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A BOTANICAL SURVEY OF LOT 510 MULLIGAN'S LAGOON ROAD (PROPOSED COTTON GIN BLOCK) KUNUNURRA

**REPORT PREPARED FOR KIMBERLEY
COTTON COMPANY**

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1. INTRODUCTION

Lot 510 lies within the Ord River catchment on the fertile Ivanhoe Plain, North-west from Kununurra. Soils of the Ivanhoe Plain were described and mapped in detail by Aldrick *et al.* (1990). He considered the soils to be developed from alluvial sediments, deposited onto a Tertiary lateritic peneplain. Sediments associated with the alluvial plain are predominantly clayey alluvium, derived from a variety of Proterozoic and Cambrian rocks. The rim of the Ivanhoe Plain, which includes Lot 510, features red-brown colluvial sands derived from ferruginous sandstones and shales.

The climate of the site is subtropical with a wet season from November to March. Most rain falls in January to February, often associated with cyclones emanating from the Timor Sea. Mean annual rainfall in Kununurra is 809 mm (BOM data). The wet season is typically humid and hot with daily temperatures in the range 35-38°C. Rainfall during the dry season from April to October is minimal but cooler temperatures prevail with night temperatures in the range 15-23°C.

The northern sector of Lot 510 was previously cleared for tea tree and lemon grass cultivation (Debra Pearce, pers. comm.). Remnant fence-lines, earth mounds, ridges, drainage ditches and excavated ponds survive from that era. Historic aerial imagery shows a grid network of cut lines formerly dissected the block (Henry Smolinski, pers. comm.).

2. METHOD

The author, accompanied by soil scientist Henry Smolinski, visited the North-western swampy sector of the site on 14 February 2022. Access was via Peter Letchford's private farm road. Between the hours 1500 and 1745, the target area was carefully searched for *Typhonium* spp. (both Kununurra & Middle Creek undescribed species): both species with which the two searchers were familiar. In addition, the author undertook searches for other Priority Flora species: notably the sedge *Cyperus digitatus*, the grass *Echinochloa kimberleyensis*, and the yellow-flowering herbs *Goodenia durackiana* & *G. malvina*. Photo-waypoints were established, flora notes made and plant specimens collected (CG061-078). Late in the day, Henry Smolinski undertook soil sampling at sites CG001-003 to verify the structure of duplex soils at the site. During the evening, plant specimens were identified using the standard reference works cited in detail in References.

On 20 February 2022, the author re-visited the site, but this time accessing from Mulligan's Lagoon Road. Between the hours 0615 and 1130, numerous traverses were undertaken of the sandy sector of the block. As before, searches were conducted for Priority Flora, photo-waypoints established, flora notes made and plant specimens collected (CG079-126).

During the afternoon, plant specimens were identified using the standard reference works cited in detail in References.

3. RESULTS

3.1 Soils

Mapping by Aldrick *et al.* (1990) and Smolinski (2003) reveals that Lot 510 supports three distinct soil types, proceeding from east to west Figure 1 (H. Smolinski 2003):

- **Cockatoo Sands (CS):** red-brown sands to sandy loams, occurring on very gentle inclined slopes beneath sandstone hills towards the alluvial plain; soil pH is acid to neutral; total area 104 ha.
- **Junction Complex (JC):** sandy duplex soils and deep red to yellow sands, moderately well-drained to poorly-drained; total area 49 ha.
- **Aquitaine (A):** grey-phase Aquitaine soils and typical Cununurra Clay, situated on the alluvial plain; Aquitaine soils are typically olive-grey, coarse-structured, poorly-drained clays with significant salinity, while Cununurra Clay soils are typically alkaline dark brown cracking clays with high agricultural value; total area 4.8 ha.

Soil samples collected by Henry Smolinski at sites CG001-CG003 are described in detail in Appendix 2.

