

# Targeted Conservation Flora Survey at Anna Plains

Anna Plains Cattle Co Pty Ltd

A13 – J01

26 September 2017



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## REPORT DETAILS

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## EXECUTIVE SUMMARY

EnviroWorks Consulting was commissioned by Anna Plains Cattle Co Pty Ltd to undertake a targeted Priority Flora survey at Anna Plains Cattle Station.

The specific objectives of the targeted Priority Flora survey were to:

- Document the occurrence of species of conservation concern in the development envelope;
- Map the location and estimate the density of species of conservation concern in the development envelope;
- As far as practicable, opportunistically map the location and estimated density of species of conservation concern in the region; and
- Provide a report which will enable assessment of potential impacts of proposed clearing on species of conservation concern

The survey was conducted from 9-13 August 2017 and was in accordance with *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment* (Environmental Protection Authority, 2016).

*Bonamia oblongifolia* (P1) and *Phyllanthus eremicus* (P3) were found within the development envelope and elsewhere at Anna Plains. Both species are regionally widespread. At the Anna Plains development envelope, and elsewhere in the region, *Bonamia oblongifolia* was found to occur on red earthy sands and gravels. It appears as a disturbance opportunist along fence-lines, tracks, roads and roadside drainage lines. *Phyllanthus eremicus* was recorded on red sands and was a common species along fence lines at Wallal Downs.

51 plants of *Bonamia oblongifolia* occur within the development envelope and 1,163 plants were found during opportunistic searching at Anna Plains. The regional population of *B. oblongifolia* (based on surveys at Anna Plains, Wallal Downs and Pardoo stations) is estimated to exceed 157,991 plants (Enviroworks 2016a, 2016b). This is an under-estimate as time constraints prevented comprehensive surveys. Therefore, the development envelope at Anna Plain contains 0.03% of the known regional population of *Bonamia oblongifolia*.

15 plants of *Phyllanthus eremicus* occur within the development envelope and 106 plants were found during opportunistic searching at Anna Plains. The regional population of *P. eremicus* (based on surveys at Anna Plains, Wallal Downs and Pardoo stations) is estimated to exceed 3,037 plants (Enviroworks 2016a, 2016b). This is an under-estimate as time constraints prevented comprehensive surveys. Therefore, the development envelope at Anna Plain contains 0.49% of the known regional population of *Phyllanthus eremicus*.

## 1 INTRODUCTION

EnviroWorks Consulting was commissioned by Anna Plains Cattle Co Pty Ltd to undertake a targeted Priority Flora survey at the proposed Irrigation Pivot site at Anna Plains Cattle Station. Figure 1 shows the location of the development envelope while Figure 2 shows 2012 aerial photography of the area.

The specific objectives of the targeted Conservation Flora survey were to:

- Document the occurrence of species of conservation concern in the development envelope;
- Map the location and estimate the density of species of conservation concern in the development envelope;
- As far as practicable, opportunistically map the location and estimated density of species of conservation concern in the region; and
- Provide a report which will enable assessment of potential impacts of proposed clearing on species of conservation concern

### 1.1 LOCATION

Anna Plains Station is located along Great Northern Hwy, 160 km south west of Broome (Figure 1). The proposed irrigation pivot development area is situated 9 km north-east of Anna Plains Homestead occurring 4 km west of Great Northern Hwy. The 200 ha Development envelope occurs on an undulating sandplain of red earthy sands (Figure 2).

The vegetation present consists of tall and medium height shrubs 1-3 metres high over a groundlayer dominated by grasses and soft perennial sub-shrubs (Plate 1). Common tall shrub species include *Bauhinia cunninghamii*, *Corymbia zygophylla*, *Dolichandrone heterophylla* and species of *Acacia*. The dominant grasses are species of *Triodia* while the dicotyledonous ground layer is relatively rich with species of *Ptilotus* and representative of the Families Fabaceae and Proteaceae being common (see Appendix B).



Plate 1: Pindan Vegetation, Development envelope, Anna Plains, August 2017.

## 2 METHODS

Dr. Stephen Connell – Flora Licence SL011584 and Mr. Tim Findlay conducted the Targeted Flora Survey from 9-13 August 2017. Aerial photography (2012) of the development envelope is shown in Figure 2. The survey was conducted in accordance with *Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment* (Environmental Protection Authority, 2016).

The survey was conducted by traversing the 200 ha development envelope on foot in a grid pattern with survey personnel walking approximately 30 m apart. GPS coordinates, plant counts and photographs were recorded of conservation significant flora.

Areas outside of the development envelope were assessed by a combination of grid-based foot traverses and car-based and opportunistic site recording of roadside and fence-line populations. All plant counts were based on 100 square metre areas and these counts were used to determine population sizes within and outside the development envelope.

In a letter to Anna Plains dated 13 April 2017, the Department of Environment and Regulation (DER) advised the following information.

*“The application area may contain the rare flora species *Seringia exastia*, listed as critically endangered under the Wildlife Conservation Act 1950 (WC Act) and the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).*

*The application area may contain suitable habitat for eight priority flora species, including *Bonamia oblongifolia* (Priority 1), *Tephrosia andrewii* (Priority 1), *Lawrencia* sp. Anna Plains (Priority 3), *Tribulopsis marliesiae* (Priority 3) and *Phyllanthus eremicus* (Priority 3).*

*The above species have been recorded within the Shire of Broome from habitats similar to those identified within the application area and species of the genus *Tephrosia* and *Phyllanthus* (not identified to species level) were identified during the site inspection. Given the number of record and known distribution of the above species, the proposed clearing may Impact on their conservation status, if present within the application area.”*

The species mentioned above were searched for as part of the survey.

### 3 ASSESSMENT OF CONSERVATION SIGNIFICANCE

The conservation status of both flora and fauna species is assessed under Commonwealth and State legislation such as the Commonwealth *Environment Protection and Biodiversity Conservation Act* (EPBC Act) 1999 and the *WA Wildlife Conservation Act 1950* (WC Act). The significance levels for species used in the EPBC Act are those recommended by the International Union for the Conservation of Nature and Natural Resources. The WC Act uses a set of Schedules but also classifies species using IUCN categories.

In Western Australia, the Department of Environment and Regulation (DER) has also produced a supplementary list of Priority Flora and Fauna, being species that are not considered threatened under the WC Act but for which there is cause for concern. Some priority species however are also assigned an IUCN Conservation category. The following levels of conservation significance are recognised in this report.

#### **WA Wildlife Conservation Act (1950) Classification**

Under the WC Act, specially protected species are listed under one of four schedules:

- Schedule 1 – Species that are rare or likely to become extinct. Taxa which have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection. Species listed under Schedule 1 are also referred to as Threatened Species for fauna or Declared Rare Flora (DRF) for flora.
- Schedule 2 – Species that are presumed to be extinct. Taxa which have not been collected, or otherwise verified, over the past 50 years despite thorough searching, or of which all known wild populations have been destroyed more recently.
- Schedule 3 – Birds protected under an international agreement.
- Schedule 4 – Other specially protected fauna.

#### **IUCN and EPBC Classifications**

The Department of Biodiversity, Conservation and Attractions in WA and federal Department of Environment also classifies species into one of five IUCN categories:

- Extinct (EX) - also listed on Schedule 2 above.
- Extinct in the wild (EW) - also listed on Schedule 1 above.
- Critically endangered (CR) - also listed on Schedule 1 above.
- Endangered (EN) - also listed on Schedule 1 above.
- Vulnerable (VU) - also listed on Schedule 1 above.

