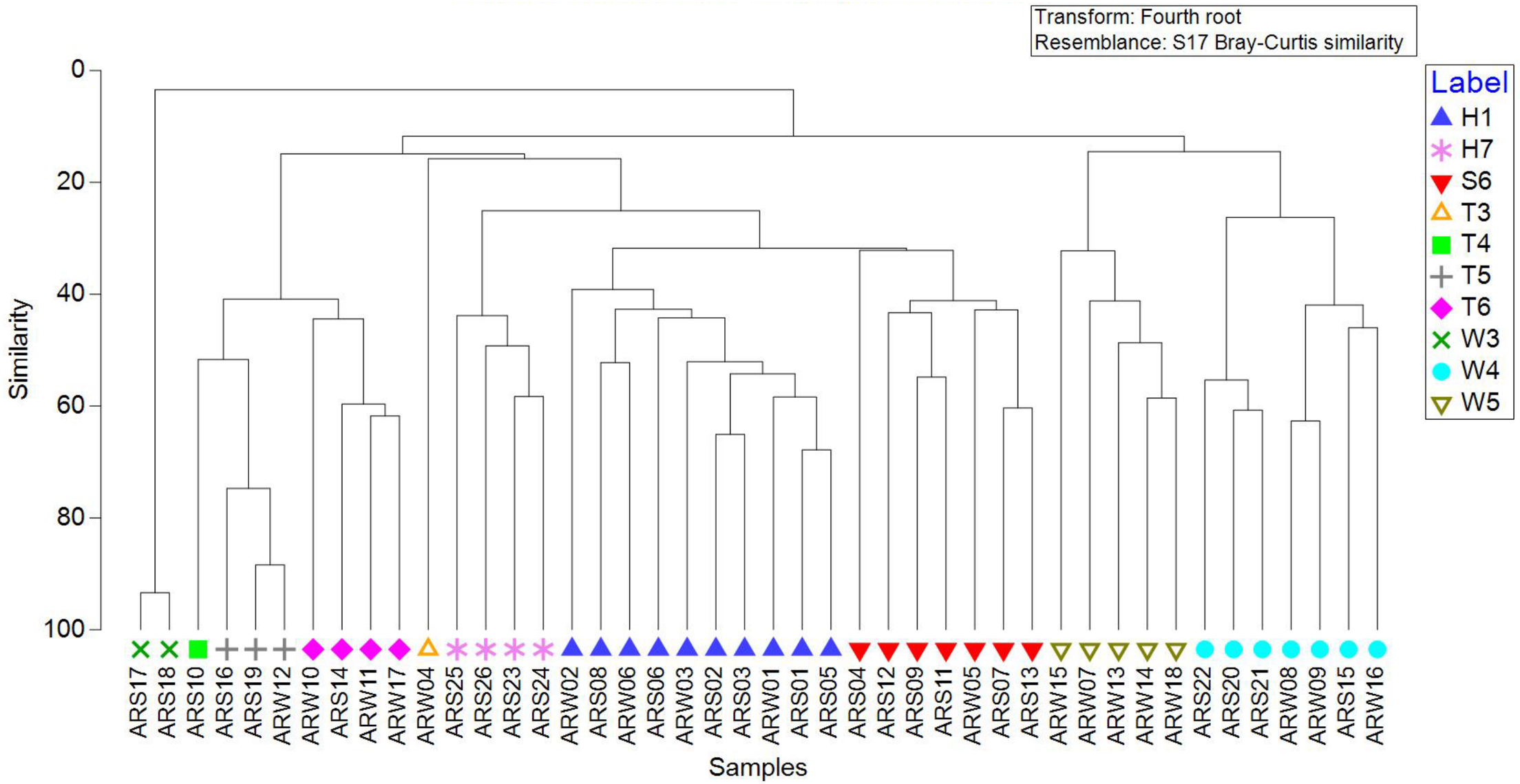
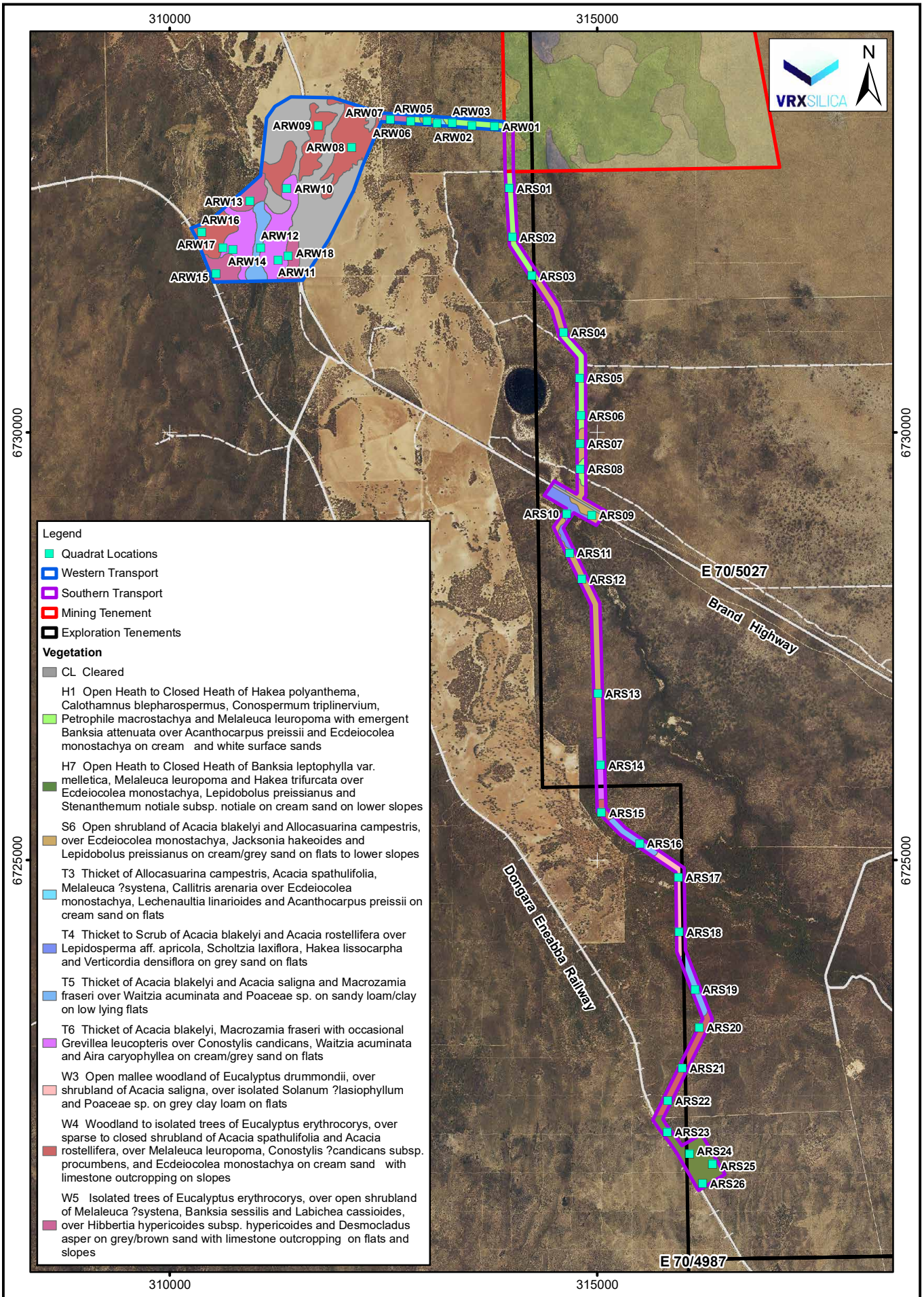


Figure 9: **Dendrogram of survey quadrats established within Arrowsmith North transport corridor survey area**



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0 1.2 km

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Arrowsmith North Project
Vegetation & Quadrat Locations

Figure: **10**

5.5.3 Threatened and Priority Ecological Communities

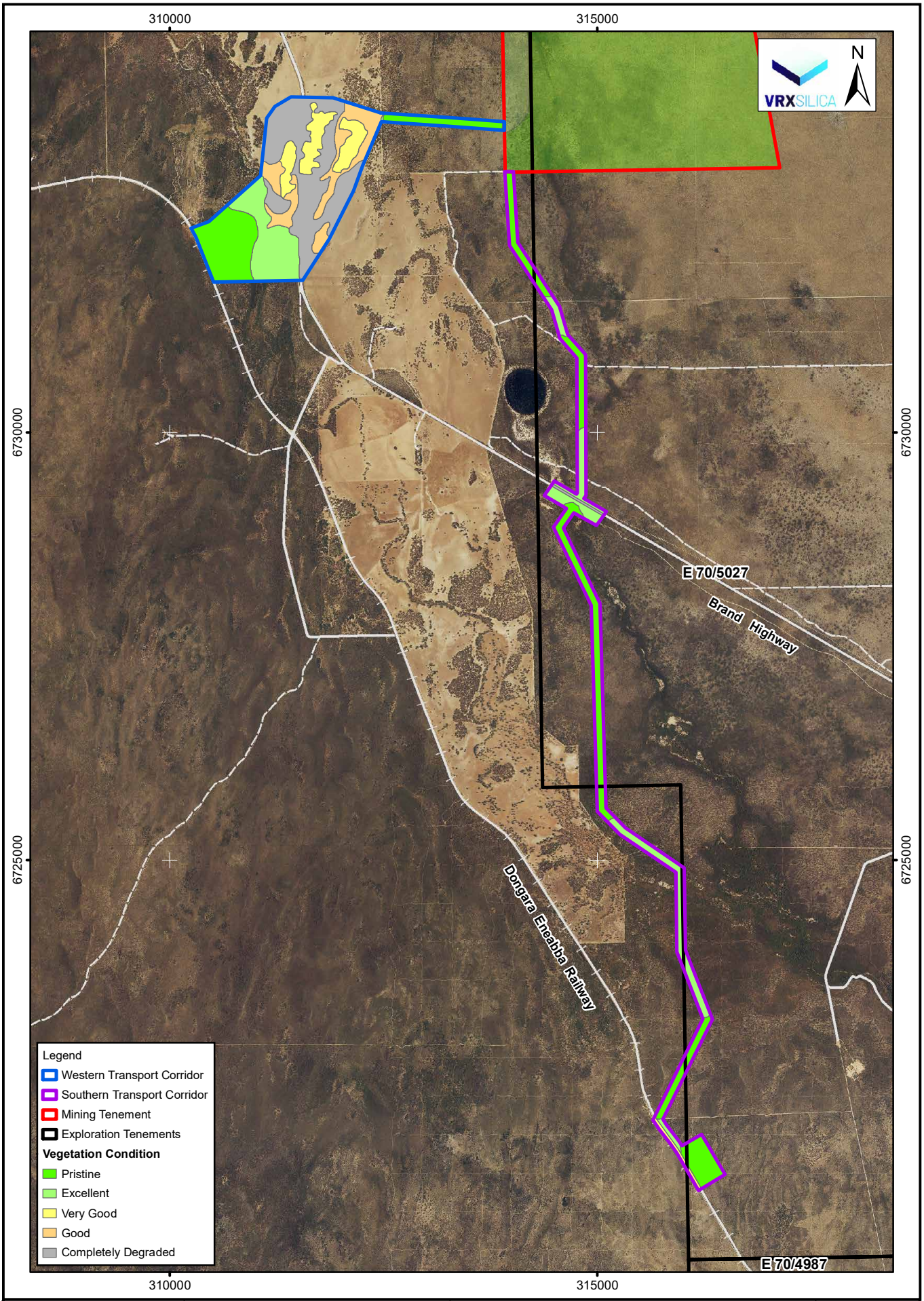
No TECs, pursuant to Part 2, Division 2, and Subdivision 1 of the BC Act and as listed by the DBCA (2018b) or DAWE (2020d) were recorded within the Arrowsmith North transport corridor survey area. No PECs as listed by the DBCA (2020) were recorded within the Arrowsmith North transport corridor survey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

5.5.4 Vegetation Condition

The condition of the vegetation within the Arrowsmith North transport corridor survey area ranged from Pristine to Completely Degraded (Table 7). The majority of the southern alignment area was considered Pristine to Excellent according to the Keighery (1994; Appendix A5) scale. Areas on the western alignment of the Arrowsmith North transport corridor survey area, varied in vegetation condition and contained large areas of Completely Degraded agricultural land. Figure 11 shows the vegetation condition of the Arrowsmith North transport corridor survey area.

