



Horizon Power

Onslow Utilities Infrastructure Upgrade Project

Targeted Flora Survey

61-34761-00000-EN-RPT-001

Rev 0
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1. Introduction

1.1 Project Background

Horizon Power (HP) has been granted a Clearing Permit 7253/1 (DER2016/001752-1) for Lot 555 on Deposited Plan 74894, Talandji by the Department of Environment Regulation (DER). As part of the approval of the Clearing Permit, HP is required to uphold a number of conditions, including the requirement to complete a targeted flora survey.

Horizon Power commissioned GHD to undertake a targeted flora survey for Lot 555 and the proposed transmission line corridor between Lot 555 and Lot 880.

2. Executive Summary of Conclusions and Recommendations

2.1 Lot 555

The Priority 3 Flora species *Triumfetta echinata* was recorded from the eastern end of Lot 555 (Refer Figure 1 and Appendix A). There were 58 plants from 35 locations recorded within Lot 555; with one plant from one location recorded immediately east of the Lot boundary. As part of the Clearing Permit requirements, a 20 m buffer is placed around each record, within which no clearing is to occur (Refer Figure 2 and Appendix A). No clearing will therefore be allowed in these locations.

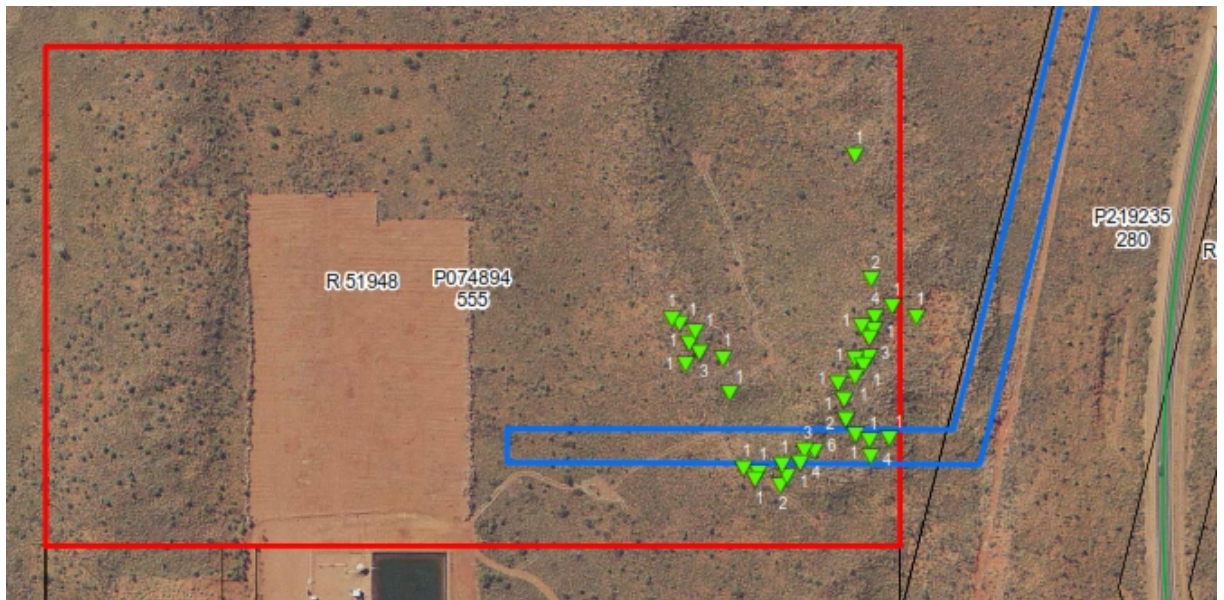
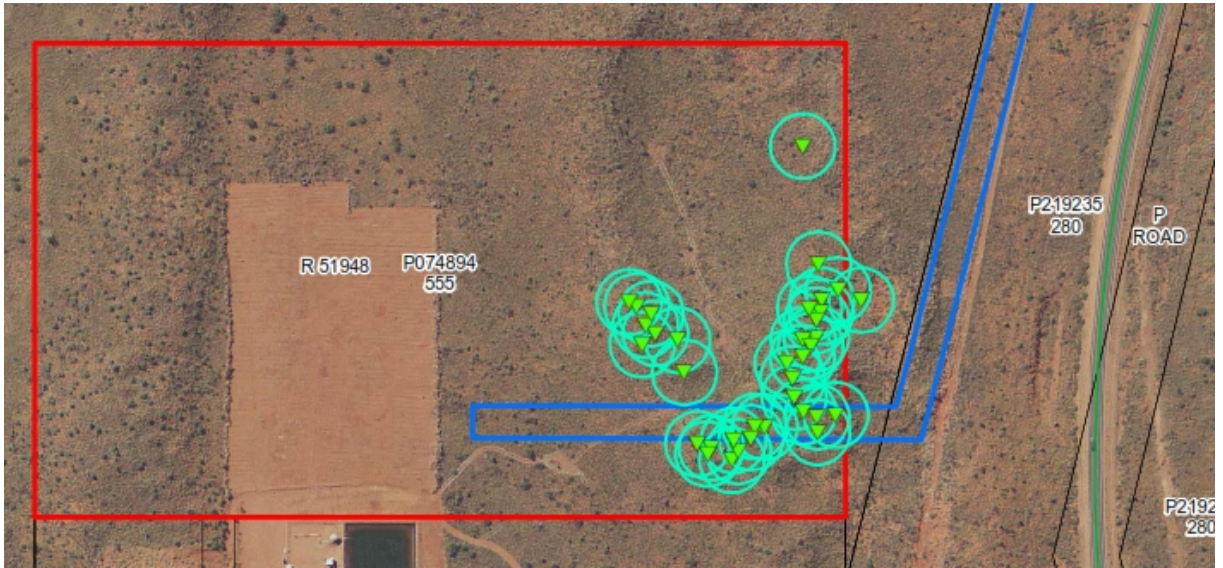


Figure 1 – Lot 555 Conservation Significant Flora Locations (Refer Appendix A for Complete Figure)



**Figure 2 – Lot 555 Conservation Significant Flora 20m Clearance Boundary
(Refer Appendix A for Complete Figure)**

Further to discussions with the GHD engineering team it is recommended that the transmission line project area impacted by the Priority 3 Flora (within Lot 555) be directionally drilled to comply with the clearing permit requirements (Refer Figure 3). This shall require a drill shot of approximately 120m.