These categories are determined by the total distribution of the species, and not just their distribution within WA.

#### **Priority Species**

If a species does not meet the criteria for listing as Threatened Fauna or DRF (e.g. due to lack of information) and is poorly known and/or conservation dependent, it may then be classified as Priority species. Priority species are placed into one of five categories of priority and are managed by Department of Biodiversity, Conservation and Attractions accordingly.

- Priority One: Taxa with few, poorly known populations (generally <5) on threatened lands.
- Priority Two: Taxa with few, poorly known populations (generally <5) on conservation lands (at least some of which are not believed to be under immediate threat).
- Priority Three: Taxa with several, poorly known populations, some on conservation lands (at least some of which are not believed to be under immediate threat).

- Priority Four: Taxa in need of monitoring. Taxa which are considered to have been adequately surveyed and which whilst being rare, are not currently threatened by any identifiable factors.
- Priority Five: Taxa that are conservation dependent (i.e. their conservation status is dependent on ongoing active management).

In summary the following categories (Table 3 and Appendix B) are used to define the status of species at international, national and state levels and where relevant have been used within this report.

**Table 1: Categories Used to Define the Conservation Status of Species.**

Level	Governing Body, Legislation (if relevant)	Conservation Categories
International	International Union for Conservation of Nature and natural resources (IUCN)	Extinct (EX) Extinct in the Wild (EW) Critically Endangered (CR) Endangered (EN) Vulnerable (VU) Near Threatened (NT) Least Concern (LC) Data Deficient (DD) Not Evaluated (NE)
National	Commonwealth Department of Environment (DoE), EPBC Act	Extinct Extinct in the Wild Critically Endangered Endangered Vulnerable Conservation Dependent
State of WA	DPaW, WC Act	Threatened Fauna/DRF (Schedule 1) Extinct in the Wild Critically Endangered Endangered Vulnerable Extinct (Schedule 2) Schedule 3 (Fauna) Birds protected under an international agreement Schedule 4 (Fauna)
State of WA	Department of Biodiversity, Conservation and Attractions supplementary priority list (not listed under legislation)	Priority species: Priority 1: Priority Two Priority Three Priority Four Priority Five

## 4 RESULTS

A database search was requested from Department of Biodiversity, Conservation and Attractions for Threatened and Priority flora species records within a 50 km search distance of the development envelope (Search reference 13-0817FL). Twenty species were recorded by this search (Table 2).

### 4.1 FIELD SURVEY

Two priority flora species were recorded within the development envelope during the field survey - *Bonamia oblongifolia* (P1) and *Phyllanthus eremicus* (P3). These species are not listed as Rare or Threatened under the federal *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) or the *WA Wildlife Conservation Act, 1950*. The “Priority” rating is a “management category” not covered by legislation.

None of the other species from the DBCA database search (Table 2) were found. It is noted that DER indicated *Tephrosia* (not identified to species level) was identified during their site inspection (on 21 February 2017). It is considered that *Tephrosia andrewii* is unlikely to occur on the site as the species is conspicuous and would have been located if present. However, other prostrate species of *Tephrosia* were noted during the survey (Appendix B).

51 plants of *B. oblongifolia* and 15 plants of *P. eremicus* were located within the development envelope (Figure 3). During the field work it was noted that both species were more common in the south-western part of the development envelope. An extension of the search area west of the development envelope established that both species occur externally and in higher numbers. 712 plants of *B. oblongifolia* and 81 plants of *P. eremicus* occur in this area. Time constraints prevented further local surveying though opportunistic records from Anna Plains expanded the total numbers of *B. oblongifolia* and *P. eremicus* to 1214 and 121 respectively (Figure 4).

Both species occur extensively in the local region (Figures 5 and 6) being mostly found on the Nita Land System – Pindan Sandplains supporting shrubby spinifex grasslands with occasional trees (Speck *et al.* 1964). Plants were found in flower in both July and August 2016 during field studies at Pardoo and Wallal Downs stations (Enviroworks 2016a, 2016b, Figure 6).

*Bonamia oblongifolia* and *P. eremicus* occur as individual plants or localised populations (mostly <5 plants per 400 sq m). Plants of both species were found underneath taller shrubs and also exposed on open sandy areas between *Triodia* clumps (Plate 2). Some plants of *Phyllanthus eremicus* appeared to have been grazed (Plate 3).

At the development envelope, and elsewhere in the region, both *B. oblongifolia* and *P. eremicus* were found on red earthy sands and gravelly red sands. *B. oblongifolia* appears to be a disturbance opportunist and was found in high numbers along roads, tracks, fence-lines and roadside drains (Plate 4, Figure 3) GPS records for *B. oblongifolia* are included in Appendix C while Appendix D lists *P. eremicus* locations.

**Table 2: Department of Biodiversity, Conservation and Attractions Conservation Significant Plant Species Records within 50km of the Development envelope at Anna Plains.**

Species	Conservation Code	Description	Habitat	Presence in the Development envelope
<i>Acacia glaucocaesia</i>	P3	Dense, glabrous shrub or tree, 1.8-6 m high. Flowers yellow, July to September	Red loam, sandy loam, clay. Floodplains.	Not located and unlikely to be present as the species is conspicuous
<i>Atriplex eremites</i>	P1	Erect shrub to 30 cm high. Flowers green, August	Tussock grassland, sandy and saline plains	Not located and unlikely to be present as its preferred habitat is absent. The nearest known location is 60km away
<i>Bonamia oblongifolia</i>	P1	Perennial, herb or shrub. Flowers blue, February to August	Sandy or gravelly soils.	Present
<i>Croton aridus</i>	P3	Monoecious, multistemmed, evergreen shrub, to 1.5 m high. Flowers yellow, August	Deep red sand, pindan soil. Sandplains or ridges, spinifex sandplains	Not located and unlikely to be present as the species is conspicuous
<i>Desmodium pullenii</i>	P1	Herb, 0.05 m high. Flowers pink, April	Lateritic loam or clay over sandstone. Sandplains, woodland.	Not located and unlikely to be present as the species is conspicuous, other species of herbaceous peas were noted during the survey
<i>Fimbristylis sp. Shay Gap (K.R. Newbey 10293)</i>	P1	Tufted annual, grass-like or herb (sedge), 0.12-0.15 m high, Flowers Jun to July	Sandy soil. Drainage line.	Not located and unlikely to be present as its preferred habitat is absent
<i>Fuirena incrassata</i>	P3	Annual, grass-like or herb (sedge), 0.1-0.3 m high, Flowers May to August	Sand, sandy clay. Swamps, creek beds, claypans, semi-saline lakes.	Not located and unlikely to be present as its preferred habitat is absent. The nearest known location is 60km away
<i>Gymnanthera cunninghamii</i>	P3	Erect shrub, 1-2 m high. Flowers cream-yellow-green, January to December	Sandy soils.	Not located and unlikely to be present as the species is conspicuous
<i>Indigofera ammobia</i>	P3	Many-stemmed shrub, to 0.5 m high. Flowers green & purple, September	Red sand. Sand dunes.	Not located and unlikely to be present, other species of Fabaceae were noted during the survey. The nearest known location is 60km away
<i>Lawrencia sp. Anna Plains (N.T. Burbidge 1433)</i>	P3	Upright perennial, herb, to 0.8 m high. Flowers white, August	Gravel. Flats, margin of semi-saline drainage depression on coastal plain.	Not located and unlikely to be present as its preferred habitat is absent
<i>Nicotiana heterantha</i>	P1	Decumbent, short-lived annual or perennial, herb, to 0.5 m high, forming low, spreading colonies. Flowers white-cream, March to September	Black clay. Seasonally wet flats	Not located and unlikely to be present as its preferred habitat is absent
<i>Phyllanthus eremicus</i>	P3	Sub-shrub to 50cm. Flowers green/cream. May to September	Rocky outcrops or on red sandplains	Present
<i>Polymeria distigma</i>	P3	Prostrate trailing herb. Flowers pink, April to July	Sandy soils.	Not located and unlikely to be present as the species is conspicuous, other