Table 7: Condition rating of areas within Arrowsmith North transport corridor survey area

Condition	Southern Alignment (ha)	Southern Alignment (%)	Western Alignment (ha)	Western Alignment (%)
Pristine	97.880	62.226	61.622	21.180
Excellent	53.411	33.956	47.860	16.450
Very Good	4.111	2.613	36.324	12.485
Good	-	-	44.442	15.275
Degraded	-	-	-	-
Completely Degraded	1.896	1.205	100.693	34.609
Total	**157.297**	**100**	**290.941**	**100**



Source: Aerial Photography: Landgate (Nov 2016), Tenements: DMIRS, Gas Pipelines: DMIRS, Topography: Landgate (Nov 2016), Soils: DPIRD

0 1.2 km

Scale: 1:60,000
MGA94 (Zone 50)

CAD Ref: a2602_f28_08

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Arrowsmith North Project
Vegetation Condition

Figure: **11**

6 DISCUSSION

6.1 General

Mattiske Consulting was commissioned in May 2020 by VRX Silica Ltd to undertake a reconnaissance level flora and vegetation survey of the Arrowsmith North transport corridor survey area. This survey occurred during May 2020. The Arrowsmith North transport corridor survey area occupies an area of approximately 448 ha, and is located between the towns of Eneabba and Dongara, Western Australia. A total of 44 vegetation survey quadrats were established to sample all the apparent vegetation community types which were located within the survey area.

While some of the plants were in flower during the survey, a proportion of plants encountered during the survey were sterile and may impact the identification of some specimens. However, botanists that undertook the survey are experienced in the flora of the Geraldton Sandplains and identification of taxa are possible even with sterile plants. Rainfall in the three months preceding the May 2020 survey was above 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 %) 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 1). Consequently, it is reasonable to conclude that the Arrowsmith North survey areas have been adequately surveyed.

6.2 Flora

A total of 126 vascular plant taxa, representative of 74 genera and 32 families, were recorded within the Arrowsmith North transport corridor survey area. The majority of taxa recorded were representative of the Proteaceae (23 taxa), Myrtaceae (22 taxa) and Fabaceae (18 taxa) families (Appendix E). The majority of the taxa recorded were widespread both locally and more broadly within the associated biogeographical subregion. The 126 taxa recorded during the survey compares to 280 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 7 threatened flora species and 20 priority taxa identified during the desktop survey, three priority flora taxa were recorded in the Arrowsmith North transport corridor 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 transport corridor survey area. The May timing of the survey was also prohibitive in potentially capturing many of the priority taxa that flower at other times of the year. Peak flowering of threatened and priority taxa identified during the desktop survey is mostly characterised as occurring during the spring months.

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 Arrowsmith North transport corridor survey area. Three priority taxa, as listed by the WAH (1998-) were recorded in the Arrowsmith North transport corridor survey area. These were *Hopkinsia anoectocolea* (P3), *Banksia elegans* (P4) and *Stawellia dimorphantha* (P4).

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

Hopkinsia anoectocolea (P3) was recorded from one location in the northern part of the southern alignment of the Arrowsmith North transport corridor survey area (Figure 8). The 48 records held at the WAH indicate *Hopkinsia anoectocolea* (P3) ranges from York to Carnamah. *Hopkinsia anoectocolea* (P3) occurs on white or grey sand in seasonally wet depressions, floodplains and salt lakes. This species has only been recorded within the T4 community and is most likely restricted to winter wet depressions.

Banksia elegans (P4) was recorded throughout the Arrowsmith North transport corridor survey area (Figure 8) from 34 locations totalling 333 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.

Stawellia dimorphantha (P4) was recorded from one location in the northern part of the southern alignment of the Arrowsmith North transport corridor survey area (Figure 8). 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 recorded within the H1 community.

Taxa representing range extensions

There were no species recorded within the Arrowsmith North transport corridor survey area which represented extensions to their current known distributions (WAH 1998-).

Introduced Taxa

Four introduced species were recorded within the Arrowsmith North transport corridor survey area: **Aira caryophyllea*, Brassicaceae sp., **Briza maxima* and **Ursinia*. None of these species are declared pest organisms pursuant to section 22 of the BAM Act (all are permitted under section 11 of the BAM Act) and none are Weeds of National Significance (DAWE 2020e). All recorded introduced species are well known in the area and are within known distributions. Given the very low level of introduced taxa present, VRX silica should take appropriate weed hygiene measures to maintain this situation.

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 North transport corridor survey area. No PECs as listed by the DBCA (2019b) were recorded within the Arrowsmith North transport corridor survey area.

The vegetation of the Arrowsmith North transport survey area ranged from Pristine to Completely Degraded. The majority of the southern alignment of the Arrowsmith North transport corridor survey area was considered to be in pristine to Excellent condition due to the absence of disturbance, tracks and weeds. The western alignment was far more varied, with large areas of Completely Degraded agricultural land.

Vegetation mapping based upon the quadrat-based species data resulted in ten vegetation communities comprising two Heathland, one Scrub, four Thicket and three Woodland communities (Appendix H). The most dominant vegetation type was the W4 vegetation community which was present throughout the western portion of the Arrowsmith North transport corridor survey area. This community accounted for 21.91 % of the total area surveyed. The second most commonly represented vegetation was the T6 vegetation community which was present in the western and central southern portion of the survey area and accounting for 12.36 % of the total area surveyed. The remaining eight communities account for 41.95 % of the survey area. The most restricted vegetation community defined was the T3 community, accounting for 0.24 % of the survey area. Overall, the vegetation communities mapped and species

recorded in the Arrowsmith North transport corridor 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 transport corridor survey area were consistent with the historical mapping of Beard (1976, 1990).

The majority of the survey area consists of thickets of *Acacia* spp., including *Acacia blakelyi*, *Acacia rostellifera* and *Acacia saligna*. While *Eucalyptus erythrocorys* woodland on limestone outcropping and slopes was also prevalent. Heath communities supporting mixed open to closed heath of *Banksia attenuata, Banksia hookeriana*, *Melaleuca leuropoma* and *Conospermum triplinervium*, over mixed Myrtaceae and Restionaceae species was found in modest proportions, unlike the Arrowsmith North main project areas in which it is the dominant community. The vegetation communities recorded within the survey area are not locally or regionally unique and are well represented in the wider area.

Three priority flora species have been recorded in the Arrowsmith North transport corridor survey area. It is recognised the peak flowering for many threatened and priority flora species potentially in the area is in Spring. Therefore, it is recommended that more detailed and targeted searches for threatened and priority species are undertaken in the Spring months. This will give a more accurate idea of population numbers and extent to be impacted.

8 ACKNOWLEDGEMENTS

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9 PERSONNEL

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

NAME	POSITION	INVOLVEMENT	FLORA COLLECTION PERMITS
Dr EM Mattiske	Managing Director & Principal Ecologist	Planning, managing, reporting	N/A
Dr S Ruoss	Project Coordinator	Planning, fieldwork, plant identification, data analysis, reporting	FB62000031; DRF TFL 17-1819
Ms L Taaffe	Botanist	Fieldwork, plant identification, reporting	FB62000021

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

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

Priority ecological communities (PECs) are defined as possible threatened ecological communities that do not meet the stringent survey criteria for the assessment of threatened ecological communities, and are listed by the 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)	**1.** Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation; **2.** Communities known from a few widespread occurrences, which are either large or within significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat; or **3.** Communities made up of large, and/or widespread occurrences, that may or not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing and inappropriate fire regimes.
P4	**Priority 4** (Ecological communities that are adequately known, rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list. These communities require regular monitoring)	**1.** Rare – Communities known from few occurrences that are considered to have been adequately surveyed, sufficient knowledge is available, and are considered not to be currently threatened. **2.** Near Threatened – Communities considered to have been adequately surveyed and do not qualify for Conservation Dependent, but are close to qualifying for Vulnerable. **3.** Communities that have been removed from the list of threatened communities during the past five years.
P5	**Priority 5** (Conservation Dependent ecological communities)	Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years.

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

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

Under the *Biosecurity and Agriculture Management Regulations 2013* (WA), declared pest plants are placed in one of three control categories, C1 (exclusion), C2 (eradication) or C3 (management), which determines the measures of control which apply to the declared pest (Table A4.1). The current listing of declared pest organisms and their control category is through the Western Australian Organism List (Department of Primary Industries and Regional Development 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
C1 (Exclusion) '(a) Category 1 (C1) — Exclusion: if in the opinion of the Minister introduction of the declared pest into an area or part of an area for which it is declared should be prevented.' Pests will be assigned to this category if they are not established in Western Australia and control measures are to be taken, including border checks, in order to prevent them entering and establishing in the State.	In relation to a category 1 declared pest, the owner or occupier of land in an area for which an organism is a declared pest or a person who is conducting an activity on the land must take such of the control measures specified in subregulation (1) as are reasonable and necessary to destroy, prevent or eradicate the declared pest.
C2 (Eradication) '(b) Category 2 (C2) — Eradication: if in the opinion of the Minister eradication of the declared pest from an area or part of an area for which it is declared is feasible.' Pests will be assigned to this category if they are present in Western Australia in low enough numbers or in sufficiently limited areas that their eradication is still a possibility.	In relation to a category 2 declared pest, the owner or occupier of land in an area for which an organism is a declared pest or a person who is conducting an activity on the land must take such of the control measures specified in subregulation (1) as are reasonable and necessary to destroy, prevent or eradicate the declared pest.
C3 (Management) '(c) Category 3 (C3) — Management: if in the opinion of the Minister eradication of the declared pest from an area or part of an area for which it is declared is not feasible but that it is necessary to: **(i)** alleviate the harmful impact of the declared pest in the area; or **(ii)** reduce the number or distribution of the declared pest in the area; or **(iii)** prevent or contain the spread of the declared pest in the area.' Pests will be assigned to this category if they are established in Western Australia but it is feasible, or desirable, to manage them in order to limit their damage. Control measures can prevent a C3 pest from increasing in population size or density or moving from an area in which it is established into an area which currently is free of that pest.	In relation to a category 3 declared pest, the owner or occupier of land in an area for which an organism is a declared pest or a person who is conducting an activity on the land must take such of the control measures specified in subregulation (1) as are reasonable and necessary to: **(a)** alleviate the harmful impact of the declared pest in the area for which it is declared; or **(b)** reduce the number or distribution of the declared pest in the area for which it is declared; or **(c)** prevent or contain the spread of the declared pest in the area for which it is declared.

APPENDIX A4: OTHER DEFINITIONS

Environmentally sensitive areas

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

Conservation significant flora

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

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

Conservation significant vegetation

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

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

APPENDIX A5: 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						
tree, palm	<10, 10-30, >30	closed forest	open forest	woodland	open woodland	isolated trees	isolated clumps of trees	trees
tree mallee	<3, <10, 10-30	closed mallee forest	open mallee forest	mallee woodland	open mallee woodland	isolated mallee trees	isolated clumps of mallee trees	mallee trees
shrub, cycad, grass-tree, tree-fern	<1, 1-2, >2	closed shrubland	shrubland	open shrubland	sparse shrubland	isolated shrubs	isolated clumps of shrubs	shrubs
mallee shrub	<3, <10, 10-30	closed mallee shrubland	mallee shrubland	open mallee shrubland	sparse mallee shrubland	isolated mallee shrubs	isolated clumps of mallee shrubs	mallee shrubs
heath shrub	<1, 1-2, >2	closed heathland	heathland	open heathland	sparse heathland	isolated heath shrubs	isolated clumps of heath shrubs	heath shrubs
chenopod shrub	<1, 1-2, >2	closed chenopod shrubland	chenopod shrubland	open chenopod shrubland	sparse chenopod shrubland	isolated chenopod shrubs	isolated clumps of chenopod shrubs	chenopod shrubs
samphire shrub	<0.5, >0.5	closed samphire shrubland	samphire shrubland	open samphire shrubland	spare samphire shrubland	isolated samphire shrubs	isolated clumps of samphire shrubs	samphire shrubs
hummock grass	<2, >2	closed hummock grassland	hummock grassland	open hummock grassland	sparse hummock grassland	isolated hummock grasses	isolated clumps of hummock grasses	hummock grasses
tussock grass	<0.5, >0.5	closed tussock grassland	tussock grassland	open tussock grassland	sparse tussock grassland	isolated tussock grassland	isolated clumps of tussock grasses	tussock grasses
other grass	<0.5, >0.5	closed grassland	grassland	open grassland	sparse grassland	isolated grasses	isolated clumps of grasses	other grasses
sedge	<0.5, >0.5	closed sedgeland	sedgeland	open sedgeland	sparse sedgeland	isolated sedges	isolated clumps of sedges	sedges
rush	<0.5, >0.5	closed rushland	rushland	open rushland	sparse rushland	isolated rushes	isolated clumps of rushes	rushes
forb	<0.5, >0.5	closed forbland	forbland	open forbland	sparse forbland	isolated forbs	isolated clumps of forbs	forbs
fern	<1, 1-2, >2	closed fernland	fernland	open fernland	sparse fernland	isolated ferns	isolated clumps of ferns	ferns
bryophyte	<0.5	closed bryophytelan d	bryophytelan d	open bryophytela nd	sparse bryophyteland	isolated bryophytes	isolated clumps of bryophytes	bryophytes
lichen	<0.5	closed lichenland	lichenland	open lichenland	sparse lichenland	isolated lichens	isolated clumps of lichens	lichens
vine	<10, 10-30, >30	closed vineland	vineland	open vineland	sparse vineland	isolated vines	isolated clumps of vines	vines
aquatic	0-0.5, <1	closed aquatic bed	aquatic bed	open aquatic bed	sparse aquatics	isolated aquatics	isolated clumps of aquatics	aquatics
seagrass	0-0.5, <1	closed seagrass bed	seagrass bed	open seagrass bed	sparse seagrasses	isolated seagrasses	isolated clumps of seagrasses	seagrasses