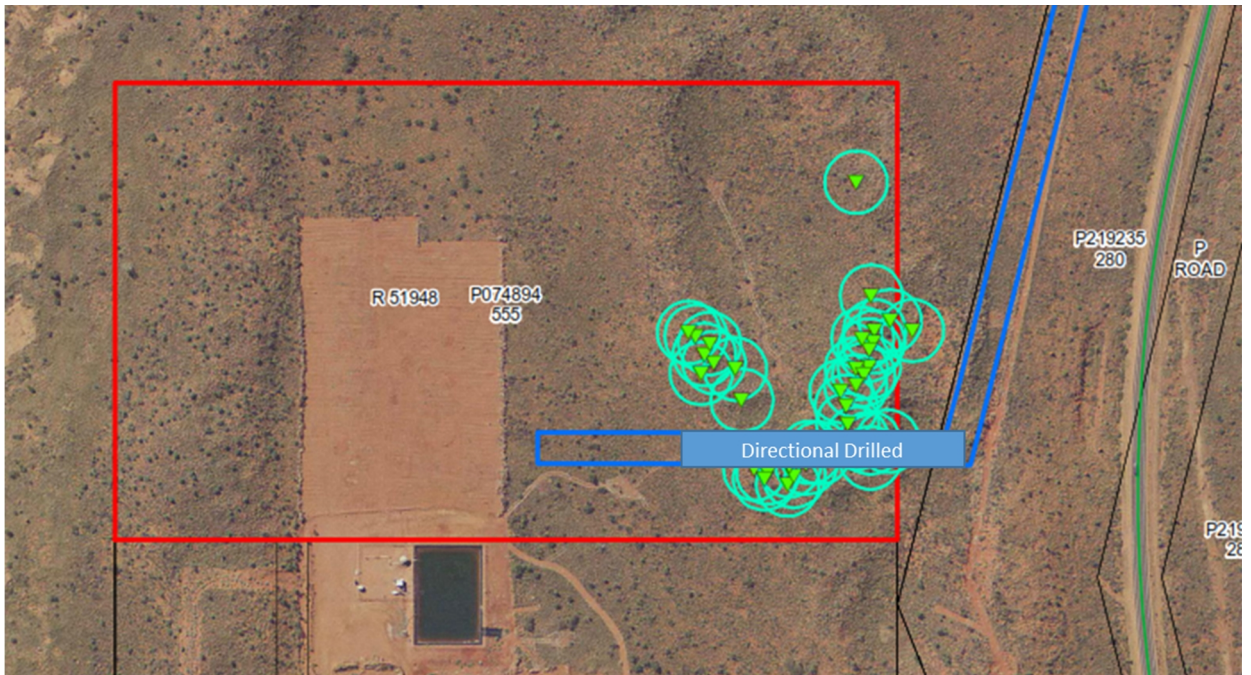


Figure 3 – Lot 555 Recommendation – Directional Drilling

2.2 Transmission Line

The Priority 3 Flora taxon *Eremophila Forrestii* subsp. *Viridis* was recorded in one section of the transmission line corridor (Refer Figure 4 and Appendix A). There were 6 plants from 4 locations recorded within the corridor. This taxon was also recorded outside the corridor, with a number of records immediately adjacent to the corridor.

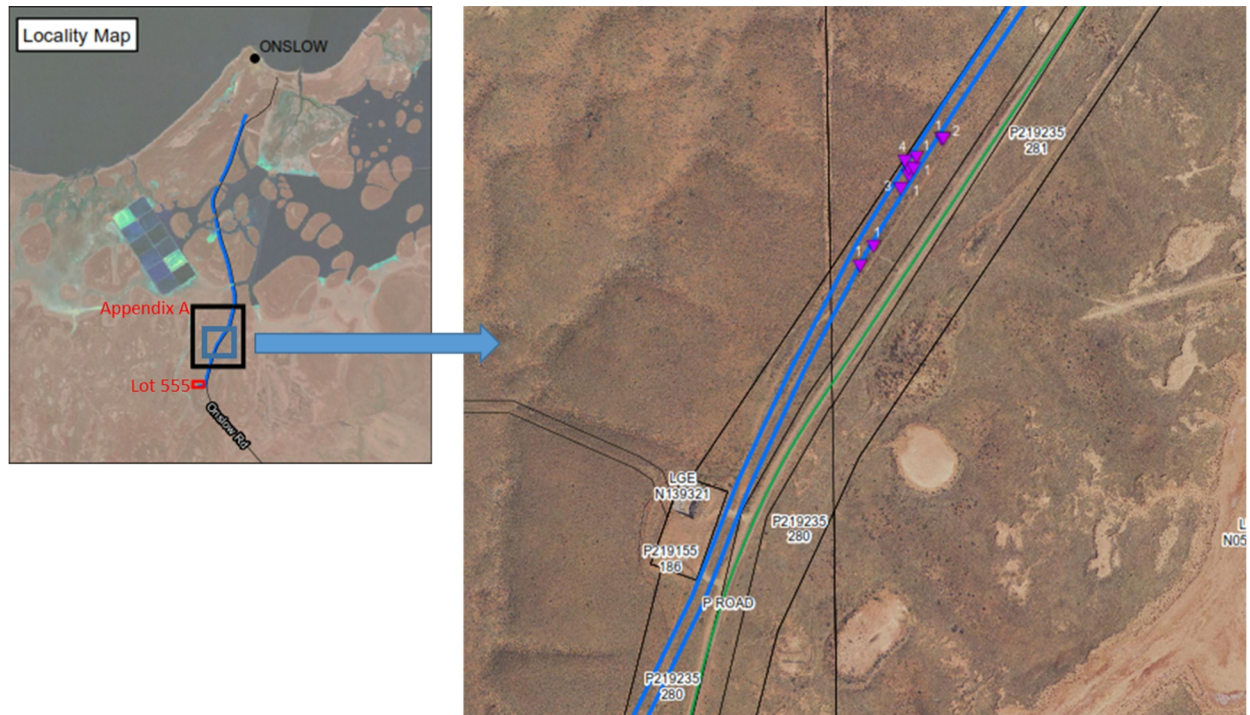


Figure 4 Transmission Line Conservation rare Flora (Refer Appendix A for Complete Figure)

