TARGETED FLORA SURVEY REPORT

Line 51, KM 320.9-322.1, Site 6

Truslove Nature Reserve, Esperance

Final

16/02/2022

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DOCUMENT CONTROL

Title: Targeted Flora Survey Report – Line 51, 320.9-322.1KM, Site 6 – Truslove Nature Reserve, Esperance
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Reviewer (s): Mary Holt, Kathryn Kinnear
Job No.: AI002-002
Client: Arc Infrastructure

REVISION RECORD

Revision	Summary	Prepared By	Reviewed By	Date
Draft v.1	Quality Assurance	K. White	M. Holt	08/02/2022
Draft v.2	Technical Review	K. White & R. White	K. Kinnear	16/02/2022

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1. Introduction, Scope and Background Information

Arc Infrastructure Pty Ltd ("the client") commissioned Bio Diverse Solutions as Environmental Consultants to undertake a Spring Targeted Flora Survey from Line Railway KM 320.9-322.1, along Line 51, adjacent to Truslove Nature Reserve. This targeted flora survey was commissioned following an out-of-season reconnaissance level 'Flora, Vegetation and Fauna' survey completed by Eco Logical Australia (ELA, 2021; herein described as the 'reconnaissance survey'). Following this, Quessentia Consulting Pty Ltd (sub-consultant, on behalf of Arc Infrastructure) engaged Umwelt Australia Pty Ltd (Umwelt) to undertake an independent peer review and risk assessment of the reconnaissance survey to determine whether further spring season surveys were required (Umwelt, 2021). They identified nine significant flora taxon that required further targeted surveys. Bio Diverse Solutions also reviewed the reconnaissance survey report upon engagement and identified numerous gaps, where the survey did not meet EPA Technical Guidance for Flora and Vegetation Assessment (2016). Lastly, Arc Infrastructure expanded the survey area to extend to the perimeter of the railway corridor, a wider area than was original surveyed during the reconnaissance survey (Map A2, Appendix A). As such, the results of the reconnaissance survey and the Umwelt peer review and risk assessment (2021) are used as basis of the scope of works required for the targeted flora survey.

The purpose of the survey is to provide further specific environmental assessment data for the application of a clearing permit, with the intention of Arc Infrastructure to begin significant maintenance and construction works on the railway line in 2022. Impact to native vegetation will occur due to widening of access tracks along the railway line and the formation of laydown bays, for the storage of machinery and materials.

The scope of works for the targeted survey include:

- Targeted flora survey for the nine species identified in the Umwelt (2021) peer review and risk assessment, namely T *Anigozanthos bicolor* subsp. *minor,* P1 *Acacia diminuta, Leucopogon remotus,* P3 *Eremophila chamaephila, Goodenia laevis* subsp. *laevis, Trachymene anisocarpa* var. *trichocarpa,* P4 *Adenanthos ileticos, Darwinia polycephala* and *Haegiela tatei;*
- Review of the desktop assessment of conservation significant flora, due to datasets not being assessed in the reconnaissance survey and the insufficient area covered in the study area;
- Targeted Field survey;
- GPS and map any populations of any other Threatened or Priority flora species and submission of threatened and reporting forms to DBCA (if applicable);
- Identification confirmation by the WA Herbarium of conservation significant flora, if necessary;
- Identification of additional incidental flora species not captured in the reconnaissance out-of-season survey;
- Prepare a report on survey outcomes; and
- Provide the client with the IBSA Data package (as required to be submitted by the client).

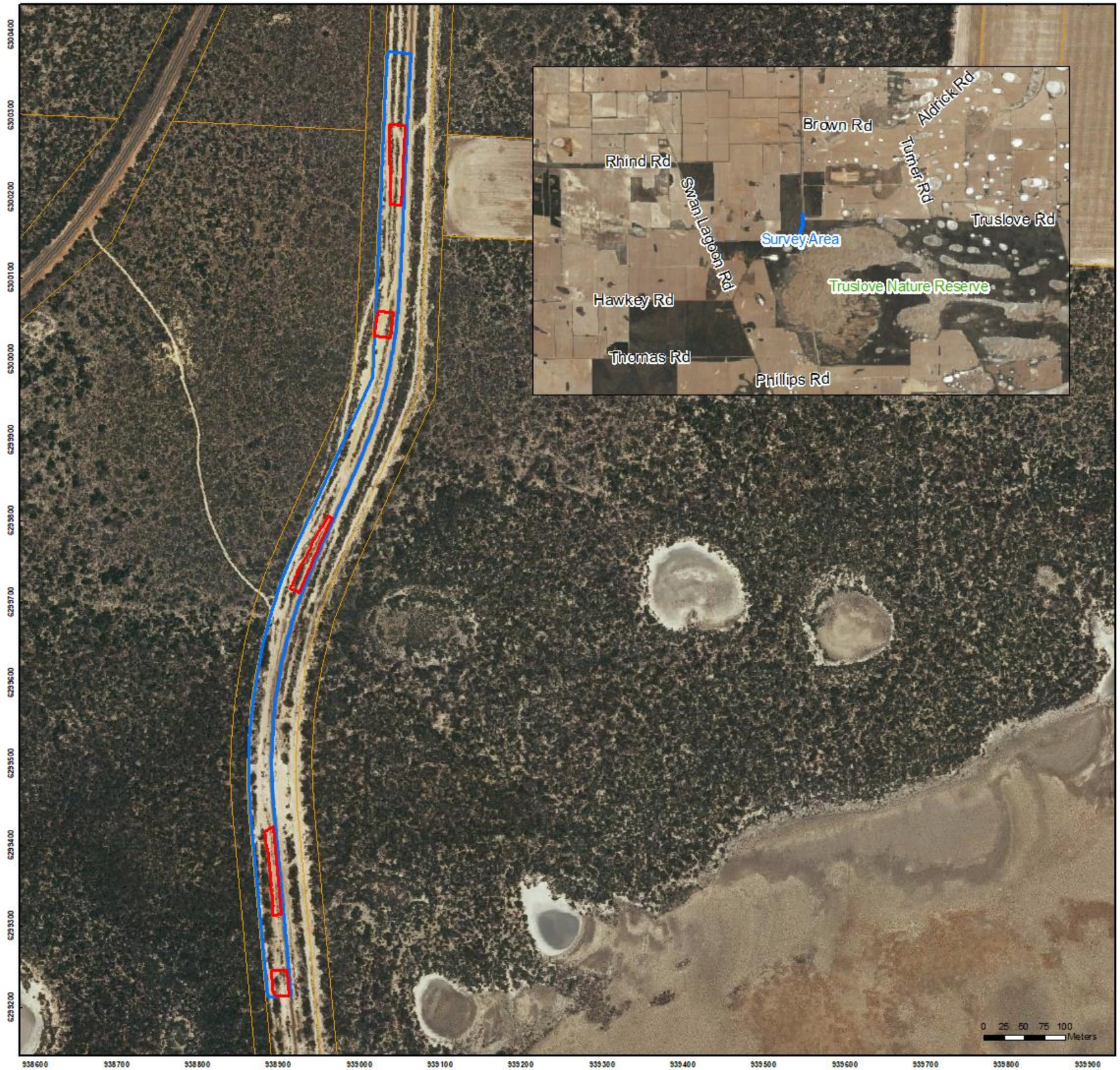
1.1. Site Location and Development Proposal

The "survey area" is defined as the area within the railway corridor along 1.2km of railway line, between railway line KM 320.9-322.1 Line 51, Scaddan (Esperance) area. In total the survey area comprised of 3.36ha, which covers the western side of the railway line only, to the western perimeter of the railway corridor. The survey area extends through the centre of Truslove Nature Reserve, managed by Department of Biodiversity, Conservation and Attractions (DBCA). Arc (formerly, Brookfield Rail, formerly Westnet Rail) is the Lessee under the Rail Freight Corridor Land Use Agreement (Standard Gauge) and Railway Infrastructure Lease, pursuant to which Arc was granted a right by the Public Transport Authority (PTA) of Western Australia to use and occupy that land designated as a Corridor Land under Part 3 of the Rail Freight Systems Act (Appendix G).

The "study area" consists of a 30km radius around the survey area, used for indications of likelihood of occurrence of threatened or priority flora and ecological communities. It provides a broader local context and assessment of the survey area.

The development proposal within the survey area includes significant maintenance and construction works, to protect critical railway infrastructure. Clearing of native vegetation is specifically proposed for sufficient access track provision along the railway line including laydown areas for storage of materials and machinery operation space during the proposed development. The footprint of clearing has been defined and will be significantly less than the survey area, consisting of 0.49ha (Figure 1).

A clearing permit has been applied for the footprint of the survey area, with proposed clearing not to exceed 0.49ha, but subject to small changes of location within the survey area. Clearing of native vegetation during proposed development will be avoided as much as practicable. As this site is present within an Environmentally Sensitive Area (through DWER's systems and Arc Infrastructures internal systems), it is recognized that a high level of ecological literacy is required when clearing. As required, an independent environmental expert (Bio Diverse Solutions) will be engaged during the clearing to monitor on-ground works to ensure that the least amount of environmental impact occurs.



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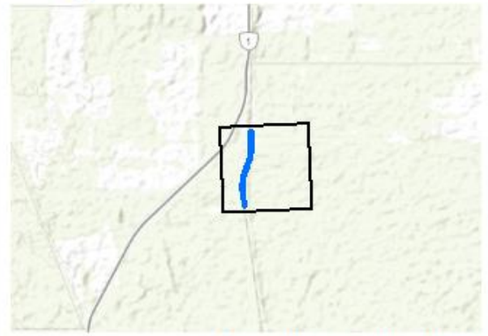

Overview Map Scale 1:100,000

Legend

- Cadastre
- Survey Area
- Area proposed to be cleared

Scale
1:4,583 @ A3
GDA MGA 94 Zone 50

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2017
IRIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012

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Figure 1: Survey Area Locality

	QA Check	*Drawn by*
	KK	**KW**
STATUS	*FILE*	*DATE*
FINAL	**AI002-002**	**16/02/2022**

2. Desktop Assessment

A desktop assessment was completed in the reconnaissance survey report (ELA, 2021), which included an analysis of bioregion, climate, geology, landforms and soils, hydrology, regional vegetation and areas of conservation significance. As per the results of the reconnaissance report (ELA, 2021), this targeted flora survey report only covers and discusses the desktop assessment relevant to conservation significant flora.

The desktop assessment completed in the reconnaissance survey (ELA, 2021) also included threatened (TEC) and priority (PEC) ecological communities. As the survey area was larger in the targeted flora survey, compared to the reconnaissance survey (Map A2, Appendix A), reference to the desktop assessment of TEC's and PEC's were referred too. Further details are included in Appendix D (Table A4, Table A5). No further assessment on TEC and PEC's at a desktop level occurred during the targeted survey.

2.1. Conservation Significant Flora

A desktop inventory and assessment was conducted by Eco Logical Australia (ELA, 2021) in the reconnaissance survey. The reconnaissance survey did not meet EPA Guidelines (EPA, 2016) as the study area was limited to a 5km radius and did not include a review of DBCA datasets such as the WA Herbarium or TPFL . Umwelt (2021) completed a peer review and risk assessment and identified numerous conservation listed species potentially still occurring within the survey area that had not been captured in the desktop assessment of the reconnaissance survey (ELA, 2021).

For the purpose of the targeted survey, Bio Diverse Solutions re-completed the desktop assessment from both the reconnaissance survey (ELA, 2021) and the peer review and risk assessment (Umwelt, 2021). The list of species identified was compiled from a 30km radius of the survey area, the typical study area radius for the Esperance IBRA region (EPA, 2016), using the following databases:

- Nature Map Database Search (combined data from DBCA, WA Museum and WA Herbarium; DBCA 2007-);
- Protected matters search tool (DAWE, 2021); and
- Flora DBCA database records (as provided by Arc Infrastructure, 2021).

The full species list compiled from all available data (Table A1 Appendix B) is based on observations from a broader area than the survey area and is likely to include species that would not occur in the actual survey area due to a lack of suitable habitat. The data also includes very old records and in some cases the species in question may have become locally or regionally extinct.

The conservation significance of fauna species has been assessed using data from the following sources:

- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Administered by the Australian Government Department of Agriculture, Water and the Environment (DAWE);
- *Biodiversity Conservation Act 2016* (BC Act). Administered by the Western Australian Department of Biodiversity Conservation and Attractions (DBCA); and
- DBCA Priority Flora list. A non-legislative list maintained by DBCA for management purposes.

As a result of the database searches, a total of 58 threatened and priority species were identified within a 30km radius of the survey area. Of these, 44 species were assessed to be 'Likely' or 'Possible' to occur, as determined through evaluation of suitable soil type, associated vegetation and general habitat suitability. Conservation categories for Threatened and Priority flora is presented in Tables A2 and A3 in Appendix C.

3. Flora Survey Methodology

A targeted flora survey was undertaken during peak wildflower season, on the 12th of October 2022. It was conducted by Katie White (Botanist/Ecologist) of Bio Diverse Solutions and Karri Grant (Environmental Scientist) of National Area Consulting Management Services. The survey area was surveyed via meandering traverses on foot, within 5 m vicinity of each traverse to target the nine species identified in the Umwelt (2021) peer review and risk assessment, and incidental collection of possible other conservation flora identified as likely or possible to occur in the desktop assessment. Flora was also incidentally recorded within the survey area, to identify annual and herbaceous species not captured during the reconnaissance survey (ELA, 2021).

3.1. Survey Limitations and Constraints

An assessment of potential survey limitations is outlined below in Table 1. Minor limitations were present, primarily relating to survey timing with four species of priority flora identified in the desktop assessment as likely or possible to occur flowering just before or just after the October flora survey.

Table 1: Assessment of potential survey limitations

Limitation	Constraint	Comment
Experience of personnel	Nil	Katie White (Bio Diverse Solutions engaged botanist) has over 4.5 years' experience at conducting and coordinating reconnaissance and targeted flora and vegetation surveys, within the Esperance IBRA region, and is competent in taxonomic identification and assessment of vegetation of the area. She has actively completed targeted surveys alongside DBCA flora officer for numerous of the priority and threatened flora identified in the desktop assessment as likely or possible to occur. Karri Grant commenced work with Natural Area in June 2018 as a member of the Natural Area Consulting field operations crew. Karri transitioned into the consulting business unit during Autumn 2021, after demonstrating a wide-ranging knowledge of Western Australian flora. Since joining the consulting team, Karri has contributed to numerous flora and vegetation assessments in various locations in Perth and the south-west of Western Australia (6D skill level).
Survey timing	Minor	The survey was conducted in the middle of October, during the peak of wildflower season. There were ample Orchids, annuals and herbaceous species indicating that the diversity of the area would have been sufficiently captured. Additionally, the reconnaissance survey was conducted during June, capturing winter flowering species or winter annuals. Therefore, two seasons have been captured by surveys conducted within the survey area. Numerous significant flora species identified as likely or possible to occur in the desktop assessment were not flowering in June or October. For eight species, this is considered negligible risk of not detecting the species, being large and distinctive shrubs primarily in the Acacia, Eucalyptus and Melaleuca genera and Myrtaceae and Ericaceae family. Additionally, there were four species that were not flowering at the time of the survey, that may not have captured without flowers and were at minor risk of not being detected. Namely, these included P1 *Beyeria physaphylla, Dicrastylis archeri,* P2 *Aotus* sp. Dundas (M.A. Burgman 2835) and *Frankenia brachyphylla.* These species all flower in early (September) or late (November) spring. Therefore, it is considered only a minor limitation with the flora survey conducted just after or just before flowering time.
Access restrictions	Nil	No access restrictions were encountered during the survey. The survey area was easily traversable by foot and relatively open.
Availability of contextual information	Nil	Publicly available desktop and background information was readily available to give a broad contextual understanding of the site. The previously conducted reconnaissance survey (ELA, 2021) and peer review and risk assessment (Umwelt, 2021) provides detailed contextual information required for conducting the targeted flora survey.
Survey effort and extent	Nil	The area was sufficiently and lengthily searched. A random meandering traverse ensured that all areas within 5m of each other was conducted.

Table 1 continued.

Limitation	Constraint	Comment
Disturbances that may affect results	Nil	The entire area whilst in Excellent condition, was generally historically disturbed with multiple intersecting vehicle access tracks adjacent to the railway line. Additionally, the area had been burnt in 2015 and the vegetation was still responding. Large germination events were observed with cohorts of plants clearly the same height, Mallee's were still re-sprouting from lignotubers and have not flowered since the fire. Generally, the vegetation remained in alternate state (ie. not mature or stable) and would be considered to still be regenerating. Therefore, numerous fire ephemeral species were captured in the survey that would otherwise have been missed.
Identification issues	Minor	The vast majority of species present contained sufficient taxonomic information for identification (such as nuts, fruit, leaf structure or flowers). It is estimated that 90% of species present were flowering. Three species of flora could not be identified.