APPENDIX B: VASCULAR PLANT SPECIES WITH THE POTENTIAL TO OCCUR WITHIN THE ARROWSMITH NORTH TRANSPORT CORRIDOR SURVEY AREA

Note: * denotes introduced species; T denotes threatened flora and P1-P4 denote priority flora species (DBCA 2019a). SCC= State conservation code; FCC = Federal conservation code; CE = Critically Endangered; E = Endangered; [1] (DAWE 2020c); [2] (DBCA 2007-)

Family		Species	SCC	FCC	EPBC[1]	NatureMap[2]	Western Alignment	Southern Alignment
ANARTHRIACEAE		*Hopkinsia anoectocolea*	P3			x		x
APIACEAE		*Eryngium pinnatifidum*				x		x
		Eryngium pinnatifidum subsp. *pinnatifidum*				x		x
		Platysace xerophila				x		x
ARALIACEAE		*Trachymene coerulea* subsp. *leucopetala*				x	x	x
ASPARAGACEAE	*	*Asparagus asparagoides*			x		x	x
		Laxmannia omnifertilis				x		x
		Sowerbaea laxiflora				x	x	
		Thysanotus arenarius				x	x	x
		Thysanotus asper				x		x
		Thysanotus manglesianus				x	x	x
		Thysanotus thyrsoideus				x		x
		Thysanotus triandrus				x		x
ASPHODELACEAE		*Bulbine semibarbata*				x		x
ASTERACEAE		*Angianthus preissianus*				x		x
		Asteridea pulverulenta				x	x	x
	*	*Cotula coronopifolia*				x	x	x
		Gnephosis angianthoides				x		x
		Myriocephalus occidentalis				x		x
		Myriocephalus oldfieldii				x		x
		Podotheca chrysantha				x		x
		Waitzia podolepis				x		x
BORAGINACEAE		*Halgania sericiflora*				x		x
BORYACEAE		*Borya sphaerocephala*				x	x	x
BYBLIDACEAE		*Byblis lamellata*				x		x
CAMPANULACEAE		*Lobelia rhytidosperma*				x		x
CASUARINACEAE		*Allocasuarina humilis*				x		x
CELASTRACEAE		*Stackhousia pubescens*				x	x	x
CENTROLEPIDACEAE		*Centrolepis alepyroides*				x		x
CENTROLEPIDACEAE		*Centrolepis polygyna*				x		x
COLCHICACEAE		*Wurmbea monantha*				x	x	x
CONVOLVULACEAE		*Convolvulus remotus*				x		x
		Wilsonia backhousei				x		x

APPENDIX B: VASCULAR PLANT SPECIES WITH THE POTENTIAL TO OCCUR WITHIN THE ARROWSMITH NORTH TRANSPORT CORRIDOR SURVEY AREA

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Family	Species	SCC	FCC	EPBC[1]	NatureMap[2]	Western Alignment	Southern Alignment
CUPRESSACEAE	*Callitris arenaria*				x	x	x
	Callitris pyramidalis				x		x
CYPERACEAE	*Isolepis cyperoides*				x	x	x
	Schoenus griffinianus	P4			x		x
	Schoenus odontocarpus				x		x
DILLENIACEAE	*Hibbertia hypericoides* subsp. *hypericoides*				x	x	x
	Hibbertia hypericoides subsp. *septentrionalis*				x		x
	Hibbertia racemosa				x		x
DROSERACEAE	*Drosera drummondii*				x		x
	Drosera echinoblastus				x		x
	Drosera humilis				x		x
	Drosera pedicellaris	P1			x		x
	Drosera porrecta				x		x
ELAEOCARPACEAE	*Tetratheca nephelioides*	T	CE	x			x
EMBLINGIACEAE	*Emblingia calceoliflora*				x		x
ERICACEAE	*Andersonia heterophylla*				x		x
	Astroloma microdonta				x		x
	Brachyloma preissii				x		x
	Conostephium preissii				x		x
	Leucopogon inflexus				x	x	x
	Leucopogon insularis				x		x
	Leucopogon obtectus	T	E	x		x	x
	Leucopogon sp. Northern ciliate (R. Davis 3393)				x		x
	Lysinema pentapetalum				x		x
	Styphelia stomarrhena				x		x
	Styphelia xerophylla				x		x
EUPHORBIACEAE	*Beyeria gardneri*	P3			x		x
	Monotaxis bracteata				x		x
	Ricinocarpos undulatus				x	x	
	Stachystemon axillaris				x		x
FABACEAE	*Acacia aciphylla*				x		x
	Acacia blakelyi				x	x	x
	Acacia cavealis				x	x	x
	Acacia dilatata				x		x
	Acacia fagonioides				x		x
	Acacia hopperiana				x		x
	Acacia idiomorpha				x	x	x
	Acacia rostellifera				x		x
	Acacia saligna				x		x
	Acacia saligna subsp. *lindleyi*				x	x	x
	Acacia scirpifolia				x		x
	Acacia spathulifolia				x	x	x

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Family		Species	SCC	FCC	EPBC[1]	NatureMap[2]	Western Alignment	Southern Alignment
FABACEAE (cont.)		*Acacia vittata*	P2			x	x	x
		Daviesia divaricata subsp. d*ivaricata*				x		x
		Gompholobium muticum				x		x
		Isotropis cuneifolia				x		x
		Jacksonia hakeoides				x	x	x
		Labichea lanceolata subsp. l*anceolata*				x		x
		Viminaria juncea				x		x
GENTIANACEAE	*	*Cicendia filiformis*				x		x
GOODENIACEAE		*Dampiera oligophylla*				x		x
		Goodenia corynocarpa				x		x
		Goodenia micrantha				x		x
		Goodenia pulchella				x		x
		Lechenaultia floribunda				x		x
		Lechenaultia stenosepala				x		x
		Scaevola glandulifera				x	x	x
		Scaevola lanceolata				x		x
		Scaevola repens subsp. Northern Sandplains (R.J. Cranfield & P.J. Spencer 8445)				x		x
		Scaevola sericophylla				x		x
		Scaevola thesioides subsp. *thesioides*				x		x
		Verreauxia reinwardtii				x		x
GYROSTEMONACEAE		*Gyrostemon ramulosus*				x	x	x
		Gyrostemon subnudus				x		x
HAEMODORACEAE		*Anigozanthos humilis* subsp. *humilis*				x	x	x
		Anigozanthos manglesii subsp. *quadrans*				x		x
		Conostylis androstemma				x	x	x
		Conostylis aurea				x	x	x
		Conostylis candicans subsp. *candicans*				x	x	x
		Conostylis canteriata				x		x
		Conostylis crassinerva subsp. *absens*				x		x
		Conostylis dielsii subsp. *teres*	T	E	x		x	x
		Conostylis micrantha	T	E	x			x
		Conostylis teretiuscula				x		x
HALORAGACEAE		*Glischrocaryon angustifolium*				x		x
HEMEROCALLIDACEAE		*Johnsonia pubescens* subsp. *pubescens*				x		x
		Stawellia dimorphantha	P4			x	x	x
		Tricoryne humilis				x		x
HYPERICACEAE		*Hypericum japonicum*				x		x
IRIDACEAE		*Orthrosanthus laxus* var. *laxus*				x	x	x
		Patersonia occidentalis var. *latifolia*				x		x

APPENDIX B: VASCULAR PLANT SPECIES WITH THE POTENTIAL TO OCCUR WITHIN THE ARROWSMITH NORTH TRANSPORT CORRIDOR SURVEY AREA

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Family	Species	SCC	FCC	EPBC[1]	NatureMap[2]	Western Alignment	Southern Alignment
JUNCAGINACEAE	*Triglochin mucronata*				x		x
	Triglochin protuberans	P3			x		x
	Triglochin sp. A Flora of Australia (G.J. Keighery 2477)				x		x
LAMIACEAE	*Hemiandra gardneri*	T	E	x			x
	Hemiandra rubriflora				x		x
	Hemiandra sp. Eneabba (H. Demarz 3687)	P3			x		x
	Hemiphora bartlingii				x	x	x
	Pityrodia hemigenioides				x		x
LAURACEAE	*Cassytha glabella* forma *glabella*				x		x
LOGANIACEAE	*Orianthera spermacocea*				x		x
LORANTHACEAE	*Amyema miquelii*				x		x
	Amyema preissii				x		x
	Nuytsia floribunda				x	x	x
MACARTHURIACEAE	*Macarthuria australis*				x	x	x
MALVACEAE	*Alyogyne hakeifolia*				x	x	x
	Alyogyne huegelii				x	x	x
	Guichenotia ledifolia				x	x	x
	Guichenotia micrantha				x		x
	Guichenotia quasicalva	P2			x		x
	Lasiopetalum drummondii				x		x
	Lasiopetalum sp. Coorow (E. Ried 101)				x		x
	Lawrencia glomerata				x		x
	Sida hookeriana				x		x
MONTIACEAE	*Calandrinia corrigioloides*				x	x	x
	Calandrinia granulifera				x		x
MYRTACEAE	*Beaufortia aestiva*				x	x	x
	Beaufortia elegans				x		x
	Calothamnus hirsutus				x	x	x
	Calothamnus quadrifidus subsp. *angustifolius*				x		x
	Calothamnus sanguineus				x		x
	Calytrix cravenii				x		x
	Calytrix depressa				x		x
	Calytrix ecalycata				x		x
	Calytrix sapphirina				x		x
	Calytrix strigosa				x		x
	Darwinia speciosa				x		x
	Eremaea beaufortioides				x		x
	Eremaea brevifolia				x		x
	Eremaea hadra				x		x
	Eremaea violacea subsp. *violacea*				x		x
	Eremaea x phoenicea				x		x
	Eucalyptus camaldulensis subsp. *obtusa*				x		x

APPENDIX B: VASCULAR PLANT SPECIES WITH THE POTENTIAL TO OCCUR WITHIN THE ARROWSMITH NORTH TRANSPORT CORRIDOR SURVEY AREA

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Family	Species	SCC	FCC	EPBC[1]	NatureMap[2]	Western Alignment	Southern Alignment
MYRTACEAE (cont.)	*Eucalyptus erythrocorys*				x		x
	Eucalyptus flocktoniae				x		x
	Eucalyptus foecunda				x		x
	Eucalyptus horistes				x		x
	Eucalyptus impensa	T	E	x		x	x
	Eucalyptus obtusiflora				x	x	x
	Eucalyptus rudis				x		x
	Eucalyptus todtiana				x	x	x
	Eucalyptus zopherophloia	P4			x		x
	Hypocalymma angustifolium subsp. Swan Coastal Plain (G.J. Keighery 16777)				x		x
	Hypocalymma tetrapterum	P3			x		x
	Melaleuca leuropoma				x	x	x
	Melaleuca rhaphiophylla				x		x
	Melaleuca ryeae				x		x
	Melaleuca trichophylla				x		x
	Melaleuca viminea subsp. *viminea*				x		x
	Scholtzia calcicola	P2			x		x
	Scholtzia chapmanii				x	x	x
	Scholtzia laxiflora				x		x
	Scholtzia trilocularis				x		x
	Scholtzia umbellifera				x	x	x
	Scholtzia uniovulata				x		x
	Verticordia blepharophylla				x		x
	Verticordia dasystylis subsp. *oestopoia*	P1			x		x
	Verticordia densiflora var. *cespitosa*				x		x
	Verticordia grandis				x		x
	Verticordia luteola var. l*uteola*	P3			x		x
	Verticordia luteola var. r*osea*	P1			x		x
	Verticordia nobilis				x		x
	Verticordia ovalifolia				x	x	x
	Verticordia pennigera				x		x
OLACACEAE	*Olax aurantia*				x		x
	Olax scalariformis				x		x
ORCHIDACEAE	*Caladenia crebra*				x	x	x
	Caladenia denticulata subsp. *albicans*	P1			x		x
	Caladenia x *coactescens*				x	x	x
	Paracaleana dixonii	T	E	x		x	x
	Prasophyllum giganteum				x	x	x
PHYLLANTHACEAE	*Phyllanthus calycinus*				x		x
PITTOSPORACEAE	*Billardiera coriacea*				x		x
	Cheiranthera preissiana				x		x
	Marianthus ringens				x		x
	Pittosporum angustifolium				x		x
PLANTAGINACEAE	* *Plantago coronopus* subsp. *commutata*				x		x