Species	Conservation Code	Description	Habitat	Presence in the Development envelope
				prostrate species of <i>Convolvulaceae</i> were noted during the survey
<i>Pterocaulon intermedium</i>	P3	Perennial, erect and compact shrub: 0.40 m high and 0.50 m wide. Violet flower.	Plain, rangeland. Brown dry sand.	Not located and unlikely to be present as the species is conspicuous, a species of <i>Pterocaulon</i> was noted off-site during the field visit
<i>Seringia exastia</i>	T	Shrub to 80cms. Flowers purple/green. August to December	Dune swales in red sands (Pindan)	Not located and unlikely to be present as the species is conspicuous
<i>Seringia katatona</i>	P3	Shrub to 80cms. Flowers purple/green. March to August	Dune swales in red sands (Pindan)	Not located and unlikely to be present as the species is conspicuous
<i>Solanum oligandrum</i>	P3	Prickly shrub, 1 m high. Flowers purple, October	Saline soil with algal crust over calcrete. Near termite mounds, seasonally-inundated sites.	Not located and unlikely to be present as its preferred habitat is absent. The nearest known location is 60km away
<i>Tephrosia andrewii</i>	P1	Ascending, multistemmed shrub, to 0.8 m high. Flowers orange, April to October	Sand. In pindan country.	Not located and unlikely to be present as the species is conspicuous, other prostrate species of <i>Tephrosia</i> were noted during the survey
<i>Terminalia kumpaja</i>	P3	Much branched, sprawling shrub to small tree ca 5 m. Bark deeply fissured, foliage deep green. Fruits dark maroon to burgundy.	White clay which is seasonally inundated. Red sand.	Not located and unlikely to be present as the species is conspicuous
<i>Tribulopsis marliesiae</i>	P3	Perennial, prostrate and open shrub: 0.10 m high and 1 m wide. Yellow flower.	Plains and dune swales. Brown dry sand.	Not located and unlikely to be present as the species is conspicuous, no species of <i>Tribulopsis</i> were noted during the survey



Plate 2: Mature plant of *B. oblongifolia*, Development envelope, Anna Plains, August 2017.



Plate 3: *Phyllanthus eremicus*, Development envelope. August 2017



Plate 4: *B. oblongifolia* habitat, road drainage area, Great Northern Highway, August 2017.

## 5 CONSERVATION SIGNIFICANT FLORA POPULATION ESTIMATES

The proposed pivot irrigation project at Anna Plains will involve a 200 ha development envelope (Figure 7).

Fifty-one plants of *Bonamia oblongifolia* and 15 plants of *Phyllanthus eremicus* occur within the development envelope (refer to Table 4 below).

51 plants of *Bonamia oblongifolia* occur within the development envelope and 1,163 plants were found during opportunistic searching at Anna Plains. The regional population of *B. oblongifolia* (based on surveys at Anna Plains, Wallal Downs and Pardoo stations) is estimated to exceed 157,991 plants (Enviroworks 2016a, 2016b). This is an under-estimate as time constraints prevented comprehensive surveys

Therefore, the development envelope at Anna Plain contains 0.03% of the known regional population of *Bonamia oblongifolia*.

15 plants of *Phyllanthus eremicus* occur within the development envelope and 106 plants were found during opportunistic searching at Anna Plains. The regional population of *P. eremicus* (based on surveys at Anna Plains, Wallal Downs and Pardoo stations) is estimated to exceed 3,037 plants (Enviroworks 2016a, 2016b). This is an under-estimate as time constraints prevented comprehensive surveys.

Therefore, the development envelope at Anna Plain contains 0.49% of the known regional population of *Phyllanthus eremicus*.

**Table 3: Population estimates of Conservation Significant Species.**

Species	Anna Plains development envelope	Anna Plains outside development envelope	Pardoo	Wallal Downs	TOTAL
<i>Bonamia oblongifolia</i>	51	1,163	777	156,000	<b>157,991</b>
<i>Phyllanthus eremicus</i>	15	106	96	2,820	<b>3,037</b>

## 6 LIMITATIONS

Limitation	Comment
Survey Intensity (In retrospect, was the intensity adequate?)	Survey intensity (desktop research followed by site visits in Winter) were appropriate for a targeted flora survey for <i>Bonamia oblongifolia</i> , <i>Phyllanthus eremicus</i> and other conservation significant flora detected by the Department of Biodiversity, Conservation and Attractions database search
Competency/experience of the consultant(s) carrying out the survey.	The author has had significant experience in flora and vegetation surveys including desktop reviews, site inspections and report writing.
Scope. (life forms sampled etc).	The scope was clear and the correct species were sampled appropriately for a targeted threatened flora survey.
Proportion of flora collected and identified (based on sampling, timing and intensity).	The proportion of flora collected and identified was appropriate for a threatened flora survey.
Timing/weather/season/cycle.	Survey intensity follows EPA (2016) recommendations. The survey was conducted in Winter (August) after recent rainfall.
Disturbances (e.g. fire, flood, accidental human intervention etc.) which affected results of survey.	No disturbances affected the survey.
Completeness (e.g. was relevant area fully surveyed) and further work which might be needed.	Desktop study covered proposed clearing area. Site inspection covered all areas of proposed disturbance. No further work is currently deemed necessary.
Resources (e.g. degree of expertise available in flora identification to taxon level).	Appropriate resources were used. Resources, in terms of time, equipment, support and personnel were appropriate to undertake and complete the survey.
Mapping reliability.	All mapping completed is deemed reliable. Hand held GPS used to record coordinates and mapping done using professional GIS system.
Access problems.	No access problems encountered.
Sources of information and availability of contextual information (i.e. pre-existing background versus new material).	Regional and local information was available and was consulted. Department of Biodiversity, Conservation and Attractions Threatened Flora Databases were searched and the author has conducted previous studies in the region.

## 7 ACKNOWLEDGEMENTS

EnviroWorks Consulting thanks Helen, David and John Stoate and employees at Anna Plains for hosting the survey team during fieldwork.