4. Targeted Flora Survey Outcomes

An additional 107 species of flora were identified during the targeted flora survey, compared to the reconnaissance survey. In summary, across the reconnaissance (ELA, 2021) and targeted flora survey, 171 flora species, consisting of 43 families and 118 genera were found. The most commonly occurring families were Myrtaceae (29 species), Fabaceae (16 species) and Proteaceae (14). There was also a significantly high number of the Poaceae (12 species) and Asteraceae (12 species) species, likely due to a number of fire/disturbance ephemerals, following the 2015 bushfire. 171 species within 3.36ha is considered extremely high biodiversity. The list includes 158 native species (refer to Table A7 Appendix E), and 13 introduced / alien species (Section 4.1).

4.1. Invasive Species

Of the additional 107 flora species recorded within the survey area during the targeted flora survey, 11 species were introduced. Two other invasive species had been identified in the reconnaissance survey (ELA, 2021), namely *Arctotheca calendula* and *Panicum capillare.* The full suite of weed species recorded in reconnaissance (ELA, 2021) and targeted flora survey is listed below in Table 2, with their corresponding ratings under the Environmental Weeds Strategy for Western Australia (CALM, 1999) and the *Biosecurity and Agricultural Management (BAM) Act* (2007). The ratings given under the Environmental Weeds Strategy for Western Australia (CALM, 1999) relate to determining the significance of a weed, based on the criteria of invasiveness, impacts, potential for spread and socioeconomic and environmental values, and can be either 'High', 'Moderate', 'Mild', or 'Low' (CALM, 1999).

All identified species are classed as 'Permitted – s11' under the *BAM Act 2007*. Under the Environmental Weeds Strategy for Western Australia (CALM, 1999) two species were identified as 'High' rating, *Ehrharta calycina* (Perennial Veldt Grass) and *Eragrostis curvula* (African Lovegrass). The remainder were considered moderate (5 species), mild (1 species) and low (2 species) rating (Table 2).

It is strongly recommended that all machinery entering the survey area (if clearing is approved in the future) has rigorous and thorough biosecurity hygiene applied to limit the introduction of invasive species infestation and the potential to significant degrade the surrounding reserve in pristine condition.

Table 2: Weed species recorded from the survey area.

Family	Species	Vernacular	WA Weed Strategy rating (CALM 1999) / BAM Act (2007)
Asphodelaceae	*Asphodelus fistulosus*	Onion Weed	Mild / Permitted-s11
Asteraceae	*Arctotheca calendula*	Cape Weed	Moderate / Permitted-s11
Asteraceae	*Hypochaeris radiata*	Flat Weed	- / Permitted-s11

Table 2 continued.

Family	Species	Vernacular	WA Weed Strategy rating (CALM 1999) / BAM Act (2007)
Asteraceae	*Ursinia anthemoides*	Ursinia	Moderate / Permitted-s11
Brassicaceae	*Heliophila pusilla*		Moderate / Permitted-s11
Chenopodiaceae	*Atriplex prostrata*	Hastate Orache	- / Permitted-s11
Lamiaceae	*Salvia verbenaca*	Wild Sage	Low / Permitted-s11
Poaceae	*Avena fatua*	Wild Oats	Moderate / Permitted-s11
Poaceae	*Ehrharta calycina*	Perennial Veldt Grass	High / Permitted-s11
Poaceae	*Eragrostis curvula*	African Lovegrass	High / Permitted-s11
Poaceae	*Lolium perenne*	Ryegrass	- / Permitted-s11
Poaceae	*Panicum capillare*	Witchgrass	Low / Permitted-s11
Primulaceae	*Lysimachia arvensis*	Pimpernel	Moderate / Permitted-s11

4.2. Threatened Flora: Presence of Conservation Significant Flora and Likelihood of Occurrence (LOO) Assessment

The reconnaissance survey (ELA, 2021) did not directly identify or detect any conservation significant flora within the survey area. Whilst the reconnaissance survey (ELA, 2021) stated that the survey was comprehensive enough to detect all species identified as likely or possible in the desktop assessment completed in the reconnaissance survey, Umwelt (2021) determined in the peer review and risk assessment that nine species were unlikely to have been captured in the survey due to being out-of-season or not captured in the reconnaissance surveys desktop assessment. The scope of this survey was to target these nine species and more broadly the conservation listed flora species identified as possible or likely to occur in the desktop assessment (Section 2.1; Table A1, Appendix B).

Three species of priority three flora were identified during the targeted flora survey, including *Persoonia cymbifolia, Pityrodia chrysocalyx* and *Conostephium marchantiorum* (Figure 2). The desktop assessment has been updated from the results of the reconnaissance survey (ELA, 2021), peer review and risk assessment (Umwelt, 2021) and the targeted survey (Table A1, Appendix B). Further detail is provided for each of the species below sections and summarised in Table 3. Vegetation types described in relation to habitat priority flora recorded in were defined in the reconnaissance survey (ELA, 2021) and are further detailed in Appendix D.

Table 3: Conservation significant flora identified within the survey area during the targeted survey.

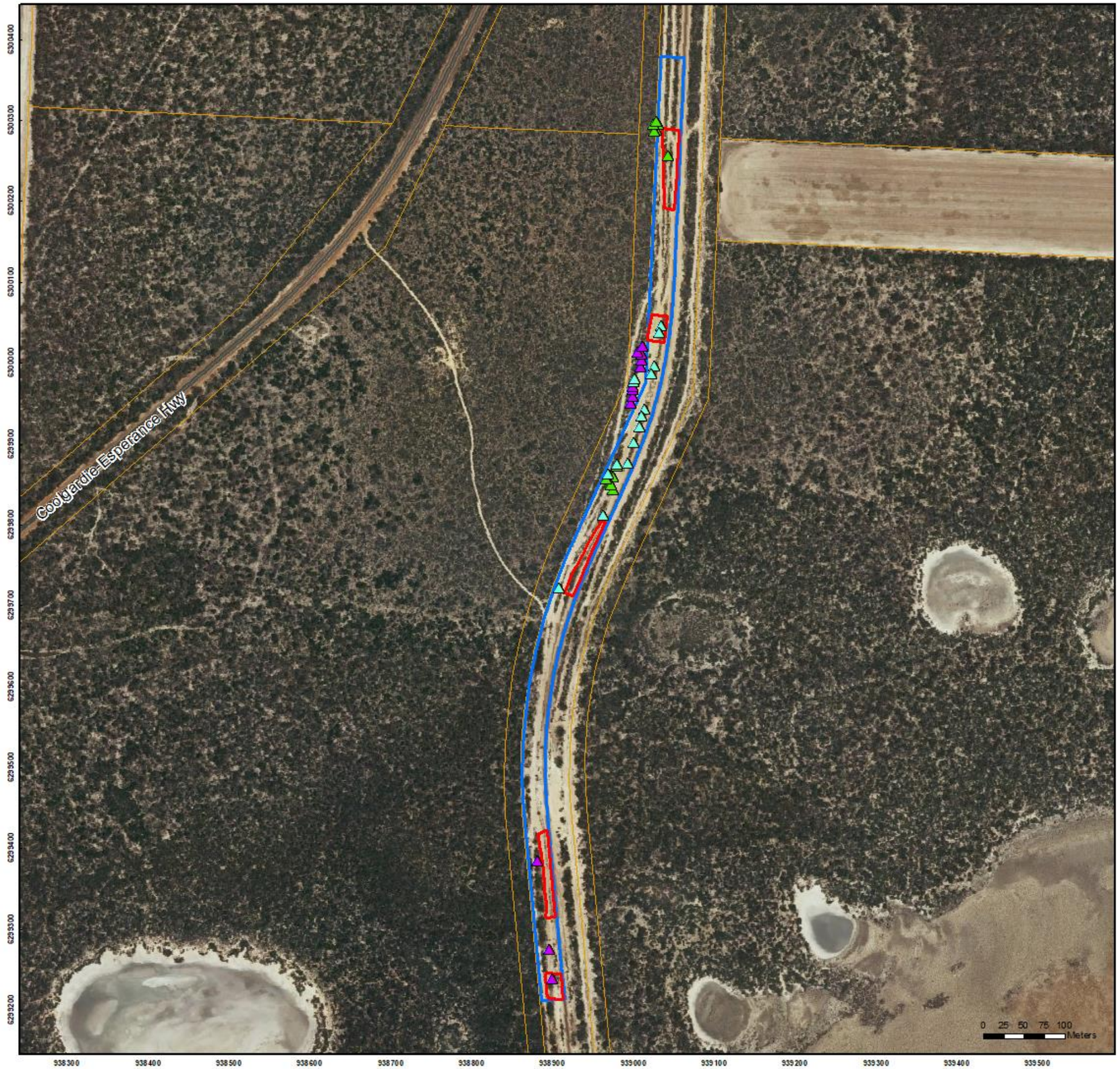
Family	Species	Conservation Code	Population Status	Line KM	Abundance	Impact
Ericaceae	*Conostephium marchantiorum*	P3	New	321.24 to 321.595	62 plants	8 plants – 13%
Lamiaceae	*Pityrodia chrysocalyx*	P3	New	321 and 321.433	71 plants	13 plants – 18.3%
Proteaceae	*Persoonia cymbifolia*	P3	New	321.284 to 321.349 and 321.921 to 322.11	117 plants	2 plants – 0.02%

Plant identification was undertaken through the most relevant, current and available taxonomic literature, keys and herbarium reference specimens available (Blackall & Grieve, 1974; Brophy *et al.* 2013; Brundrett, 2014; Euclid, n.d.; George, 2002; Hammer & Thiele, 2021; Hollister & Thiele, n.d.; Hollister, Lander & Thiele, n.d.; JSTOR, 2000- ; Maslin, 2018; Rye, 2007; van

der Moezel, 1987; Wilkins & Whitlock, 2011; Young, 2021). All resources used were the most current to knowledge. Nomenclature used through this report follows the most recent scientific names through the Western Australian Herbarium.

Two non-threatened species were identified as incidental collection of species through the targeted survey area that bore close similarities to conservation listed species identified as possible or likely to occur in the desktop assessment or recorded within the general region. Rationale on differences to priority species are listed below:

- *Eucalyptus quadrans* (non-threatened) – distinguished from similar *Eucalyptus merrickiae (*T – Vu) by operculum present with an apiculate or slightly beaked shape, oppose to the club, oblong shape of *E. merrickiae*; and
- *Melaleuca plumea* (non-threatened) – distinguished from similar *Melaleuca similis* (P1) due to leaf width being below 1mm, opposed to 2mm width in *M. similis.*



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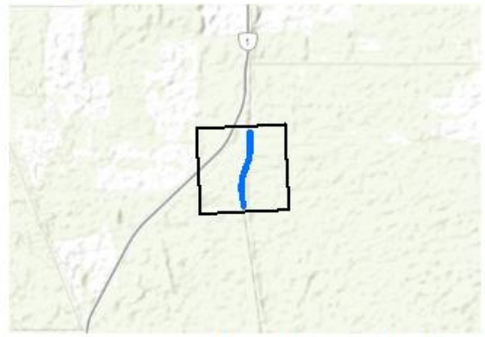

Overview Map Scale 1:100,000

Legend

- Cadastre
- Survey Area
- Area proposed to be cleared

Priority Flora

TaxonName

- Conostephium marchantiorum
- Persoonia cymbifolia
- Pityrodia chrysocalyx

Scale
1:4,583 @ A3
GDA MGA 94 Zone 50

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2017
IRIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012

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Figure 2: Conservation Significant flora

	QA Check	*Drawn by*
	KK	KW
STATUS	*FILE*	*DATE*
FINAL	AI002-002	16/02/2022

***Conostephium marchantiorum*, P3**

62 plants of *Conostephium marchantiorum* were counted directly in the survey area, after being identified as 'likely' to occur in the desktop assessment. This was due to the species being recorded in the general vicinity and suitable habitat of Eucalyptus mallee woodlands adjacent to salt lakes being identified in the reconnaissance report (ELA, 2021). Plants were scattered regularly for 350m between Line KM 321.24 to 321.595, and entirely restricted to Vegetation Type EpHcBp (Appendix D). Of the 62 plants detected, 8 (13%) are to be impacted in the proposed area of clearing.

Due to a new population being recorded, a specimen was previously collected (Figure 3) and submitted to the WA Herbarium for verification of identification (KW159, Accession 9281, retained by WA Herbarium). A threatened and Priority Report Form (TPFL) was submitted with updated population numbers to DBCA Species district Flora Conservation Office (Emma Adams) and Species and Communities Branch on the 12/10/2021.

The plants of *C. marchantiorum* counted represent a partial or an edge survey, with only plants directly located within the survey area counted. It is likely that the population extends more broadly into the surrounding suitable habitat of the adjacent reserve within the vicinity, and the total population number is much higher with impact indicated under-represented. Further surveys may be required to quantify impact of proposed clearing of areas identified in the survey area, within the context of the total population.

The known distribution and records of *C. marchantiorum* within the Australasian Virtual Herbarium (AVH, n.d.) and Florabase (WAH, 1998 -) indicate that *C. marchantiorum* has a total of 59 records, scattered regularly between Gibson (~30 km north of Esperance), north of Salmon Gums (150 km north of Esperance), and west towards Peak Charles region (Figure 4). It has been recorded within the Local Government areas of Esperance, and IBRA subregions of Eastern Mallee and Recherche.

Figure 3: Photo and scanned specimen of *Conostephium marchantiorum* collected within the survey area.

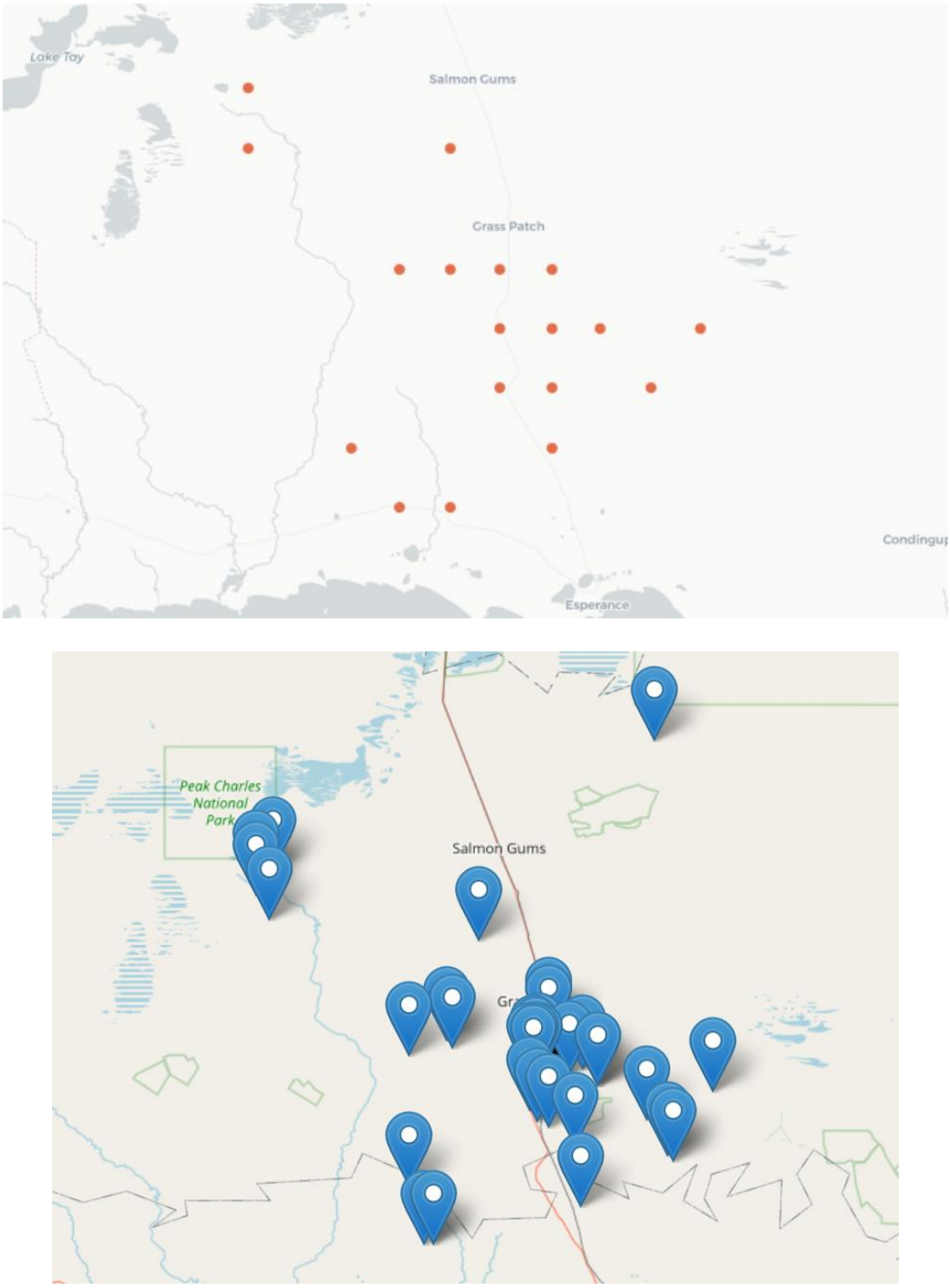

Figure 4: Regional distribution of *Conostephium marchantiroum* (WAH, 1998 -; AVH ref).