Horizon Power has not yet applied for a clearing permit for the transmission line corridor (at the time of reporting). Therefore there are no clearing permit requirements applicable to this area yet. Whilst there may be scope for HP to negotiate a more modest clearing exclusion boundary than that imposed for Lot 555, there is a need to recommend to HP a solution that provides certainty with respect to a way forward, given what is currently known. Assuming therefore that a 20m exclusion will be imposed for the Transmission Line Priority 3 flora it is unlikely that a realigned trench will therefore be feasible in the impacted areas, given the width constraints of the corridor between the Minderoo fence line and the road shoulder.

Following consultation with the GHD Perth engineering team the following is therefore recommended:

- The transmission line in the impacted area be installed using two directional drill shots as detailed in Figure 5 – approx. 75m and 150m respectively.
- HP advise the DER regarding the existence of the Priority 3 flora and attempts to negotiate a favourable outcome. If trenching becomes feasible due to revised DER conditions then a realigned trench can be assessed.

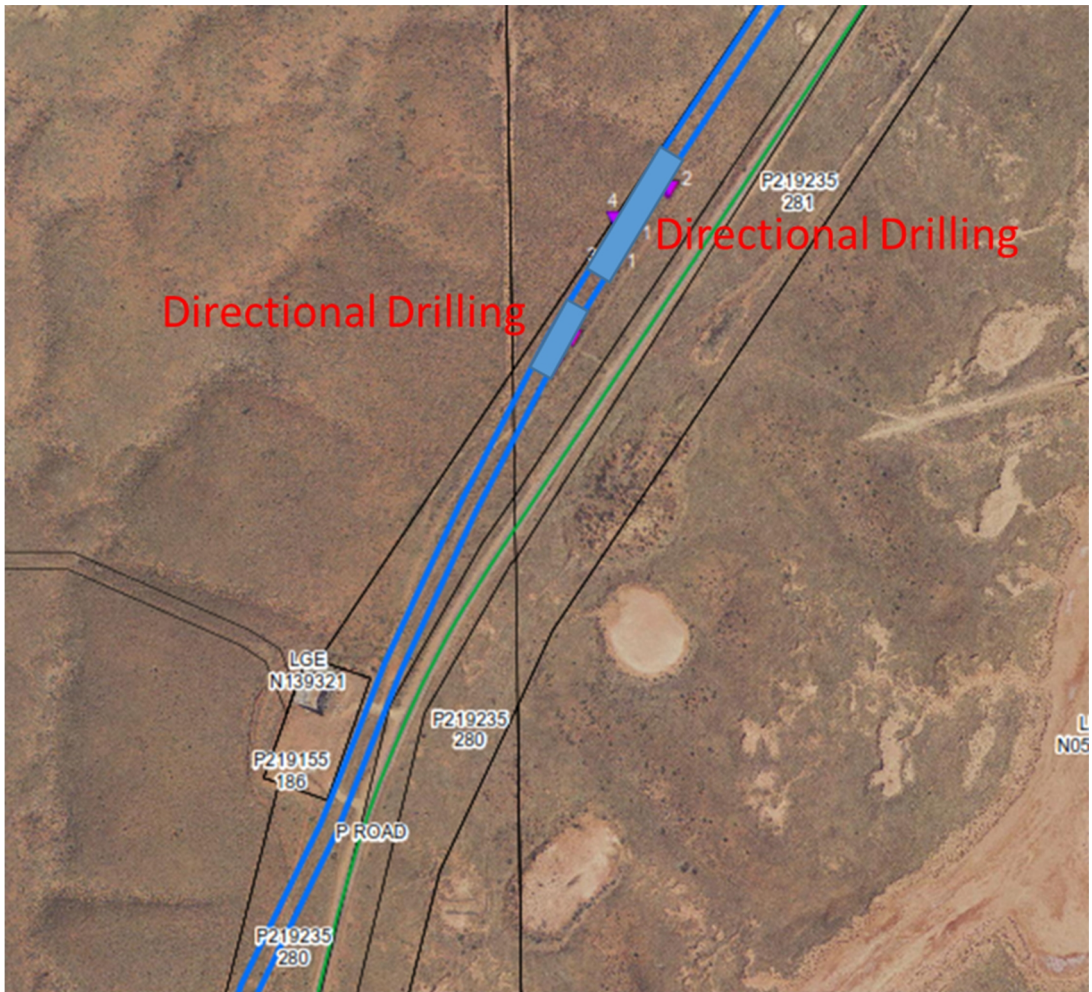


Figure 5 – Transmission Line Recommendation – Directional Drilling

2.3 Zone Substation

There were no species of concern within the Zone Substation Lot 880.

3. Scope of Works

Specifically, Clearing Permit 7253/1 Condition 2 states:

2. Flora management

(a) Prior to undertaking any clearing within the inland sand dune vegetation units 1D1, as identified within the 'Wheatstone Project, Desktop Review of the Proposed Onslow Micro-Siting Survey Area' the Permit Holder shall engage a *botanist* to undertake a Level 1 survey of the 1D1 area to be cleared in accordance with *Guidance Statement No. 51* to identify possible occurrences of, and habitat suitable for *priority flora*.