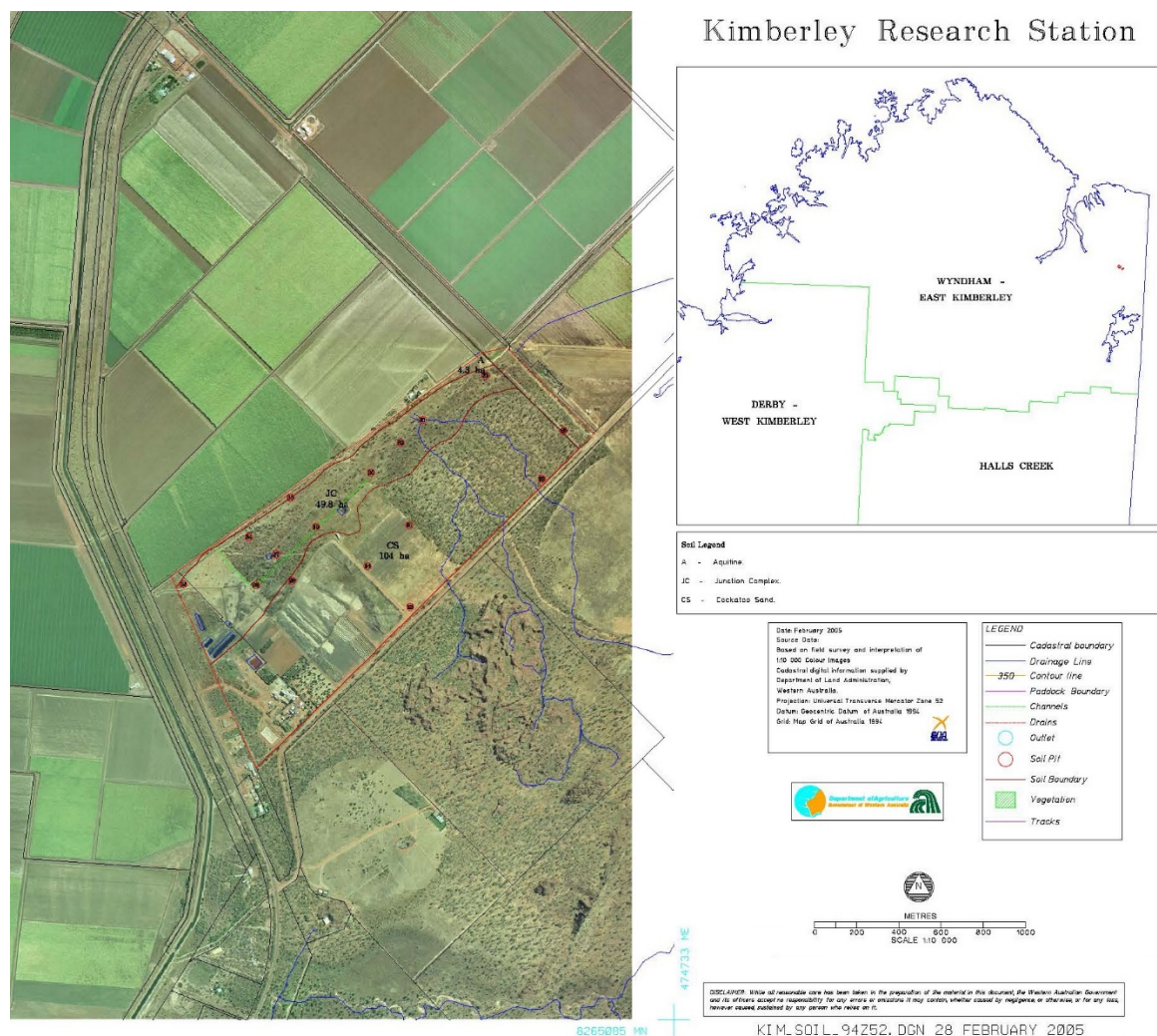


Figure 1. Lot 510 location and soil types within the area.

3.2 Flora

A total of one hundred and twenty-six (126) plant species were identified, which are listed in Appendix 1. This total includes twenty-two (22) introduced, naturalised weed species. None of the targeted Priority Flora species were found. It is concluded that the disturbed nature of the site - from both historic clearing and earthworks - explains the abundance of weeds. In addition, the heavy thatching of both weeds and grasses is considered detrimental for the establishment and survival of both *Typhonium* species, as well as many native herb species that might otherwise be expected. However, two other non-targeted Priority Flora species were identified at sites CG075 & CG089.

The author collected plant specimens under Flora Taking (Biological Assessment) Licence No. FB62000260, issued on 18/5/2020 for a period of three years.