***Pityrodia chrysocalyx*, P3**

71 plants of *Persoonia cymbifolia* were counted directly in the survey area, after being identified as 'likely' to occur in the desktop assessment, due to suitable vegetation and soil type present within the survey area and being recorded in the general vicinity. Plants were clustered in two distinct locations, 390m apart from each other. These were specifically located at Line KM 321 and 321.433, and entirely restricted to Vegetation Type EpHcBp (Appendix D). Of the 71 plants detected, 13 (18.3%) plants are to be impacted in the proposed area of clearing.

Due to a new population being recorded, a specimen was previously collected (Figure 5) and submitted to the WA Herbarium for verification of identification (KW158, Accession 9281, retained by WA Herbarium). A threatened and Priority Report Form (TPFL) was submitted with updated population numbers to DBCA Species district Flora Conservation Office (Emma Adams) and Species and Communities Branch on the 12/10/2021.

The plants of *P. chrysocalyx* plants represent a partial or an edge survey, with only plants directly located within the survey area counted. It is likely that the population extends more broadly into the surrounding suitable habitat of the adjacent reserve within the vicinity, and the total population number is much higher. Further surveys may be required to quantify impact of proposed clearing of areas identified in the survey area, within the context of the total population.

The known distribution and records of *P. cymbifolia* within the Australasian Virtual Herbarium (AVH n.d.) and Florabase (WAH 1998 -) indicate that the known *P. cymbifolia* distribution consists of a total of 29 records, located in 120km east-west and 200km north-south distribution, from the Esperance to Norseman area (Figure 6). It has been recorded within the Local Government Areas of Esperance and Dundas, and IBRA subregions of Eastern Goldfield and Eastern Mallee.

Figure 5: Photo and scanned specimen of *Pityrodia chrysocalyx* collected within the survey area.

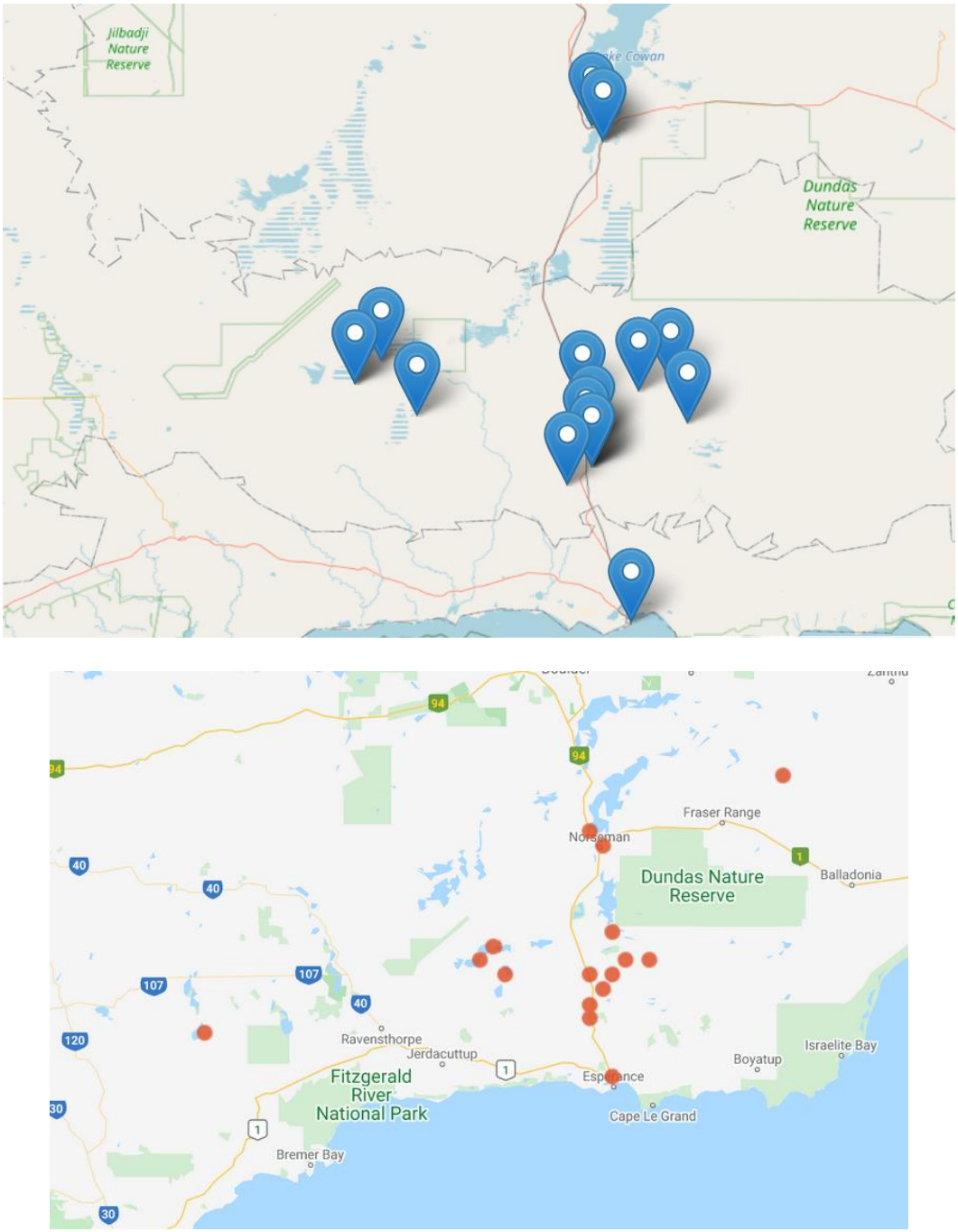

Figure 6: Regional distribution of *Pityrodia chrysocalyx* (WAH, 1998 -; AVH ref).

***Persoonia cymbifolia*, P3**

117 plants of *Persoonia cymbifolia* were counted directly in the survey area, after being identified as 'likely' to occur in the desktop assessment, due to associated vegetation present, suitable soil type and other recent records in the general area. Two distinct clusters of plants were detected within the survey area, approximately 564m apart in both Vegetation Type ElAmCc and EpHcBp (Appendix D). These specifically occurred at Line KM, 321.284 to 321.349 and 321.927 to 322.11. Of the 117 plants detected within the survey area, 2 (0.002%) plants are currently to be impacted in the proposed area of clearing.

Due to a new population being recorded, a specimen was previously collected (Figure 7) and submitted to the WA Herbarium for verification of identification (KW157, Accession 9281, retained by WA Herbarium). A threatened and Priority Report Form (TPFL) was submitted with updated population numbers to DBCA Species district Flora Conservation Office (Emma Adams) and Species and Communities Branch on the 12/10/2021.

The plants of *P. cymbifolia* counted represent a partial or an edge survey, with only plants directly located within the survey area counted. It is likely that the population extends more broadly into the surrounding suitable habitat of the adjacent reserve within the vicinity, and the total population number is much higher. Further surveys may be required to quantify impact of proposed clearing of areas identified in the survey area, within the context of the total population.

The known distribution and records of *P. cymbifolia* within the Australasian Virtual Herbarium (AVH n.d.) and Florabase (WAH 1998 -) indicate that the known *P. cymbifolia* distribution consists of a total of 56 records, located in 300km east-west and 200km north-south distribution, scattered from Cape Arid to Frank Hann and Jilbadji Nature Reserve area. It has been recorded within the Local Government areas of Esperance, Lake Grace and Yilgarn, and IBRA regions of Coolgardie, Esperance Plains and Mallee. See Figure 8.

Figure 7: Photo and scanned specimen of *Persoonia cymbifolia* collected within the survey area.

Figure 8: Regional distribution of *Persoonia cymbifolia* (WAH, 1998 -; AVH ref).

5. Vegetation

As the survey area was larger in the targeted flora survey, compared to the reconnaissance survey (Map A2, Appendix A). The vegetation types identified in the reconnaissance survey (ELA, 2021) were assessed to ensure that they were consistent within the expanded area. This was confirmed, with ElAmCc and EpHcBp vegetation types consistent with vegetation present in the areas not covered by the reconnaissance survey. Boundaries between the two vegetation types are consistent with the area surveyed in the targeted survey.

It is noted that the findings from the reconnaissance survey determined that EpHcBp forms part of the threatened (TEC) and priority (PEC) ecological community 'Proteaceae Dominated Kwongkan Shrublands of the South-east Coastal Floristic Province (Kwongkan)' (Appendix D). The area of Kwongkan TEC/PEC present within the survey area of the reconnaissance survey (ELA, 2021) was 0.05ha. In addition to the survey area being expanded, the specific areas of clearing proposed to occur for laydown bays was formalised. Therefore, a total of 0.35ha of Kwongkan TEC/PEC is proposed to be impacted.

6. Discussion

The scope of this targeted flora survey was to target the nine species identified in the Umwelt (2021) peer review and risk assessment, and incidental collection of possible other conservation flora identified as likely or possible to occur in the desktop assessment. This follows a reconnaissance out-of-season survey (ELA, 2021) and peer review and risk assessment (Umwelt, 2021) being completed and identifying potential gaps in the reconnaissance survey. The environmental surveys completed are used to support a clearing permit application for the survey area.

An additional 107 flora species were identified in the targeted flora survey, resulting in a total of 171 flora species, consisting of 158 native and 13 introduced/alien species being identified. No Weeds of National Significance or Declared Species were identified within the survey area. The site is considered in excellent condition, with extremely high biodiversity and complicated ecological communities.

Three species of priority flora were identified within the survey area, including *Conostephium marchantiorum* (P3), *Persoonia cymbifolia* (P3) and *Pityrodia chrysocalyx* (P3). Due to only being priority listed, a clearing permit meets legislative requirements to impact species and no further approvals are required. All populations were only partially surveyed, with only plants directly within the survey area being counted, and therefore the population may be larger extending into the surrounding reserve. However, a measure of impact is evaluated as clearing is only proposed within 0.49 of the 3.36ha area. Population impacts and further species dynamics are summarised in Table 3. The highest impact proposed is to *P. chrysocalyx,* with 18.3% of plants proposed to be cleared.

Additionally, vegetation types (EpHcBp and ElAmCc) identified in the reconnaissance survey (ELA, 2021) were confirmed to be consistent with the larger survey area surveyed in the targeted flora survey (Appendix D). EpHcBp had been assessed in the reconnaissance survey as priority (P3) and threatened (En) ecological community 'Proteaceae Dominated Kwongkan Shrublands of the South-east Coastal Floristic Province (Kwongkan)' (Appendix D). Due to changes in the survey area and final delineation of laydown areas, the total impact to Kwongkan increased to 0.35ha.

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8 Appendices

Appendix A – Maps

Appendix B – Conservation Significant Values Likelihood of Occurrence Analysis

Appendix C – Conservation Status Definitions and Condition Scale

Appendix D – Vegetation Types identified and the ecological community desktop assessment completed in the reconnaissance survey (ELA, 2021)

Appendix E – Species Lists and Relevé Data

Appendix F - DBCA Threatened and Priority Reporting (TPFL) Forms

Appendix G – Letter of Authority for Arc Infrastructure

Appendix A

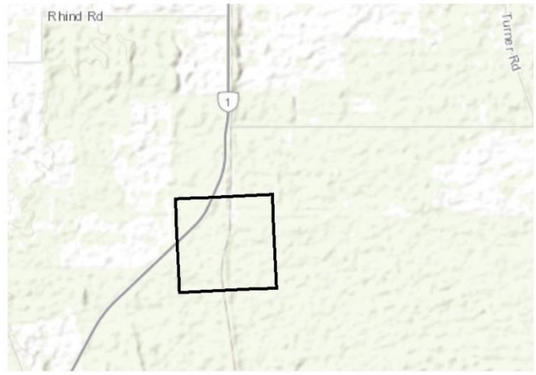
Maps

Albany Office:
29 Hercules Crescent
Albany, WA 6330
(08) 9842 1575

Denmark Office:
7/40 South Coast Highway
Denmark, WA 6333
(08) 9848 1309

Esperance Office:
2A/113 Dempster Street
Esperance, WA 6450
(08) 9072 1382

BIO DIVERSE SOLUTIONS



Overview Map Scale 1:100,000

Legend

- Survey Area
- Cadastre

Scale
1:4,500 @ A3
GDA MGA 94 Zone 50

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2017
IRIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012

CLIENT
Arc Infrastructure
Line 51 KM 320.9-322.1, Site 6
Esperance, WA 6450

Map A1: Survey Effort

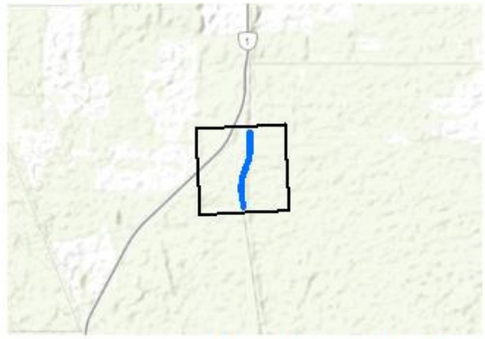
	QA Check	Drawn by
	BT	CV
STATUS	FILE	DATE
FINAL	AI002-002	01/02/2022

Albany Office:
29 Hercules Crescent
Albany, WA 6330
(08) 9842 1575

Denmark Office:
7/40 South Coast Highway
Denmark, WA 6333
(08) 9848 1309

Esperance Office:
2A/113 Dempster Street
Esperance, WA 6450

BIO DIVERSE SOLUTIONS



Overview Map Scale 1:100,000

Legend

- Cadastre
- Survey Area - Targeted Survey
- Survey Area - Reconnaissance Survey

Scale
1:4,583 @ A3
GDA MGA 94 Zone 50

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2017
IRIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012

CLIENT
Arc Infrastructure
Line 51, KM 320.9-322.1, Site 6
Esperance, WA 6450

Map A2: Survey Area Differences Map

	QA Check	Drawn by
	KK	KW
STATUS	FILE	DATE
FINAL	AI002-002	16/02/2022

Appendix B

Conservation Significant Values - Likelihood of Occurrence Analysis

Table A1: Potential conservation significant flora located within 10km of the survey area and likelihood of occurrence analysis (post survey).
NB - Species are sorted by likelihood of presence.

Numerous resources were used in the likelihood of occurrence assessment and desktop survey (Briggs & Johnson, 2001; Brophy, Craven & Doran 2013; Euclid, n.d.; Hislop, 2013; Maslin, 2018; JSTOR, 2000 - ; van der Moezel, 1987; VicFlora, 2022).