(b) Prior to undertaking any clearing, where an area has been identified in accordance with condition 2(a) as containing possible occurrences of, and habitat suitable for *priority flora*, the Permit Holder shall engage a *botanist* to inspect that area for the presence of *priority flora*.

(c) Where *priority flora* are identified in relation to condition 2(b) of this Permit, the Permit Holder shall ensure that:

- (i) no clearing occurs within 50 metres of identified priority 1 flora, unless approved by the CEO in writing;
- (ii) no clearing occurs within 20 metres of identified priority 2, 3 and 4 flora, unless approved by the CEO in writing;
- (iii) no clearing of identified *priority flora* occurs unless approved by the CEO in writing.

To assist Horizon Power, GHD Pty Ltd (GHD) completed the following scope of works:

- Supply of a suitably qualified botanist to undertake a site visit;
- A site assessment of Priority Flora known or that may possibly occur on the within Lot 555 and the transmission line corridor;
- Production of a map indicating Lot 555 and transmission line corridor boundaries (and Priority Flora locations); and
- A short report detailing results of the field assessment.

3.1 Report Limitations and Assumptions

This report has been prepared by GHD for Horizon Power and may only be used and relied on by Horizon Power for the purpose agreed between GHD and Horizon Power as set out in Section 1.2 of this report.

GHD otherwise disclaims responsibility to any person other than Horizon Power arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.

Investigations undertaken in respect of this report are constrained by the particular site conditions, such as the location of access tracks, services, third party operational works and vegetation. As a result, not all relevant site features and conditions may have been identified in this report.

Site conditions may change after the date of this Report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change.

This report has assessed Priority Flora within Lot 555 and the transmission line corridor. Should the survey area change or be refined, further assessment may be required.

4. Methodology

4.1 Survey Methodology

4.1.1 Level 1 Survey Requirements

To achieve Condition 2(a) of Clearing Permit 7253/1 a Level 1 survey is required. The definition of the Level 1 survey is provided by the Environmental Protection Authority (EPA) Guidance Statement No. 51 Guidance for the Assessment of Environmental Factors (in accordance with the *Environmental Protection Act 1986*) *Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia.*, June 2004.

Table 1 Level 1 Flora and Vegetation Survey Requirement (EPA, 2004).

Survey Level	Requirement
Level 1	<p>Background research or ‘desktop’ study</p> <p>The purpose is to gather background information on the target area (usually at the locality scale).</p> <p>This involves a search of all sources of literature, data and map-based information.</p> <p>Reconnaissance survey</p> <p>The purposes are: i) to verify the accuracy of the background study; ii) to further delineate and characterise the flora and the range of vegetation units present in the target area; and iii) to identify potential impacts.</p> <p>This involves a target area visit by suitably qualified personnel to undertake selective, low intensity sampling of the flora and vegetation, and to produce maps of vegetation units and vegetation condition at an appropriate scale.</p>

4.1.2 Desktop Review

Previous studies and the Department of Parks and Wildlife (DPaW) flora databases were searched to provide background information on the target area.

The studies examined included:

- Biota Environmental Services (2010). Wheatstone Project Flora and Fauna Assessment Addendum. Unpublished report prepared for URS Australia Pty Ltd on behalf of Chevron Australia Pty Ltd, May 2010;
- GHD Pty Ltd (2011). Onslow Road Biological Survey. Unpublished Report for Main Roads Western Australia,
- GHD Pty Ltd (2012). Report for Onslow Road – Twitchen Road Intersection Upgrade, Preliminary Environmental Impact Assessment. Unpublished report for Gascoyne Alliance, April 2012;
- Strategen Environmental Consultants (2013). Wheatstone to DBNGP Natural Gas Pipeline. EP Act Referral Supporting Documentation. Unpublished report prepared for DBP Development Group Nominees Pty Ltd, October 2013;
- Biota Environmental Sciences (2013). Desktop Review of the Proposed Onslow Micro-Siting Survey Area. Unpublished Report, April 2013;
- Horizon Power (2014). Onslow Power Infrastructure Upgrade Project, EPA Part IV Referral Supporting Documentation, 21 July 2014; and
- GHD Pty Ltd (2014). Onslow Ring Road Biological Survey. Unpublished report for Main Roads Western Australia, September 2014.

The databases examined included:

- DPaW and Western Australian Museum (2007-) *NatureMap*: Mapping Western Australia's biodiversity. Available online at: <https://naturemap.dpaw.wa.gov.au/>
- DPaW (1998-). *FloraBase*: the Western Australian Flora. Available online at: <https://florabase.dpaw.wa.gov.au/>
- Department of the Environment and Energy (DoTEE) (2016). Protected Matters Search Tool. Available online at: <http://www.environment.gov.au/webgis-framework/apps/pmst/pmst.jsf>

Prior to the field survey, information from the desktop review (e.g. aerial photography, soils and topography data, *FloraBase* and *NatureMap*) was reviewed to determine conservation significant flora taxa potentially present within the survey area. Additionally, ecological information (e.g. habitat, associated flora taxa and phenology) was sourced from *FloraBase* (DPaW, 1998-) and other relevant publications where available, to provide further details.

4.1.3 Field Survey Methodology

Field Survey Personnel

GHD's Principal Ecologist Joshua Foster is a suitably qualified botanist. Joshua has a Bachelor of Science Degree majoring in Botany and Zoology from the University of Western Australia (awarded 1996).

Joshua has been undertaking biological survey works in Western Australia for 18 years, including 11 in the Pilbara Interim Biogeographic Regionalisation of Australia (IBRA) bioregion.

Joshua holds a current Permit to Take Flora for Scientific or Other Prescribed Purposes (SL011812) issued by the Department of Parks and Wildlife (DPaW).

Joshua was assisted in the field by GHD Environmental Scientist Marlee Starcevich.

Field Survey Timing

A single season field survey was completed on 20 and 21 December 2016. The timing was considered adequate as Priority Flora known from the survey area are perennial plants and support readily identifiable material (e.g. fruit, old flowers) at the time of survey. In addition, the botanist undertaking the survey has previously collected the Priority Flora known from Lot 555 and from the vicinity of the transmission line corridor.