APPENDIX B: VASCULAR PLANT SPECIES WITH THE POTENTIAL TO OCCUR WITHIN THE ARROWSMITH NORTH TRANSPORT CORRIDOR SURVEY AREA

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Family	Species	SCC	FCC	EPBC[1]	NatureMap[2]	Western Alignment	Southern Alignment
POACEAE	*Amphipogon turbinatus*				x		x
	Austrostipa compressa				x	x	x
	* *Cenchrus ciliaris*			x		x	x
	* *Chloris gayana*				x	x	x
	Neurachne alopecuroidea				x	x	x
	* *Vulpia myuros*				x		x
POLUGALACEAE	*Comesperma calymega*				x		x
PRIMULACEAE	*Samolus repens* var. *paucifolius*				x		x
PROTEACEAE	*Banksia attenuata*				x		x
	Banksia candolleana				x		x
	Banksia elegans	P4			x		x
	Banksia hookeriana				x		x
	Banksia leptophylla				x		x
	Banksia leptophylla var. *melletica*				x		x
	Banksia menziesii				x		x
	Banksia shuttleworthiana				x		x
	Conospermum boreale				x		x
	Conospermum boreale subsp. *ascendens*				x		x
	Conospermum brachyphyllum				x		x
	Conospermum canaliculatum				x		x
	Conospermum stoechadis				x		x
	Conospermum unilaterale				x		x
	Grevillea argyrophylla				x	x	x
	Grevillea erinacea	P3			x		x
	Grevillea exposita				x		x
	Grevillea leucopteris				x	x	x
	Hakea auriculata				x		x
	Hakea costata				x	x	x
	Hakea eneabba				x		x
	Hakea lissocarpha				x		x
	Hakea polyanthema				x		x
	Hakea prostrata				x		x
	Hakea varia				x		x
	Isopogon adenanthoides				x	x	x
	Isopogon tridens				x		x
	Petrophile brevifolia				x		x
	Petrophile drummondii				x	x	x
	Petrophile scabriuscula				x		x
	Synaphea oulopha	P3			x		x
RESTIONACEAE	*Alexgeorgea nitens*				x		x
	Chordifex sinuosus				x		x
	Desmocladus asper				x	x	x
RHAMNACEAE	*Cryptandra scoparia*				x		x
	Stenanthemum notiale subsp. *notiale*				x	x	x

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Family		Species	SCC	FCC	EPBC[1]	NatureMap[2]	Western Alignment	Southern Alignment
RUBIACEAE		*Opercularia vaginata*				x	x	x
RUTACEAE		*Boronia busselliana*				x		x
		Boronia cymosa				x		x
		Boronia ramosa subsp. *anethifolia*				x	x	
		Diplolaena leemaniana				x		x
SANTALACEAE		*Exocarpos sparteus*				x		x
		Santalum acuminatum				x		x
SAPINDACEAE		*Diplopeltis huegelii* subsp. *lehmannii*				x		x
		Diplopeltis huegelii subsp. *subintegra*				x		x
SCROPHULARIACEAE		*Eremophila glabra* subsp. *albicans*				x	x	x
		Eremophila oldfieldii subsp. *oldfieldii*				x		x
		Myoporum caprarioides				x		x
SELAGINELLACEAE		*Selaginella gracillima*				x		x
SOLANACEAE		*Anthocercis ilicifolia* subsp. *ilicifolia*				x		x
		Anthocercis littorea				x	x	x
	*	*Lycium ferocissimum*			x		x	x
STYLIDACEAE		*Stylidium adpressum*				x		x
		Stylidium bicolor				x		x
		Stylidium crossocephalum				x		x
		Stylidium despectum				x		x
		Stylidium diuroides subsp. *paucifoliatum*				x		x
		Stylidium ecorne				x		x
		Stylidium hesperium				x	x	x
		Stylidium kalbarriense				x		x
		Stylidium longitubum	P4			x		x
		Stylidium maitlandianum				x	x	x
		Stylidium ponticulus				x		x
		Stylidium purpureum				x		x
		Stylidium rigidulum				x		x
		Stylidium udusicola				x		x
TAMARICACEAE	*	*Tamarix aphylla*			x		x	x
THYMELAEACEAE		*Pimelea ferruginea*				x	x	x
		Pimelea floribunda				x	x	x
		Pimelea imbricata var. *piligera*				x	x	
VIOLACEAE		*Hybanthus calycinus*				x	x	x
		Hybanthus floribundus subsp. *floribundus*				x	x	x
XANTHORRHOEACEAE		*Chamaescilla versicolor*				x	x	x

APPENDIX C: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT IN THE ARROWSMITH NORTH TRANSPORT CORRIDOR 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.

WESTERN ALIGNMENT

Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Conostylis dielsii subsp. *teres*	Haemodoraceae	T	Endangered	Habit: Shortly rhizomatous, tufted perennial, grass-like or herb, 0.13-0.33 m high, leaves terete. Flower colour: cream-yellow Flowering period (indicated in green): J F M A M J J A S O N D; ▲ in M; Survey (▲) Soils: White, grey or yellow sand, gravel. Low open woodland. IBRA Distribution: GES Florabase records: 24	Moderate
Eucalyptus impensa	Myrtaceae	T	Endangered	Habit: (Straggly mallee), to 1.5 m high, bark smooth. Flower colour: pink Flowering period (indicated in green): J F M A M J J A S O N D; ▲ in M; Survey (▲) Soils: Yellow sand. Lateritic hills. IBRA Distribution: GES Florabase records: 10	Low
Leucopogon obtectus	Ericaceae	T	Endangered	Habit: Erect shrub, 0.5-1.7 m high. Flower colour: cream-yellow Flowering period (indicated in green): J F M A M J J A S O N D; ▲ in M; Survey (▲) Soils: Grey sand. IBRA Distribution: GES Florabase records: 19	Moderate

APPENDIX C: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT IN THE ARROWSMITH NORTH TRANSPORT CORRIDOR 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
Paracaleana dixonii	Orchidaceae	T	Endangered	Habit: Tuberous, perennial, herb, 0.09-0.2 m high. Flower colour: yellow-brown Flowering period (indicated in green): J F M A M J J A S O N D ▲ Survey (▲) Soils: Grey sand over granite IBRA Distribution: GES, SWA Florabase records: 19	Moderate
Acacia vittata	Fabaceae	P2	-	Habit: Dense, rounded shrub, 1-4 m high. Flower colour: yellow Flowering period (indicated in green): J F M A M J J A S O N D ▲ Survey (▲) Soils: Grey sand, sandy clay. Margins of seasonal lakes. IBRA Distribution: AVW, GES Florabase records: 15	Moderate
Stawellia dimorphantha	Hemerocallidaceae	P4	-	Habit: Stilt-rooted perennial, herb, 0.05-0.2 m high. Flower colour: purple/cream Flowering period (indicated in green): J F M A M J J A S O N D ▲ Survey (▲) Soils: White, grey, yellow sand. IBRA Distribution: GES Florabase records: 23	High

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

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SOUTHERN ALIGNMENT

Species	Family	SCC	FCC	Description and Habitat	Likelihood of Occurrence
Conostylis dielsii subsp. *teres*	Haemodoraceae	T	Endangered	Habit: Shortly rhizomatous, tufted perennial, grass-like or herb, 0.13-0.33 m high, leaves terete. Flower colour: cream-yellow Flowering period (indicated in green): J F M A M J J A S O N D ▲ ▲ Survey (▲) Soils: White, grey or yellow sand, gravel. Low open woodland. IBRA Distribution: GES Florabase records: 24	Moderate
Conostylis micrantha	Haemodoraceae	T	Endangered	Habit: Rhizomatous, tufted perennial, grass-like or herb, 0.13-0.24 m high. Flower colour: yellow-cream/red Flowering period (indicated in green): J F M A M J J A S O N D ▲ Survey (▲) Soils: White or grey sand. Sandplains. IBRA Distribution: AVW, GES Florabase records: 22	Moderate

APPENDIX C: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT IN THE ARROWSMITH NORTH TRANSPORT CORRIDOR 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
Eucalyptus impensa	Myrtaceae	T	Endangered	Habit: (Straggly mallee), to 1.5 m high, bark smooth. Flower colour: pink Flowering period (indicated in green): J F M A M J J A S O N D ▲ Survey (▲) Soils: Yellow sand. Lateritic hills. IBRA Distribution: GES Florabase records: 10	Low
Hemiandra gardneri	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): J F M A M J J A S O N D ▲ Survey (▲) Soils: Grey or yellow sand, clayey sand. Sandplains. IBRA Distribution: AVW, GES Florabase records: 21	Moderate
Leucopogon obtectus	Ericaceae	T	Endangered	Habit: Erect shrub, 0.5-1.7 m high. Flower colour: cream-yellow Flowering period (indicated in green): J F M A M J J A S O N D ▲ Survey (▲) Soils: Grey sand. IBRA Distribution: GES Florabase records: 19	Moderate

APPENDIX C: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT IN THE ARROWSMITH NORTH TRANSPORT CORRIDOR 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
Paracaleana dixonii	Orchidaceae	T	Endangered	Habit: Tuberous, perennial, herb, 0.09-0.2 m high. Flower colour: yellow-brown Flowering period (indicated in green): J F M A M J J A S O N D ▲ Survey (▲) Soils: Grey sand over granite IBRA Distribution: GES, SWA Florabase records: 19	Moderate
Tetratheca nephelioides	Elaeocarpaceae	T	Critically Endangered	Habit: Caespitose, dwarf shrub, to 0.3 m high. Flower colour: purple Flowering period (indicated in green): J F M A M J J A S O N D ▲ Survey (▲) Soils: White-grey sand, yellow-brown clayey sand, gravel, laterite. Outcrops, undulating hills, ridges. IBRA Distribution: AVW, GES Florabase records: 17	Moderate
Caladenia denticulata subsp. *albicans*	Orchidaceae	P1	-	Habit: Tuberous herb to 0.30 m high. Flower colour: creamy white Flowering period (indicated in green): J F M A M J J A S O N D ▲ Survey (▲) Soils: Sand, moist depressions. Undulating limestone country. IBRA Distribution: GES, SWA Florabase records: 4	Moderate

APPENDIX C: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT IN THE ARROWSMITH NORTH TRANSPORT CORRIDOR 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
Drosera pedicellaris	Droseraceae	P1	-	Habit: Fibrous-rooted perennial herb to 0.15m high. Flower colour: white Flowering period (indicated in green): J F M A M J J A S O N D ▲ (Survey) Soils: Deep beige sand. IBRA Distribution: AVW, GES, SWA Florabase records: 8	Moderate
Verticordia dasystylis subsp. *oestopoia*	Myrtaceae	P1	-	Habit: Spreading shrub, 0.1-0.4 m high. Flower colour: cream-yellow Flowering period (indicated in green): J F M A M J J A S O N D ▲ (Survey) Soils: Gritty soils over granite. Outcrops. IBRA Distribution: AVW, GES Florabase records: 15	Low
Verticordia luteola var. *rosea*	Myrtaceae	P1	-	Habit: Slender shrub,0.3-2 m high. Flower colour: pink/green-cream-brown Flowering period (indicated in green): J F M A M J J A S O N D ▲ (Survey) Soils: White sand. Flats. IBRA Distribution: GES Florabase records: 17	Moderate

APPENDIX C: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT IN THE ARROWSMITH NORTH TRANSPORT CORRIDOR 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
Acacia vittata	Fabaceae	P2	-	Habit: Dense, rounded shrub, 1-4 m high. Flower colour: yellow Flowering period (indicated in green): J F M A M J J A S O N D ▲ (Survey) Soils: Grey sand, sandy clay. Margins of seasonal lakes. IBRA Distribution: AVW, GES Florabase records: 15	Moderate
Guichenotia quasicalva	Malvaceae	P2	-	Habit: Erect, compact shrub, to 0.5 m high. Flower colour: blue-purple Flowering period (indicated in green): J F M A M J J A S O N D ▲ (Survey) Soils: Sandy clay over laterite. Drainage line. IBRA Distribution: AVW, GES Florabase records: 20	Low
Scholtzia calcicola	Myrtaceae	P2	-	Habit: Perennial shrub to 1.10 m high. Flower colour: pink Flowering period (indicated in green): J F M A M J J A S O N D ▲ (Survey) Soils: Sand. Slopes. IBRA Distribution: GES Florabase records: 5	Moderate