Family	Species	Vernacular	Status (WA)	Description- Species	Description - Habitat	Peak Flowering period	Likelihood Analysis - BDS	Flora Survey Outcome	Likelihood Analysis - ELA Australia	Likelihood Analysis - Umwelt
Ericaceae	***Conostephium marchantiorum***		**P3**	**Erect, much branched shrub. 0.4-1.8 m high. Red, purple, brown and yellow flower. Bright green and hairy leaves.**	**White/grey or light-yellow sand. Plains on edges of salt lakes, plains, creek lines. Open Mallee and scrub heath communities.**	**Mar or Jul or Nov**	**Likely - recorded in general area, suitable habitat of Eucalyptus Mallee woodlands mapped in recon report. Surrounding salt lakes indicated suitable habitat.**	**Detected - KW159, Accession 9281.**	**Likely - suitable habitat occurs within survey area. Multiple recent records around margin of Truslove Nature Reserve (most recent 2002).**	
Lamiaceae	***Pityrodia chrysocalyx***		**P3**	**Erect, branched shrub, 0.3-0.75(-1) m high. Fl. White**	**Sandy soils. Sandplains, gentle slopes, edges of salt lakes. In Heathland/mallee Woodland.**	**Aug to Oct.**	**Likely - suitable vegetation and soil type present and recorded in general vicinity.**	**Detected - KW158, Accession 9281.**	**Potential - Suitable habitat occurs within survey area. No recent records, nearest ~3km NW (1976).**	
Proteaceae	***Persoonia cymbifolia***		**P3**	**Erect, spreading shrub, 0.20.6 (1) m high. Flowers yellow.**	**Sandy soils. On flats or in rock crevices.**	**Dec or Jan**	**Likely - suitable vegetation and soil type present and recorded in direct vicinity.**	**Detected - KW157, Accession 9281.**	**Likely - Suitable habitat occurs within survey area. Two recent records in Truslove Nature Reserve (2001, 2002).**	
Myrtaceae	*Eucalyptus merrickiae*	Goblet Mallee	T - Vu	Mallee, 2-4(6) m high. Bark rough and flaky. Distinguished by extremely red bud caps. Silver sheen to leaves.	Sandy clay, grey sand. Associated strongly with salt lakes in the Scaddan to Salmon Gums area, Esperance.	Aug to Nov	Highly Likely - associated vegetation type and soil type, and recorded in direct vicinity.	Not detected - Numerous Mallee trees present. Single species bearing similarity, but identified as non-threatened Eucalyptus quadrans.	Likely - Suitable habitat occurs within survey area. Recent records within Truslove Nature Reserve (2009).	
Fabaceae	*Acacia diminuta*		P1	Intricately branched, spreading or glabrous shrub to 0.2 m high. Flowers yellow-cream.	Sandy clay or sandy loam. Sometimes over shallow ironstone gravel. Occurs 200km from West River to west of Truslove Nature Reserve. Shrub mallee.	Oct to Nov	Highly likely - recorded in general vicinity of site, and suitable habitat present.	Not detected	Potential - Suitable habitat occurs within survey area. One older record within Truslove Nature Reserve (1987).	High risk of taxon being present in study area - suitable habitat present, nearby records and moderate suitability for species range
Fabaceae	*Aotus* sp. Dundas (M.A. Burgman 2835)		P2	Rounded shrub to 0.5 - 0.8 m tall, orange, yellow to red flowers. Can be prostrate, woody shrub.	Upslope from salt lake, sandplains. Sandy or white limestone soils. Associated with disturbance. Open shrub mallee.	Nov to Dec	Highly likely - recorded in general vicinity of site, and suitable habitat present.	Not detected		
Goodeniaceae	*Goodenia laevis* subsp *laevis*		P3	Erect, woody shrub or subshrub. 0.1-0.25 m high. Largest leaves 15-25 x 1-3 mm, entire. Flowers yellow.	Brown sandy loam or clay, underlying geology of limestone, gypsum content or laterite. On flats or plains. Often associated strongly with disturbance and road verges. Often associated with Acacia, *Bossiaea leptacantha, Eucalyptus dissimulata* and *Grevillea huegelii.*	Aug to Dec	Highly likely - associated with disturbance and suitable soil type and associated vegetation present in reconnaissance report (ELA,2021).	Not detected	Potential - Some suitable habitat may occur within survey area. One record within Truslove Nature Reserve (1982).	High risk of taxon being present in study area - moderate suitability of habitat present and present within species range, and high likelihood due to nearby records.

Table A1 continued.

Family	Species	Vernacular	Status (WA)	Description- Species	Description - Habitat	Peak Flowering period	Likelihood Analysis - BDS	Flora Survey Outcome	Likelihood Analysis - ELA Australia	Likelihood Analysis - Umwelt
Araliaceae	*Trachymene anisocarpa* var *trichocarpa*	Native Parsnip	P3	Upright, spreading annual, herb, 0.3-1.5 m high. Peduncles up to 140 mm long. Distinguished by hairlike bristles on the fruits. Flowers blue-white.	Flat, dry, brown sand loam. Potentially on granite. Eucalyptus woodland with mixed shrub understorey. Associated species of Acacia, *Melaleuca uncinata*, Pimelea, Dodonaea and Cassytha sp. Often associated with recently burnt or disturbed.	Oct to Nov.	Highly likely - Incidental species list from Reconnaissance report includes all associated species. Surrounding area additionally burnt. Significant limitations without flowering in previous reconnaissance survey (ELA, 2021).	Not detected		Moderate risk of taxon being present in survey area - moderate suitability of habitat, proximity of nearby record and suitability of survey site with species range.
Fabaceae	*Acacia bartlei*		P3	Erect shrub or tree from 1.5-7 m tall. Narrow phyllodes, oblong to elliptic. Glabrous. Pods linear 20-65 mm long, 2.5-3.5 mm wide.	Flat or gently undulating landscape. Waterlogged depressions in brown or grey, sandy loam or clay-loam or in grey sand over clay adjacent to depressions. Tolerates level of salinity.	Late June to Mid Oct	Highly likely - recorded in general vicinity of site, and suitable habitat present.	Not detected	Likely - Suitable habitat occurs within survey area. Recent record ~2km to N (2002).	
Fabaceae	*Acacia euthyphylla*		P3	Shrub, 0.7-2 m high. Flowers yellow.	Grey/white sand, clay loam. Margins of salt lakes and marshes. Seasonal swamps in tall Myrtaceous shrubland and Mallee Woodland.	Aug to Sept	Highly likely - recorded in general vicinity of site, and suitable habitat present.	Not detected	Likely - Suitable habitat occurs within survey area. One record within Truslove Nature Reserve (1985). Nearest recent record ~10km to S (2007).	
Euphorbiaceae	*Stachystemon vinosus*		P4	Compact shrub, to 0.1 m high. Flowers purple - red/white.	Fine loamy sand, stony soils. Sandplains, rock crevices on breakaways.	Sep to Nov	Highly likely - suitable habitat and vegetation type present.	Not detected		
Thymelaeaceae	*Pimelea pelinos*		P1	Erect, scraggly shrub, 0.3-0.6 m high. Flowers Cream	Sandy clay, salt lakes.	Jun to Jul	Likely - recorded in direct vicinity and potential suitable habitat and soil type present.	Not detected		
Ericaceae	*Leucopogon remotus*		P1	Woody shrub of 1 m high x 8 m wide.	Associated with mixed woodlands and variety of soil types. Sand or sandy loam. Slopes, flats or edges of plains near salt lakes.	Jul	Likely - recorded in general area wide range of suitable habitat and soil types.	Not detected		Moderate risk of taxon being present in survey area - moderate suitability of habitat, proximity of nearby record and suitability of survey site with species range.
Euphorbiaceae	*Beyeria physaphylla*		P1	Shrub, to 0.5 m high. Scraggly. Flowers axial, separate male and female flowers.	Restricted to Scaddan. Grows in Mallee Eucalypt with *Melaleuca, Hakea* and *Leptospermum* sp. On grey sandy soil on edge of salt lakes.	Sept	Likely - recorded in general vicinity and suitable associated vegetation present. Beyeria sp. Identified without being identified to species level in reconnaissance survey (ELA, 2021).	Not detected		
Ericaceae	*Conostephium uncinatum*		P2	Erect shrub, 0.5-1.4 m high.	Deep sandy soils. Edges of salt lakes, undulating plains, claypans.	June	Likely - recorded in general area, suitable habitat of Eucalyptus Mallee woodlands mapped in recon report. Surrounding salt lakes indicated suitable habitat.	Not detected		

Table A1 continued.

Family	Species	Vernacular	Status (WA)	Description- Species	Description - Habitat	Peak Flowering period	Likelihood Analysis - BDS	Flora Survey Outcome	Likelihood Analysis - ELA Australia	Likelihood Analysis - Umwelt
Ericaceae	*Astroloma* sp. Grass Patch (A.J.G. Wilson 110)		P2	Multi-stemmed, domed shrub. 0.2-0.4 m high. Red flowers. Flowers facing upwards, very skinny leaves.	White/grey sand, edge of salt lake in Melaleuca thickets.	June to August	Likely - recorded in general area, suitable habitat present in ElAmCc habitat mapped in reconnaissance report (ELA, 2021).	Not detected		
Myrtaceae	*Eucalyptus foliosa*		P3	Mallee to 4 m high, bark smooth	Grey/white sandy clay. Flats adjacent to salt lake. Distribution between Grass Patch and Gibson.	Recorded in Mar, Jun, Nov and Dec	Likely - associated vegetation type and soil type, and recorded in general area.	Not detected	Likely - suitable habitat occurs within survey area. Several recent records ~10-15km to SW (2003).	
Fabaceae	*Acacia glaucissima*		P3	Dense, bushy shrub, 0.3-1.5 m high. Flower yellow.	Sand or clay. Flats, low-lying areas.	September	Likely - distribution generally further north of site, but suitable soil and vegetation association present at site.	Not detected		
Ericaceae	*Brachyloma mogin*		P3	Compact shrub, 0.4 m high. Flowers red/pink/white.	Grey clayey sand. Swamp flat. Open woodland in areas that become inundated in winter. Field observations occur on sand banks surrounding salt lakes.	June	Likely - recorded in general area, suitable habitat of Eucalyptus Mallee woodlands mapped in recon report. Surrounding salt lakes indicated suitable habitat.	Not detected	Potential - Suitable habitat occurs within survey area. Nearest recent record ~25km to S (2009).	
Proteaceae	*Isopogon alcicornis*	Ellkhorn Coneflower	P3	Low, lignotubers shrub, 0.3-0.5 m high to 0.6 m wide. Flowers yellow, white, pink. Distinctive shaped leaves forming cluster. No distinct stems.	Sandy soils, skeletal loam, sandhills, sandplains.	Oct to Dec or Feb	Likely - suitable vegetation and soil type present and recorded in direct vicinity.	Not detected	Potential - Suitable habitat occurs within survey area. No recent nearby records, nearest are two records ~12km to SW (1982, 1992).	
Scrophulariaceae	*Eremophila chamaephila*	Earth Loving Eremophila	P3	Low, dome shaped Shrub, 0.1-0.25 m high. 0.2-0.8 m wide. Flowers blue-purple.	White sand, clay or sandy clay. Sandplains, flats and disturbed road verges. Sometimes winter wet. Associated with Eucalyptus woodlands.	Nov to Dec	Likely - suitable vegetation and soil type present and recorded in general vicinity.	Not detected	Potential - Suitable habitat occurs within survey area. No recent nearby records; nearest ~5km to N (1992).	High risk of taxon being present in study area - moderate suitability of habitat present and present within species range, and high likelihood due to nearby records.
Scrophulariaceae	*Eremophila compressa*	Wispy Eremophila	P3	Erect, often spindly shrub, 0.5-0.7(2) m high. Flower white-cream.	Red brown clay or clay loam, sandy loam. Undulating plains.	Oct to Dec or Mar	Likely - suitable vegetation and soil type present and recorded in general vicinity.	Not detected	Potential - some suitable habitat may occur within survey area. Only one nearby record ~4km to NW (2016).	
Fabaceae	*Bossiaea flexuosa*		P3	Compact shrub to 0.6 m high. Flower yellow-orange-red-brown.	Deep sandy soil.	Sept to Nov	Likely - wide distribution and suitable soil and vegetation type present.	Not detected		
Myrtaceae	*Eucalyptus dolichorhyncha*	Fuchsia Gum	P4	Mallee or tree, 1-5 m high. Flowers yellow. Distinct elongated operculum bud caps, differentiating from non-threatened *Eucalyptus forrestiana*.	White or yellowish sandy clay or clay. Flats or slightly rising ground. Mallee Woodlands.	Jan to Mar or May	Likely - associated vegetation type and soil type, and recorded in general area.	Not detected	Likely - Suitable habitat occurs within survey area. One record within Truslove Nature Reserve (1972), nearest recent record ~3km to N (2004).	

Table A1 continued.

Family	Species	Vernacular	Status (WA)	Description- Species	Description - Habitat	Peak Flowering period	Likelihood Analysis - BDS	Flora Survey Outcome	Likelihood Analysis - ELA Australia	Likelihood Analysis - Umwelt
Proteaceae	*Grevillea baxteri*	Cape Arid Grevillea	P4	Erect to spreading shrub. 0.8-4 m high. Large and bushy form. Toothbrush grevillea form, flower colour yellow-orange-brown-red.	Sand, sandplains, often acidic soils. Wide associated vegetation type; scrubby heathland. Often associated with gravel or overlying heavier soils.	Feb or May to Jul or Sept to Dec	Likely - suitable vegetation and soil type present and recorded in direct vicinity.	Not detected	Likely - Suitable habitat occurs within survey area. Nearest recent record ~8km S (2004).	
Proteaceae	*Grevillea aneura*	New Names Grevillea	P4	Dense, prickly shrub, 0.5-2.8 m high. Flower red.	Sand, sandy clay, gravel.	Jun or Aug to Dec or Jan	Possible - distribution generally further north of subject site, but potential suitable habitat present.	Not detected		
Lamiaceae	*Dicrastylis archeri*		P1	Erect, spindly shrub, 0.4-1 m high. Inflorescence with scale-like indumentum; upper-leaf surface glabrous; stamens usually 4. Flowers cream-white.	White sand. Open Mallee.	Nov to Dec	Possible - extremely wide range and distribution. Associated vegetation present, per vegetation mapping in recon report.	Not detected		
Proteaceae	*Adenanthos ileticos*	Club Leaf Adenanthos	P1	Diffuse, lignotuberous shrub, 0.7-2 (3) m high. Flowers pink and cream/yellow.	Distribution 115km, from Salmon Gums in the west to north of Beaumont in east. Within Salmon Gum woodland. Sand or sandy loam. Slopes, dunes, upslopes of salt lakes.	Mar or Jul to Oct or Dec	Possible - generally recorded further north of site but potential suitable habitat present.	Not detected		Moderate risk of taxon being present in survey area - moderate suitability of habitat and proximity of nearby record. Low suitability of survey site with species range.
Myrtaceae	*Darwinia* sp. Gibson (R.D. Royce 3569)		P1	Compact shrub to 0.4 m high. Flowers yellow/orange. Small succulent looking shrub.	Grey-brown sandy clay and white sand on margins of salt lakes and road verges. Common on sandy rises immediately around normally dry lakes.	Jun to July	Possible - recorded in buffer vegetation around salt lakes, not directly occurring in subject site mapped vegetation but in surrounds and may extend into area.	Not detected	Likely - Suitable habitat occurs within survey area. Several recent records ~20km SE (2003, 2006).	
Frankeniaceae	*Frankenia brachyphylla*	Short Leaved Frankenia	P2	Small, decumbent shrub. Flower white/pink.	Salt Lake margins	Nov	Possible - minimal records and wide distribution recorded. However, generally significantly further north distribution to Salmon Gums region.	Not detected		
Myrtaceae	*Melaleuca viminea* subsp. *appressa*		P2	Spreading shrub, 1.3-4.5 m high. Flowers white-cream.	Shallow sand over clay. Near creeks or wet depressions.	Sept to Oct	Possible - extremely wide range and distribution. Associated vegetation present, per vegetation mapping in reconnaissance report (ELA, 2021).	Not detected		
Rhamnaceae	*Spyridium mucronatum* subsp. *multiflorum*		P2	Erect or spreading shrub, 0.15-0.6 m high. Fl. white-cream-yellow	Gravelly loam or clay.	Oct to Dec or Jan.	Possible - extremely wide range and distribution. Associated vegetation present, per vegetation mapping in reconnaissance report (ELA, 2021).	Not detected		

Table A1 continued.