Site Surveys

The field survey was undertaken to verify information provided by the desktop review, and identify and record conservation significant flora taxa present at the time of survey.

Using a combination of: database search results; known Priority Flora locations; Priority Flora preferred habitat; and aerial photography, targeted surveys were conducted in Lot 555 and along the transmission line corridor. Wandering transects were conducted within potential habitat.

Specimens were marked using a hand-held Global Positioning System (GPS) tool to accuracy approximately ± 5 m and counts of plants (within 5 m of record) were made.

Species well known to the survey botanists were identified in the field. Other specimens were collected and assigned a unique collection number to facilitate tracking. Plant specimens collected during the field assessment were dried and processed in accordance with the requirements of the WA Herbarium. Plant species were identified by the use of taxonomic literature, electronic keys and online electronic databases. Where necessary, plant taxonomists considered to be authorities on particular plant groups were consulted.

The conservation status of all recorded flora was compared against the current lists available on *FloraBase* (DPaW 1998-)

4.2 Reporting

This report details the number of Priority Plants, their recorded locations, and the consideration of a 20m buffer surrounding each record.

5. Results of Field Surveys

5.1 Lot 555

5.1.1 Vegetation

The vegetation within Lot 555 was considered to be equivalent to that mapped by Biota (2013):

- CS1: *Acacia tetragonophylla* scattered shrubs over *Triodia epactia* hummock grassland occurring on interdunal swales; and
- ID1: *Grevillea stenobotrya* tall open shrubland over *Crotalaria cunninghamii*, *Trichodesma zeylanicum* var. *grandiflorum* open shrubland over *Triodia epactia* open hummock grassland occurring on red sandy dunes.

There are existing, cleared areas within the interdunal swales, with infrastructure already present

5.1.2 Targeted Flora Surveys

Triumfetta echinata

The Priority 3 Flora species *Triumfetta echinata* was recorded from the eastern end of Lot 555. These records occurred in known habitat and surrounded known records. This taxon is described by *FloraBase* (DPaW, 1998-) as a prostrate shrub to 0.3 metres (m) high that flowers in August, and occurs on red sandy soils on sand dunes. *NatureMap* (DPaW, 2007-) records indicate that this species is known from seven locations, most of which are known from the Onslow area.

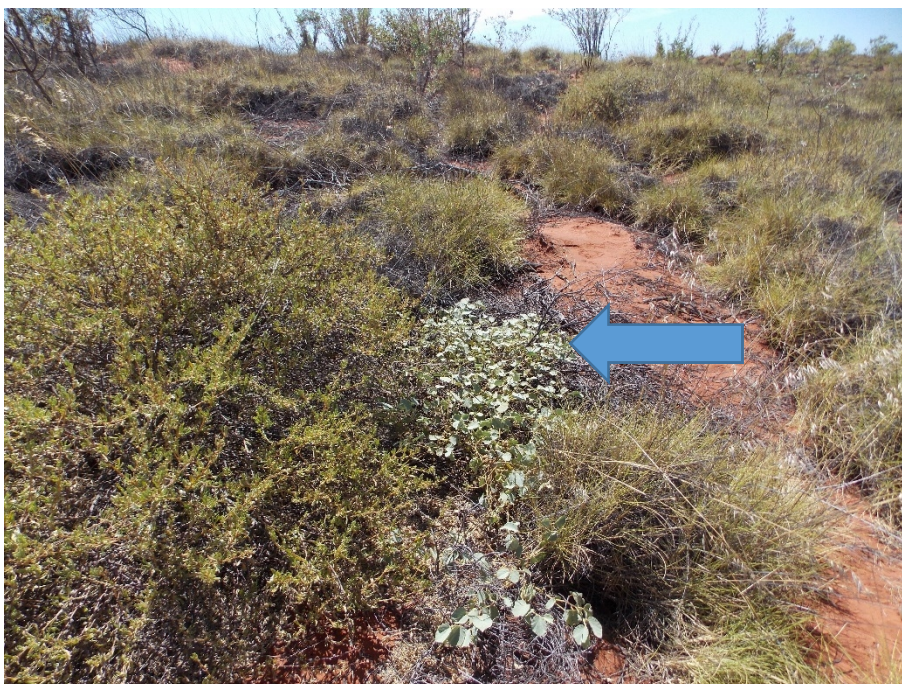


Plate 1 *Triumfetta echinata* (arrowed) habitat



Plate 2 *Triumfetta echinata* close up of leaf morphology



Plate 3 *Triumfetta echinata* distinctive fruit

Fifty-eight plants from 35 locations recorded from Lot 555 with one plant from one location recorded immediately east of the Lot boundary (Figure 1). All records were restricted to the dune vegetation (ID1).

The *Triumfetta echinata* locations (and 20 m buffer) do not intersect the proposed design for the power station (as per Drawing OWP-TL-C-3009-01).

Within Lot 555, the *Triumfetta echinata* locations and 20 m buffer overlap the proposed transmission line corridor that leads from the power station towards the southeastern boundary. There are no *Triumfetta echinata* locations along the transmission line corridor outside of Lot 555.

5.2 Transmission Line

Eremophila forrestii subsp. *viridis*

The Priority 3 Flora taxon *Eremophila forrestii* subsp. *viridis* was recorded from one population in the southern portion of the transmission line, in the vicinity of a known record mapped by Biota (2013).

This taxon is described by *FloraBase* (DPaW, 1998-) as a much-branched shrub to 1 m high with pink-cream flowers in August. Both Chinnock (2007) and Brown and Buirchell (2011) describe this taxon as having bright green, scarcely hairy leaves, which is distinctive. Chinnock (2007) describes the leaves as growing up to 25 millimetres (mm) long by 12 mm wide; however Brown and Buirchell (2011) indicate the leaves only up to 15 mm long by 12 mm wide.