3.3 Vegetation

The sandy sector of the site, underlain by Cockatoo Sands (CS) is dominated by a regrowth woodland of Spear Wattle (*Acacia tumida*), typically reaching 8m in height. Occasional specimens of Soap Wattle (*Acacia colei*) and Ghost Wattle (*Acacia platycarpa*) occur, as well as patches of *Grevillea agrifolia* and Ironwood (*Erythrophleum chlorostachys*). Annual Sorghum (*Sorghum stipoideum*) to 3m height is the dominant understorey, where it has not been displaced by dense – often monotypic - patches of weedy Hyptis (**Mesosphaerum suaveolens*).

The former [pre-clearance] scattered, emergent canopy formed by Stringybark (*Eucalyptus tetradonta*) to 14m height has not had time to re-establish itself. However isolated remnant clumps were noted at CG109 & 110, adjoining Mulligan's Lagoon Road, and a young regrowth specimen at CG096.

Proceeding from South-east to North-west, as the swampy western margin is approached, the vegetation community changes. Although Spear Wattle (*Acacia tumida*) is still present, stands of Silky Grevillea (*Grevillea pteridifolia*), Broad-leaved Paperbark (*Melaleuca viridiflora*) and Glider-wing Tree (*Terminalia platyptera*) are a feature of the Junction Complex (JC) transition zone soils, especially in the northern area. Further South, occasional isolated Boabs (*Adansonia gregorii*) evidently escaped previous clearing. However, numerous earth mounds, ditches and ponds occur in this zone, creating a mosaic of dense weedy grasslands. Rosella (**Hibiscus sabdariffa*), a weedy species of African origin, is well-established along the eastern margin of this transition zone. It is evident that these communities indicate the presence of clay layers at depth, beneath the surface sands.

Most of the very minor area of Aquitaine (A) clay soils, which only occurs in the extreme North-west of the site has been modified by earthworks to form a drainage sump.

3.4 Priority Flora

Targeted searches on 14 & 20 February failed to locate any of the following species:

- *Cyperus digitatus* (sedge)
- *Echinochloa kimberleyensis* (grass)
- *Goodenia durackiana* (herb)
- *Goodenia malvina* (herb)
- *Typhonium* sp. Kununurra (A.N. Start ANS 1467)
- *Typhonium* sp. Middle Creek (M.D. Barrett MDB 3246)

It should be noted that *Typhonium* sp. Kununurra has not been recorded on Junction Complex (JC) soils (Henry Smolinski, pers. comm.).

However, single individuals of two other Priority Flora species were recorded as follows:

- CG075 *Dolichandrone filiformis* – Wire-leaf Lemonwood (Priority One)
- CG089 *Brachychiton tuberculatus* – Warty-fruited Kurrajong (Priority Three)

3.5 Weeds

A total of twenty-two (22) introduced, naturalised weedy species were recorded during the survey.

In Appendix 1, introduced species are indicated by a * symbol and their observed locations listed. Table 1 indicates weed species that were recorded during the survey.

Table 1. Weed species and frequencies observed.

SPECIES	NAME & LIFEFORM	FREQUENCY
* <i>Alysicarpus vaginalis</i>	Buffalo Clover (herb)	Occasional
* <i>Azadirachta indica</i>	Neem Tree (tree)	Abundant
* <i>Bothriochloa pertusa</i>	Indian Blue Grass (grass)	Occasional
* <i>Calotropis procera</i>	Rubber Bush (large shrub)	Scattered
* <i>Cenchrus ciliaris</i>	Buffel Grass (grass)	Scattered
* <i>Chloris barbata</i>	Purpletop Grass (grass)	Occasional
* <i>Clitoria ternatea</i>	Darwin Pea (vine)	Occasional
* <i>Distimake aegyptius</i>	Hairy Merremia (vine)	Scattered
* <i>Echinochloa colona</i>	Barnyard Grass (grass)	Patches
* <i>Hibiscus sabdariffa</i>	Rosella (shrub)	Abundant
* <i>Khaya senegalensis</i>	African Mahogany (tree)	Scattered
* <i>Leucaena leucocephala</i>	Sneaky Tree (tree)	Patches
* <i>Macroptilium atropurpureum</i>	Siratiro (vine)	Scattered