Family	Species	Vernacular	Status (WA)	Description- Species	Description - Habitat	Peak Flowering period	Likelihood Analysis - BDS	Flora Survey Outcome	Likelihood Analysis - ELA Australia	Likelihood Analysis - Umwelt
Araliaceae	*Hydrocotyle tuberculata*	Bumpy Fruited Pennywort	P2	Small herb, 1-3 cm high, 2-4 cm wide, reddish green colour. Simple umbel flowers.	Low shrubs and samphire with *Disphyma* and *Wilsonia humil*is. Full sun area.	Oct	Possible - potential associated vegetation present.	Not detected		
Fabaceae	*Acacia amyctica*		P2	Erect, bushy, pungent shrub, 0.7-1.5 m high. Flower yellow.	Sandy loam or clay. Flats.	Recorded in Apr and Sept	Possible - generally distribution further north of subject site, and in dense Mallet woodlands lacking in associated vegetation recorded in reconnaissance report (ELA, 2021).	Not detected		
Asteraceae	*Microseris walteri*	Murnong	P3	Perennial herb, 15-50 cm high. Leaves linear to oblanceolate. Yellow flower.	Wide range of habitat, most common in dry, open forest.	Sept and Oct	Possible - extremely wide range and distribution. Associated vegetation present, per vegetation mapping in reconnaissance report.	Not detected		
Goodeniaceae	*Dampiera sericantha*		P3	Erect, slender perennial, herb, 0.05-0.3(-0.6) m high, stems with blunt angles. Fl. Blue.	Sand, sometimes with gravel. Plains. Associated with disturbance.	May or Aug to Dec.	Possible - generally distribution further south of subject site. Suitable soil type present of white sands.	Not detected		
Myrtaceae	*Kunzea salina*		P3	Low shrub <1 m. Very small leaves. Spreading shrub. Flowers white.	Adjacent to salt lake periphery in low shrub margin. Winter wet lowlands with grey/white and sands and clay. Saline water bodies. Low heathland.	Dec to Jan	Possible - recorded in buffer vegetation around salt lakes, not directly occurring in subject site mapped vegetation but in surrounds and may extend into area.	Not detected	Likely - Suitable habitat occurs within survey area. One record within Truslove Nature Reserve (1992), nearest recent record ~12km to SE (2004).	
Myrtaceae	*Melaleuca dempta*		P3	Shrub, 0.2-0.6 m high. White cream flower. Rounder and more circular leaves to similar non-threatened *Melaleuca calycina*.	Shrubland and mallee. White clayey soils. Sometimes recorded on salt lakes.	Aug	Possible - recorded in buffer vegetation around salt lakes, not directly occurring in subject site mapped vegetation but in surrounds and may extend into area.	Not detected	Potential - Suitable habitat occurs within survey area. Nearest records ~10km to SE are older (1982, 1995).	
Fabaceae	*Acacia improcera*		P3	Spreading, spiny shrub, 0.15-0.4 m high. Flowers yellow.	Sand, loamy clay, clay. Undulating plains, flats.	Aug	Possible - wide distribution, potential suitable soil type and habitat present at the site.	Not detected		
Restionaceae	*Desmocladus biformis*		P3	Rhizomatous, densely tufted perennial, herb (sedge-like), 0.1-0.2 m high.	Sand, sandy clay, lateritic soils. Dry sites.	Sep to Oct.	Possible - generally records significantly further west but single record in general vicinity.	Not detected		
Ericaceae	*Styphelia rotundifolia*		P3	Erect, compact shrub to 1.5 m high x 1.5 m wide. Flowers cream and erect.	Mixed heath and shrublands. Mostly recorded in coastal areas.	April	Possible - mostly recorded coastal, but nearby associated record. Shrublands recorded in vegetation associations.	Not detected		
Asteraceae	*Haegiela tatei*		P4	Ascending to erect annual, herb, 0.02-0.08 (0.2) m high. Flowers white-yellow.	Clay, sandy loam, gypsum in saline areas or claypans. Edges of plains of or upslope of salt lakes. Samphire flats, halophytic shrubland or low chenopod shrubland.	Aug to Nov	Possible - potential suitable soil type and recorded in nearby vicinity.	Not detected	Potential - Some suitable habitat may occur within survey area. Only one nearby older record ~4km to E (1984).	Moderate risk of taxon being present in survey area - high likelihood due to proximity of records, moderate suitability of species range and low suitability of habitat present.

Table A1 continued.

Family	Species	Vernacular	Status (WA)	Description- Species	Description - Habitat	Peak Flowering period	Likelihood Analysis - BDS	Flora Survey Outcome	Likelihood Analysis - ELA Australia	Likelihood Analysis - Umwelt
Myrtaceae	*Darwinia polycephala*		P4	Diffuse shrub, 0.1-0.5 m high. Flowers red-purple.	Sand, clay or clayey sand. Flats near Salt Lakes, edges or dunes upslope of salt lakes. Shrub and Mallees, with herbs and sedges.	Mar or May to Jul or Sept	Possible - recorded in buffer vegetation around salt lakes, not directly occurring in subject site mapped vegetation but in surrounds and may extend into area.	Not detected	Likely - Suitable habitat occurs within survey area. One record within Truslove Nature Reserve (1984), nearest recent record ~12km to E (2006).	High risk of taxon being present in study area - moderate suitability of habitat present and present within species range, and high likelihood due to nearby records.
Myrtaceae	*Melaleuca fissurata*		P4	Shrub, 0.5-2 (4) m. Flowers white/yellow.	White/grey sand or aeolian loamy sand, well drained. Margins of salt lakes, samphire flats, drainage lines, and salt pans. Open shrub Mallee and tall Shrubs.	Jul to Aug	Possible - recorded in buffer vegetation around salt lakes, not directly occurring in subject site mapped vegetation but in surrounds and may extend into area.	Not detected	Potential - Some suitable habitat may occur within survey area. One record within Truslove Nature Reserve (1984), one on margin (1992). Nearest recent records ~5km to NE (2004, 2009).	
Myrtaceae	*Cyathostemon* sp. Salmon Gums (B. Archer 769)		P3	Shrub, 2-4 m tall. Leaves pointed. Flowers white; free part of stamens longer than fused part.	Shrubland. Salt Lake Margin. Sandy gravel.	Sept - Oct	Unlikely - distribution of records significantly further north of subject sites, towards Salmon Gums.	No suitable habitat		
Myrtaceae	*Darwinia* sp. Mt Ragged (S. Barrett 663)		P2		Brown loamy sand, quartzite, granite. Outcrops, steep ridges, rocky slopes.	Jul or Dec	Unlikely - distribution restricted to Cape Arid and second population significantly west of subject site.	No suitable habitat		
Proteaceae	*Conospermum sigmoideum*		P2	Erect shrub, 0.2-0.5 m high. Flower blue.	Aug to Sept	Yellow Sand	Unlikely - distribution significantly north-west of site towards Peak Charles and Frank Hann National Park.	No suitable habitat		
Scrophulariaceae	*Eremophila lactea*	Milky Emu Bush	T - Cr / En (EPBC)	Spindly, erect shrub, 0.3-0.8 m high. Fl. white/white-pink.	Sandy loam or clay loam. Flat plains. Known disturbed areas (eg. road verges) on low lying sand-loam flats. Habitat is *Eucalyptus* (including Mallees) woodland over a range of shrubs	Jul to Nov	Unlikely - extremely restricted and endemic distribution in western Grass Patch region.	No suitable habitat	Potential - suitable habitat occurs within survey area. Nearest record ~25 km to NW (2018).	
Fabaceae	*Daviesia pauciflora*		P3	Diffuse, many stemmed, sprawling shrub. 0.3-0.8 m high. Lacking formal leaves. Flowers Yellow and red.	White or grey sand over laterite or limestone. Flats. Associated with deep sands, often with *Banksia speciosa* or Kwongkan shrublands.	Oct to Dec or Jan	Unlikely - lack of suitable soil type and associated *Banksia speciosa* present.	No suitable habitat		
Euphorbiaceae	*Ricinocarpos trichophorus*	Barrens Wedding Bush	T - Vu / En (EPBC)	Erect, openly branching shrub, 0.3-1 m high. Fl. White.	Sandy clay, loam. Breakaways, among sandstone rocks.	May or Aug to Sep	Unlikely - lack of suitable soil type or vegetation present.	No suitable habitat	Unlikely - no suitable habitat occurs within survey area. Nearest recent record ~75 km to SW (2000).	
Goodeniaceae	*Goodenia turleyae*		P1	Annual herb, 0.03-0.04 m high. White or grey-brown sand over clay, yellow-brown gravelly clay and granite.	Moist sheltered areas near salt lakes.		Unlikely - recorded directly on sale lake beds, which isn't recorded in subject site.	No suitable habitat		
Myrtaceae	*Eucalyptus misella*		P1	Mallee, 1-3 m high. Bark smooth. Flowers cream.	White, yellow or grey sand. Low lying sandplain.	Nov	Unlikely - restricted to sandplains south of Peak Charles.	No suitable habitat		

Table A1 continued.

Family	Species	Vernacular	Status (WA)	Description- Species	Description - Habitat	Peak Flowering period	Likelihood Analysis - BDS	Flora Survey Outcome	Likelihood Analysis - ELA Australia	Likelihood Analysis - Umwelt
Dilleniaceae	*Hibbertia turleyana*		P2	Procumbent shrub to 0.2 m high, to 0.35 m wide. Flowers yellow.	Dry white sand. Flats, seasonally wet areas.	August	Unlikely - vast majority of records significantly further south in subcoastal sandplains.	No suitable habitat		
Araliaceae	*Hydrocotyle asterocarpa*	Starry Pennywort	P2	Small annual herb, trilobed and toothed leaves. Bright green with purple stem.	Sandy loam soils on margins of inland salt lakes, in low open shrubland often in sheltered positions of *Tecticornia* and *Frankenia* sp. Common on salt lakes and winter-wet flats between Salmon gums and Scaddan.	Winter annual - Sept to Nov	Unlikely - vegetation associations mapped in recon didn't include direct salt lake periphery veg.	No suitable habitat	Potential - some suitable habitat may occur within survey area. One record within Truslove Nature Reserve (1992). Recent records ~10km to E and S (2018).	
Araliaceae	*Hydrocotyle papilionella*	Butterfly Pennywort	P2	Annual herb, stem erect to ascending and pale green to reddish greens. Leaves trilobed. Flowers pale pink to crimson. Winter annual.	Damp loam soils surrounding the margins of inland salt lakes and in damp granitic sandy loam surrounding exposed granite outcropping.	Sept to Nov	Unlikely - vegetation associations mapped in recon didn't include direct salt lake periphery veg.	No suitable habitat		
Chenopodiaceae	*Tecticornia indefessa*		P2	Prostrate, perennial shrub, 0.05-0.15 m high.	White to brown-grey sand. Near the edges of salt lakes.		Unlikely - vegetation associations mapped in recon didn't include direct salt lake periphery veg.	No suitable habitat		
Proteaceae	*Lambertia echinata* subsp. *Echinata*	Prickly Honeysuckle	T - En	Prickly, much branched, non-lignotuberous shrub. 1.5 m high. Flower orange, red to pink. Leaves with tridentate shape.	Gravely sandy loam, brown sandy loam, white grey sand, granite, laterite. Entirely restricted or known from Cape Le Grand National park.	Sept to Oct	Highly unlikely - distribution restricted entirely to Cape Le Grand and lack of suitable soil types present.	No suitable habitat		
Haemodoraceae	*Anigozanthos bicolor* subsp. *minor*	Small Two-Coloured Kangaroo Paw	T - Vu / En (EPBC)	Rhizomatous, perennial, herb, 0.05-0.2 m high. Fl. Green & red.	White Sand. Well-watered or winter-wet sites. Subcoastal freshwater sumps, off granite. Moist sandy soils in heath communities dominated by *Thryptomene, Borya* sp, *Leptospermum* sp. and *Diuris laxiflora* and in shallow soils over granite.	Aug to Oct	Highly unlikely - lack of suitable granitic or freshwater habitat present.	No suitable habitat	Potential - Suitable habitat occurs within survey area. No recent nearby records (nearest ~50km to SW, 1963).	Moderate risk of taxon being present in survey area - low suitability of habitat and proximity of nearby record. Moderate suitability of survey site with species range.

Appendix C

Conservation Status Definitions and Condition Scale

Table A2: Conservation code definitions for flora as listed as threatened or specially protected.
Threatened, Extinct and Specially Protected fauna or flora are species which have been adequately searched for and are deemed to be, in the wild, threatened, extinct or in need of special protection, and have been gazetted as such.

Threat Category	Definition
Threatened - Critically endangered species (CR)	Facing an extremely high risk of extinction in the wild in the immediate future
Threatened - Endangered species (EN)	Facing a very high risk of extinction in the wild in the near future
Threatened - Vulnerable species (VU)	Facing a high risk of extinction in the wild in the medium-term future
Threatened - Extinct (EX)	There is no reasonable doubt that the last member of the species has died
Threatened – Extinct in the wild (EW)	Species is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; and it has not been recorded in its known habitat or expected habitat, at appropriate seasons, anywhere in its past range, despite surveys over a time frame appropriate to its life cycle and form.

Table A3: Conservation code definitions for flora as listed as Priority.

Possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3.

Threat Category	Definition
Priority 1: Poorly-known species	Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation.
Priority 2: Poorly-known species	Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation.
Priority 3: Poorly-known species	Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat.
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 are close to qualifying for vulnerable but are not listed as Conservation Dependent. (c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

Table A4: Conservation code definitions for ecological communities listed as threatened (TEC).

Threat Category	Definition
Presumed Totally Destroyed (PD)	An ecological community that has been adequately searched for but for which no representative occurrences have been located. The community has been found to be totally destroyed or so extensively modified throughout its range that no occurrence of it is likely to recover its species composition and/or structure in the foreseeable future.
Critically Endangered (CR)	An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or that was originally of limited distribution and is facing severe modification or destruction throughout its range in the immediate future, or is already severely degraded throughout its range but capable of being substantially restored or rehabilitated.
Endangered (EN)	An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or was originally of limited distribution and is in danger of significant modification throughout its range or severe modification or destruction over most of its range in the near future.
Vulnerable (VU)	An ecological community that has been adequately surveyed and is found to be declining and/or has declined in distribution and/or condition and whose ultimate security has not yet been assured and/or a community that is still widespread but is believed likely to move into a category of higher threat in the near future if threatening processes continue or begin operating throughout its range.

Table A5: Conservation code definitions for ecological communities listed as priority (PEC).

Possible threatened ecological communities that do not meet survey criteria or that are not adequately defined are added to the Priority Ecological Community List under priorities 1, 2 and 3.

Threat Category	Definition
Priority One (P1)	Ecological communities that are known from very few occurrences with a very restricted distribution (generally ≤5 occurrences or a total area of ≤100ha), and appear to be under immediate threat.
Priority Two (P2)	Communities that are known from few occurrences with a restricted distribution (generally ≤10 occurrences or a total area of ≤200ha). At least some occurrences are not believed to be under immediate threat (within approximately 10 years) of destruction or degradation.
Priority Three (P3)	(i)Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or: (ii)communities known from a few widespread occurrences, which are either large or with significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat (within approximately 10 years), or; (iii)communities made up of large, and/or widespread occurrences, that may or may not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, inappropriate fire regimes, clearing, hydrological change etc.
Priority Four (P4)	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.
Priority Five (P5)	Conservation Dependent 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.

Table A6: Condition Rating Scale (adapted from Keighery 1994) outlined in EPA (2016a).

Vegetation Condition Rating	Description
Pristine	Pristine or nearly so, no obvious signs 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. 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 very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. 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. 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 and shrubs.

Appendix D

Vegetation types identified and the ecological community desktop assessment completed in the reconnaissance survey (ELA, 2021)

The below information on the vegetation types identified and ecological community assessment in the desktop survey are direct screenshots from the reconnaissance survey (ELA, 2021).

4.1.3. Ecological Communities summary

One TEC, *Proteaceae Dominated Kwongan Shrublands of the Southeast Coastal Floristic Province of Western Australia*, was identified by the database searches as possibly occurring in the survey area.

This ecological community generally comprises sparse to dense kwongkan shrubland (a type of heathland) where species of the Proteaceae family form a significant component, and occurs on sandplains, slopes, rides and uplands within the Esperance Sandplains bioregion and adjacent parts of the Mallee and Jarrah Forest bioregions in the southeast part of Western Australia. The vegetation of the Kwongkan Shrublands TEC is dominated by shrublands of varying height, and sometimes has a mallee woodland canopy, which may be very sparse to dense and does not affect the composition of the shrub layers. The Proteaceae-rich shrub layers have high floristic richness and a high degree of local endemism. Several fauna species are either endemic or are very reliant on the Proteaceae species present for food (Department of the Environment [DoE] 2014).

The key diagnostic characteristics for this TEC are discussed in section 4.2.6.

4.2.4. Vegetation types

Two broad vegetation communities, *ElAmCc* and *EpHcBp*, were delineated and mapped within the survey area (**Figure 3**). Both comprise mallee shrubs over heathland; a more detailed description is given in **Table 4**. The most widespread vegetation communities was *EpHcBp*, which covered 10.0% (0.05 ha) of the survey area. Cleared areas, including previously cleared vehicle access tracks and cleared areas adjacent to the rail line, covered the majority (83.6%; 0.41 ha) of the survey area.

Whilst much of the survey area comprised previously cleared tracks, there were pockets of intact native vegetation present between the disturbed areas, and also vegetated areas connected to the bushland immediately to the west of the survey area. It should be noted that the intact native vegetation is what is described in this section of the report, and the previously cleared tracks themselves did not support such an assemblage of flora species. These tracks, mapped here as Cleared areas, whilst supporting widely scattered plants, could not be restored to native vegetation even partially resembling that of the intact vegetation to the west without significant and sustained effort.

Table 4: Broad vegetation types mapped in the survey area

Photo	Vegetation type code	Description	Relevé/s	Total area (ha)	Proportion of the survey area (%)
	ElAmCc	Mid open mallee shrubland of *Eucalyptus leptocalyx* over low open heathland of *Acacia mutabilis* subsp. *mutabilis, Chamelaucium ciliatum* and *Grevillea anethifolia* over low isolated clumps of sedges of *Gahnia* sp.	ELA01, ELA02, ELA03	0.03	6.4
	EpHpBp	Low isolated clumps of mallee shrubs of *Eucalyptus pleurocarpa* over mid open heathland of *Hakea corymbosa, Calothamnus gracilis* and *Conospermum leianthum* over low sparse heathland of *Banksia pilostylis*, low isolated clumps of rushes of *Desmocladus* spp. and low isolated clumps of mixed grasses.	ELA04, ELA05, ELA06	0.05	10.0

4.2.6. Conservation significant ecological communities

One TEC, *Proteaceae Dominated Kwongan Shrublands of the Southeast Coastal Floristic Province of Western Australia*, was identified by the desktop assessment as possibly occurring in the survey area.

