



Memorandum

23 October 2018

To Public Transport Authority

Copy to

From GHD

Subject Additional Targeted Flora Survey

Job no. 6136327 and 6137062

1. Introduction

1.1 Background

The Public Transport Authority (PTA) is in the planning stage for the extension of the passenger railway between Thornlie and Cockburn, the Thornlie-Cockburn Link Project (the project). The proposed alignment extends from Beckenham Junction to Thornlie Station and through to Cockburn Central Station, a distance of approximately 18 kilometres (km). The project also includes two new stations, park and ride facilities at Ranford Road and Nicholson Road in Canning Vale, the duplication of the existing rail bridge over the Canning River, and drainage infrastructure areas outside of the rail reserve.

GHD Pty Ltd (GHD) completed a biological assessment for the project with surveys undertaken in September and October 2017, and February, March and October 2018. The GHD surveys assessed a total survey area of 157.90 hectares (ha).

The project was referred to the Environmental Protection Authority (EPA) under Section 38 of the *Environmental Protection Act 1986* (EP Act). The EPA decided to assess the proposal with the level of assessment set as Referral Information with Additional Information (4-week public review). The additional information request included flora and vegetation aspects, specifically information regarding significant flora species.

The project has also been referred to the Department of Environment and Energy (DEE) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The DEE has determined that the proposed action is a controlled action and will require assessment and approval under the EPBC Act before it can proceed.

1.2 Purpose

The PTA has commissioned GHD to complete an additional targeted survey for conservation significant flora. The outcome of this assessment will be supplied to the EPA and DEE to assist inform their environmental assessment.

1.3 Scope of works

The scope of works involves a targeted survey of conservation significant flora identified as known, likely or possibly occurring within the survey area. The findings of the survey will be provided in a brief memorandum (this document).

1.4 Limitations and assumptions

The limitations and assumptions outlined in the GHD flora and fauna assessment report (GHD 2018) also apply to this memorandum.

2. Methodology

2.1 Targeted flora

Desktop searches of the EPBC Act PMST, *NatureMap*, and DBCA TPFL and WAHERB databases identified the presence/potential presence of 85 conservation significant flora taxa within the study area (GHD 2018). A likelihood of occurrence assessment undertaken by GHD based on survey effort between September 2017 and March 2018 (and as reported in the Thornlie-Cockburn Link Referral Documentation **Appendix 2 - Flora & Fauna Report** (GHD 2018a)) concluded two taxa are known to occur, seven taxa are considered likely to occur and 24 taxa may possibly occur within the survey area. The remaining species are considered unlikely to occur within the survey area. These 33 taxa, including their reported flowering periods, are listed in Table 1 and were the focus of this significant flora targeted survey.

Table 1 Targeted flora survey

| Family | Taxon | Status | Description | Flowering time (WA Herbarium 1998-, DEE 2018) |
|------------------------|-------------------------------|--------|--|---|
| Known to occur | | | | |
| Orchidaceae | <i>Caladenia huegelii</i> | T, En | Tuberous, perennial, herb, 0.25-0.6 m high. Flowers green & cream & red. Grey or brown sand, clay loam. | September to October |
| Sapindaceae | <i>Dodonaea hackettiana</i> | P4 | Erect shrub or tree, 1-5 m high. Fl. yellow-green/red, mainly. Sand. Outcropping limestone. | July to October |
| Likely to occur | | | | |
| Cyperaceae | <i>Tetraria australiensis</i> | T, Vu | Rhizomatous, tufted perennial, grass-like or herb (sedge), to 1 m high. Fl. brown. Has been recorded on yellow and grey sand, moist grey sandy loam/light clay in open sedgelands amongst open Marri/Jarraah woodlands. | November to December |
| Macarthuriaceae | <i>Macarthuria keigheryi</i> | T, En | Erect or spreading perennial, herb or shrub, 0.2-0.4 m high, 0.3-0.6 m wide. White or grey sand. | September to December or |