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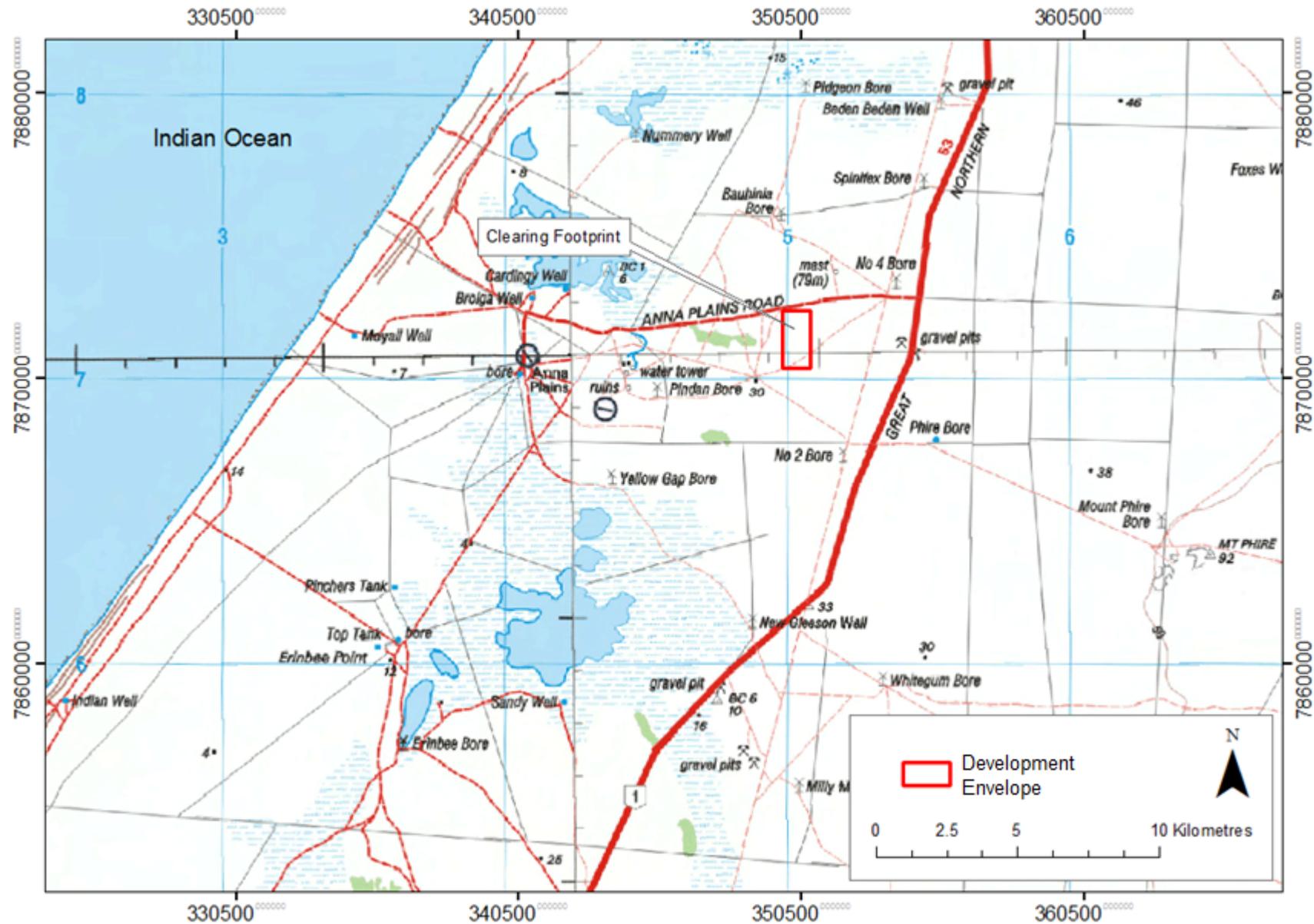