<i>*Macroptilium lathyroides</i>	Phasey Bean (shrub)	Patches
<i>*Mesosphaerum suaveolens</i>	Hyptis or Mint Bush (shrub)	Very Abundant
<i>*Passiflora foetida</i>	Wild Passionfruit (vine)	Scattered
<i>*Physalis minima</i>	Wild Gooseberry (herb)	Occasional
<i>*Sida acuta</i> subsp. <i>carpinifolia</i>	Spinyhead Sida	Scattered
<i>*Stylosanthes hamata</i>	Caribbean Stylo (herb)	Patches
<i>*Trianthema portulacastrum</i>	Giant Pigweed (herb)	Occasional
<i>*Tridax procumbens</i>	Tridax Daisy (herb)	Scattered
<i>*Urochloa mosambicensis</i>	Sabi Grass (grass)	Patches

By far the most abundant weed is Hyptis or Mint Bush (**Mesosphaerum suaveolens*), which is present across approximately one third of the site, often forming dense monotypic stands to 2m height. Many of the weed species are covered in detail in the field guide by Smith (2011). Wind-blown seeds include **Calotropis*, **Khaya* and **Tridax*, while **Azadirachta* and **Passiflora* are known to be spread by frugivorous native bird species.

3.6 Fauna

Agile wallabies (*Macropus agilis*) were noted on 20 February, resting in dense grasses in the weedy open areas at CG123 & 124. However, the population on the block appears to be low in number as scats were rarely encountered during traverses.

4. RECOMMENDATIONS

Despite the degraded nature of the site, it would be desirable from a conservation perspective to retain some of the relatively intact paperbark (*Melaleuca viridiflora*) community at CG082 & 083 in the extreme north-west of the site for drainage purposes, inasmuch as this can be achieved with the proposed footprint of the cotton gin development.

Strategic control measures for highly invasive weedy species (notably *Azadirachta* and *Leucaena*) should also be considered.

In the sandy (majority) sector of the block, it would be desirable from both a conservation and aesthetic perspective to retain some of the existing stringybark (*Eucalyptus tetradonta*) stands, especially where these are located along the fence-line, running parallel to Mulligan's Lagoon Road.

5. ACKNOWLEDGEMENTS

The following staff from the Department of Primary Industry and Regional Development (DPIRD) ably assisted the author:

Henry Smolinski (Soil Scientist) with field assistance in Priority Flora searches, valuable insights into local soils and historic imagery of the site.

Jo-Ann Ellis and Helena O'Dwyer with GPS data processing.

Peter Letchford kindly provided vehicle access to the western side of the site from his private farm road.

Molly Ahern (Broome) is thanked for assembling the final document into a presentable form.

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7. APPENDICES

Appendix 1: Flora list of 126 taxa recorded from the site

SPECIES	LOCATION
Family Aizoaceae	
<i>Trianthema pilosa</i> F. Muell.	92, 93
* <i>Trianthema portulacastrum</i> L.	81, 84
Family Amaranthaceae	
<i>Gomphrena breviflora</i> (R. Br.) Spreng	80, 92
<i>Gomphrena canescens</i> R. Br.	80, 92
Family Apocynaceae	
* <i>Calotropis procera</i> (Aiton) W.T. Aiton	93, 123
<i>Wrightia saligna</i> (R. Br.) Benth.	75
Family Asteraceae	
<i>Pterocaulon sphacelatum</i> (Labill.) F. Muell.	84
* <i>Tridax procumbens</i> L.	82, 123
Family Bignoniaceae	
<i>Dolichandrone filiformis</i> Seem	75 PRIORITY ONE
<i>Dolichandrone occidentalis</i> Jackes	75
Family Bixaceae	
<i>Cochlospermum fraseri</i> Planch.	95, 99
Family Boraginaceae	
<i>Heliotropium ovalifolium</i> Forssk.	81, 84
<i>Trichodesma zeylanicum</i> (Burm.f.) R. Br.	84
Family Capparaceae	
<i>Arivela viscosa</i> (L.) Raf.	80, 81, 84
Family Combretaceae	
<i>Terminalia platyptera</i> F. Muell.	79, 80, 81, 87, 88
<i>Terminalia volucris</i> R. Br. ex Benth.	62, 63, 64
Family Commelinaceae	
<i>Commelina ensifolia</i> R. Br.	82, 83
<i>Cyanotis axillaris</i> D. Don	82, 83
Family Convolvulaceae	