| Family | Taxon | Status | Description | Flowering time (WA Herbarium 1998-, DEE 2018) |
|--------------------------|---|--------|---|---|
| | | | Five of the six known populations occur within a 5 km radius of Welshpool and Kewdale area. These populations are found in low-lying winter-wet damp, grey/white sands and grows in open patches with low tree canopy cover among heathland, Jarrah and <i>Allocasuarina/Banksia</i> woodland at Welshpool and Kewdale. | February to March |
| Polygalaceae | <i>Comesperma griffinii</i> | P2 | Annual or perennial, herb, to 0.15 m high. Fl. white. Yellow or grey sand. Plains. | October |
| Polygalaceae | <i>Comesperma rhadinocarpum</i> | P2 | Perennial, herb. Fl. blue. White sandy soils | October to November |
| Stylidiaceae | <i>Stylidium aceratum</i> | P3 | Fibrous rooted annual, herb, 0.05-0.09 m high, leaves spatulate. Fl. pink/white. Sandy soils. Swamp heathland. | October to November |
| Ericaceae | <i>Styphelia filifolia</i> | P3 | Shrub, ca 50cm. Fl. white. Brown-grey sand. Associated with <i>Banksia</i> woodland. | February-March |
| Celastraceae | <i>Tripterococcus</i> sp. <i>Brachylobus</i> (A.S. George 14234). | P4 | Erect perennial herb 80 cm high and 15 cm wide. Fl. green to yellow. Grey sand. | November to December |
| Possible to occur | | | | |
| Amaranthaceae | <i>Ptilotus pyramidatus</i> | T, Cr | Small herb up to 5 cm tall. The erect stem is tufted, unbranched, finely striated, hairy and greyish in colour. Flowers are a greenish-yellow colour and arranged in dense, pyramid-shaped spikes about 2.5 cm long (DEE 2018). Sandy clay. Floodplains. Previous records have been found on floodplains growing under <i>Melaleuca acutifolia</i> and <i>Verticordia</i> sp. shrubland in grey sandy loam/clay. | Early October |
| Proteaceae | <i>Synaphea</i> sp. Fairbridge Farm (D. Papenfus 696) | T, Cr | Dense, clumped shrub 25-65 cm tall, to 20-80 cm wide. Fl. yellow. Occurs on grey, clayey sand with lateritic pebbles in low woodland areas near winter-wet flats. | September to November |

| Family | Taxon | Status | Description | Flowering time (WA Herbarium 1998-, DEE 2018) |
|-------------|---|--------|---|--|
| Myrtaceae | <i>Calytrix breviseta</i> subsp. <i>breviseta</i> | T, En | <p>The swamp starflower is a free-standing shrub with widely-spaced, spreading-ascending leaves that can reach 40 cm in height (DEE 2018). Occurs on sandy clay on swampy flats.</p> <p>The swamp starflower occurs in the Kenwick area of Perth. Historically, the species was also known from Gosnells and Bellevue, but it is now extinct in these areas. The species is restricted to winter-wet clay flats with low shrubs or Jarrah forest.</p> | October to November |
| Orchidaceae | <i>Diuris purdiei</i> | T, En | <p>Tuberous, perennial, herb, 0.15-0.35 m high. Fl. yellow, but only after a summer or early autumn fire.</p> <p>It grows on sand to sandy clay soils, in areas subject to winter inundation, and amongst native sedges and dense heath with scattered emergent <i>Melaleuca preissiana</i>, <i>Eucalyptus calophylla</i>, <i>E. marginata</i> and <i>Nuytsia floribunda</i>.</p> | Late September to mid-October |
| Orchidaceae | <i>Drakaea elastica</i> | T, En | <p>Tuberous, perennial, herb, 0.12-0.3 m high. Fl. red, green and yellow.</p> <p>Occurs on bare patches of white or grey sand in low-lying situations adjoining winter-wet swamps.</p> | Late September and continue flowering until late October or more rarely early November. The best time to look for the plant is in July and August when the leaves are relatively conspicuous |
| Orchidaceae | <i>Drakaea micrantha</i> | T, Vu | <p>Tuberous, perennial, herb, 0.15-0.3 m high. Flowers red & yellow.</p> <p>Usually found on cleared firebreaks or open sandy patches that have been disturbed, where competition from other plants has been removed. This suggests that the plants may need a disturbance event at some point, and that plants regenerate from soil stored seed after such an event. The Dwarf Hammer-orchid occurs in infertile grey sands, in Jarrah and Common Sheoak</p> | September to October |