Figure 1: Location of development envelope

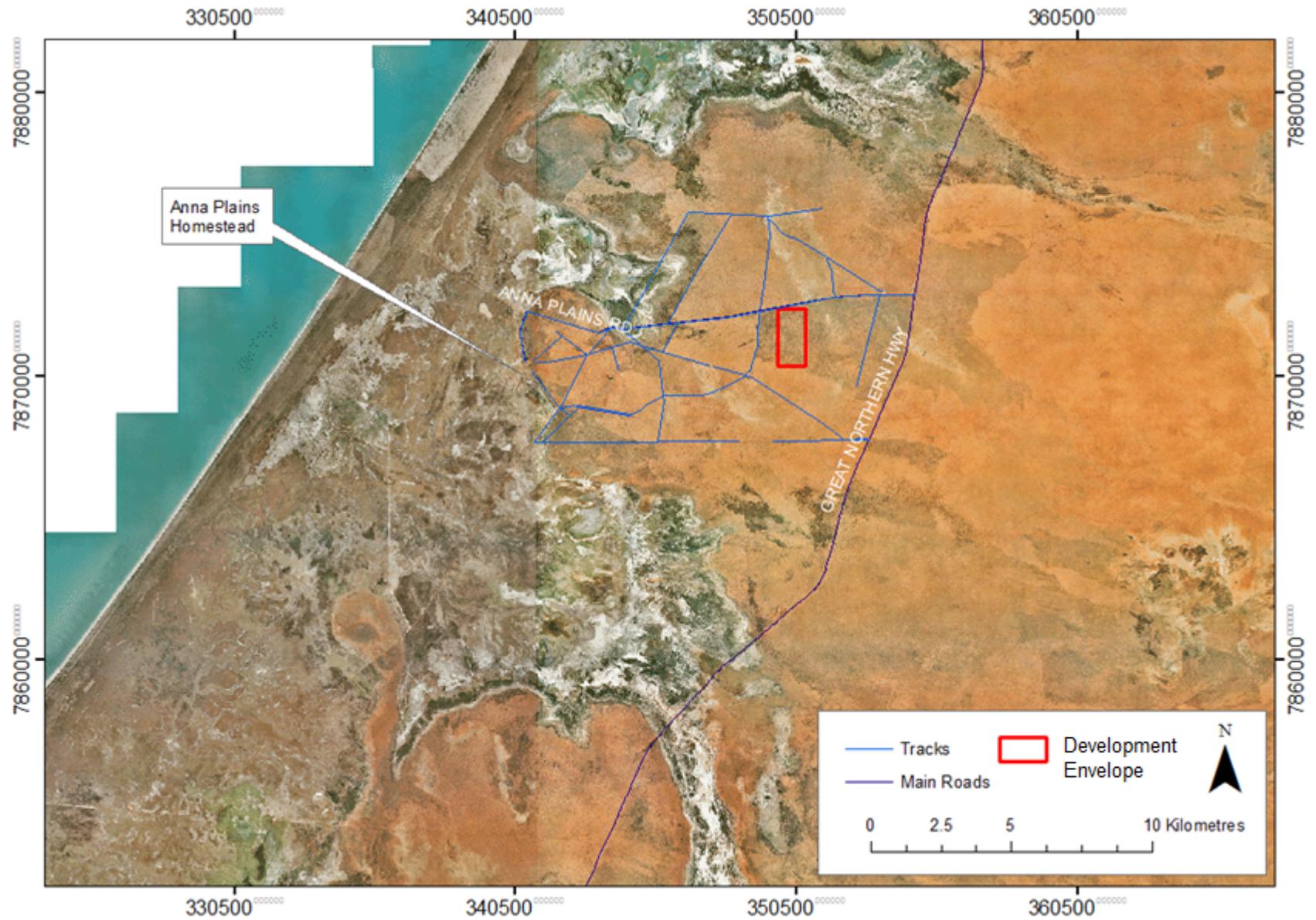


Figure 2: Aerial photography 2012

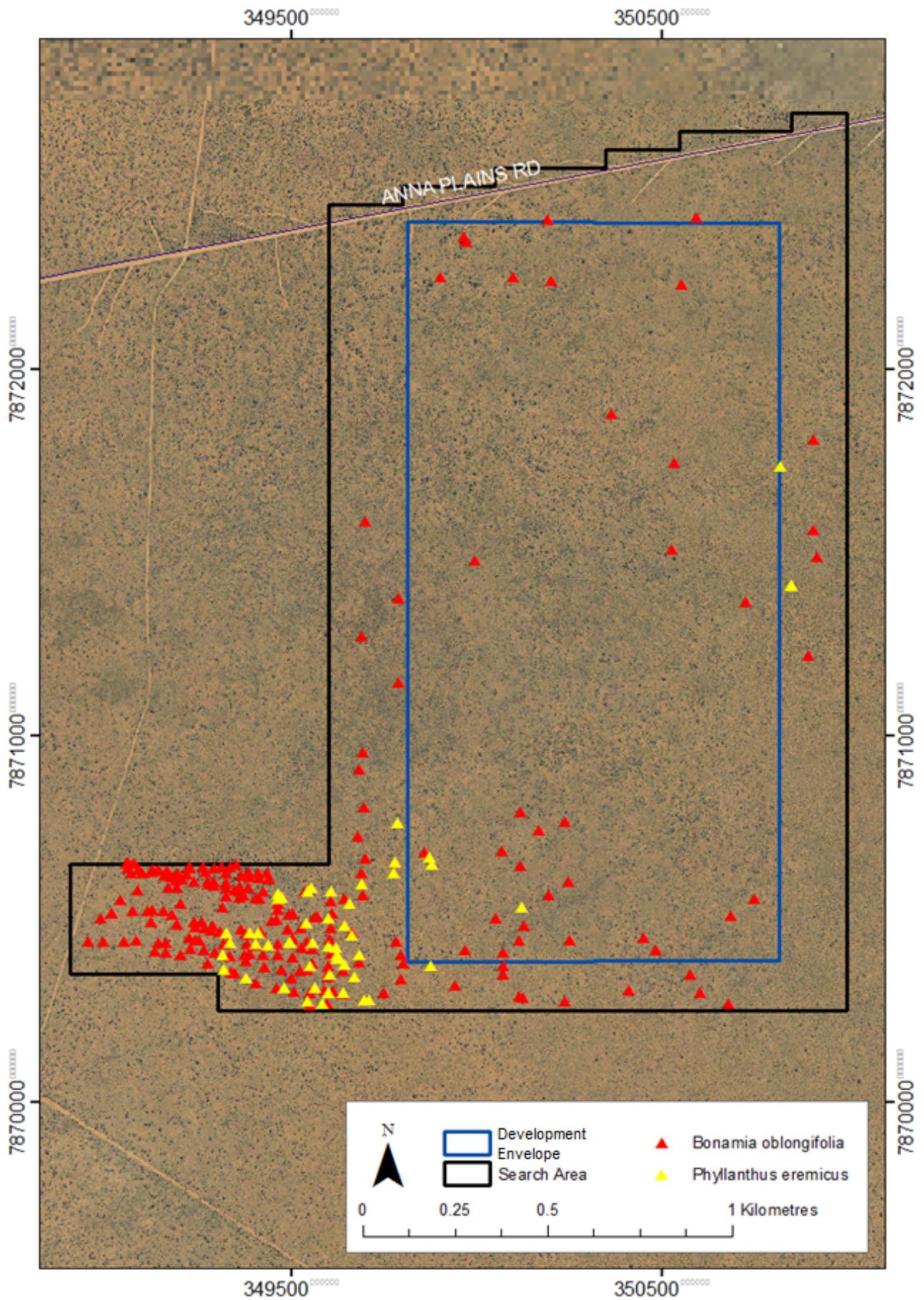


Figure 3: Conservation flora records

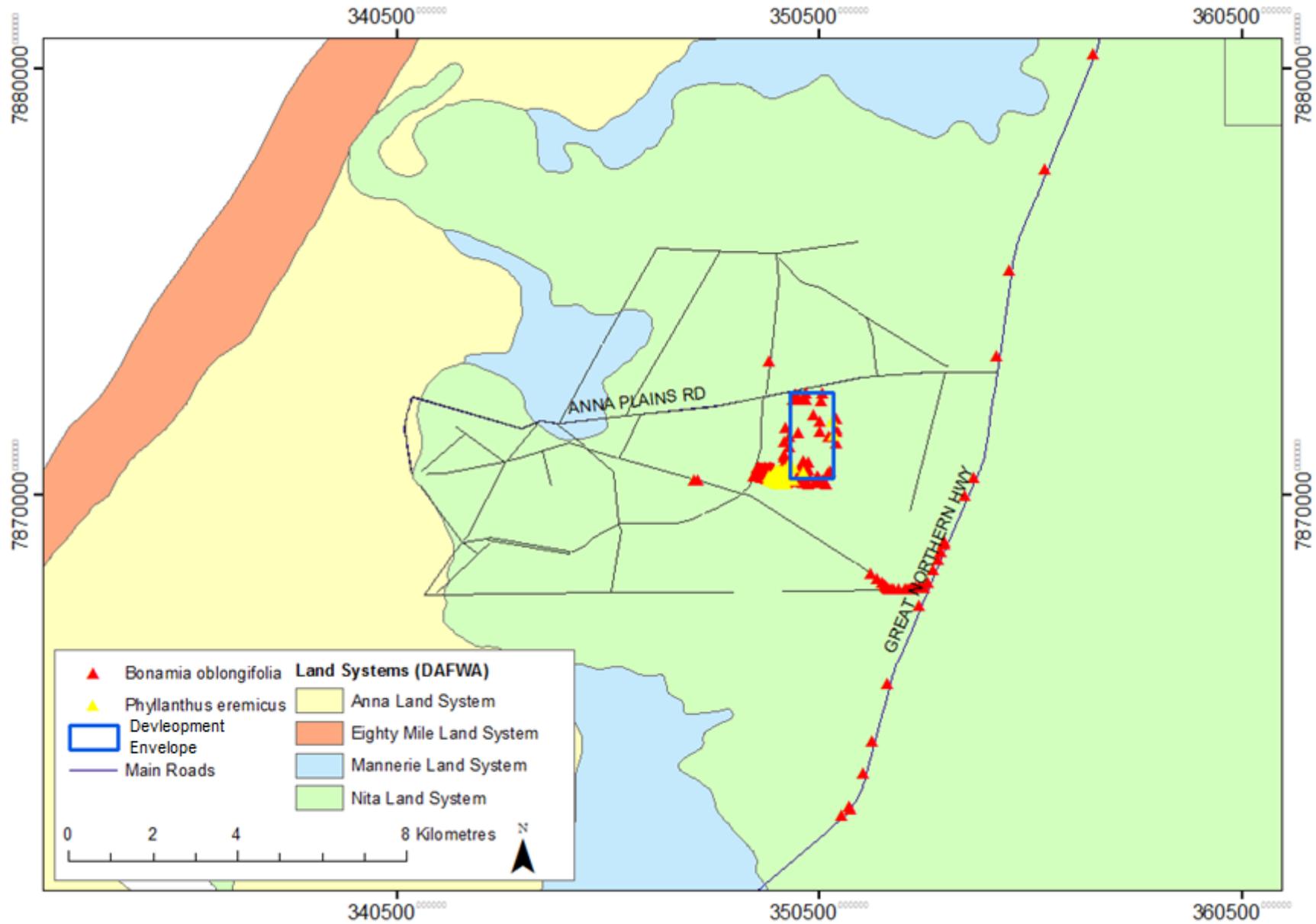


Figure 4: Local conservation flora records and Land Systems

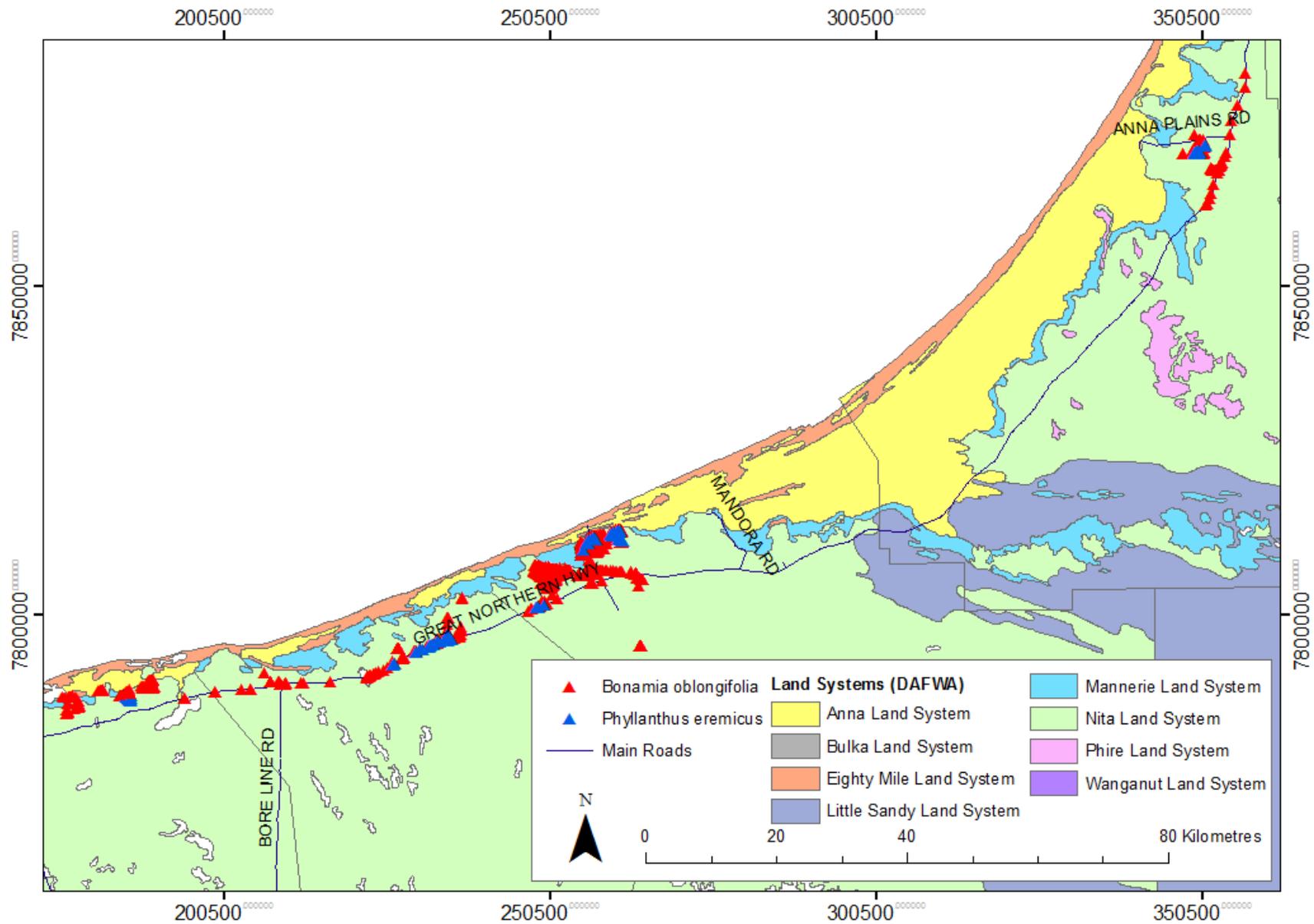


Figure 5: Regional conservation flora records and Land Systems

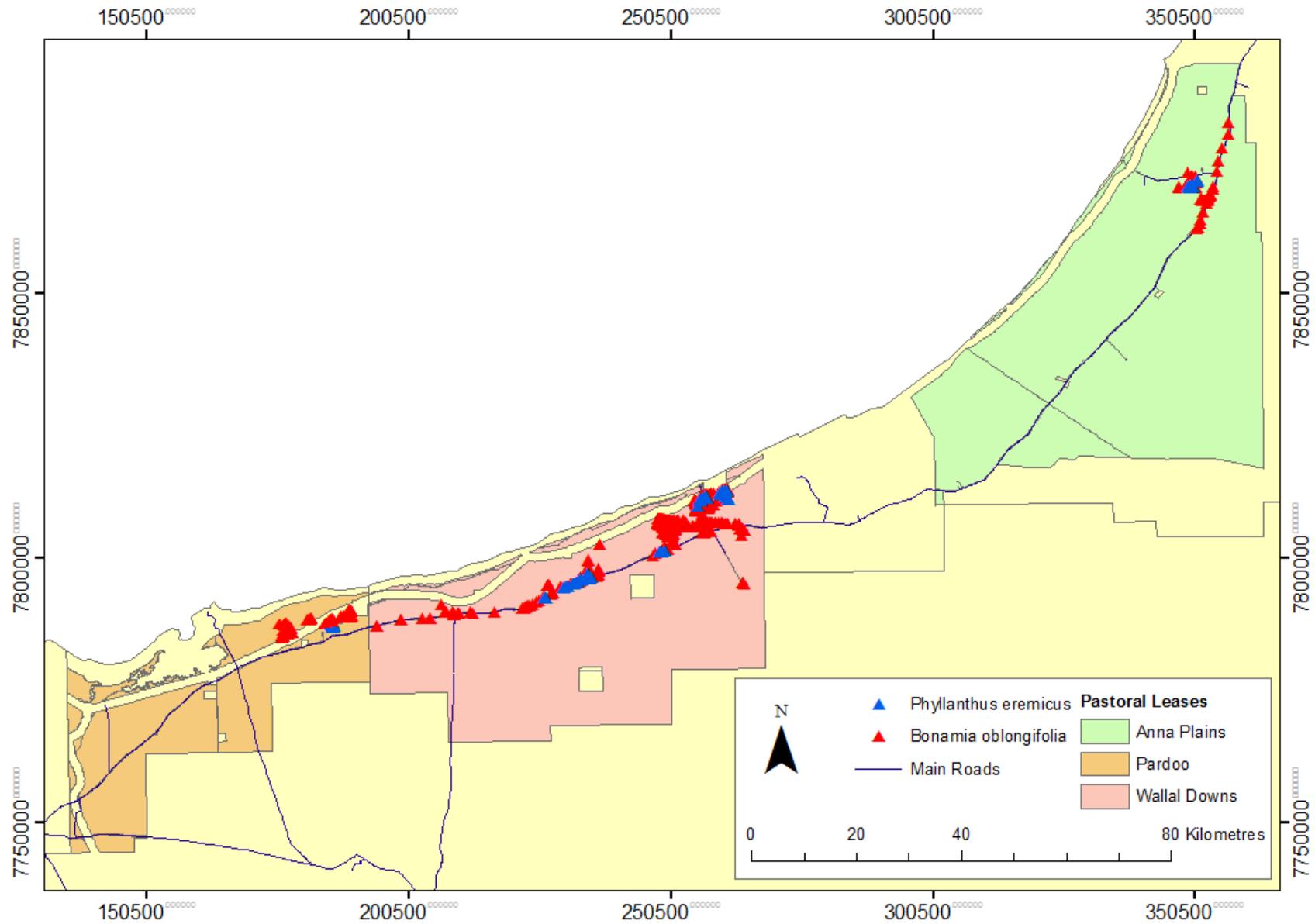


Figure 6: Regional conservation flora records and Pastoral Leases

### **T Threatened species**

Published as Specially Protected under the Wildlife Conservation Act 1950, and listed under Schedules 1 to 4 of the Wildlife Conservation (Specially Protected Fauna) Notice for Threatened Fauna and Wildlife Conservation (Rare Flora) Notice for Threatened Flora (which may also be referred to as Declared Rare Flora).

Threatened flora is flora that has been declared to be 'likely to become extinct or is rare, or otherwise in need of special protection', pursuant to section 23F(2) of the Wildlife Conservation Act.

The assessment of the conservation status of these species is based on their national extent and ranked according to their level of threat using IUCN Red List categories and criteria as detailed below.

#### ***CR Critically endangered species***

Threatened species considered to be facing an extremely high risk of extinction in the wild. Published as Specially Protected under the Wildlife Conservation Act 1950, in Schedule 1 of the Wildlife Conservation (Specially Protected Fauna) Notice for Threatened Fauna and Wildlife Conservation (Rare Flora) Notice for Threatened Flora.

#### ***EN Endangered species***

Threatened species considered to be facing a very high risk of extinction in the wild. Published as Specially Protected under the Wildlife Conservation Act 1950, in Schedule 2 of the Wildlife Conservation (Specially Protected Fauna) Notice for Threatened Fauna and Wildlife Conservation (Rare Flora) Notice for Threatened Flora.