<i>Bonamia pannosa</i> (R. Br.) Hallier f.	98
* <i>Distimake aegyptius</i> (L.) A.R. Simoes and Staples	80
<i>Ipomoea polymorpha</i> Roemer and Schultes	92
<i>Operculina codonantha</i> (Benth.) Hallier f.	70
Family Cucurbitaceae	
<i>Cucumis melo</i> L.	123, 124
<i>Luffa saccata</i> I. Telford	82
Family Cyperaceae	
<i>Cyperus aquatilis</i> R. Br.	64, 81, 82, 83
<i>Fimbristylis phaeoleuca</i> S.T. Blake	62, 63, 64
Family Droseraceae	
<i>Drosera ordensis</i> Lowrie	80
Family Euphorbiaceae	
<i>Euphorbia coghlanii</i> F.M. Bailey	81
Family Fabaceae	
<i>Acacia colei</i> Maslin and Thomson.	83, 92, 93, 96, 120
<i>Acacia platycarpa</i> F. Muell.	93, 112, 113, 114
<i>Acacia tumida</i> F. Muell.	79, 80, 81, 84, 85, 86, 88, 89, 90, 92, 94, 95, 96, 98, 99, 100, 101, 112
<i>Acacia</i> sp. Kununurra (Lullfitz 6195)	85, 88, 96
<i>Albizia lebbeck</i> (L.) Benth.	64
* <i>Alysicarpus vaginalis</i> (L.) DC.	80
<i>Bauhinia cunninghamii</i> (Benth.) Benth.	67, 119
<i>Cajanus marmoratus</i> (Benth.) F. Muell.	92
* <i>Clitoria ternatea</i> L.	79
<i>Crotalaria cunninghamii</i> R. Br.	105, 122, 125
<i>Crotalaria medicaginea</i> Lam.	91, 99
<i>Erythrophleum chlorostachys</i> (F. Muell.) Hennings	85, 88, 96, 97
<i>Indigofera hirsuta</i> L.	84
<i>Indigofera linifolia</i> (L.f.) Retz.	80
<i>Jacksonia forrestii</i> F. Muell.	81
* <i>Leucaena leucocephala</i> (Lam.) De Wit.	71,75
* <i>Macroptilium atropurpureum</i> (DC.) Urban	117, 119, 123, 124
* <i>Macroptilium lathyroides</i> (L.) Urb.	123
<i>Neptunia dimorphantha</i> F. Muell.	79
<i>Senna venusta</i> (F. Muell.) Randell	86
<i>Sesbania formosa</i> F. Muell.	120
<i>Sesbania cannabina</i> (Retz.) Pers.	120

<i>*Stylosanthes hamata</i> (L.) Taub	87, 119
<i>Tephrosia coriacea</i> F. Muell.	84, 96
<i>Zornia prostrata</i> S. Reyn. and Holland var. <i>prostrata</i>	88, 92
Family Goodeniaceae	
<i>Goodenia sepalosa</i> Benth. var. <i>sepalosa</i>	80
<i>Velleia panduriformis</i> A. Cunn. ex Benth.	85, 90
Family Gyrocarpaceae	
<i>Gyrocarpus americanus</i> Jacq. subsp. <i>pachyphyllus</i> Kubitzki.	87
Family Lamiaceae	
<i>*Mesosphaerum suaveolens</i> (L.) Kuntze	79, 80, 81, 84, 86, 87, 88, 89, 92, 96, 97, 98, 99, 108, 112, 113, 123, 124, 125
Family Loganiaceae	
<i>Mitrasacme nummularia</i> S. Moore	80
Family Malvaceae	
<i>Abutilon andrewsianum</i> W. Fitzg.	87
<i>Adansonia gregorii</i> F. Muell.	66, 104, 119
<i>Brachychiton tuberculatus</i> (W. Fitzg.) Guymer.	89 PRIORITY THREE
<i>Gossypium australe</i> F. Muell.	92
<i>Hibiscus austrinus</i> Juswara and Craven var. <i>austrinus</i>	79
<i>Hibiscus meraukensis</i> Hochr.	106
<i>*Hibiscus sabdariffa</i> L.	65, 102, 104, 115, 117
<i>Melhania oblongifolia</i> F. Muell	92
<i>*Sida acuta</i> Burm.f. subsp. <i>carpinifolia</i> (L.f.) Borss.	123
<i>Sida hackettiana</i> W. Fitzg.	96
<i>Waltheria indica</i> L.	111, 123
Family Meliaceae	
<i>*Azadirachta indica</i> A. Juss.	81, 83, 87, 93, 104, 105, 111, 118, 119, 120, 121
<i>*Khaya senegalensis</i> (Desr.) A. Juss.	79, 80
Family Menispermaceae	
<i>Tinospora smilacina</i> Benth.	80
Family Moraceae	
<i>Ficus aculeata</i> var. <i>indecora</i> (Miq.) D.J. Dixon.	72
Family Myrtaceae	
<i>Calytrix exstipulata</i> DC.	81
<i>Corymbia confertiflora</i> (Kippist) K.D. Hill and L.A.S. Johnson.	119, 120