In order to determine if any vegetation within the survey area forms part of the Kwongkan Shrublands TEC, ELA relevés and broad vegetation types were compared with the key diagnostic characteristics for the TEC, as outlined in the Approved Conservation Advice (DoE 2014). Vegetation must satisfy three criteria to be considered part of the Kwongkan Shrublands TEC: criterium 1 for location and physical environment; either of criteria 2a and 2b regarding cover and presence of Proteaceae species; and criterium 3 for condition thresholds and patch size. An assessment of the vegetation of the survey area against the TEC criteria is given in **Appendix H** and results are summarised here.

All intact vegetation within the survey area meets diagnostic criterium 1 for location and physical environment and criterium 3 for condition thresholds. Criterium 2(a) requires that the cover of Proteaceae species across all layers where those species occur must be 30% or greater. Whilst there were proteaceous species present in all of the relevés, in no relevé was the cover of Proteaceae species 30% or greater. Therefore, none of the vegetation in the survey area meets criterium 2(a). Criterium 2(b) requires that the vegetation patch contains at least two diagnostic Proteaceae species which are likely to form a significant vegetative component when regenerated. As noted in section 4.2.5, the vegetation within and adjacent to the survey area had been burnt recently (within the last 5 years), and thus any Proteaceae species present may regrow over time. The vegetation type *EpHcBp*, as recorded in relevés ELA04, ELA05 and ELA06, meets criterium 2(b), as all of the relevés in this vegetation type contain at least two diagnostic Proteaceae species which are likely to form a significant vegetative component when regenerated. The vegetation type *ElAmCc* does not meet criterium 2(b), as none of the relevés in this vegetation type contain at least two diagnostic Proteaceae species.

Based on this assessment, the vegetation community *EpHcBp* potentially forms part of the Kwongkan Shrublands TEC, but the community *ElAmCc* does not. It is recognised that this assessment is based on results of a Reconnaissance Level flora and vegetation survey. The extent of the vegetation potentially associated with the Kwongkan Shrublands TEC is shown in **Figure 5**.


Figure 3A: Broad vegetation types and fauna habitat recorded in the survey area (Extent 1)
Legend
Survey Area
Vegetation Type
Cleared
ElAmCc
EpHcBp
Fauna Habitat
Mallee Shrubland
0 10 20 40
Metres
Datum/Projection:
GDA 1994 MGA Zone 50
N
eco logical AUSTRALIA
A TETRA TECH COMPANY
Project: 18901-DD Date: 24/06/2021

Figure 3B: Broad vegetation types and fauna habitat recorded in the survey area (Extent 2)

Figure 3C: Broad vegetation types and fauna habitat recorded in the survey area (Extent 3)

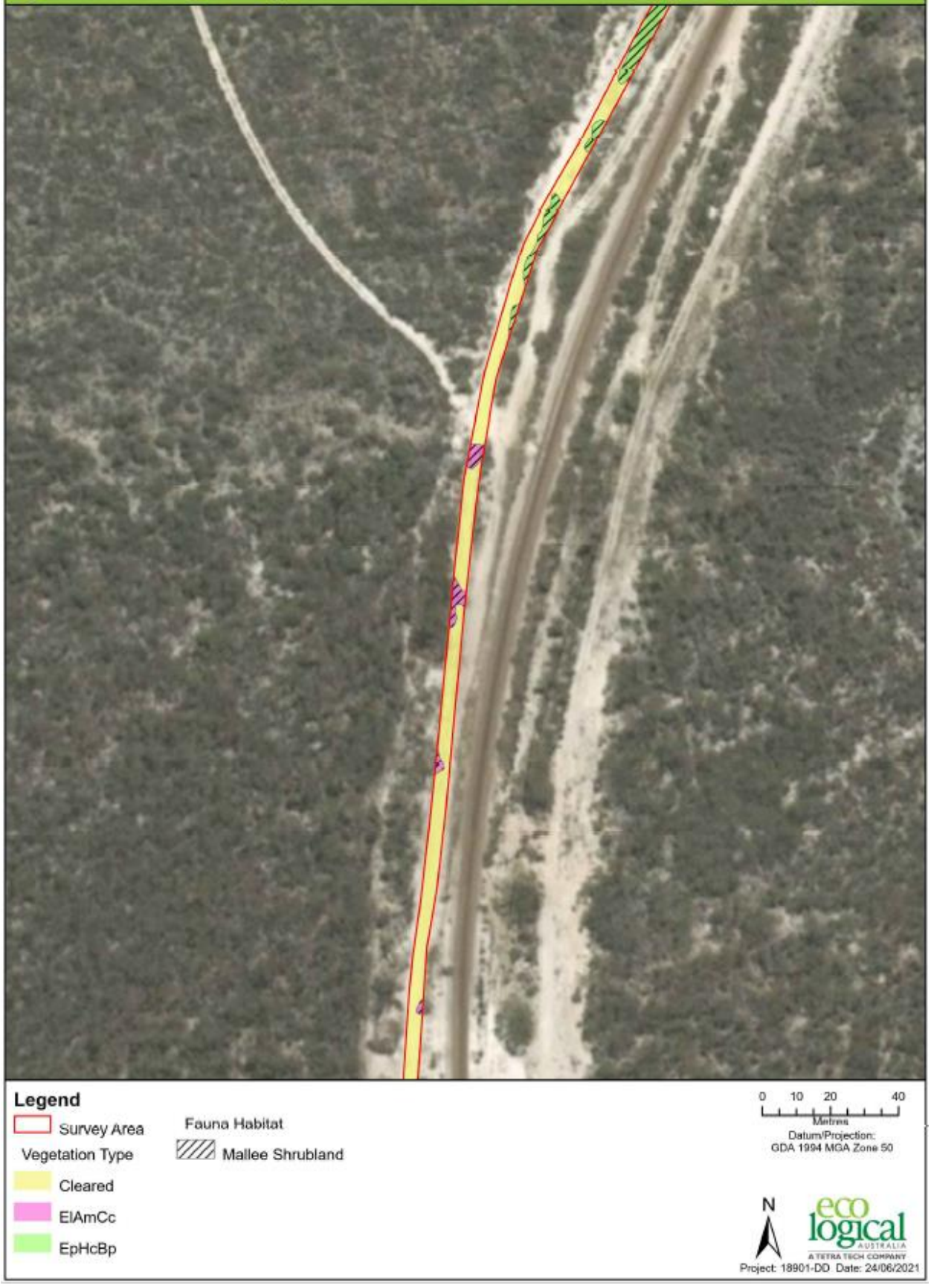



Figure 3D: Broad vegetation types and fauna habitat recorded in the survey area (Extent 4)
Legend
Survey Area
Vegetation Type
Cleared
ElAmCc
Fauna Habitat
Mallee Shrubland
0 10 20 40
Metres
Datum/Projection:
GDA 1994 MGA Zone 50
N
Project: 18901-DD Date: 24/06/2021

5.2. Vegetation

Two broad vegetation types, *ElAmCc* and *EpHcBp*, were delineated and mapped within the survey area. Both vegetation types are well represented in the surrounding area. The *EpHcBp* vegetation type showed characteristics associated with the *Proteaceae Dominated Kwongan Shrublands of the Southeast Coastal Floristic Province of Western Australia* TEC. The recommended minimum buffer zone for this ecological community is 30 m from the edge of a vegetation patch, as determined from the outer edge of the shrub canopy (DoE 2014). This implies that previously cleared parts of the survey area, where adjacent to vegetation type *EpHcBp,* fall within the buffer. The buffer zone is not actually part of the TEC so restrictions on activities in the zone are advisory only; however, it is requested in the Approved Conservation Advice (DoE 2014) that care is exercised with the buffer in order to minimise the risk of any significant adverse impacts extending into those patches. It is noted that conclusions relating to the presence of the *Proteaceae Dominated Kwongan Shrublands of the Southeast Coastal Floristic Province of Western Australia* TEC are based on a Reconnaissance level survey, as such a degree of caution should be applied.

Vegetation condition of the survey area was assessed as Excellent (Keighery (1994) scale). Cleared areas covered the majority of the survey area.

Appendix H Key diagnostic characteristics

Step	Key diagnostic characteristic	Outcome
1	**Location and physical environment** Occurs within the Southeast Coastal Floristic Province (sensu Hopper & Gioia, 2004; relating to south west Australian phytogeographic boundaries).	The survey area **is located** within the Southeast Coastal Floristic Province.
2	**Species composition and cover** (a) Characterised by Proteaceae species having 30% or greater cover of Proteaceae species across all layers where these shrubs occur (crowns measured as if they are opaque); OR (b) Two or more diagnostic Proteaceae species are present that are likely to form a significant vegetative component when regenerated (diagnostic species are listed below. The use of diagnostic species is for situations in which the cover of Proteaceae species is reduced due to recent disturbance (e.g. fire). **Diagnostic Proteaceae species for eastern Southeast Coastal Floristic Province (Table 1, DoE 2014)** *Adenanthos cuneatus, Banksia alliacea, B. armata, B. cirsioides, B. media, B. nivea, B. nutans, B. obovata, B. occidentalis, B. petiolaris, B. ptilostylis, B. plumosa, B. prolata, B. pulchella, B. speciosa, B. tenuis, Grevillea concinna, Hakea cinerea, H. corymbosa, H. drupacea, H. nitida, H. obliqua, H. pandanicarpa, H. trifurcata, Isopogon formosus, I. heterophyllus, I. polycephalus, I. trilobus, Lambertia inermis.*	(a) Proteaceae species cover **does not** reach 30% or greater in any layer where they are present. (b) Within vegetation type *EpHcBp*, **at least two diagnostic Proteaceae species are present**, as follows: Three diagnostic Proteaceae species are present in each of relevés: ELA04 (*Banksia pilostylis, Hakea cinerea, H. corymbosa*) ELA06 (*Banksia pilostylis, H. corymbosa, H. nitida*) Two diagnostic Proteaceae species are present in relevé ELA05 (*Banksia pilostylis, Hakea corymbosa*).
3	**Condition thresholds** Any vegetation patch must meet the following thresholds for condition and patch size in order to be subject to the referral, assessment and compliance provisions of the EPBC Act.	The patch of vegetation type *EpHcBp* in which relevés ELA04, ELA05 and ELA06 are situated is bounded to the east by a rail line, to the north and west by the Coolgardie-Esperance highway, and to the south by the edge of the mallee woodland vegetation type *ElAmCc*. The patch is **approximately 80 ha** in areal extent and is in **Excellent condition** on the Keighery (1994) scale.

Condition Category	Minimum patch size	Weed cover	Dieback presence
High	1 ha	≤30% perennial weed cover	No known infestation
Moderate	0.05 ha (e.g. 10 m x 50 m)	≤70% perennial weed cover	May be present or absent

The following factors should be considered when assessing a vegetation patch against the key diagnostic characteristics (DoE 2014):

- Mallee eucalypts may be present at varying densities, but providing the minimum Proteaceae cover is present, the ecological community is still recognised.
- Adjacent woodlands, generally comprised of *Eucalyptus* species trees but also include *Melaleuca* or *Allocasuarina* species, are not included in the ecological community. Where they border, the boundary of the ecological community is defined as areas where there is not greater than 10% projective foliage cover of tree species. A patch of the ecological community may contain localised patches of trees that may be at a higher density (>10% projective foliage cover), where they occur within the broader Proteaceae-dominated vegetation (e.g. swamps dominated by swamp yate *Eucalyptus occidentalis*).
- Although very degraded/modified patches are not protected as the ecological community listed under the EPBC Act, it is recognised that patches that do not meet the condition thresholds may still retain important natural values and may be critical to protecting those patches that meet minimum thresholds.
- A patch is defined as a discrete and continuous area of the ecological community. However, a patch may include small-scale disturbances, such as tracks or breaks (including exposed soil), watercourses/drainage lines or localised changes in vegetation that do not act as a permanent barrier or significantly alter its overall functionality. This ecological community is highly diverse and variable. Composition often changes across a patch, but structure and presence of a significant Proteaceae component are unifying features.

Appendix E

Species Lists and Relevé Data

Table A7: Flora Species List recorded within survey area.

Family	Genus	Species	Vernacular	Identified in Recon (ELA, 2021)	Invasive	Cons Code	Comments
Aizoaceae	*Carpobrotus*	*modestus*	Inland Pigface	X			
Anarthriaceae	*Lyginia*	*imberbis*					
Araliaceae	*Trachymene*	*pilosa*	Native Parsnip				
Asparagaceae	*Laxmannia*	*ramosa*	Branched Lilly	X			
Asparagaceae	*Laxmannia*	*squarrosa*		X			
Asparagaceae	*Lomandra*	*mucronata*					
Asparagaceae	*Thysanotus*	*patersonii*	Twining Fringe Lilly				
Asphodelaceae	*Asphodelus*	*fistulosus*	Onion Weed	X	X		
Asteraceae	*Arctotheca*	*calendula*	Cape Weed		X		
Asteraceae	*Blennospora*	*drummondii*					
Asteraceae	*Brachyscome*	*ciliaris*		X			
Asteraceae	*Hypochaeris*	*radiata*	Flat Weed		X		
Asteraceae	*Olearia*	*muricata*	Rough Leaved Daisy Bush				
Asteraceae	*Ozothamnus*	*blackallii*	Milky Everlasting				
Asteraceae	*Podotheca*	*angustifolia*	Sticky Longheads				
Asteraceae	*Pogonolepis*	*muelleriana*					
Asteraceae	*Pterochaeta*	*paniculata*	Woolly Waitzia				
Asteraceae	*Ursinia*	*anthemoides*	Ursinia		X		
Asteraceae	*Vittadinia*	*dissecta* var *hirta*		X			
Asteraceae	*Waitzia*	*suaveolens* var *suaveolens*	Fragrant Waitzia				
Brassicaceae	*Heliophila*	*pusilla*			X		
Casuarinaceae	*Allocasuarina*	*acuaria*		X			
Casuarinaceae	*Allocasuarina*	*humilis*	Dwarf Sheoak	X			
Chenopodiaceae	*Atriplex*	*prostrata*	Hastate Orache		X		
Chenopodiaceae	*Rhagodia*	*preissii*					
Chenopodiaceae	*Sclerolaena*	*diantha*	Grey Copperburr	X			
Convolvulaceae	*Wilsonia*	*humilis*					
Crassulaceae	*Crassula*	*colorata*	Dense Crassula				
Cupressaceae	*Callitris*	*roei*	Roe's Cypress Pine	X			

Table A7 continued.

Family	Genus	Species	Vernacular	Identified in Recon (ELA, 2021)	Invasive	Cons Code	Comments
Cyperaceae	*Caustis*	*dioica*	Puzzle Grass				
Cyperaceae	*Chaetophora*	*curvifolia*					
Cyperaceae	*Cyathochaeta*	*equitans*	Tibetan Flags				
Cyperaceae	*Gahnia*	*ancistrophylla*	Hooked Leaf Saw Sedge	X			
Cyperaceae	*Lepidosperma*	*leptostachyum*		X			
Cyperaceae	*Lepidosperma*	*squamatum*					
Cyperaceae	*Lepidosperma*	*squamatum*					
Cyperaceae	*Schoenus*	*pleiostemoneus*					
Cyperaceae	*Schoenus*	*sublaxus*					
Dilleniaceae	*Hibbertia*	*exasperata*					
Dilleniaceae	*Hibbertia*	*gracilipes*	Australian Buttercup				
Dilleniaceae	*Hibbertia*	*rostellata*		X			
Dilleniaceae	*Hibbertia*	sp					
Ericaceae	*Conostephium*	*marchantiorum*				P3 - KW159	
Ericaceae	*Leucopogon*	sp. Coujinup (M.A. Burgman 1085)					
Ericaceae	*Lysinema*	*pentapetalum*	Curry Flower	X			
Euphorbiaceae	*Beyeria*	*sulcata?*		X			Likely to be *Stachystemon brachyphyllus*
Euphorbiaceae	*Monotaxis*	*paxii*					
Euphorbiaceae	*Stachystemon*	*brachyphyllus*					
Fabaceae	*Acacia*	*aemula*					
Fabaceae	*Acacia*	*chrysocephala*					
Fabaceae	*Acacia*	*cyclops*	Red Eyed Wattle	X			
Fabaceae	*Acacia*	*gonophylla*					
Fabaceae	*Acacia*	*lasiocarpa*	Panjang	X			
Fabaceae	*Acacia*	*latipes*		X			
Fabaceae	*Acacia*	*maxwellii*					
Fabaceae	*Acacia*	*mutabilis* subsp *angustifolia*		X			
Fabaceae	*Acacia*	*mutabilis* subsp *mutabilis*		X			

Table A7 continued.