APPENDIX C: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT IN THE ARROWSMITH NORTH TRANSPORT CORRIDOR 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
Beyeria gardneri	Euphorbiaceae	P3	-	Habit: Shrub, 0.25-0.5 m high. Flower colour: yellow Flowering period (indicated in green): J F M A M J J A S O N D ▲ (Survey) Soils: Yellow sand. IBRA Distribution: AVW, GES, SWA, YAL Florabase records: 36	Moderate
Grevillea erinacea	Proteaceae	P3	-	Habit: Spindly, prickly, sparingly branched shrub, (0.3-) 0.6-1.8 m high. Flower colour: green-white-cream Flowering period (indicated in green): J F M A M J J A S O N D ▲ (Survey) Soils: White, grey or yellow sand, often with lateritic gravel. IBRA Distribution: AVW, GES Florabase records: 35	Low
Hemiandra sp. Eneabba (H. Demarz 3687)	Lamiaceae	P3	-	Habit: Straggly, erect shrub, 0.5-0.9 m high, to 0.4 m wide. Flower colour: blue/violet Flowering period (indicated in green): J F M A M J J A S O N D ▲ (Survey) Soils: Sand. Disturbed sites. IBRA Distribution: GES Florabase records: 33	High

APPENDIX C: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT IN THE ARROWSMITH NORTH TRANSPORT CORRIDOR 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
Hopkinsia anoectocolea	Anarthriaceae	P3	-	Habit: Rhizomatous, tufted perennial, herb, 0.5-1 m high, to 1 m in diameter. Flower colour: brown Flowering period (indicated in green): J F M A M J J A S O N D ▲ (Survey) Soils: White or grey sand, often saline. Winter-wet depressions, floodplains, salt-lakes. IBRA Distribution: AVW, GES, SWA Florabase records: 47	Low
Hypocalymma tetrapterum	Myrtaceae	P3	-	Habit: Shrub, 0.4-0.9 m high. Flower colour: white Flowering period (indicated in green): J F M A M J J A S O N D ▲ (Survey) Soils: Grey sand, loam, lateritic gravel. Riverbanks, breakaways. IBRA Distribution: GES, SWA Florabase records: 24	Low

APPENDIX C: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT IN THE ARROWSMITH NORTH TRANSPORT CORRIDOR 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
Synaphea oulopha	Proteaceae	P3	-	Habit: Compact shrub, ca 0.2 m high. Flower colour: yellow Flowering period (indicated in green): J F M A M J J A S O N D ▲ Survey (▲) Soils: Grey sand, gravelly loam, clay. Lateritic breakaways & rises. IBRA Distribution: GES Florabase records: 16	Low
Triglochin protuberans	Juncaginaceae	P3	-	Habit: Annual, herb, 0.03-0.13 m high. Flower colour: - Flowering period (indicated in green): J F M A M J J A S O N D ▲ 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	Low
Verticordia luteola var. *luteola*	Myrtaceae	P3	-	Habit: Slender shrub, 0.5-1.4 m high. Flower colour: white-yellow Flowering period (indicated in green): J F M A M J J A S O N D ▲ Survey (▲) Soils: Grey sand over gravel. Flats. IBRA Distribution: AVW, GES Florabase records: 20	Moderate

APPENDIX C: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT IN THE ARROWSMITH NORTH TRANSPORT CORRIDOR 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
Banksia elegans	Proteaceae	P4	-	Habit: Shrub (with fire-tolerant rootstock, often suckering), 1-4 m high. Flower colour: yellow/green-yellow Flowering period (indicated in green): J F M A M J J A S O N D ▲ (Survey) Soils: Yellow, white or red sand. Sandplains, low consolidated dunes. IBRA Distribution: AVW, GES Florabase records: 42	High
Eucalyptus zopherophloia	Myrtaceae	P4	-	Habit: Spreading mallee, 2.5-4 m high. Flower colour: cream-white Flowering period (indicated in green): J F M A M J J A S O N D ▲ (Survey) Soils: Grey/white sand with limestone rubble. Coastal areas. IBRA Distribution: CAR, GES, SWA Florabase records: 59	Low

APPENDIX C: ASSESSMENT OF THREATENED AND PRIORITY FLORA POTENTIALLY PRESENT IN THE ARROWSMITH NORTH TRANSPORT CORRIDOR 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
Schoenus griffinianus	Cyperaceae	P4	-	Habit: Small, tufted perennial, grass-like or herb (sedge), to 0.1 m high. Flower colour: - Flowering period (indicated in green): J F M A M J J A S O N D ▲ (Survey) Soils: White sand. IBRA Distribution: AVW, GES, SWA Florabase records: 38	High
Stawellia dimorphantha	Hemerocallidaceae	P4	-	Habit: Stilt-rooted perennial, herb, 0.05-0.2 m high. Flower colour: purple/cream Flowering period (indicated in green): J F M A M J J A S O N D ▲ (Survey) Soils: White, grey, yellow sand. IBRA Distribution: GES Florabase records: 23	High
Stylidium longitubum	Stylidiaceae	P4	-	Habit: Erect annual (ephemeral), herb, 0.05-0.12 m high. Flower colour: pink Flowering period (indicated in green): J F M A M J J A S O N D ▲ (Survey) Soils: Sandy clay, clay. Seasonal wetlands IBRA Distribution: GES, JAF, SWA Florabase records: 43	Low

APPENDIX D: LOCATION OF VEGETATION SURVEY QUADRATS ESTABLISHED IN THE ARROWSMITH NORTH TRANSPORT CORRIDOR SURVEY AREA, MAY 2020

QUADRAT	LOCATION (GDA94, Zone 50)	
	EASTING (mE)	NORTHING (mN)
ARS01	313971	6732848
ARS02	314008	6732274
ARS03	314238	6731823
ARS04	314605	6731164
ARS05	314796	6730627
ARS06	314812	6730193
ARS07	314802	6729862
ARS08	314800	6729567
ARS09	314936	6729029
ARS10	314642	6729044
ARS11	314677	6728587
ARS12	314821	6728279
ARS13	315008	6726943
ARS14	315041	6726107
ARS15	315051	6725552
ARS16	315495	6725190
ARS17	315946	6724800
ARS18	315957	6724157
ARS19	316144	6723488
ARS20	316191	6723042
ARS21	315992	6722571
ARS22	315825	6722187
ARS23	315819	6721822
ARS24	316077	6721568
ARS25	316349	6721449
ARS26	316230	6721221
ARW01	313800	6733570
ARW02	313536	6733582
ARW03	313305	6733610
ARW04	313132	6733608
ARW05	313012	6733637
ARW06	312819	6733630
ARW07	312580	6733653
ARW08	312131	6733324
ARW09	311741	6733582
ARW10	311374	6732845
ARW11	311272	6732009
ARW12	311068	6732156
ARW13	310944	6732697
ARW14	310744	6732135
ARW15	310544	6731848
ARW16	310378	6732338
ARW17	310625	6732155
ARW18	311389	6732056

APPENDIX E: SUMMARY OF VASCULAR PLANT SPECIES RECORDED WITHIN THE ARROWSMITH NORTH TRANSPORT CORRIDOR SURVEY AREA, MAY 2020

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

Family	Species
Anarthriaceae	*Hopkinsia anoectocolea* (P3)
Asparagaceae	*Acanthocarpus preissii* *Thysanotus spiniger* *Thysanotus sp.*
Asteraceae	?*Gnephosis tenuissima* *Olearia* ?sp. Eremicola (Diels & Pritzel s.n. PERTH 00449628) *Pterochaeta paniculata* * *Ursinia anthemoides* *Waitzia acuminata* Asteraceae sp.
Brassicaceae	* Brassicaceae sp.
Casuarinaceae	*Allocasuarina campestris* *Allocasuarina humilis*
Cupressaceae	*Callitris arenaria*
Cyperaceae	*Lepidosperma* aff. *apricola* *Lepidosperma* sp. *Mesomelaena pseudostygia* *Schoenus latitans* *Schoenus* sp.
Dilleniaceae	*Hibbertia hypericoides* subsp. *hypericoides* *Hibbertia subvaginata*
Ecdeiocoleaceae	*Ecdeiocolea monostachya*
Ericaceae	*Leucopogon inflexus* *Styphelia insularis*
Fabaceae	*Acacia blakelyi* *Acacia cavealis* *Acacia comans* *Acacia idiomorpha* *Acacia lasiocarpa* *Acacia rostellifera* *Acacia saligna* *Acacia spathulifolia* *Acacia xanthina* *Bossiaea* ?*eriocarpa* *Daviesia divaricata* subsp. *divaricata* *Daviesia nudiflora* *Gompholobium tomentosum* *Jacksonia calcicola* *Jacksonia hakeoides*

APPENDIX E: SUMMARY OF VASCULAR PLANT SPECIES RECORDED WITHIN THE ARROWSMITH NORTH TRANSPORT CORRIDOR SURVEY AREA, MAY 2020

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

Family	Species
Fabaceae (cont.)	*Jacksonia* sp. *Labichea cassioides* *Mirbelia* ?s*pinosa* Fabacaceae sp.
Goodeniaceae	*Lechenaultia linarioides* *Scaevola repens* subsp. Northern Sandplains (R.J. Cranfield & P.J. Spencer 8445) *Scaevola sericophylla* ?*Scaevola* sp. *Verreauxia reinwardtii*
Gyrostemonaceae	*Gyrostemon ramulosus*
Haemodoraceae	*Conostylis candicans* subsp. *candicans* *Conostylis* ?*candicans* subsp. *procumbens*
Hemerocallidaceae	*Dianella revoluta* *Stawellia dimorphantha* (P4)
Iridaceae	*Patersonia occidentalis*
Lamiaceae	*Lachnostachys eriobotrya*
Lauraceae	*Cassytha* ?*aurea* var. *aurea* *Cassytha* sp.
Malvaceae	?*Guichenotia* sp.
Myrtaceae	*Beaufortia* ?*aestiva* *Beaufortia elegans* *Calothamnus blepharospermus* *Calothamnus quadrifidus* subsp. *angustifolius* *Calothamnus sanguineus* *Calytrix* ?*strigosa* *Calytrix* sp. *Eremaea beaufortioides* *Eremaea beaufortioides* var. *microphylla* *Eremaea violacea* *Eucalyptus drummondii* *Eucalyptus erythrocorys* *Eucalyptus todtiana* *Leptospermum oligandrum* *Leptospermum spinescens* *Melaleuca* ?*systena* *Melaleuca leuropoma* *Pileanthus filifolius* *Scholtzia laxiflora* *Scholtzia* sp.