<i>Eucalyptus microtheca</i> F. Muell.	103, 120
<i>Eucalyptus tetradonta</i> F. Muell.	99, 109, 110
<i>Melaleuca viridiflora</i> Solander ex Gaertn.	81, 82, 83, 92, 101, 103, 105, 116
<i>Verticordia verticillata</i> N. Byrnes.	81
Family Nyctaginaceae	
<i>Boerhavia domini</i> Meikle and Hewson	84, 85
Family Oleaceae	
<i>Jasminum didymum</i> G. Forst.	120
Family Onagraceae	
<i>Ludwigia octovalvis</i> (Jacq.) Raven	70
Family Passifloraceae	
* <i>Passiflora foetida</i> (L.) var. <i>hispida</i> (DC. ex Triana and Planchon) Killip	87, 118, 120
Family Platyzomataceae	
<i>Platyzoma microphyllum</i> R. Br.	81
Family Poaceae	
<i>Aristida inaequiglumis</i> Domin	95, 96
* <i>Bothriochloa pertusa</i> (L.) A. Camus	82
* <i>Cenchrus ciliaris</i> L.	124
* <i>Chloris barbata</i> (L.) Sw.	83, 84
<i>Chrysopogon latifolius</i> S.T. Blake.	88
<i>Cynodon dactylon</i> (L.) Pers.	72, 82
<i>Dactyloctenium radulans</i> (R. Br.) P. Beauv.	85
<i>Dicanthium fecundum</i> S.T. Blake	89
* <i>Echinochloa colona</i> (L.) Link	89, 94
<i>Eragrostis eriopoda</i> Benth.	86
<i>Eragrostis tenellula</i> (Kunth.) Steud.	81
<i>Eulalia aurea</i> (Bory) Kunth	120
<i>Heteropogon contortus</i> (L.) P. Beauv. ex Roem. and Schult.	73, 74, 79, 80, 88, 89
<i>Pseudoraphis spinescens</i> (R. Br.) Vickery.	120
<i>Setaria apiculata</i> (Scribner and Merr.) Schumann	94
<i>Sorghum australiense</i> Garber and Snyder.	79, 80, 81
<i>Sorghum stipoideum</i> (Ewart and J. White) C. Gardner and Hubbard	84, 86, 87, 88, 90, 93, 94, 95, 99, 100, 101, 105, 111, 112
<i>Triodia bitextura</i> R. Br., Prodr.	95
* <i>Urochloa mosambicensis</i> (Hack.) Dandy.	122, 123, 124
Family Polygalaceae	
<i>Polygala eriocephala</i> Benth.	108