Family	Genus	Species	Vernacular	Identified in Recon (ELA, 2021)	Invasive	Cons Code	Comments
Fabaceae	*Acacia*	*pritzeliana*		X			
Fabaceae	*Aotus*	sp. Esperance (P.G. Wilson 7904)					
Fabaceae	*Bossiaea*	*leptacantha*					
Fabaceae	*Chorizema*	*aciculare*		X			
Fabaceae	*Daviesia*	*aphylla*		X			
Fabaceae	*Dillwynia*	sp. Mallee (W.R. Archer 1709959)					
Fabaceae	*Gompholobium*	*baxteri*					
Fabaceae	*Jacksonia*	*venosa*		X			
Goodeniaceae	*Coopernookia*	*strophiolata*					
Goodeniaceae	*Dampiera*	*fasciculata*	Bundle Leaf Dampiera				
Goodeniaceae	*Dampiera*	*lavandulacea*					
Goodeniaceae	*Goodenia*	*affinis*	Silver Goodenia				
Goodeniaceae	*Goodenia*	*concinna*	Elegant Goodenia				
Goodeniaceae	*Goodenia*	*scapigera* subsp. *scapigera*					
Haemodoraceae	*Anigozanthos*	*rufus*	Esperance Kangaroo Paw	X			
Haloragaceae	*Glischrocaryon*	*aureum*	Common Pop Flower				
Hemerocallidaceae	*Dianella*	*brevicaulis*	Flax Lilly				
Hemerocallidaceae	*Dianella*	*revoluta*	Blueberry Lilly	X			
Iridaceae	*Patersonia*	*occidentalis*	Purple Flag				
Lamiaceae	*Pityrodia*	*chrysocalyx*				P3 - KW157	
Lamiaceae	*Prostanthera*	*serpyllifolia* subsp. *Microphylla*					
Lamiaceae	*Salvia*	*verbenaca*	Wild Sage		X		
Lamiaceae	*Westringia*	*dampieri*		X			
Lauraceae	*Cassytha*	*glabella*	Dodder Laurel	X			
Lauraceae	*Cassytha*	*racemosa*	Dodder Laurel	X			
Malvaceae	*Alyogyne*	*hakeifolia*	Native Hibiscus				
Malvaceae	*Androcalva*	*cuneata*					
Malvaceae	*Guichenotia*	*ledifolia*		X			

Table A7 continued.

Family	Genus	Species	Vernacular	Identified in Recon (ELA, 2021)	Invasive	Cons Code	Comments
Malvaceae	*Stenanthemum*	*notiale*					
Myrtaceae	*Beaufortia*	*empetrifolia*	South Coast Beaufortia				
Myrtaceae	*Calothamnus*	*gracilis*	One-sided Bottle Brush	X			
Myrtaceae	*Calytrix*	*leschenaultii*	Esperance Star Flower				
Myrtaceae	*Chamelaucium*	*ciliatum*		X			
Myrtaceae	*Conothamnus*	*aureus*		X			
Myrtaceae	*Cyathostemon*	*ambiguus*					
Myrtaceae	*Eucalyptus*	*angulosa*	Ridge Fruited Mallee				
Myrtaceae	*Eucalyptus*	*leptocalyx*	Hopetoun Mallee	X			
Myrtaceae	*Eucalyptus*	*perangusta*	Fine-leaved Mallee	X			
Myrtaceae	*Eucalyptus*	*pleurocarpa*	Blue Mallee; Tallerack	X			
Myrtaceae	*Eucalyptus*	*quadrans*	Cascade Mallee				
Myrtaceae	*Eucalyptus*	*uncinata*	Hook-leaved Mallee	X			
Myrtaceae	*Leptospermum*	*erubescens*	Roadside Tea Tree	X			
Myrtaceae	*Leptospermum*	*spinescens*	Spiny Tea Tree	X			
Myrtaceae	*Melaleuca*	*brevifolia*					
Myrtaceae	*Melaleuca*	*calcicola*					
Myrtaceae	*Melaleuca*	*eleuterostachya*					
Myrtaceae	*Melaleuca*	*glaberrima*					
Myrtaceae	*Melaleuca*	*plumea*					
Myrtaceae	*Melaleuca*	*podiocarpa*		X			
Myrtaceae	*Melaleuca*	*pulchella*	Crab Claw Melaleuca				
Myrtaceae	*Melaleuca*	*societatis*	Soccer Ball Melaleuca				
Myrtaceae	*Melaleuca*	*thymoides*					
Myrtaceae	*Melaleuca*	*tuberculata* var *tuberculata*					
Myrtaceae	*Melaleuca*	*uncinata*	Broom Bush	X			
Myrtaceae	*Melaleuca*	*undulata*	Hidden Honey Myrtle	X			
Myrtaceae	*Micromyrtus*	*elobata*		X			
Myrtaceae	*Phymatocarpus*	*maxwellii*					
Myrtaceae	*Verticordia*	*plumosa* var *incrassata*	Plumed Featherflower				

Table A7 continued.

Family	Genus	Species	Vernacular	Identified in Recon (ELA, 2021)	Invasive	Cons Code	Comments
Orchidaceae	*Caladenia*	sp.					
Orchidaceae	*Pterostylis*	*recurva*	Jug Orchid				
Orchidaceae	*Thelymitra*	*macrophylla*	Scented Sun Orchid				
Pittosporaceae	*Billardiera*	*lehmanniana*	Kurup				
Poaceae	*Amphipogon*	*turbinatus*		X			
Poaceae	*Austrostipa*	*drummondii*					
Poaceae	*Austrostipa*	*exilis*					
Poaceae	*Austrostipa*	*flavescens*					
Poaceae	*Austrostipa*	*hemipogon*	Half Bearded Stipa				
Poaceae	*Avena*	*fatua*	Wild Oats		X		
Poaceae	*Ehrharta*	*calycina*	Perennial Veldt Grass		X		
Poaceae	*Eragrostis*	*curvula*	African Lovegrass		X		
Poaceae	*Lolium*	*perenne*	Ryegrass		X		
Poaceae	*Neurachne*	*alopecuroidea*	Mulga Foxtail				
Poaceae	*Panicum*	*capillare*	Witchgrass	X	X		
Poaceae	*Rytidosperma*	*setaceum*	Edgar	X			
Polygalaceae	*Comesperma*	*spinosum*	Spiny Milkwort				
Polygonaceae	*Muehlenbeckia*	*adpressa*	Climbing Lignum				
Primulaceae	*Lysimachia*	*arvensis*	Pimpernel		X		
Proteaceae	*Banksia*	*obtusa*	Shining Honeypot	X			
Proteaceae	*Banksia*	*pilostylis*	Sandplain Banksia	X			
Proteaceae	*Conospermum*	*leianthum*		X			
Proteaceae	*Grevillea*	*anethifolia*		X			
Proteaceae	*Grevillea*	*plurijuga* subsp. *superba*					
Proteaceae	*Hakea*	*adnata*	Swan Hakea	X			
Proteaceae	*Hakea*	*cinerea*	Ashy Hakea	X			
Proteaceae	*Hakea*	*corymbosa*	Cauliflower Hakea	X			
Proteaceae	*Hakea*	*nitida*	Frog Hakea	X			
Proteaceae	*Isopogon*	*polycephalus*	Clustered Coneflower				
Proteaceae	*Persoonia*	*cymbifolia*				P3 - KW158	
Proteaceae	*Petrophile*	*teretifolia*	Pixie Mops	X			

Table A7 continued.

Family	Genus	Species	Vernacular	Identified in Recon (ELA, 2021)	Invasive	Cons Code	Comments
Proteaceae	*Stirlingia*	*anethifolia*		X			
Proteaceae	*Synaphea*	*petiolaris* subsp *petiolaris*					
Proteaceae	*Synaphea*	*spinulosa* subsp *major*					
Restionaceae	*Desmocladus*	*castaneus*		X			
Restionaceae	*Desmocladus*	*lateriflora*		X			
Restionaceae	*Lepidobolus*	*chaetocephalus*	Bristle headed Chaff Rush	X			
Restionaceae	*Leptocarpus*	*crebriculmis*		X			
Rhamnaceae	*Cryptandra*	*recurva*					
Rhamnaceae	*Microcybe*	*pauciflora*	Yellow Microcybe				
Rhamnaceae	*Spyridium*	*microcephalum*	Small Headed Spyridium				
Rutaceae	*Boronia*	*crassifolia*					
Rutaceae	*Boronia*	*inornata*	Desert Boronia				
Rutaceae	*Cyanothamnus*	*ramosus* subsp. *anethifolia*					
Rutaceae	*Phebalium*	*lepidotum*					
Rutaceae	*Philotheca*	*gardneri* subsp. *gardneri*					
Santalaceae	*Exocarpos*	*sparteus*	Native Cherry				
Santalaceae	*Santalum*	*acuminatum*	Quandong				
Sapindaceae	*Dodonaea*	*amblyophylla*		X			
Scrophulariaceae	*Myoporum*	sp.		X			
Solanaceae	*Solanum*	*hoplopetalum*	Thorny Solanum				
Solanaceae	*Solanum*	*symonii*					
Stylidiaceae	*Stylidium*	*repens*	Matted Trigger-plant				
Stylidiaceae	*Stylidium*	*turleyae*					
Thymelaeaceae	*Pimelea*	*erecta*		X			
Violaceae	*Hybanthus*	*epacroides*	Spiny Hybanthus				

Appendix F

DBCA Threatened and Priority Reporting (TPFL) Forms

Appendix G

Letter of Authority for Arc Infrastructure

Department of **Biodiversity, Conservation and Attractions**

GOVERNMENT OF WESTERN AUSTRALIA

Threatened and Priority Flora Report Form

Version 1.4 March 2021

Please complete as much of the form as possible, with emphasis on those sections bordered in black. For information on how to complete the form please refer to the Threatened & Priority Flora Report Form (TPRF) manual on the DBCA website at www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/threatened-plants

TAXON: Conostephium marchantiorum **TPFL Pop. No:**

OBSERVATION DATE: 12/10/2021 **CONSERVATION STATUS:** P3 **New population** ☒

OBSERVER/S: Katie White, Karri Grant **PHONE** 0439 993 451 or 0458 441 432

ROLE: Botanist / Consultant **ORGANISATION:** Bio Diverse Solutions

EMAIL: katie@biodiversesolutions.com.au ; enquiry@biodiversesolutions.com.au

DESCRIPTION OF LOCATION (Provide at least nearest town/named locality, and the distance and direction to that place)**:**

~55km north of Esperance and 9.5km north of Scaddan. On western railway corridor, 1.3 km south of Truslove Rd crossing

Reserve No:

DBCA DISTRICT: South coast **LGA:** Esperance Land manager present: ☐

DATUM:
GDA94 / MGA94 ☐
AGD84 / AMG84 ☐
WGS84 ☐
Unknown ☐

COORDINATES: (If UTM coords provided, **Zone** is also required)
DecDegrees ☐ DegMinSec ☐ UTMs ☒
Lat / Northing: 939016.735
Long / Easting: 6299915.038
ZONE: 51H

METHOD USED:
GPS ☐ Differential GPS ☐ Map ☒
No. satellites: _____ Map used: ArcGIS
Boundary polygon captured: ☐ Map scale: _____

LAND TENURE:

Nature reserve ☐	Timber reserve ☐	Private property ☐	Rail reserve ☒	Shire road reserve ☐
National park ☐	State forest ☐	Pastoral lease ☐	MRWA road reserve ☐	Other Crown reserve ☐
Conservation park ☐	Water reserve ☐	UCL ☐	SLK/Pole 321.23 to _____	Specify other: _____

AREA ASSESSMENT: Edge survey ☐ Partial survey ☒ Full survey ☐ Area observed (m²): _____

EFFORT: Time spent surveying (minutes): _____ No. of minutes spent / 100 m²: _____

POP'N COUNT ACCURACY: Actual ☒ Extrapolation ☐ Estimate ☐ Count method: _____ (Refer to field manual for list)

WHAT COUNTED: Plants ☐ Clumps ☐ Clonal stems ☐

TOTAL POP'N STRUCTURE:	**Mature:**	**Juveniles:**	**Seedlings:**	**Totals:**
Alive	62 plants			
Dead				

Area of pop (m²): _____

Note: Pls record count as numbers (not percentages) for database.

QUADRATS PRESENT: No. _____ Size _____ Data attached ☐ Total area of quadrats (m²): _____

Summary Quad. Totals: Alive				

REPRODUCTIVE STATE: Clonal ☐ Vegetative ☐ Flowerbud ☐ Flower ☒
Immature fruit ☐ Fruit ☒ Dehisced fruit ☐ Percentage in flower: 90%

CONDITION OF PLANTS: Healthy ☒ Moderate ☐ Poor ☐ Senescent ☐

COMMENT: Often scattered along edge of existing railway maintenance tracks, potential impact to population already occurred

THREATS - type, agent and supporting information: Eg clearing, too frequent fire, weed, disease. Refer to field manual for list of threats & agents. **Specify agent** where relevant. Rate current and potential threat impact: N=Nil, L=Low, M=Medium, H=High, E=Extreme Estimate time to potential impact: S=Short (<12mths), M=Medium (<5yrs), L=Long (5yrs+)	**Current impact (N-E)**	**Potential Impact (L-E)**	**Potential Threat Onset (S-L)**
• Laydown areas and track widening along the railway access tracks	M	H	S
•			

Please return completed form to **Species And Communities Program** DBCA,
Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983 **OR** email to: flora.data@dbca.wa.gov.au

RECORDS: Please forward to **Flora Administrative Officer,** Species and Communities Program.

Record entered by:_____ **Sheet No.:**_____ **Record Entered in Database** ❑

Department of **Biodiversity, Conservation and Attractions**

GOVERNMENT OF WESTERN AUSTRALIA

Threatened and Priority Flora Report Form

Version 1.4 March 2021

HABITAT INFORMATION:

LANDFORM:
Crest ☐
Hill ☐
Ridge ☐
Outcrop ☐
Slope ☒
Flat ☐
Open depression ☐
Drainage line ☐
Closed depression ☐
Wetland ☐

ROCK TYPE:
Granite ☐
Dolerite ☐
Laterite ☐
Ironstone ☐
Limestone ☐
Quartz ☐
Specify other:

LOOSE ROCK:
(on soil surface; eg gravel, quartz fields)
0-10% ☐
10-30% ☒
30-50% ☐
50-100% ☐

SOIL TYPE:
Sand ☐
Sandy loam ☐
Loam ☐
Clay loam ☐
Light clay ☐
Peat ☐
Specify other: Clay-sand

SOIL COLOUR:
Red ☐
Brown ☐
Yellow ☒
White ☐
Grey ☐
Black ☐
Specify other:

DRAINAGE:
Well drained ☒
Seasonally inundated ☐
Permanently inundated ☐
Tidal ☐

Specific **Landform** Element:
(Refer to field manual for additional values)

CONDITION OF SOIL: Dry ☒ Moist ☐ Waterlogged ☐ Inundated ☐

VEGETATION CLASSIFICATION*:
Eg: **1**. Banksia woodland (B. attenuata, B. ilicifolia); **2**. Open shrubland (Hibbertia sp., Acacia spp.) ; **3**. Isolated clumps of sedges (M.tetragona)

1. Low isolated clumps of Eucalyptus pleurocarpa, over mid-heath of Hakea corymbosa, Calothamnus gracilis, Comepserma lainthum, over sparse heathland of Banksia pilostylis, over isolated clumps of Desmocladus sp
2.
3.
4.

ASSOCIATED SPECIES:

Other (non-dominant) spp

* Please record up to four of the most representative vegetation layers (with up to three dominant species in each layer). Structural Formations should follow 2009 *Australian Soil and Land Survey Field Handbook* guidelines – refer to field manual for further information and structural formation table.

CONDITION OF HABITAT: Pristine ☐ Excellent ☒ Very good ☐ Good ☐ Degraded ☐ Completely degraded ☐

COMMENT:

FIRE HISTORY: **Last Fire:** Season/Month: _____ Year: 2015 **Fire Intensity:** High ☒ Medium ☐ Low ☐ No signs of fire ☐

FENCING: Not required ☐ Present ☐ Replace / repair ☐ Required ☐ Length req'd: _____

ROADSIDE MARKERS: Not required ☐ Present ☐ Replace / reposition ☐ Required ☐ Quantity req'd: _____

OTHER COMMENTS: (Please include recommended management actions and/or implemented actions - include date. Also include details of additional data available, and how to locate it.)