| Family | Taxon | Status | Description | Flowering time (WA Herbarium 1998-, DEE 2018) |
|---------------|---|--------|---|---|
| | | | woodland or forest associated with <i>Banksia</i> species. | |
| Amaranthaceae | <i>Ptilotus sericostachyus</i> subsp. <i>roseus</i> | P1 | Prostrate to ascending perennial, herb. Fl. pink-white. | September to December |
| Orchidaceae | <i>Thelymitra variegata</i> | P2 | Tuberous, perennial, herb, 0.1-0.35 m high. Fl. orange & red & purple & pink. Has been recorded in yellow sand associated with <i>Banksia attenuata</i> , <i>Allocasuarina fraseri</i> and <i>Hibbertia hypericoides</i> in the Jandakot area. | June to September |
| Asparagaceae | <i>Thysanotus anceps</i> | P3 | Rhizomatous, leafless perennial, herb, to 0.4 m high. Fl. purple. White or grey sand, lateritic gravel, laterite. Also some granite outcrops. | October to December |
| Myrtaceae | <i>Babingtonia urbana</i> | P3 | Spreading shrub to 1 m tall x 1.5 m wide. Fl. pink. | January to February |
| Haemodoraceae | <i>Haemodorum loratum</i> | P3 | Bulbaceous, perennial, herb, 0.45-1.2(-2) m high. Fl. black/brown-black/green. Grey or yellow sand, gravel. | November |
| Haemodoraceae | <i>Meionectes tenuifolia</i> | P3 | Annual semi aquatic herb. Moist sandy clay. | October to November |
| Fabaceae | <i>Jacksonia gracillima</i> | P3 | Perennial tufted herb with narrow leaves 10-40 cm long, with rose pink flowers. Grey sand, winter wet. | October to November |
| Haemodoraceae | <i>Myriophyllum echinatum</i> | P3 | Erect annual, herb, 0.02-0.03 m high. Fl. red. Clay. Winter-wet flats. | November |
| Cyperaceae | <i>Schoenus benthamii</i> | P3 | Tufted perennial, grass-like or herb (sedge), 0.15-0.45 m high. Fl. brown. White, grey sand, sandy clay. Winter-wet flats, swamps. | October to November |
| Cyperaceae | <i>Schoenus capillifolius</i> | P3 | Semi-aquatic tufted annual, grass-like or herb (sedge), 0.05 m high. Fl. green. Brown mud. Claypans. | October to November |

| Family | Taxon | Status | Description | Flowering time (WA Herbarium 1998-, DEE 2018) |
|---------------|--|--------|---|---|
| Cyperaceae | <i>Schoenus</i> sp. Waroona (G.J. Keighery 12235) | P3 | Tufted annual, grass-like or herb (sedge), 0.02-0.06 m high. Fl. brown-red-green. Clay or sandy clay. Winter-wet flats. | October to November |
| Stylidiaceae | <i>Stylidium</i> <i>paludicola</i> | P3 | Reed-like perennial, herb, 0.35-1 m high. Fl. pink. Peaty sand over clay. Winter wet habitats. | October to December |
| Droseraceae | <i>Drosera</i> <i>occidentalis</i> subsp. <i>occidentalis</i> | P4 | Fibrous-rooted, rosetted perennial, herb, to 0.01 m high. Fl. pink/white. Sandy & clayey soils. Swamps & wet depressions. | November to December |
| Menyanthaceae | <i>Ornduffia</i> <i>submersa</i> | P4 | Aquatic annual, 0.3 cm high. Fl white. Wetland | October to November |
| Orchidaceae | <i>Microtis</i> <i>quadrata</i> | P4 | Erect herb 40 cm, green/cream flowers. Swamps. Known to occur in black peaty soil of Lake Jandakot. | October to December |
| Cyperaceae | <i>Schoenus</i> <i>natans</i> | P4 | Aquatic annual, grass-like or herb (sedge), 0.3 m high. Fl. brown. Winter-wet depressions. | October |
| Stylidiaceae | <i>Stylidium</i> <i>longitubum</i> | P4 | Erect annual (ephemeral), herb, 0.05-0.12 m high. Fl. pink. Sandy clay, clay. Seasonal wetlands. | October to December |
| Myrtaceae | <i>Verticordia</i> <i>lindleyi</i> subsp. <i>lindleyi</i> | P4 | Erect shrub, 0.2-0.75 m high. Fl. pink. Sand, sandy clay. Winter-wet depressions. | May or November to December or January. |