Family Portulacaceae	
<i>Calandrinia strophiolata</i> (F. Muell.) B.D. Jacks.	84
<i>Portulaca oleracea</i> L.	87
Family Proteaceae	
<i>Grevillea agrifolia</i> Cunn. ex R. Br.	90, 91, 98, 107, 112
<i>Grevillea pteridifolia</i> Knight	80, 88, 93, 105
Family Rubiaceae	
<i>Dolichocarpa argillacea</i> (Halford) K.L. Gibbons	81, 84
<i>Spermacoce argillacea</i> Harwood	82, 83
Family Sapindaceae	
<i>Atalaya hemiglauc</i> a (F. Muell.) F. Muell. ex Benth.	75
<i>Dodonaea hispidula</i> var. <i>phylloptera</i> (F. Muell.) M. G. Harr.	86
Family Scrophulariaceae	
<i>Lindernia clausa</i> (F. Muell.) F. Muell.	80
Family Solanaceae	
* <i>Physalis minima</i> L.	123, 124
Family Taccaceae	
<i>Tacca leontopetaloides</i> (L.) Kuntze	106
Family Tiliaceae	
<i>Corchorus aestuans</i> L.	81
<i>Corchorus pumilio</i> Benth.	99
<i>Grewia savannicola</i> R. L. Barrett	119
<i>Triumfetta plumigera</i> F. Muell.	96
Family Typhaceae	
<i>Typha domingensis</i> Pers.	79
Family Verbenaceae	
<i>Clerodendrum floribundum</i> R. Br.	91
Family Violaceae	
<i>Afrohybanthus aurantiacus</i> (Benth.) Flicker	81
Family Vitaceae	
<i>Ampelocissus</i> sp. Kununurra (M.D. Barrett MDB 1525).	89, 95
<i>Cissus adnata</i> Roxb.	3
Family Zygophyllaceae	
<i>Tribulopsis angustifolia</i> R.Br.	92

* Indicates an introduced, naturalised or weedy species

Appendix 2. Soil profile within Lot 510 (Henry Smolinski)

Soil validation of the Aquitaine and Junction Complex map unit areas within Location 510 (proposed Cotton Gin Site) was carried out on 20/2/2022. Representative soil descriptions of the dominant soils within the Junction Complex are described below.

Note:

- Most of the Aquitaine and Junction Complex map units within the Cotton Gin Site have been modified by agriculture and earthworks.
- *Typhonium* sp. Kununurra has not be recorded on Junction Complex soils.

Site Coordinates: S 15.65447, E 128.70898

Soil unit: JC Junction Complex

Soil type: Grey loamy earth

Australian Soil Classification: Kandosolic Redoxic Hydrosol

Profile morphology

Horizon	Depth (cm)	Description
Ap	0-8	Very dark grey (10YR 3/1) humic sandy loam structureless, moist, earthy fabric; pH 6.0-6.5. Clear boundary to
B1	8-20	Dark greyish brown to brown (10YR 4/2-4/3) with rusty mottles sandy clay loam massive, moist; pH 6.5. Gradual boundary to
B2	20-50	Dark grey (10YR 4/1) with brown and yellow mottles sandy clay massive to weak angular blocky structure, saturated; pH 6.5.

Site Coordinates: S 15.66929, E 128.74838

Soil unit: JC Junction Complex

Soil type: Shallow grey loamy duplex

Australian Soil Classification: Chromosolic Redoxic Hydrosol

Profile morphology

Horizon	Depth (cm)	Description
Ap	0-5	Black (10YR 2/1) humic loam structureless, moist, earthy fabric; pH 6.0-6.5. Clear boundary to
A12	5-15	Dark greyish brown to brown (10YR 4/2-4/3) with rusty mottles sandy loam massive, saturated; pH 6.5. Clear boundary to
B21	15-20	Dark greyish brown (10YR 4/2) with brown and yellow mottles sandy clay massive to weak angular blocky structure, saturated; pH 6.5. Diffuse boundary to
B22	20-50	Dark grey (10YR 4/1) with brown and yellow mottles sandy clay massive, saturated; pH 6.5

Appendix 3. Photos



Plate 1: General view Lot 510.



Plate 2: NW corner of Lot 510 showing swamp with Melaleucas.



Plate 3: Eastern view of Lot 510.



Plate 4: Lot 510 showing Northern sector.



Plate 5: Lot 510 from Western side.



Plate 6: Weedy flat.



Plate 7: Melaleuca swamp.



Plate 8: CG089 Priority 3 Species; *Brachychiton tuberculatus*.