APPENDIX E: SUMMARY OF VASCULAR PLANT SPECIES RECORDED WITHIN THE ARROWSMITH NORTH TRANSPORT CORRIDOR SURVEY AREA, MAY 2020

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

Family	Species
Myrtaceae (cont.)	*Verticordia densiflora* *Verticordia grandis*
Phyllanthaceae	*Phyllanthus* ?*calycinus*
Poaceae	* *Aira caryophyllea* *Austrostipa macalpinei* *Austrostipa* sp. * *Briza maxima* *Neurachne alopecuroidea* Poaceae sp.
Polygonaceae	*Muehlenbeckia adpressa*
Proteaceae	*Banksia attenuata* *Banksia dallanneyi* subsp. *media* *Banksia elegans* (P4) *Banksia leptophylla* var. *melletica* *Banksia menziesii* *Banksia prionotes* *Banksia sessilis* *Banksia* sp. *Conospermum* ?*stoechadis* subsp. s*toechadis* *Conospermum triplinervium* *Grevillea eriostachya* *Grevillea leucopteris* *Grevillea preissii* subsp. *preissii* *Hakea costata* *Hakea incrassata* *Hakea lissocarpha* *Hakea polyanthema* *Hakea trifurcata* *Persoonia acicularis* *Petrophile brevifolia* *Petrophile drummondii* *Petrophile macrostachya* *Synaphea* sp.
Restionaceae	*Chordifex sinuosus* *Desmocladus asper* *Lepidobolus preissianus* Restionaceae sp.
Rhamnaceae	*Cryptandra* ?*myriantha* *Stenanthemum notiale* subsp. n*otiale*
Rutaceae	*Diplolaena leemaniana* *Geleznowia verrucosa*

APPENDIX E: SUMMARY OF VASCULAR PLANT SPECIES RECORDED WITHIN THE ARROWSMITH NORTH TRANSPORT CORRIDOR SURVEY AREA, MAY 2020

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

Family	Species
Solanaceae	*Solanum* ?*lasiophyllum*
Stylidiaceae	*Stylidium adpressum* *Stylidium crossocephalum* *Stylidium repens*
Vitaceae	?*Clematicissus angustissima*
Xanthorrhoeaceae	*Xanthorrhoea drummondii*
Zamiaceae	*Macrozamia fraseri*

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

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

SPECIES	ARS01	ARS02	ARS03	ARS04	ARS05	ARS06	ARS07	ARS08	ARS09	ARS10	ARS11	ARS12	ARS13	ARS14	ARS15	ARS16	ARS17	ARS18	ARS19	ARS20	ARS21	ARS22	ARS23	ARS24	ARS25	ARS26
Acacia blakelyi	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X			X		X					
Acacia cavealis		X						X					X													
Acacia comans	X																									
Acacia idiomorpha									X		X	X														
Acacia lasiocarpa																										
Acacia rostellifera				X					X	X					X	X							X	X		
Acacia saligna									X	X		X				X	X	X	X							
Acacia spathulifolia	X							X												X	X	X	X	X		
Acacia xanthina																										
Acanthocarpus preissii		X	X												X											
* *Aira caryophyllea*																										
Allocasuarina campestris			X				X	X	X		X	X														
Allocasuarina humilis																								X		
Asteraceae sp.							X		X		X		X				X	X						X	X	
Austrostipa macalpinei																										
Austrostipa sp.																										
Banksia attenuata	X	X	X	X	X	X	X						X													
Banksia dallanneyi subsp. *media*																										
Banksia elegans (P4)							X						X													
Banksia leptophylla var. *melletica*	X																						X	X	X	X
Banksia menziesii	X				X																					
Banksia prionotes						X																				
Banksia sessilis																						X	X			
Banksia sp.																										
Beaufortia ?aestiva																							X		X	
Beaufortia elegans		X																								
Bossiaea ?eriocarpa																									X	
* Brassicaceae sp.																X			X							
* *Briza maxima*																X										
Callitris arenaria									X																	
Calothamnus blepharospermus	X	X	X				X	X																		
Calothamnus quadrifidus subsp. *angustifolius*				X																						
Calothamnus sanguineus											X													X		X
Calytrix ?strigosa	X				X			X																		
Calytrix sp.											X													X		X
Cassytha ?aurea var. *aurea*																										
Cassytha sp.	X					X																				
?Clematicissus angustissima																										
Chordifex sinuosus																						X				
Conospermum ?stoechadis subsp. *stoechadis*																							X	X		
Conospermum triplinervium	X							X													X			X		X
Conostylis candicans subsp. *candicans*	X		X	X	X	X	X					X	X	X									X	X		
Conostylis ?candicans subsp. *procumbens*															X					X	X	X				
Cryptandra ?myriantha																										X
Daviesia divaricata subsp. *divaricata*	X	X			X																					X
Daviesia nudiflora																										
Desmocladus asper									X		X	X											X	X	X	
Dianella revoluta										X																X
Diplolaena leemaniana															X											
Ecdeiocolea monostachya	X	X	X	X	X		X	X	X		X	X	X	X						X	X	X		X	X	X
Eremaea beaufortioides	X				X	X																				
Eremaea beaufortioides var. *microphylla*																									X	
Eremaea violacea	X	X				X																				
Eucalyptus drummondii																	X	X								
Eucalyptus erythrocorys															X					X	X	X				
Eucalyptus todtiana							X					X														

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

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

SPECIES	ARS01	ARS02	ARS03	ARS04	ARS05	ARS06	ARS07	ARS08	ARS09	ARS10	ARS11	ARS12	ARS13	ARS14	ARS15	ARS16	ARS17	ARS18	ARS19	ARS20	ARS21	ARS22	ARS23	ARS24	ARS25	ARS26
Fabacaceae sp.									X																	
Geleznowia verrucosa																										
?*Gnephosis tenuissima*																										
Gompholobium tomentosum						X																				
Grevillea eriostachya	X		X		X																					
Grevillea leucopteris				X		X	X																			
Grevillea preissii subsp. *preissii*																										
?*Guichenotia sp.*																										
Gyrostemon ramulosus					X									X												
Hakea costata											X												X	X		X
Hakea incrassata																							X			X
Hakea lissocarpha									X	X										X		X	X	X		
Hakea polyanthema	X	X	X		X	X		X																		
Hakea trifurcata									X														X	X	X	X
Hibbertia hypericoides subsp. *hypericoides*						X					X	X										X	X			
Hibbertia subvaginata																									X	
Hopkinsia anoectocolea (P3)										X																
Jacksonia calcicola																										
Jacksonia hakeoides	X	X	X			X	X	X	X		X		X								X			X		X
Jacksonia sp.																										
Labichea cassioides																						X			X	
Lachnostachys eriobotrya																										
Lechenaultia linarioides			X	X			X																X			X
Lepidobolus preissianus	X	X	X				X	X	X		X		X								X	X	X	X	X	X
Lepidosperma aff. *apricola*										X																
Lepidosperma sp.													X													
Leptospermum oligandrum						X																				
Leptospermum spinescens						X			X																	X
Leucopogon inflexus		X			X	X																				
Macrozamia fraseri				X		X						X		X		X			X	X	X	X				
Melaleuca leuropoma	X	X	X	X	X	X		X	X		X		X								X	X	X	X	X	X
Melaleuca ?*systena*																										
Mesomelaena pseudostygia	X	X					X				X	X	X													
Mirbelia ?*spinosa*											X															
Muehlenbeckia adpressa																										
Neurachne alopecuroidea									X																	
Olearia ?sp. Eremicola (Diels & Pritzel s.n. PERTH 00449628)																										
Patersonia occidentalis																						X				
Persoonia acicularis	X	X	X	X	X		X	X																		
Petrophile brevifolia						X		X															X	X		
Petrophile drummondii	X																								X	
Petrophile macrostachya	X				X																					
Phyllanthus ?*calycinus*															X						X					
Pileanthus filifolius	X	X	X		X																					
Poaceae sp.								X						X	X	X	X	X	X	X	X					
Pterochaeta paniculata			X						X																	
Restionaceae sp.												X											X			X
Scaevola repens subsp. Northern Sandplains (R.J. Cranfield & P.J. Spencer 8	X	X	X		X	X																				X
Scaevola sericophylla				X																				X		X
?*Scaevola* sp.																										
Schoenus latitans																										X
Schoenus sp.																										
Scholtzia laxiflora	X				X	X			X	X	X		X													X
Scholtzia sp.		X		X																		X	X	X	X	
Solanum ?*lasiophyllum*																X		X								
Stenanthemum notiale subsp. *notiale*	X	X	X		X	X		X	X												X	X	X	X	X	X

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

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

SPECIES	ARS01	ARS02	ARS03	ARS04	ARS05	ARS06	ARS07	ARS08	ARS09	ARS10	ARS11	ARS12	ARS13	ARS14	ARS15	ARS16	ARS17	ARS18	ARS19	ARS20	ARS21	ARS22	ARS23	ARS24	ARS25	ARS26
Stylidium adpressum					X						X															
Stylidium crossocephalum																										X
Stylidium repens																										
Stylphelia insularis																						X	X			
Synaphea sp.																										
Thysanotus sp.																X							X			
Thysanotus spiniger	X												X													
* *Ursinia anthemoides*																	X		X							
Verreauxia reinwardtii				X																						
Verticordia densiflora								X		X														X		
Verticordia grandis	X	X	X																							
Waitzia acuminata			X											X	X	X			X	X	X	X				
Xanthorrhoea drummondii					X																					

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

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

	SPECIES	ARW01	ARW02	ARW03	ARW04	ARW05	ARW06	ARW07	ARW08	ARW09	ARW10	ARW11	ARW12	ARW13	ARW14	ARW15	ARW16	ARW17	ARW18
	Acacia blakelyi		X	X		X	X				X	X	X	X	X			X	
	Acacia cavealis																		
	Acacia comans																		
	Acacia idiomorpha																		X
	Acacia lasiocarpa		X																X
	Acacia rostellifera		X														X		
	Acacia saligna												X						
	Acacia spathulifolia			X	X			X								X	X		
	Acacia xanthina							X			X					X			X
	Acanthocarpus preissii				X	X		X											
*	*Aira caryophyllea*										X		X					X	
	Allocasuarina campestris				X	X													
	Allocasuarina humilis																		
	Asteraceae sp.									X			X				X		
	Austrostipa macalpinei		X																
	Austrostipa sp.											X				X			
	Banksia attenuata	X	X																
	Banksia dallanneyi subsp. *media*		X																X
	Banksia elegans (P4)																		
	Banksia leptophylla var. *melletica*		X																
	Banksia menziesii																		
	Banksia prionotes																		
	Banksia sessilis													X		X	X		X
	Banksia sp.						X												
	Beaufortia ?aestiva														X				X
	Beaufortia elegans																		
	Bossiaea ?eriocarpa																		
*	Brassicaceae sp.																		
*	*Briza maxima*										X	X							
	Callitris arenaria			X	X														
	Calothamnus blepharospermus						X												
	Calothamnus quadrifidus subsp. *angustifolius*																		
	Calothamnus sanguineus																		
	Calytrix ?strigosa	X	X			X	X												
	Calytrix sp.																		
	Cassytha ?aurea var. *aurea*	X	X																
	Cassytha sp.															X			
	?Clematicissus angustissima								X										
	Chordifex sinuosus																		
	Conospermum ?stoechadis subsp. *stoechadis*																		
	Conospermum triplinervium	X		X															
	Conostylis candicans subsp. *candicans*	X				X						X		X	X		X	X	X
	Conostylis ?candicans subsp. *procumbens*															X			
	Cryptandra ?myriantha																		
	Daviesia divaricata subsp. *divaricata*	X																	
	Daviesia nudiflora	X																	
	Desmocladus asper		X			X		X		X	X			X	X				X
	Dianella revoluta														X				X
	Diplolaena leemaniana																		
	Ecdeiocolea monostachya	X		X	X	X	X												
	Eremaea beaufortioides	X	X																
	Eremaea beaufortioides var. *microphylla*																		
	Eremaea violacea	X					X												
	Eucalyptus drummondii																		
	Eucalyptus erythrocorys					X	X	X	X	X					X		X		
	Eucalyptus todtiana																		

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

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

SPECIES	ARW01	ARW02	ARW03	ARW04	ARW05	ARW06	ARW07	ARW08	ARW09	ARW10	ARW11	ARW12	ARW13	ARW14	ARW15	ARW16	ARW17	ARW18
Fabacaceae sp.				X														
Geleznowia verrucosa		X													X			
?*Gnephosis tenuissima*		X													X			
Gompholobium tomentosum		X																
Grevillea eriostachya			X				X										X	
Grevillea leucopteris							X							X	X	X		
Grevillea preissii subsp. *preissii*										X				X	X	X		
?*Guichenotia sp.*										X								
Gyrostemon ramulosus		X																
Hakea costata																		
Hakea incrassata							X						X					X
Hakea lissocarpha	X	X	X			X												
Hakea polyanthema																		
Hakea trifurcata						X	X			X	X		X	X	X			X
Hibbertia hypericoides subsp. *hypericoides*							X								X			
Hibbertia subvaginata																		
Hopkinsia anoectocolea (P3)											X			X			X	X
Jacksonia calcicola	X	X	X		X	X												
Jacksonia hakeoides				X														
Jacksonia sp.													X	X				X
Labichea cassioides						X												
Lachnostachys eriobotrya				X														
Lechenaultia linarioides	X	X	X		X	X								X				X
Lepidobolus preissianus																		
Lepidosperma aff. *apricola*	X																	X
Lepidosperma sp.	X	X																
Leptospermum oligandrum	X		X															
Leptospermum spinescens											X	X						
Leucopogon inflexus																X		
Macrozamia fraseri	X	X	X	X	X		X			X	X		X	X	X			X
Melaleuca leuropoma			X									X						
Melaleuca ?*systena*	X		X		X													X
Mesomelaena pseudostygia												X					X	
Mirbelia ?*spinosa*																		
Muehlenbeckia adpressa								X	X	X	X	X	X	X	X	X		X
Neurachne alopecuroidea																		
Olearia ?sp. Eremicola (Diels & Pritzel s.n. PERTH 00449628)							X	X										X
Patersonia occidentalis																		
Persoonia acicularis	X		X	X		X												
Petrophile brevifolia	X													X				X
Petrophile drummondii																		
Petrophile macrostachya	X	X	X															
Phyllanthus ?*calycinus*																		
Pileanthus filifolius	X		X															
Poaceae sp.								X	X	X	X	X	X			X	X	
Pterochaeta paniculata		X																
Restionaceae sp.																		
Scaevola repens subsp. Northern Sandplains (R.J. Cranfield & P.J. Spencer 8	X	X	X			X												
Scaevola sericophylla																		
?*Scaevola* sp.									X									
Schoenus latitans																		
Schoenus sp.									X									
Scholtzia laxiflora																		
Scholtzia sp.	X	X	X	X	X					X			X	X				X
Solanum ?*lasiophyllum*								X										
Stenanthemum notiale subsp. *notiale*	X	X	X										X					