2.2 Field survey

2.2.1 Survey area

The targeted flora survey area encompassed the GHD biological assessment survey area (GHD 2018a, 2018b) as well as adjacent areas of native vegetation, generally to 20 m beyond the survey area boundary. Additional areas also included in the targeted flora survey area were:

- Tom Bateman Reserve – the entire of site up to Roe Highway
- Ken Hurst Park / Jandakot Airport Bush Forever Site – expanded out to a 50m buffer both north and south of the survey area
- Ranford Road Station – larger area to the south-west

- North and south of the Karel Ave Intersection – further bushland included

The targeted flora survey area covered 174.29 hectares (ha) and is shown in Figure 1, Attachment A. This larger survey area was surveyed to inform an assessment of potential direct and indirect offsite impacts to conservation significant flora as a result of the project.

2.2.2 **Sampling method**

GHD undertook a 14.5 person-day targeted significant flora survey of the survey area between 19 September – 11 October 2018. Field survey timing generally coincided with the most suitable period to identify the flora taxa listed in Table 1. The reported flowering period for most of the targeted species is September/October with a small number of species that flower from November to December or between January and March. The flora targeted during the field survey included those taxa that are expected to be flowering and those species that present identifiable features without flowers.

Based on the significant flora to be targeted (including orchids), vegetation mapping completed for the project and previous survey results and effort, GHD employed a sampling method involving walking traverses spaced approximately 5 metres (m) apart in areas of native vegetation (vegetation condition rating Degraded and above). Traverse spacing equated to a 2.5 m search area either side of the walked traverse, which was deemed sufficient intensity for the taxa targeted. Tracklogs of walked traverses were captured using handheld Garmin GPS and Nomad Juno units. Survey effort for the targeted flora survey is shown on Figure 2, Attachment A.

As the purpose of the targeted flora survey was to search for and record significant flora taxa, additional information along each traverse such as descriptive location, landform, aspect, soils and vegetation condition was not recorded. This information has already been captured for the biological survey area as part of detailed vegetation and flora surveys completed and reported on by GHD (2018).

Where individuals were identified, the location and number of plants present were recorded using handheld GPS units. Additional data was collected to support the lodgement of a Threatened and Priority Flora Report Form. A small representative sample of the Priority, or potential Priority listed flora was collected for verification and lodgement at the Western Australian Herbarium.

2.2.3 **Survey limitations**

Three small areas of suitable bushland were not accessed during the survey. These areas occurred in the west part of the survey area and included one area located along Kwinana Freeway, one area within the rail corridor and the third required crossing the rail corridor. These area supported *Banksia* woodland vegetation in Good and Good – Degraded condition, and Shrubland in Degraded condition.

3. **Results**

Two significant flora species were recorded during the survey:

- *Caladenia huegelii* listed as Endangered by the EPBC Act and Threatened under the WC Act
- *Jacksonia gracillima* listed as Priority 3 by DBCA.

Locations of these species are shown on Figure 1, Attachment A.