Specimen retained by WA Herbarium

Proposed impact and targeted level survey results presented in 'Bio Diverse Solutions, targeted flora survey, Truslove Nature Reserve railway corridor, KM 321-322 (2022)'

FLORA AUTHORISATION / LICENCE No: FB62000327 Note if only observing plants (i.e. no specimens or plant matieral is taken) then no authorisation/licence is required. For further information on authorisation and licening requirements see the Threatened Flora and Wildlife Licensing pages on DBCA's website. Any actions carried out under authorisations/licences should be recorded above in the OTHER COMMENTS section.

SPECIMEN: Collectors No: KW159 WA Herb. ☐ Regional Herb. ☐ District Herb. ☐ Other: _____

LODGEMENT: WA Herb Lodgement No: 9281

ATTACHED: Map ☐ Mudmap ☐ Photo ☐ GIS data ☒ Field notes ☐ Other: _____

COPY SENT TO: Regional Office ☒ District Office ☒ Other: _____

Submitter of Record: Katie White Role: Botanist / Ecologist Signed: KW Date: 05/ 01 /2022

Please return completed form to **Species And Communities Program** DBCA,
Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983 **OR** email to: flora.data@dbca.wa.gov.au

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TAXON: Persoonia cymbifolia **TPFL Pop. No:**

OBSERVATION DATE: 12/10/2021 **CONSERVATION STATUS:** P3 **New population** ☒

OBSERVER/S: Katie White, Karri Grant **PHONE** 0439 993 451 or 0458 441 432

ROLE: Botanist / Consultant **ORGANISATION:** Bio Diverse Solutions

EMAIL: katie@biodiversesolutions.com.au ; enquiry@biodiversesolutions.com.au

DESCRIPTION OF LOCATION (Provide at least nearest town/named locality, and the distance and direction to that place)**:**

~55km north of Esperance and 9.5km north of Scaddan. On western railway corridor, , 1.3 and 2 km south of railway

Crossing on Truslove Rd. Within truslove Nature reserve. Only surveyed on western side / within rail reserve

Reserve No:

DBCA DISTRICT: South coast **LGA:** Esperance Land manager present: ☐

DATUM:
GDA94 / MGA94 ☒
AGD84 / AMG84 ☐
WGS84 ☐
Unknown ☐

COORDINATES: (If UTM coords provided, **Zone** is also required)
DecDegrees ☐ DegMinSec ☐ UTMs ☒

Lat / Northing: 938994.707

Long / Easting: 6299957.803

ZONE: 51H

METHOD USED:
GPS ☐ Differential GPS ☐ Map ☒

No. satellites: _____ Map used: ArcGIS

Boundary polygon captured: ☐ Map scale: _____

LAND TENURE:

Nature reserve ☐	Timber reserve ☐	Private property ☐	Rail reserve ☒	Shire road reserve ☐
National park ☐	State forest ☐	Pastoral lease ☐	MRWA road reserve ☐	Other Crown reserve ☐
Conservation park ☐	Water reserve ☐	UCL ☐	SLK/Pole 321.26 to 323	Specify other:

AREA ASSESSMENT: Edge survey ☐ Partial survey ☒ Full survey ☐ Area observed (m²): _____

EFFORT: Time spent surveying (minutes): _____ No. of minutes spent / 100 m²: _____

POP'N COUNT ACCURACY: Actual ☒ Extrapolation ☐ Estimate ☐ Count method: _____ (Refer to field manual for list)

WHAT COUNTED: Plants ☐ Clumps ☐ Clonal stems ☐

TOTAL POP'N STRUCTURE:

	Mature:	Juveniles:	Seedlings:	Totals:
Alive	117 plants			
Dead				

Area of pop (m²): _____

Note: Pls record count as numbers (not percentages) for database.

QUADRATS PRESENT: No. _____ Size _____ Data attached ☐ Total area of quadrats (m²): _____

Summary Quad. Totals: Alive				

REPRODUCTIVE STATE: Clonal ☐ Vegetative ☐ Flowerbud ☐ Flower ☐
Immature fruit ☐ Fruit ☒ Dehisced fruit ☐ Percentage in flower: 0%

CONDITION OF PLANTS: Healthy ☒ Moderate ☐ Poor ☐ Senescent ☐

COMMENT: Often scattered along edge of existing railway maintenance tracks, potential impact to population already occurred

THREATS - type, agent and supporting information: Eg clearing, too frequent fire, weed, disease. Refer to field manual for list of threats & agents. **Specify agent** where relevant. Rate current and potential threat impact: N=Nil, L=Low, M=Medium, H=High, E=Extreme Estimate time to potential impact: S=Short (<12mths), M=Medium (<5yrs), L=Long (5yrs+)	**Current impact (N-E)**	**Potential Impact (L-E)**	**Potential Threat Onset (S-L)**
• Laydown areas and track widening along the railway access tracks	M	H	S
•			

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Record entered by:_____ **Sheet No.:**_____ **Record Entered in Database** ❑

Department of **Biodiversity, Conservation and Attractions**

GOVERNMENT OF WESTERN AUSTRALIA

Threatened and Priority Flora Report Form

Version 1.4 March 2021

HABITAT INFORMATION:

LANDFORM:
Crest ☐
Hill ☐
Ridge ☐
Outcrop ☐
Slope ☒
Flat ☐
Open depression ☐
Drainage line ☐
Closed depression ☐
Wetland ☐

ROCK TYPE:
Granite ☐
Dolerite ☐
Laterite ☐
Ironstone ☐
Limestone ☐
Quartz ☐
Specify other:

LOOSE ROCK:
(on soil surface; eg gravel, quartz fields)
0-10% ☐
10-30% ☒
30-50% ☐
50-100% ☐

SOIL TYPE:
Sand ☐
Sandy loam ☐
Loam ☐
Clay loam ☐
Light clay ☐
Peat ☐
Specify other: Clay-sand

SOIL COLOUR:
Red ☐
Brown ☐
Yellow ☒
White ☐
Grey ☐
Black ☐
Specify other:

DRAINAGE:
Well drained ☒
Seasonally inundated ☐
Permanently inundated ☐
Tidal ☐

Specific **Landform** Element: Salt lakes in near vicinity
(Refer to field manual for additional values)

CONDITION OF SOIL: Dry ☒ Moist ☐ Waterlogged ☐ Inundated ☐

VEGETATION CLASSIFICATION*:
Eg: **1**. Banksia woodland (B. attenuata, B. ilicifolia); **2**. Open shrubland (Hibbertia sp., Acacia spp.) ; **3**. Isolated clumps of sedges (M.tetragona)

1. Low isolated clumps of Eucalyptus pleurocarpa, over mid-heath of Hakea corymbosa, Calothamnus gracilis, Comepserma lainthum, over sparse heathland of Banksia pilostylis, over isolated clumps of Desmocladus sp
2.
3.
4.

ASSOCIATED SPECIES:

Other (non-dominant) spp

* Please record up to four of the most representative vegetation layers (with up to three dominant species in each layer). Structural Formations should follow 2009 *Australian Soil and Land Survey Field Handbook* guidelines – refer to field manual for further information and structural formation table.

CONDITION OF HABITAT: Pristine ☐ Excellent ☒ Very good ☐ Good ☐ Degraded ☐ Completely degraded ☐

COMMENT:

FIRE HISTORY: **Last Fire:** Season/Month: _____ Year: 2015 **Fire Intensity:** High ☒ Medium ☐ Low ☐ No signs of fire ☐

FENCING: Not required ☐ Present ☐ Replace / repair ☐ Required ☐ Length req'd: _____

ROADSIDE MARKERS: Not required ☐ Present ☐ Replace / reposition ☐ Required ☐ Quantity req'd: _____

OTHER COMMENTS: (Please include recommended management actions and/or implemented actions - include date. Also include details of additional data available, and how to locate it.)

Specimen retained by WA Herbarium

Proposed impact and targeted level survey results presented in 'Bio Diverse Solutions, targeted flora survey, Truslove Nature Reserve railway corridor, KM 321-322 (2022)'

FLORA AUTHORISATION / LICENCE No: FB62000327 Note if only observing plants (i.e. no specimens or plant matieral is taken) then no authorisation/licence is required. For further information on authorisation and licening requirements see the Threatened Flora and Wildlife Licensing pages on DBCA's website. Any actions carried out under authorisations/licences should be recorded above in the OTHER COMMENTS section.

SPECIMEN: Collectors No: KW158 WA Herb. ☐ Regional Herb. ☐ District Herb. ☐ Other: _____

LODGEMENT: WA Herb Lodgement No: 9281

ATTACHED: Map ☐ Mudmap ☐ Photo ☐ GIS data ☒ Field notes ☐ Other: _____

COPY SENT TO: Regional Office ☒ District Office ☒ Other: _____

Submitter of Record: Katie White Role: Botanist / Ecologist Signed: KW Date: 05/ 01 /2022

Please return completed form to **Species And Communities Program** DBCA,
Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983 **OR** email to: flora.data@dbca.wa.gov.au

RECORDS: Please forward to **Flora Administrative Officer,** Species and Communities Program.

Record entered by:_____ **Sheet No.:**_____ **Record Entered in Database** ❑

Department of **Biodiversity, Conservation and Attractions**

GOVERNMENT OF WESTERN AUSTRALIA

Threatened and Priority Flora Report Form

Version 1.4 March 2021

Please complete as much of the form as possible, with emphasis on those sections bordered in black. For information on how to complete the form please refer to the Threatened & Priority Flora Report Form (TPRF) manual on the DBCA website at www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities/threatened-plants

TAXON: Pityrodia chrysocalyx **TPFL Pop. No:**

OBSERVATION DATE: 12/10/2021 **CONSERVATION STATUS:** P3 **New population** ☒

OBSERVER/S: Katie White, Karri Grant **PHONE** 0439 993 451 or 0458 441 432

ROLE: Botanist / Consultant **ORGANISATION:** Bio Diverse Solutions

EMAIL: katie@biodiversesolutions.com.au ; enquiry@biodiversesolutions.com.au

DESCRIPTION OF LOCATION (Provide at least nearest town/named locality, and the distance and direction to that place)**:**

~55km north of Esperance and 9.5km north of Scaddan. On western railway corridor, with two populations at 1km and 1.5 Km south of the railway crossing at Truslove Rd. In Truslove Nature Reserve area

Reserve No:

DBCA DISTRICT: South coast **LGA:** Esperance Land manager present: ☐

DATUM:
GDA94 / MGA94 ☐
AGD84 / AMG84 ☐
WGS84 ☐
Unknown ☐

COORDINATES: (If UTM coords provided, **Zone** is also required)
DecDegrees ☐ DegMinSec ☐ UTMs ☒
Lat / Northing: 9389735.858
Long / Easting: 6299856.34
ZONE: 51H

METHOD USED:
GPS ☐ Differential GPS ☐ Map ☒
No. satellites: _____ Map used: ArcGIS
Boundary polygon captured: ☐ Map scale: _____

LAND TENURE:

Nature reserve ☐	Timber reserve ☐	Private property ☐	Rail reserve ☒	Shire road reserve ☐
National park ☐	State forest ☐	Pastoral lease ☐	MRWA road reserve ☐	Other Crown reserve ☐
Conservation park ☐	Water reserve ☐	UCL ☐	SLK/Pole 321 to 321.423	Specify other:

AREA ASSESSMENT: Edge survey ☐ Partial survey ☒ Full survey ☐ Area observed (m²): _____

EFFORT: Time spent surveying (minutes): _____ No. of minutes spent / 100 m²: _____

POP'N COUNT ACCURACY: Actual ☒ Extrapolation ☐ Estimate ☐ Count method: _____ (Refer to field manual for list)

WHAT COUNTED: Plants ☐ Clumps ☐ Clonal stems ☐

TOTAL POP'N STRUCTURE:	**Mature:**	**Juveniles:**	**Seedlings:**	**Totals:**
Alive	71 plants			
Dead				

Area of pop (m²): _____

Note: Pls record count as numbers (not percentages) for database.

QUADRATS PRESENT: No. _____ Size _____ Data attached ☐ Total area of quadrats (m²): _____

Summary Quad. Totals: Alive				

REPRODUCTIVE STATE: Clonal ☐ Vegetative ☐ Flowerbud ☐ Flower ☒
Immature fruit ☐ Fruit ☐ Dehisced fruit ☐ Percentage in flower: 50%

CONDITION OF PLANTS: Healthy ☒ Moderate ☐ Poor ☐ Senescent ☐

COMMENT: Germination event triggered by 2015 fire, all plants below 30cm in height and only some flowering.

THREATS - type, agent and supporting information: Eg clearing, too frequent fire, weed, disease. Refer to field manual for list of threats & agents. **Specify agent** where relevant. Rate current and potential threat impact: N=Nil, L=Low, M=Medium, H=High, E=Extreme Estimate time to potential impact: S=Short (<12mths), M=Medium (<5yrs), L=Long (5yrs+)	**Current impact (N-E)**	**Potential Impact (L-E)**	**Potential Threat Onset (S-L)**
• Laydown areas and track widening along the railway access tracks	M	H	S
•			

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HABITAT INFORMATION:

LANDFORM:
Crest ☐
Hill ☐
Ridge ☐
Outcrop ☐
Slope ☒
Flat ☐
Open depression ☐
Drainage line ☐
Closed depression ☐
Wetland ☐

ROCK TYPE:
Granite ☐
Dolerite ☐
Laterite ☐
Ironstone ☐
Limestone ☐
Quartz ☐
Specify other:

LOOSE ROCK:
(on soil surface; eg gravel, quartz fields)
0-10% ☐
10-30% ☒
30-50% ☐
50-100% ☐

SOIL TYPE:
Sand ☐
Sandy loam ☐
Loam ☐
Clay loam ☐
Light clay ☐
Peat ☐
Specify other: Clay-sand

SOIL COLOUR:
Red ☐
Brown ☐
Yellow ☒
White ☐
Grey ☐
Black ☐
Specify other:

DRAINAGE:
Well drained ☒
Seasonally inundated ☐
Permanently inundated ☐
Tidal ☐

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From: Shona James
To: "Rochelle Sweeney"
Subject: FW: PTA/Arc Network Lease - Exclusive Authority over the land - Legal clarification
Date: Thursday, 28 January 2021 1:07:00 PM

Hey Rochelle,

I got a response from our legal guru below, hopefully this satisfies the requirement of Arcs authority to use the land.

There's also the link to the publicly available network lease if you are up for some light reading!

Please let me know if you need anything else.

Thanks,

Shona James
HSE Advisor - Environmental

Arc Infrastructure
Level 3, 1 George Wiencke Drive, Perth Airport, WA, 6105
GPO Box S1411, Perth WA 6845

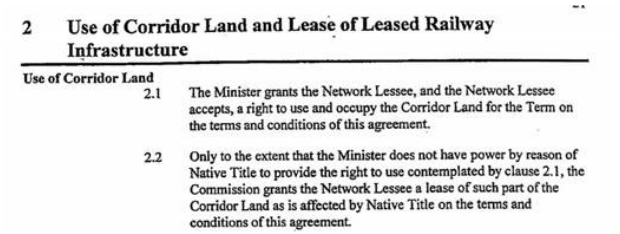
| **M** – 0436 946 223
E – Shona.James@arcinfra.com
W – arcinfra.com

From: Sarah Fitzgerald <Sarah.Fitzgerald@arcinfra.com>
Sent: Thursday, 28 January 2021 12:03 PM
To: Shona James <Shona.James@arcinfra.com>
Subject: RE: PTA/Arc Network Lease - Exclusive Authority over the land

Hi Shona,

'Arc (formerly Brookfield Rail, formerly Westnet Rail) is the Lessee under the Rail Freight Corridor Land Use Agreement (StandardGauge) and Railway Infrastructure Lease, pursuant to which Arc was granted a right by the Public Transport Authority of Western Australia to use and occupy that land designated as Corridor Land under Part 3 of the Rail Freight Systems Act.'

A copy of the relevant clause is below.



2 Use of Corridor Land and Lease of Leased Railway Infrastructure

Use of Corridor Land

2.1 The Minister grants the Network Lessee, and the Network Lessee accepts, a right to use and occupy the Corridor Land for the Term on the terms and conditions of this agreement.

2.2 Only to the extent that the Minister does not have power by reason of Native Title to provide the right to use contemplated by clause 2.1, the Commission grants the Network Lessee a lease of such part of the Corridor Land as is affected by Native Title on the terms and conditions of this agreement.

The network lease is actually published online:
https://www.parliament.wa.gov.au/parliament/Commit.nsf/($lookupRelatedDocsByID)/2AAF392BA313802448257D72002577C2/$file/2+20001217+Standard+Gauge+Lease.pdf

Sarah Fitzgerald
Senior Legal Counsel

Arc Infrastructure
Level 3, 1 George Wiencke Drive, Perth Airport, WA, 6105
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T – (08) 9212 2981 | **M** – 0436 618 949
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W – arcinfra.com