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

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

SPECIES	ARW01	ARW02	ARW03	ARW04	ARW05	ARW06	ARW07	ARW08	ARW09	ARW10	ARW11	ARW12	ARW13	ARW14	ARW15	ARW16	ARW17	ARW18
Stylidium adpressum			X															
Stylidium crossocephalum																		
Stylidium repens	X													X				
Stylphelia insularis													X		X			
Synaphea sp.			X															
Thysanotus sp.																		
Thysanotus spiniger																		
* *Ursinia anthemoides*																		
Verreauxia reinwardtii						X												
Verticordia densiflora	X																	
Verticordia grandis	X		X															
Waitzia acuminata				X	X	X					X		X				X	X
Xanthorrhoea drummondii		X			X													X

APPENDIX G: LOCATION OF THREATENED AND PRIORITY FLORA RECORDED WITHIN ARROWSMITH NORTH TRANSPORT CORRIDOR SURVEY AREA, MAY 2020

Conservation Code	Species	GDA94_Z50		No. Plants	Area (m)
		Easting (mE)	Northing (mN)		
P3	*Hopkinsia anoectocolea*	314642	6729044	1	20x20
P4	*Banksia elegans*	313758	6733564	5	5x5
		314134	6732051	2	5x5
		314145	6732017	1	-
		314150	6732035	1	-
		314559	6731228	3	10x10
		314589	6731262	2	10x10
		314591	6731224	6	10x10
		314599	6731235	4	20x20
		314771	6729238	10	10x10
		314784	6729254	6	10x10
		314787	6729269	5	20x20
		314796	6729967	5	40x40
		314800	6729935	20	40x40
		314800	6730099	21	40x40
		314802	6729862	4	40x40
		314802	6729863	10	30x30
		314806	6730126	20	10x10
		314810	6730852	9	20x20
		314811	6729303	17	40x40
		314811	6730061	20	30x30
		314814	6730153	22	50x50
		314815	6730001	38	30x30
		314816	6729813	8	20x20
		314817	6729327	9	20x20
		314820	6729292	8	50x50
		314821	6730033	43	10x10
		314846	6730832	6	10x10
		314997	6726983	3	10x10
		314999	6726963	4	10x10
		315008	6726943	3	10x10
		315021	6726905	2	20x20
		315025	6726920	4	10x10
		315030	6726859	8	10x10
		315035	6726834	4	1x1
	Stawellia dimorphantha	314256	6731773	1	-

APPENDIX H: VASCULAR PLANT SPECIES RECORDED IN EACH VEGETATION COMMUNITY IN THE ARROWSMITH NORTH TRANSPORT CORRIDOR SURVEY AREA, MAY 2020

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

SPECIES	VEGETATION COMMUNITY									
	H1	H7	S6	T3	T4	T5	T6	W3	W4	W5
Acacia blakelyi	X		X		X	X	X		X	X
Acacia cavealis	X		X							
Acacia comans	X									
Acacia idiomorpha			X							X
Acacia lasiocarpa	X									X
Acacia rostellifera	X	X	X		X	X			X	
Acacia saligna			X		X	X		X		
Acacia spathulifolia	X	X		X					X	X
Acacia xanthina							X			X
Acanthocarpus preissii	X		X	X					X	X
* *Aira caryophyllea*						X	X			
Allocasuarina campestris	X		X	X						
Allocasuarina humilis		X								
Asteraceae sp.		X	X			X		X	X	
Austrostipa macalpinei	X									
Austrostipa sp.							X			X
Banksia attenuata	X		X							
Banksia dallanneyi subsp. *media*	X									X
Banksia elegans (P4)			X							
Banksia leptophylla var. *melletica*	X	X								
Banksia menziesii	X									
Banksia prionotes	X									
Banksia sessilis		X							X	X
Banksia sp.	X									
Beaufortia ?*aestiva*		X								X
Beaufortia elegans	X									
Bossiaea ?*eriocarpa*		X								
* Brassicaceae sp.						X				
* *Briza maxima*						X	X			
Callitris arenaria	X		X	X						
Calothamnus blepharospermus	X		X							
Calothamnus quadrifidus subsp. *angustifolius*			X							
Calothamnus sanguineus		X	X							
Calytrix ?*strigosa*	X		X							
Calytrix sp.		X	X							
Cassytha ?aurea var. *aurea*	X									
Cassytha sp.	X									X
?*Clematicissus angustissima*									X	
Chordifex sinuosus									X	
Conospermum ?*stoechadis* subsp. *stoechadis*		X								
Conospermum triplinervium	X	X							X	
Conostylis candicans subsp. *candicans*									X	X
Conostylis ?*candicans* subsp. *procumbens*	X	X	X				X		X	X
Cryptandra ?*myriantha*		X								
Daviesia divaricata subsp. *divaricata*	X	X								
Daviesia nudiflora	X									
Desmocladus asper	X	X	X				X		X	X
Dianella revoluta		X			X					X
Diplolaena leemaniana									X	
Ecdeiocolea monostachya	X	X	X	X			X		X	

APPENDIX H: VASCULAR PLANT SPECIES RECORDED IN EACH VEGETATION COMMUNITY IN THE ARROWSMITH NORTH TRANSPORT CORRIDOR SURVEY AREA, MAY 2020

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

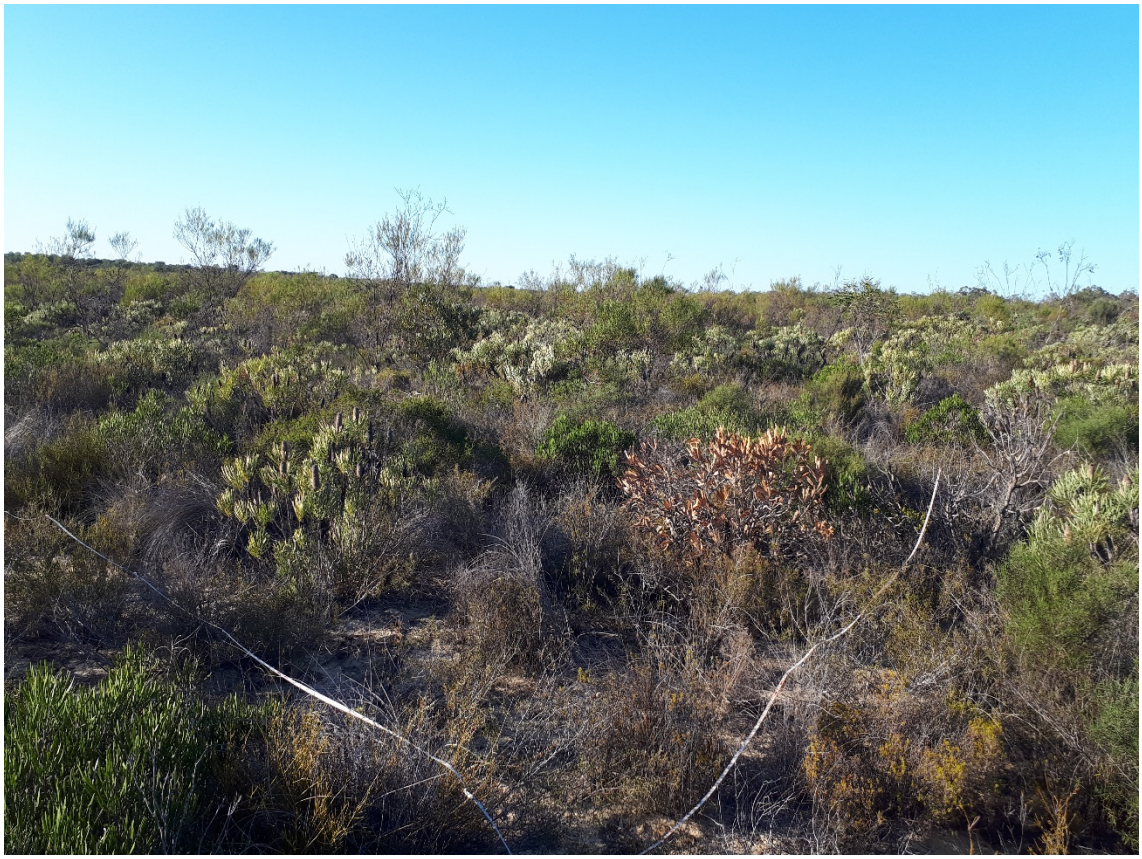
SPECIES	VEGETATION COMMUNITY									
	H1	H7	S6	T3	T4	T5	T6	W3	W4	W5
Eremaea beaufortioides	X									
Eremaea beaufortioides var. *microphylla*		X								
Eremaea violacea	X									
Eucalyptus drummondii								X		
Eucalyptus erythrocorys	X		X						X	X
Eucalyptus todtiana			X							
Fabacaceae sp.			X							
Geleznowia verrucosa				X						
?*Gnephosis tenuissima*	X									X
Gompholobium tomentosum	X									
Grevillea eriostachya	X									
Grevillea leucopteris	X		X				X			
Grevillea preissii subsp. *preissii*										X
?*Guichenotia sp.*									X	X
Gyrostemon ramulosus	X						X			
Hakea costata	X	X	X							
Hakea incrassata		X								
Hakea lissocarpha		X	X		X				X	X
Hakea polyanthema	X									
Hakea trifurcata		X	X							
Hibbertia hypericoides subsp. *hypericoides*	X	X	X				X		X	X
Hibbertia subvaginata		X								X
Hopkinsia anoectocolea (P3)					X					
Jacksonia calcicola							X			X
Jacksonia hakeoides	X	X	X						X	
Jacksonia sp.				X						
Labichea cassioides		X							X	X
Lachnostachys eriobotrya	X									
Lechenaultia linarioides	X	X	X	X						
Lepidobolus preissianus	X	X	X						X	X
Lepidosperma aff. *apricola*					X					
Lepidosperma sp.	X		X							X
Leptospermum oligandrum	X									
Leptospermum spinescens	X	X	X							
Leucopogon inflexus	X									
Macrozamia fraseri	X		X			X	X		X	
Melaleuca leuropoma			X	X			X			X
Melaleuca ?*systena*	X	X	X						X	
Mesomelaena pseudostygia	X		X							X
Mirbelia ?*spinosa*			X							
Muehlenbeckia adpressa						X	X		X	
Neurachne alopecuroidea			X							
Olearia ?sp. Eremicola (Diels & Pritzel s.n. PERTH									X	X
Patersonia occidentalis									X	
Persoonia acicularis	X		X	X						
Petrophile brevifolia	X	X								X
Petrophile drummondii	X	X								
Petrophile macrostachya	X									
Phyllanthus ?*calycinus*									X	
Pileanthus filifolius	X									

APPENDIX H: VASCULAR PLANT SPECIES RECORDED IN EACH VEGETATION COMMUNITY IN THE ARROWSMITH NORTH TRANSPORT CORRIDOR SURVEY AREA, MAY 2020

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

SPECIES	VEGETATION COMMUNITY									
	H1	H7	S6	T3	T4	T5	T6	W3	W4	W5
Poaceae sp.	X					X	X	X	X	X
Pterochaeta paniculata	X		X							
Restionaceae sp.		X	X							
Scaevola repens subsp. Northern Sandplains (R.J. Cranfield & P.J. Spencer 8445)	X	X								
Scaevola sericophylla		X	X							
?*Scaevola* sp.									X	
Schoenus latitans		X								
Schoenus sp.									X	
Scholtzia laxiflora	X	X	X		X					
Scholtzia sp.	X	X	X	X			X		X	X
Solanum ?*lasiophyllum*						X		X	X	
Stenanthemum notiale subsp. *notiale*	X	X	X						X	X
Stylidium adpressum	X		X							
Stylidium crossocephalum		X								
Stylidium repens	X									X
Styphelia insularis		X							X	X
Synaphea sp.	X									
Thysanotus sp.		X				X				
Thysanotus spiniger	X		X							
* *Ursinia anthemoides*						X		X		
Verreauxia reinwardtii	X		X							
Verticordia densiflora	X	X			X					
Verticordia grandis	X									
Waitzia acuminata		X	X		X	X		X	X	
Xanthorrhoea drummondii		X							X	