3.1 ***Caladenia huegelii***


A number of plants of *Caladenia huegelii* were recorded within the Caladenia Grove Wetland Reserve and within the northern section of Ken Hurst Park. All except two of these plants were in areas which had been previously recorded and physically marked with aluminium pegs or protective wire. The two

plants not previously marked are within Ken Hurst Park, within relatively close proximity to known, populations. Plants of *Caladenia huegelii* were in full bloom at the time of survey, however, a number of previously marked plants had not grown a leaf or were not flowering. All individuals were found in *Banksia* woodland areas, growing in grey/white sand, and generally in lower lying (but well drained) areas with relatively dense understorey. The species appears relatively robust, in that it occurs within somewhat disturbed areas (weeds, close to infrastructure and old tracks).

Twenty eight individuals of *Caladenia huegelii* were recorded within the targeted flora survey area. The 13 individuals within Ken Hurst Park are located adjacent to the survey area considered in the Thornlie-Cockburn Link Project, Flora and Fauna Survey report (GHD 2018a, 2018b); whereas the 15 individuals within Caladenia Grove Wetland Reserve are within the survey area considered in the Thornlie-Cockburn Link Project, Flora and Fauna Survey report (GHD 2018a, 2018b).

3.2 *Jacksonia gracillima*

One hundred and eighty five individuals of *Jacksonia gracillima* were recorded in open shrubland areas and in Marri woodland in Good and Good to Degraded condition in Tom Bateman Reserve.

 These records are outside the survey area considered in the *Thornlie-Cockburn Link Project, Flora and Fauna Survey* report (GHD 2018a, 2018b). The species grows with *Jacksonia furcellata* in this area, which can look similar as a young plant. This species has been recorded between Busselton and Cockburn and due to its similarity to a common species may be found in more locations.

4. Conclusions

Most species known, likely, or possible to occur based on the likelihood of occurrence assessment were potentially flowering at the time of survey. Exceptions include: *Tetraria australiensis* (Vu, T, likely to occur) which flowers in November to December, *Styphelia filifolia* (P3, likely to occur) which flowers in February to March, *Babingtonia urbana* (P3, possible to occur) which flowers January to February and *Tripterococcus* sp. *Brachylobus* (P4, likely to occur) which flowers in November to December.

A review of available habitats, species habit and form, and recent survey effort concluded that one species may possibly occur within the survey area, *Tetraria australiensis*. There is very limited potential habitat for *Tetraria australiensis*, including a patch of open Marri woodland present at Tom Bateman Reserve. This habitat could be searched late in the spring or early summer to determine the presence of this species.

On the basis of the survey results and conclusions presented in this memorandum, the likelihood of occurrence assessment has been updated for the GHD biological assessment survey area in the revised *Thornlie-Cockburn Link Project, Flora and Fauna Survey* report (GHD 2018b).

5. References

Department of the Environment and Energy (DEE) 2018, Species Profile and Threats Database (SPRAT), retrieved October 2018, from <http://www.environment.gov.au/cgi-bin/sprat/public/>.

GHD Pty Ltd (GHD) 2018a, Thornlie-Cockburn Link Project, Flora and Fauna Survey, unpublished report (Rev 2) prepared for the Public Transport Authority.

GHD Pty Ltd (GHD) 2018b, Thornlie-Cockburn Link Project, Flora and Fauna Survey, unpublished report (Rev 5) prepared for the Public Transport Authority.