#### ***VU Vulnerable species***

Threatened species considered to be facing a high risk of extinction in the wild. Published as Specially Protected under the Wildlife Conservation Act 1950, in Schedule 3 of the Wildlife Conservation (Specially Protected Fauna) Notice for Threatened Fauna and Wildlife Conservation (Rare Flora) Notice for Threatened Flora.

### **EX Presumed extinct species**

Species which have been adequately searched for and there is no reasonable doubt that the last individual has died. Published as Specially Protected under the Wildlife Conservation Act 1950, in Schedule 4 of the Wildlife Conservation (Specially Protected Fauna) Notice for Presumed Extinct Fauna and Wildlife Conservation (Rare Flora) Notice for Presumed Extinct Flora.

## P Priority species

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. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened flora or fauna.

Species that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been recently removed from the threatened species or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring.

Assessment of Priority codes is based on the Western Australian distribution of the species, unless the distribution in WA is part of a contiguous population extending into adjacent States, as defined by the known spread of locations.

- **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. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.
- **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. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.
- **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. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.
- **Priority 4: Rare, Near Threatened and other species in need of monitoring**
  - **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.
  - **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.
  - Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

## APPENDIX B. PLANT SPECIES RECORDED WITHIN THE DEVELOPMENT ENVELOPE AT ANNA PLAINS

<b>Species</b>	<b>Family</b>
<i>Acacia coleii</i>	Fabaceae
<i>Acacia dictyophleba</i>	Fabaceae
<i>Acacia drepanocarpa</i> subsp. <i>drepanocarpa</i>	Fabaceae
<i>Acacia hilliana</i>	Fabaceae
<i>Acacia stellaticeps</i>	Fabaceae
<i>Acacia tumida</i>	Fabaceae
<i>Bauhinia cunninghamii</i>	Fabaceae
<i>Bonamia alatisemina</i>	Convolvulaceae
<i>Bonamia oblongifolia</i>	Convolvulaceae
<i>Calandrinia strophiolata</i>	Portulacaceae
<i>Calytrix carinata</i>	Myrtaceae
<i>Capparis umbonata</i>	Capparaceae
<i>Carissa lanceolata</i>	Apocynaceae
<i>Cassytha filiformis</i>	Lauraceae
* <i>Cenchrus ciliaris</i>	Poaceae
<i>Cleome uncifera</i>	Cleomaceae
<i>Corchorus parviflorus</i>	Malvaceae
<i>Corymbia zygophylla</i>	Myrtaceae
<i>Cyanostegia cyanocalyx</i>	Lamiaceae
<i>Dolichandrone heterophylla</i>	Bignoniaceae
<i>Duboisia hopwoodii</i>	Solanaceae
<i>Enneapogon purpurascens</i>	Poaceae
<i>Eragrostis falcata</i>	Poaceae
<i>Erythrophleum chlorostachys</i>	Fabaceae
<i>Eulalia aurea</i>	Poaceae
<i>Evolvulus alsinoides</i>	Convolvulaceae
<i>Grevillea pyramidalis</i>	Proteaceae
<i>Grevillea wickhamii</i>	Proteaceae
<i>Gyrostemon tepperi</i>	Gyrostemonaceae
<i>Hakea chordophylla</i>	Proteaceae
<i>Heliotropium leptaleum</i>	Boraginaceae
<i>Heliotropium vestitum</i>	Boraginaceae
<i>Hybanthus aurantiacus</i>	Violaceae
<i>Indigofera monophylla</i>	Fabaceae
<i>Jacksonia aculeata</i>	Fabaceae
<i>Leptosema anomalum</i>	Fabaceae
<i>Mollugo molluginis</i>	Molluginaceae
<i>Newcastelia cladotricha</i>	Lamiaceae
<i>Phyllanthus eremicus</i>	Phyllanthaceae
<i>Pimelea ammocharis</i>	Thymeleaceae
<i>Polymeria ambigua</i>	Convolvulaceae
<i>Portulaca oleracea</i>	Portulacaceae
<i>Ptilotus arthrolasius</i>	Amaranthaceae
<i>Ptilotus astrolasius</i>	Amaranthaceae
<i>Ptilotus calostachyus</i>	Amaranthaceae
<i>Rhynchosia minima</i>	Fabaceae
<i>Scaevola collaris</i>	Goodeniaceae
<i>Senna notabilis</i>	Fabaceae