Within the Onslow area this taxon was found to be intermixed with the more common *Eremophila forrestii* subsp. *hastieana* (Biota, 2013). *NatureMap* (DPaW, 2007-) records indicate that this taxon is known from six locations, most of which are known from the Onslow area, with a disjunct record in the Great Sandy Desert.



Plate 4 *Eremophila forrestii* subsp. *hastieana* (left) and *E. forrestii* subsp. *viridis* (right)



Plate 5 *Eremophila forrestii* subsp. *viridis* showing old flowers (sepals and peduncle)

During the December 2016 survey, 22 plants from 12 locations were recorded. Within the transmission line corridor, there were 6 plants from 4 locations recorded within the corridor. This taxon was also recorded outside the corridor, with a number records immediately adjacent to the corridor (Figure 1). All specimens were recorded in the CS1 vegetation type.

5.3 Lot 880

There were no species of concern within the Zone Substation Lot 880.

6. Recommendations

6.1 Lot 555

As part of Clearing Permit 7253/1, Horizon Power is required to avoid all locations (and a 20 m buffer) of *Triumfetta echinata*. The locations of this plant (and 20 m buffer) intersect the proposed transmission line corridor within Lot 555.

Recommendation

To avoid this species, GHD recommends directional drilling under the impacted area with a single drill shot. This is considered the most feasible solution given the extent of the Priority 3 species, the clearing buffer and the space required for direct trenching making it difficult to implement.

6.2 Transmission Line Corridor

The Priority 3 Flora taxon *Eremophila forrestii* subsp. *viridis* was recorded one section of the transmission line corridor. There were 6 plants from 4 locations recorded within the corridor. This taxon was also recorded outside the corridor, with a number of records immediately adjacent to the corridor.

The Priority Flora Locations (*Eremophila forrestii* subsp. *viridis*) may impact on the installation of the transmission line.

Depending on the areal extent of clearing required for the installation of the transmission line, the records of Priority Flora Locations (*Eremophila forrestii* subsp. *viridis*) may be able to be avoided within the current proposed transmission line corridor. The width of the trench may be able avoid these plants. However, if a 20 m buffer is applied to each location (as is applied to Priority Flora present in Lot 555), clearing cannot occur in the current transmission line corridor.

Recommendation

GHD recommends that Horizon Power directionally drill under the *Eremophila forrestii* subsp. *viridis* population to avoid the individual plants and any 20 m buffer. This recommendation is made given similar issues to Lot 555 combined with:

- The health and safety risks associated with working adjacent to Onslow Road.
- The Transmission Line corridor not imposing on the future Water Corp water pipeline corridor.

7. References

- Biota Environmental Sciences (2013). Desktop Review of the Proposed Onslow Micro-Siting Survey Area. Unpublished Report, April 2013.
- Biota Environmental Services (2010). Wheatstone Project Flora and Fauna Assessment Addendum. Unpublished report prepared for URS Australia Pty Ltd on behalf of Chevron Australia Pty Ltd, May 2010.
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- Strategen Environmental Consultants (2013). Wheatstone to DBNGP Natural Gas Pipeline. EP Act Referral Supporting Documentation. Unpublished report prepared for DBP Development Group Nominees Pty Ltd, October 2013.