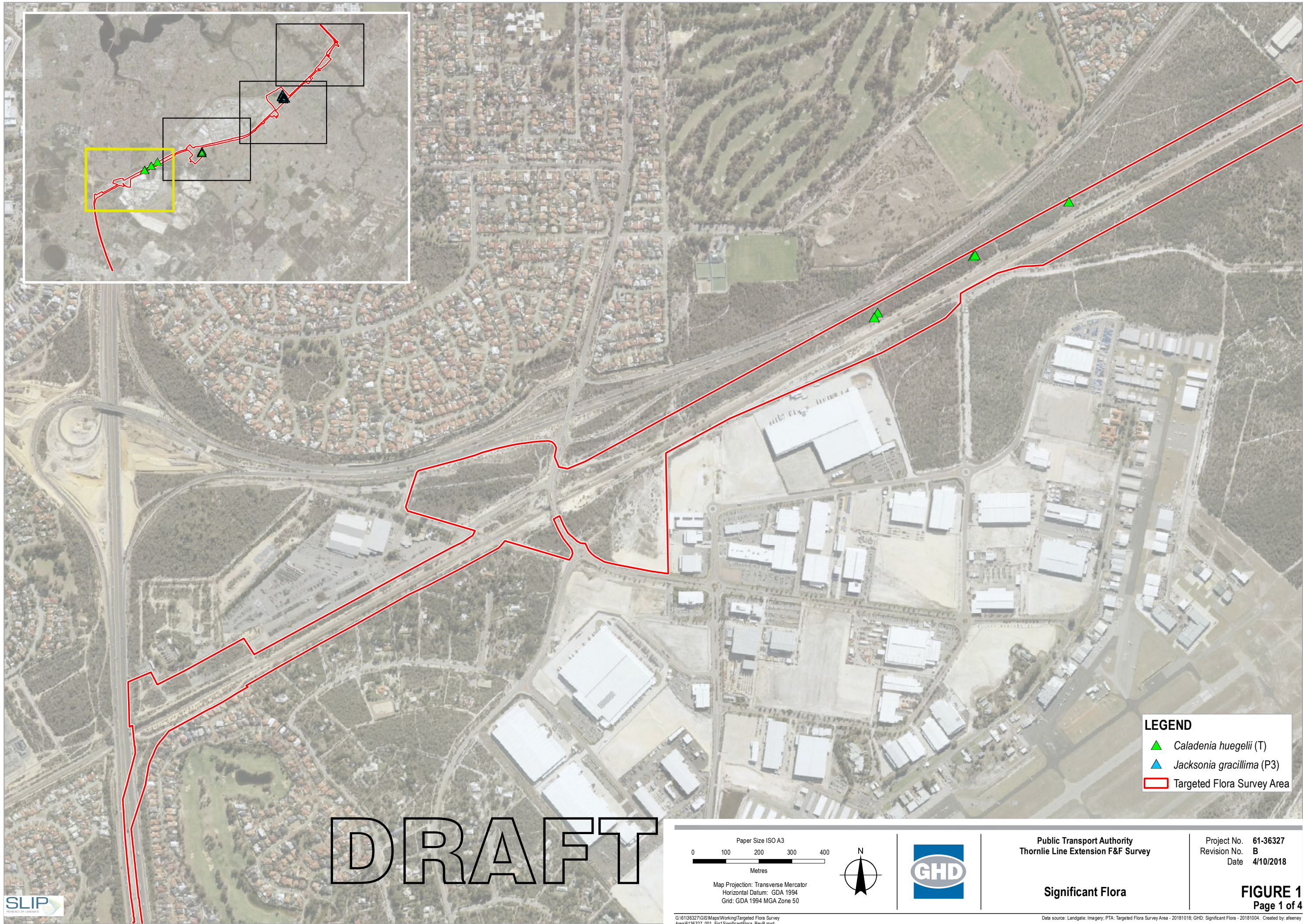
Western Australian (WA) Herbarium 1998–, FloraBase—the Western Australian Flora, Biodiversity, Conservation and Attractions, retrieved October 2018, from <http://florabase.dpaw.wa.gov.au/>.

Attachment A – Figures

Figure 1 Significant flora

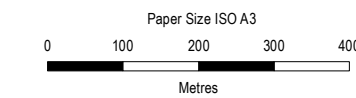
Figure 2 Survey effort

Draft Rev B

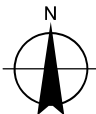


LEGEND

- ▲ *Caladenia huegelii* (T)
- ▲ *Jacksonia gracillima* (P3)
- Targeted Flora Survey Area



Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50



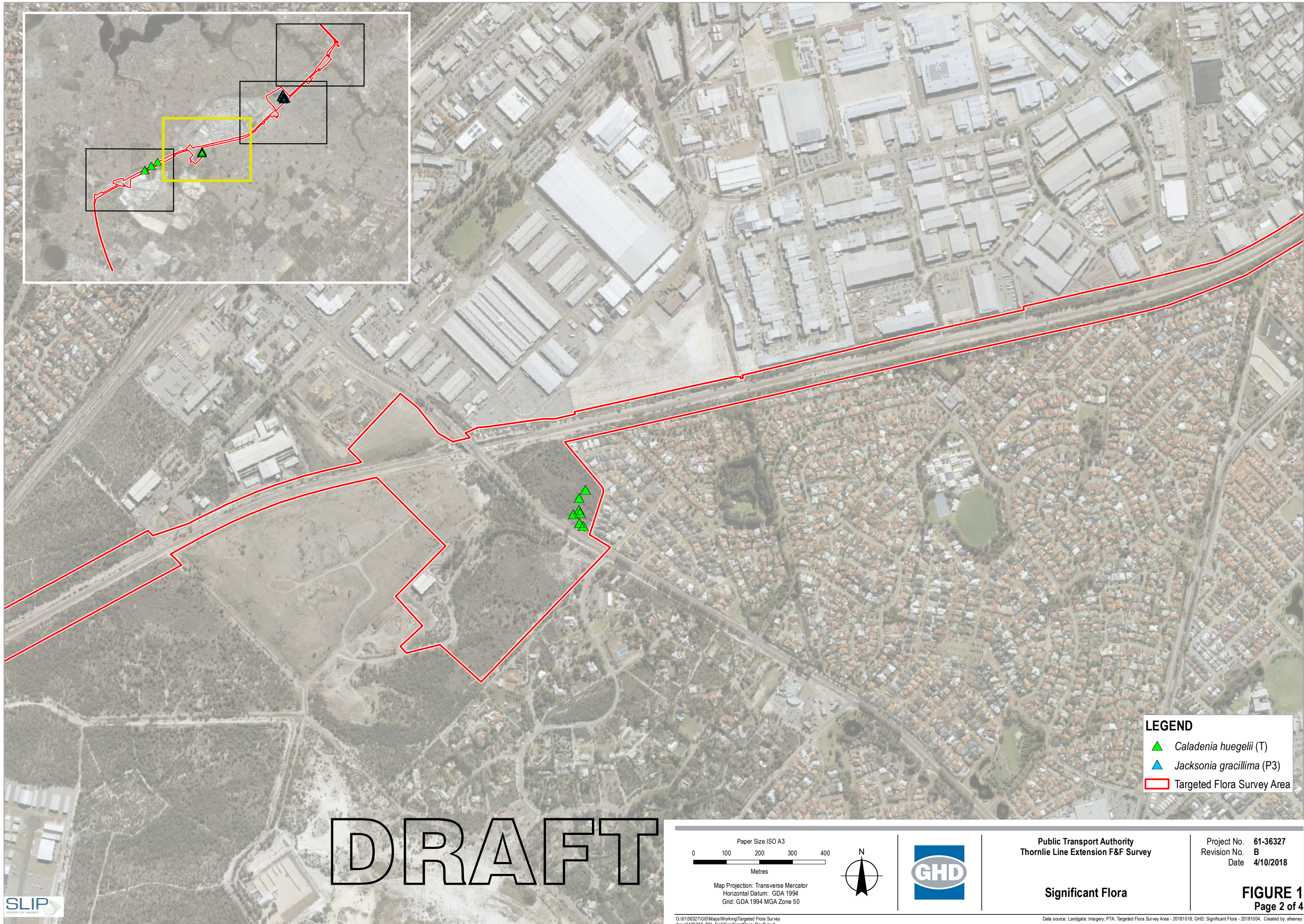
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Significant Flora

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Date 4/10/2018

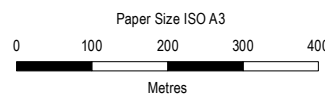
FIGURE 1
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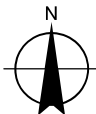


- LEGEND**
- ▲ *Caladenia huegelii* (T)
 - ▲ *Jacksonia gracillima* (P3)
 - Targeted Flora Survey Area

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Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50