APPENDIX I: SUMMARY OF VEGETATION COMMUNITIES RECORDED IN ARROWSMITH NORTH TRANSPORT CORRIDOR SURVEY AREA, MAY 2020

Vegetation Community Description
Vegetation map code: H1 **Structural:** 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. **Associated species:** *Acacia blakelyi, Jacksonia hakeoides, Scaevola repens* subsp. Northern Sandplains (R.J. Cranfield & P.J. Spencer 8445)*, Persoonia acicularis, Banksia attenuata* **Soils and Landforms:** Cream/white/grey sands on plains **Outcropping:** Absent **Condition:** Pristine/Excellent **Area:** 36.57 ha — **Proportion of survey area:** 8.16 % **Number of Quadrats:** 10 — **Species richness:** 22 ± 1.41
Representative Photographs
 **Site:** ARS01

APPENDIX I: SUMMARY OF VEGETATION COMMUNITIES RECORDED IN ARROWSMITH NORTH TRANSPORT CORRIDOR SURVEY AREA, MAY 2020

Vegetation Community Description	
Vegetation map code: H7	
Structural: Open Heath to Closed Heath of *Banksia leptophylla* var. *melletica*, *Melaleuca leuropoma* and *Hakea trifurcata* over *Ecdeiocolea monostachya*, *Lepidobolus preissianus* and *Stenanthemum notiale* subsp. *notiale* on cream sand on lower slopes.	
Associated species: *Acacia spathulifolia, Calothamnus sanguineus, Jacksonia hakeoides, Hibbertia hypericoides* subsp. *hypericoides*	
Soils and Landforms: Cream sand on lower slopes	
Outcropping: Absent/ occasional limestone	
Condition: Pristine/Excellent	
Area: 24.09 ha	**Proportion of survey area:** 5.37 %
Number of Quadrats: 4	**Species richness:** 20.75 ± 1.93

Representative Photographs

Site: ARS025

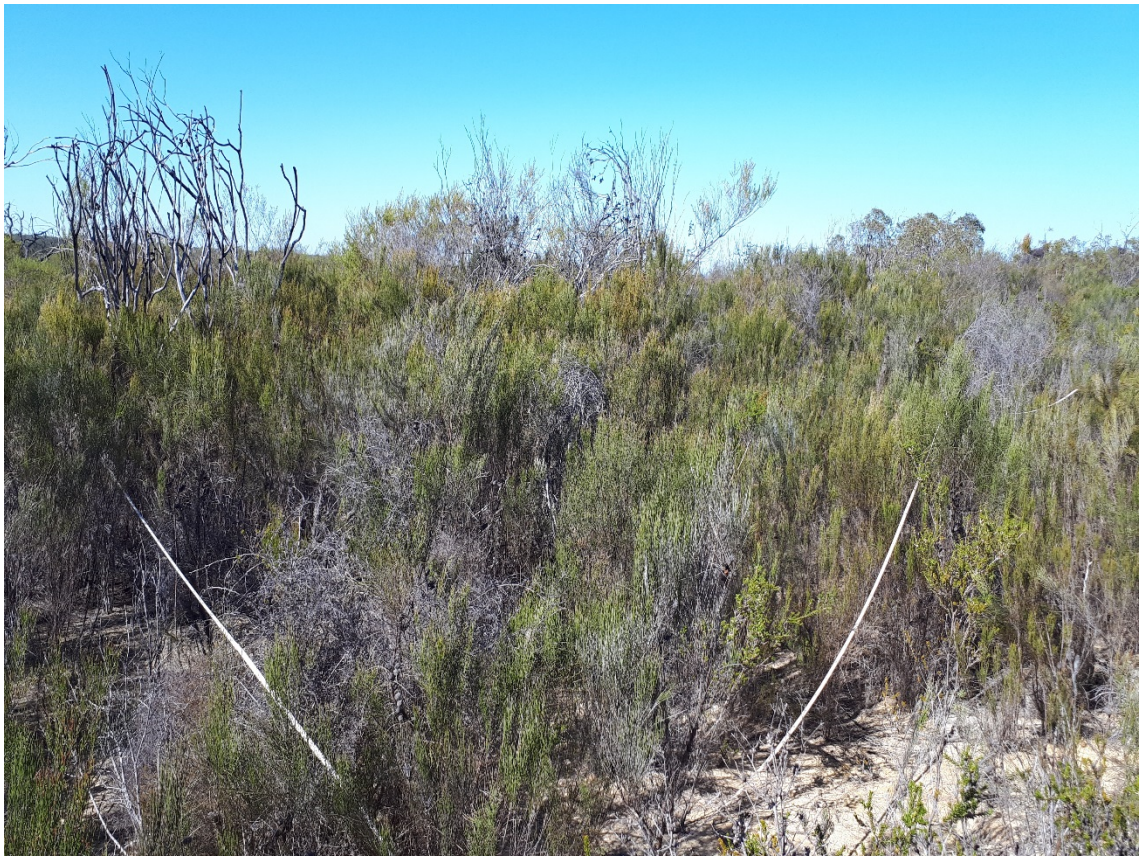
APPENDIX I: SUMMARY OF VEGETATION COMMUNITIES RECORDED IN ARROWSMITH NORTH TRANSPORT CORRIDOR SURVEY AREA, MAY 2020

Vegetation Community Description
Vegetation map code: S6 **Structural:** Open shrubland of *Acacia blakelyi* and *Allocasuarina campestris*, over *Ecdeiocolea monostachya*, *Jacksonia hakeoides* and *Lepidobolus preissianus* on cream/grey sand on flats to lower slopes. **Associated species:** *Acacia rostellifera, Conostylis candicans, Melaleuca leuropoma, Calothamnus quadrifidus* subsp. *angustifolius* **Soils and Landforms:** Cream/white/grey sands on flats and lower slopes **Outcropping:** Absent **Condition:** Pristine/excellent **Area:** 44.39 ha **Proportion of survey area:** 9.90 % **Number of Quadrats:** 7 **Species richness:** 15.29 ± 0.97
Representative Photographs
 **Site:** ARS04

APPENDIX I: SUMMARY OF VEGETATION COMMUNITIES RECORDED IN ARROWSMITH NORTH TRANSPORT CORRIDOR SURVEY AREA, MAY 2020

Vegetation Community Description	
Vegetation map code: T3	
Structural: Thicket of *Allocasuarina campestris, Acacia spathulifolia, Melaleuca ?systena, Callitris arenaria* over *Ecdeiocolea monostachya, Lechenaultia linarioides* and *Acanthocarpus preissii* on cream sand on flats.	
Associated species: *Persoonia acicularis, Geleznowia verrucosa, Waitzia acuminata*	
Soils and Landforms: Cream sand on flats	
Outcropping: Absent	
Condition: Pristine	
Area: 1.07 ha	**Proportion of survey area:** 0.24 %
Number of Quadrats: 1	**Species richness:** 12 ± 0

Representative Photographs



Site: ARW04

APPENDIX I: SUMMARY OF VEGETATION COMMUNITIES RECORDED IN ARROWSMITH NORTH TRANSPORT CORRIDOR SURVEY AREA, MAY 2020

Vegetation Community Description

Vegetation map code: T4

Structural: Thicket to Scrub of *Acacia blakelyi* and *Acacia rostellifera* over *Lepidosperma* aff. *apricola*, *Scholtzia laxiflora, Hakea lissocarpha* and *Verticordia densiflora* on grey sand on flats.

Associated species: *Acacia saligna, Hopkinsia anoectocolea* (P3)*, Dianella revoluta*

Soils and Landforms: Grey sand on flats

Outcropping: Absent

Condition: Pristine

Area: 9.88 ha

Proportion of survey area: 2.20 %

Number of Quadrats: 1

Species richness: 9 ± 0

Representative Photographs

Site: ARS10

APPENDIX I: SUMMARY OF VEGETATION COMMUNITIES RECORDED IN ARROWSMITH NORTH TRANSPORT CORRIDOR SURVEY AREA, MAY 2020

Vegetation Community Description
Vegetation map code: T5 **Structural:** Thicket of *Acacia blakelyi* and *Acacia saligna* and *Macrozamia fraseri* over *Waitzia acuminata* and Poaceae sp. on sandy loam/clay on low lying flats. **Associated species:** *Muehlenbeckia adpressa, Solanum ?lasiophyllum* **Soils and Landforms:** Grey/white sand on low lying flats **Outcropping:** Absent **Condition:** Excellent **Area:** 26.74 ha **Proportion of survey area:** 5.97 % **Number of Quadrats:** 3 **Species richness:** 8 ± 1.00
Representative Photographs
 **Site:** ARS19

APPENDIX I: SUMMARY OF VEGETATION COMMUNITIES RECORDED IN ARROWSMITH NORTH TRANSPORT CORRIDOR SURVEY AREA, MAY 2020

Vegetation Community Description	
Vegetation map code: T6	
Structural: Thicket of *Acacia blakelyi*, *Macrozamia fraseri* with occasional *Grevillea leucopteris* over *Conostylis candicans*, *Waitzia acuminata* and *Aira caryophyllea* on cream/grey sand on flats.	
Associated species: *Acacia xanthina, Desmocladus asper, Gyrostemon ramulosus*	
Soils and Landforms: Cream/grey sand on flats	
Outcropping: Absent	
Condition: Pristine/Excellent/Very Good	
Area: 55.38 ha	**Proportion of survey area:** 12.36 %
Number of Quadrats: 5	**Species richness:** 8.75 ± 0.75

Representative Photographs

Site: ARW10

APPENDIX I: SUMMARY OF VEGETATION COMMUNITIES RECORDED IN ARROWSMITH NORTH TRANSPORT CORRIDOR SURVEY AREA, MAY 2020

Vegetation Community Description	
Vegetation map code: W3	
Structural: Open mallee woodland of *Eucalyptus drummondii,* over shrubland of *Acacia saligna,* over isolated *Solanum* ?*lasiophyllum* and Poaceae sp. on grey clay loam on flats.	
Associated species: Asteraceae sp., **Ursinia anthemoides*	
Soils and Landforms: Grey clay loam on flats	
Outcropping: Absent	
Condition: Excellent	
Area: 13.28 ha	**Proportion of survey area:** 2.96 %
Number of Quadrats: 2	**Species richness:** 5 ± 0

Representative Photographs

Site: ARS18

APPENDIX I: SUMMARY OF VEGETATION COMMUNITIES RECORDED IN ARROWSMITH NORTH TRANSPORT CORRIDOR SURVEY AREA, MAY 2020

Vegetation Community Description

Vegetation map code: W4

Structural: Woodland to isolated trees of *Eucalyptus erythrocorys*, over sparse to closed shrubland of *Acacia spathulifolia* and *Acacia rostellifera*, over *Melaleuca leuropoma*, *Conostylis* ?*candicans* subsp. *procumbens*, and *Ecdeiocolea monostachya* on cream sand with limestone outcropping on slopes.

Associated species: *Banksia sessilis, Chordifex sinuosus, Diplolaena leemaniana, Hibbertia hypericoides* subsp. *hypericoides*

Soils and Landforms: Cream sand on slopes

Outcropping: Moderate/ numerous limestone

Condition: Pristine/Very Good

Area: 98.23 ha

Proportion of survey area: 21.91 %

Number of Quadrats: 7

Species richness: 9.71 ± 1.64

Representative Photographs

Site: ARS15

APPENDIX I: SUMMARY OF VEGETATION COMMUNITIES RECORDED IN ARROWSMITH NORTH TRANSPORT CORRIDOR SURVEY AREA, MAY 2020

Vegetation Community Description	
Vegetation map code: W5	
Structural: Isolated trees of *Eucalyptus erythrocorys,* over open shrubland of *Melaleuca ?systena*, *Banksia sessilis* and *Labichea cassioides*, over *Hibbertia hypericoides* subsp. *hypericoides* and *Desmocladus asper* on grey/brown sand with limestone outcropping on flats and slopes.	
Associated species: *Hakea lissocarpha, Acacia blakelyi, Olearia* ?sp. Eremicola (Diels & Pritzel s.n. PERTH 00449628), *Acacia spathulifolia*	
Soils and Landforms: Grey/brown sand on flats and slopes	
Outcropping: Occasional/moderate limestone	
Condition: Pristine/Excellent	
Area: 32.03 ha	**Proportion of survey area:** 7.15 %
Number of Quadrats: 5	**Species richness:** 14.4 ± 2.06

Representative Photographs

Site: ARW07