Appendices

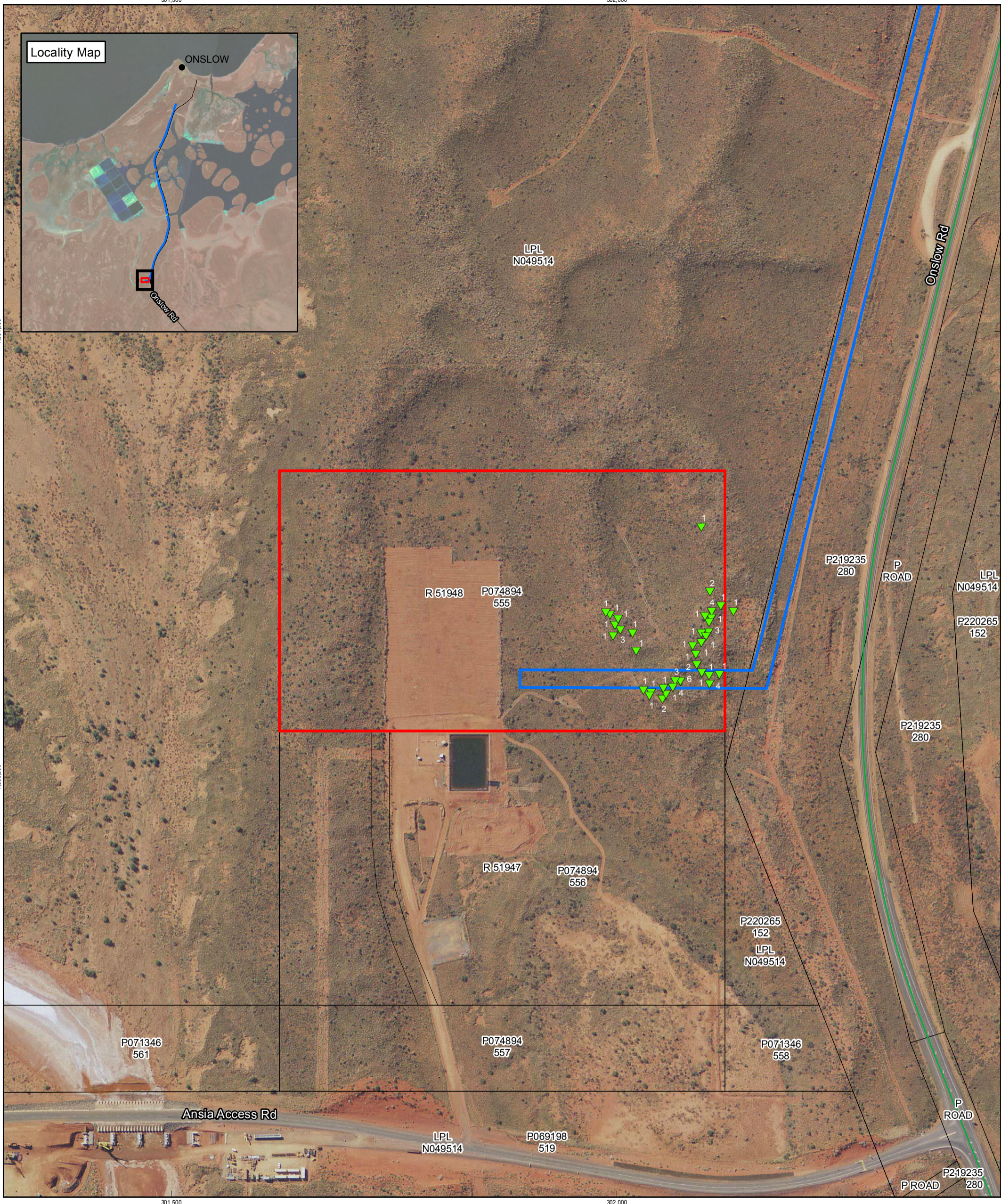
Appendix A - Figures

Figure 1 Lot 555 Significant Flora Locations

Figure 2 Lot 555 Conservation Significant Flora – 20m Buffer

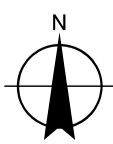
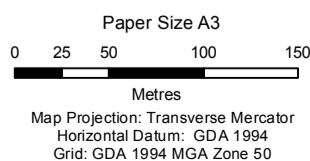
Figure 4 Transmission Line Significant Flora Locations

Locality Map



LEGEND

- Conservation Significant Flora (population count annotated) Lot 555 Clearing Permit Boundary
- ▼ *Eremophila forrestii* subsp. *viridis* Cadastral Boundary
- ▼ *Triumfetta echinata*
- Transmission Line Works Area

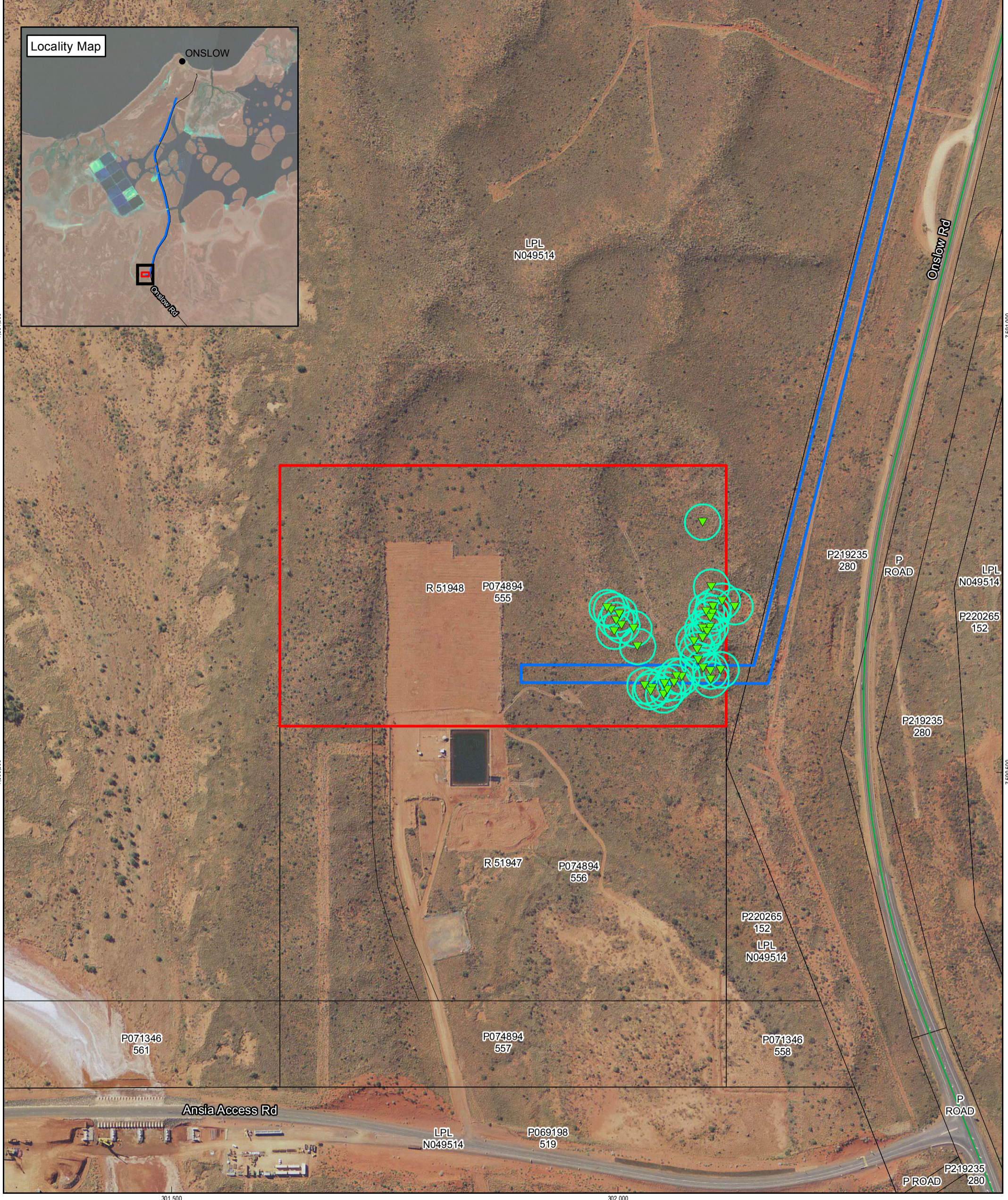
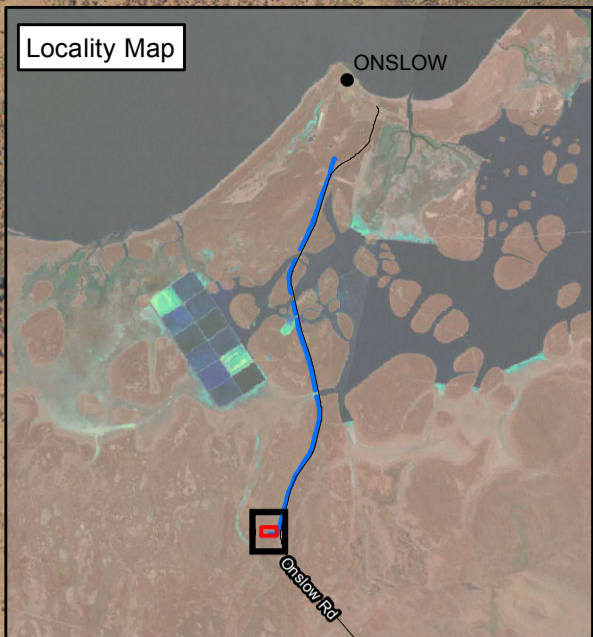