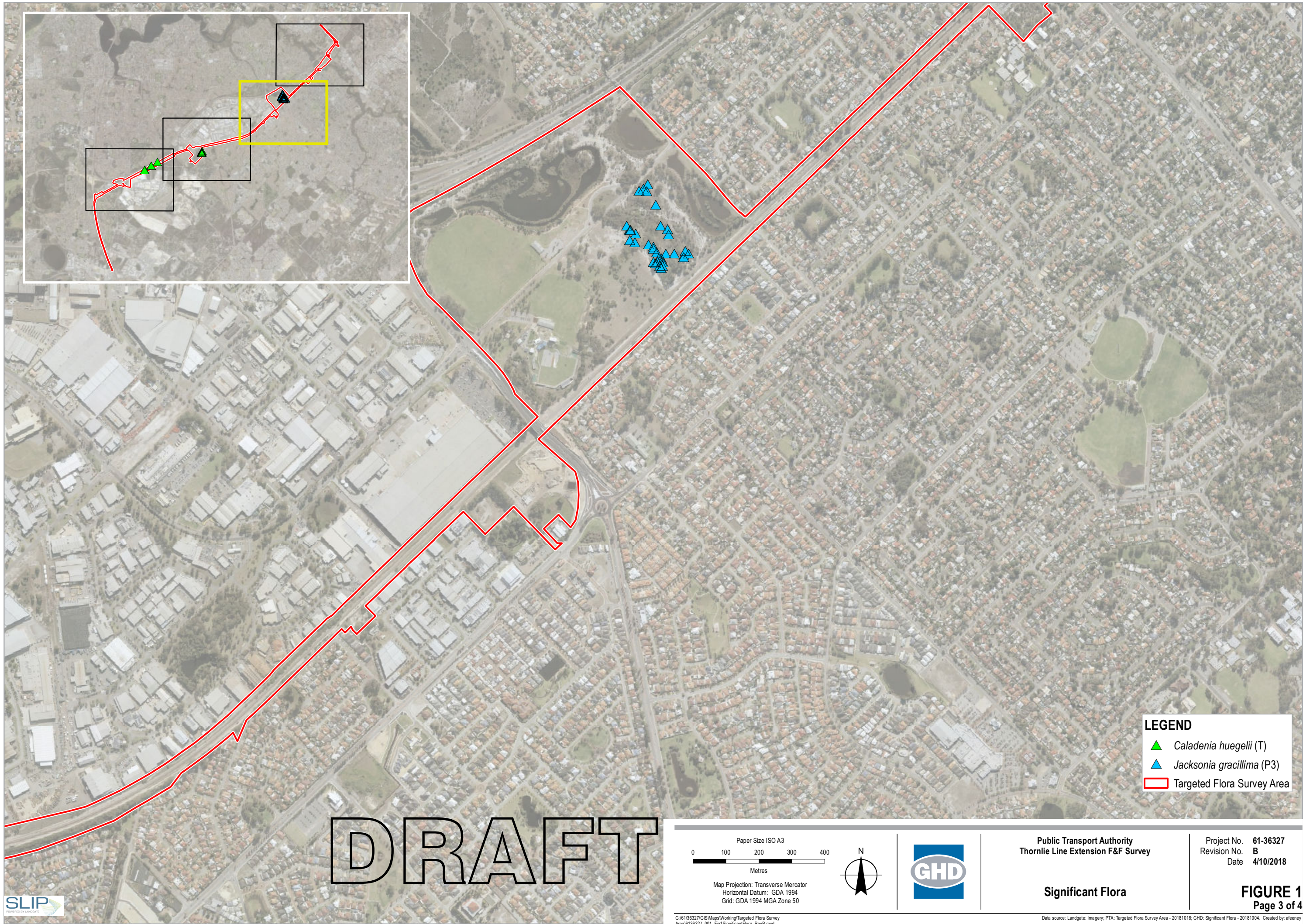
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FIGURE 1
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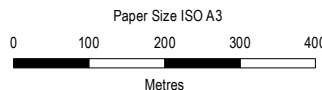




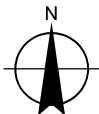
LEGEND

- ▲ *Caladenia huegelii* (T)
- ▲ *Jacksonia gracillima* (P3)
- ▭ Targeted Flora Survey Area

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Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50



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FIGURE 1
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