<b>Species</b>	<b>Family</b>
<i>Sida arenicola</i>	Malvaceae
<i>Sida calyxhymenia</i>	Malvaceae
<i>Solanum diversiflorum</i>	Solanaceae
<i>Solanum esuriale</i>	Solanaceae
<i>Tephrosia leptoclada</i>	Fabaceae
<i>Trachymene oleracea</i>	Araliaceae
<i>Trianthema pilosum</i>	Aizoaceae
<i>Trianthema triquetra</i>	Aizoaceae
<i>Trianthema turgidifolia</i>	Aizoaceae
<i>Trichodesma zeylanicum</i> var. <i>zeylanicum</i>	Boraginaceae
<i>Triodia epactia</i>	Poaceae
<i>Triodia schinzii</i>	Poaceae
<i>Chamaecrista symonii</i>	Fabaceae
<i>Chrysopogon pallidus</i>	Poaceae
<i>Dodonaea hispidula</i>	Sapindaceae
<i>Goodenia sepalosa</i>	Goodeniaceae
<i>Halgania solanacea</i>	Boraginaceae
<i>Ptilotus polystachyus</i>	Amaranthaceae
<i>Sorghum plumosum</i>	Poaceae
<i>Velleia panduriformis</i>	Goodeniaceae

\*introduced

**APPENDIX C. GPS LOCATIONS OF *BONAMIA OBLONGIFOLIA* (GDA 51)**

<b>Easting</b>	<b>Northing</b>
349698	7871588
349690	7871272
349691	7870958
349682	7870910
349694	7870807
349680	7870725
349688	7870598
350898	7871220
349903	7872254
349996	7871480
349970	7872348
349964	7872362
350119	7870795
350120	7870646
350128	7870485
350116	7870442
350125	7870288
350238	7870278
350253	7870442
350247	7870604
350238	7870765
350364	7871881
350486	7870416
353956	7869997
353484	7868916
353460	7868862
353453	7868840
353383	7868685
353378	7868669
353199	7868266
352588	7867809
352536	7867809
352389	7867802
352254	7867793
352191	7867789
352149	7867788
352111	7867818
352082	7867857
352044	7867899
351987	7867966
351875	7868056

<b>Easting</b>	<b>Northing</b>
351718	7868165
347626	7870344
347551	7870366
351025	7862469
351207	7862675
351246	7862635
351552	7863469
351751	7864228
352118	7865567
352872	7867404
353315	7868485
354169	7870410
349320	7873150
350596	7872415
350681	7870269
350751	7870558
350727	7871367
349055	7870657
349073	7870653
349140	7870638
349161	7870635
349188	7870626
349217	7870623
349265	7870629
349321	7870626
349362	7870619
349384	7870616
349411	7870614
349440	7870609
349536	7870578
349543	7870577
349606	7870551
349641	7870555
349661	7870464
349638	7870359
349612	7870303
349637	7870298
349667	7870344
349596	7870272
349548	7870266
349499	7870341

<b>Easting</b>	<b>Northing</b>
349490	7870473
349491	7870512
349422	7870578
349383	7870587
349358	7870589
349323	7870600
349288	7870603
349272	7870602
349235	7870603
349202	7870610
349201	7870610
349175	7870617
349140	7870634
349096	7870628
349067	7870628
349082	7870581
349164	7870586
349190	7870586
349321	7870562
349358	7870561
349403	7870559
349462	7870542
349462	7870528
349458	7870500
349416	7870466
349375	7870460
349305	7870467
349283	7870470
349267	7870476
349240	7870480
354714	7873274
355007	7875300
355842	7877667
356980	7880377
356987	7882641
349698	7870668
349690	7870627
349691	7870566
349682	7870383
349696	7870282
349749	7870301
349795	7870336
349800	7870380
349795	7870403
349783	7870439

<b>Easting</b>	<b>Northing</b>
349776	7870626
349777	7870657
349787	7871146
349789	7871378
350910	7871810
350912	7871565
350922	7871492
349860	7870683
349942	7870320
349969	7870417
350098	7872253
350068	7870686
350052	7870502
350072	7870411
350072	7870372
350073	7870350
350117	7870291
350195	7870566
350170	7870744
350202	7872242
350193	7872409
350411	7870306
350450	7870451
353067	7867951
352984	7867831
352965	7867829
352950	7867827
352906	7867825
352875	7867824
352795	7867824
352773	7867822
352720	7867818
352672	7867816
352646	7867815
350555	7872233
350536	7871745
350530	7871509
350578	7870350
350606	7870301
350688	7870511
349051	7870653
349121	7870636
349220	7870642
349222	7870645
349259	7870644

<b>Easting</b>	<b>Northing</b>
349288	7870641
349308	7870643
349333	7870645
349350	7870649
349380	7870630
349409	7870627
349431	7870627
349642	7870484
349501	7870395
349503	7870518
349461	7870558
349411	7870557
349369	7870568
349358	7870575
349345	7870580
349321	7870587
349289	7870595
349274	7870597
349184	7870606
349156	7870619
349119	7870629
349086	7870637
349057	7870642
349036	7870553
349199	7870545
349314	7870534
349446	7870496
349362	7870473
349284	7870484
349254	7870493
349235	7870494
349119	7870494
348981	7870504
349011	7870518
349011	7870518
349011	7870518
349069	7870522
349110	7870525
349124	7870526
349151	7870522
349177	7870514
349190	7870488
349221	7870449
349240	7870443
349240	7870443

<b>Easting</b>	<b>Northing</b>
349249	7870443
349314	7870435
349329	7870436
349380	7870432
349405	7870431
349460	7870433
349502	7870448
349527	7870478
349560	7870507
349570	7870507
349570	7870507
349608	7870517
349604	7870478
349602	7870446
349606	7870408
349600	7870374
349599	7870353
349598	7870342
349588	7870307
349548	7870300
349506	7870305
349459	7870315
349403	7870326
349347	7870354
349334	7870356
349272	7870380
349200	7870404
349157	7870410
349128	7870412
348947	7870440
348989	7870440
349045	7870439
349080	7870442
349140	7870436
349157	7870436
349292	7870410
349373	7870404
349385	7870405
349422	7870402
349462	7870404
349526	7870423
349542	7870441
349554	7870420
349556	7870380
349542	7870362

<b>Easting</b>	<b>Northing</b>
349520	7870360
349470	7870364
349426	7870369
349375	7870386
349331	7870399
349261	7870417
349225	7870421
349467	7870613
349486	7870611
349499	7870611
349509	7870611
349589	7870607

<b>Easting</b>	<b>Northing</b>
349601	7870607
349637	7870606
349734	7870590
349654	7870587
349630	7870584
349603	7870588
349581	7870593
349556	7870595
349537	7870595
349511	7870591
349499	7870589
349461	7870589

**APPENDIX D. GPS LOCATIONS OF *PHYLLANTHUS EREMICUS* (GDA 51)**

<b>Easting</b>	<b>Northing</b>
349688	7870598
349710	7870280
350852	7871411
349871	7870672
349878	7870649
349877	7870373
350122	7870535
349543	7870577
349656	7870544
349661	7870455
349642	7870377
349639	7870301
349667	7870344
349492	7870437
349462	7870570
349409	7870463
349384	7870462
349321	7870463
349471	7870562
350852	7871414
350823	7871735
349550	7870586
349605	7870578
349642	7870484
349620	7870422
349623	7870404

<b>Easting</b>	<b>Northing</b>
349624	7870394
349623	7870394
349602	7870349
349599	7870301
349582	7870270
349542	7870278
349495	7870438
349462	7870557
349683	7870405
349696	7870282
349776	7870626
349777	7870657
349785	7870762
349333	7870437
349402	7870432
349434	7870432
349539	7870489
349598	7870504
349599	7870427
349561	7870314
349479	7870312
349375	7870342
349315	7870362
349313	7870403
349550	7870372
349554	7870437