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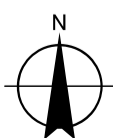
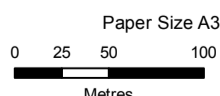
Conservation Significant Flora

Figure 1



LEGEND

- Conservation Significant Flora (population count annotated)
 - ▼ *Eremophila forrestii* subsp. *viridis*
 - ▼ *Triumfetta echinata*
- 20m Buffer for Conservation Significant Flora
- Transmission Line Works Area
- Lot 555 Clearing Permit Boundary
- Cadastral Boundary

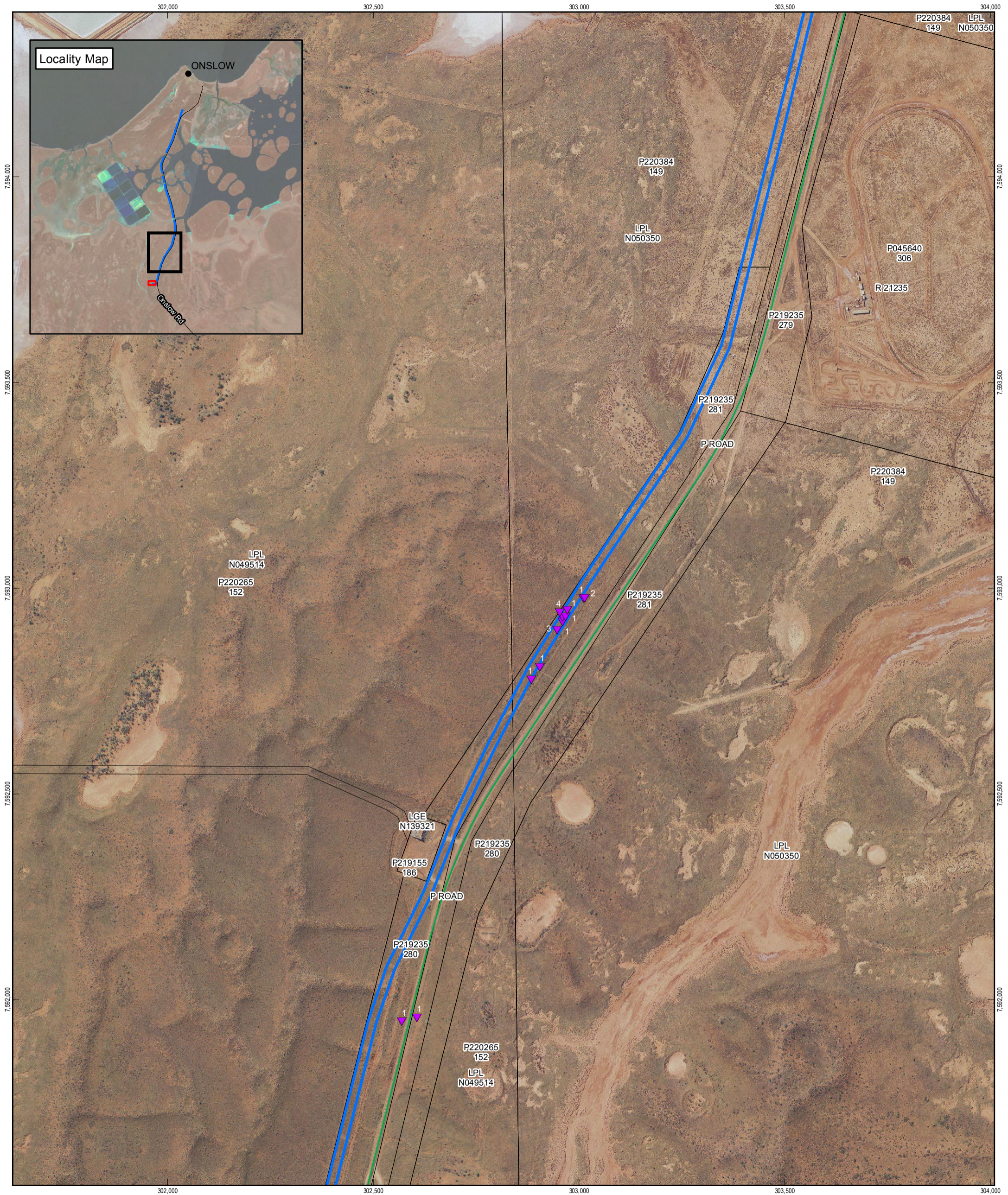


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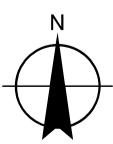
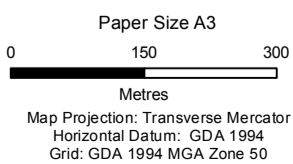
Page 1 of 2

Conservation Significant Flora - 20m Buffer Figure 2



LEGEND

- Conservation Significant Flora (population count annotated) Lot 555 Clearing Permit Boundary
- ▼ *Eremophila forrestii* subsp. *viridis* Cadastral Boundary
- ▼ *Triumphetta echinata*
- Transmission Line Works Area



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Conservation Significant Flora

Figure 4

GHD

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

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