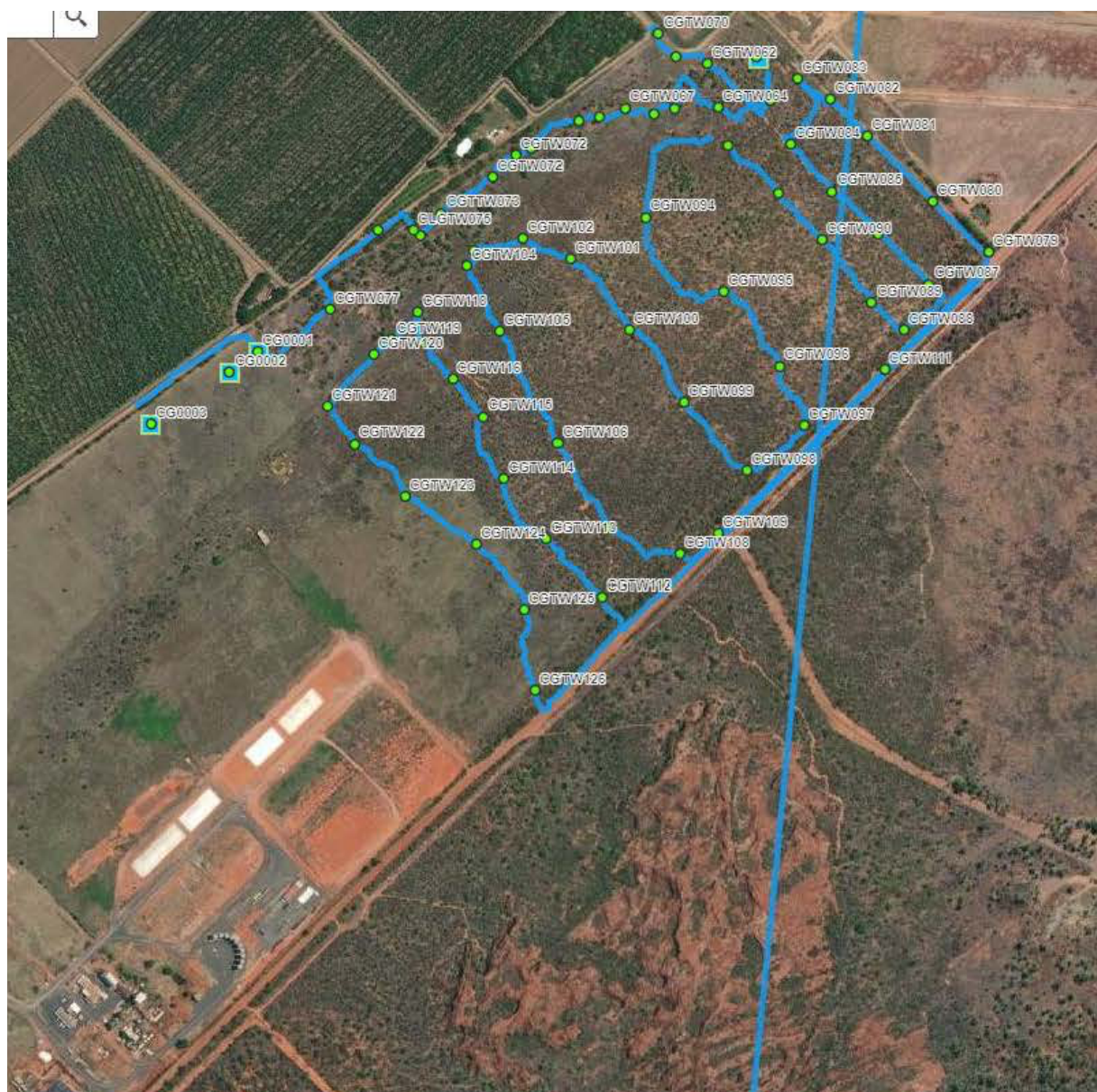


Plate 9: CG075 Priority 1 Species; *Dolichandrone filiformis*.



Plate 10: *Grevillea agrifolia* on Lot 510 (20 Feb 2023).

Appendix 4. Track Logs and waypoints from GPS unit



Appendix 5. Individual waypoints and comments

Site ID	First Observed	Comments	x	y
CGTW070	14/2/2022, 3:38 PM	Photo-point and weeds	14333000.78	-1765824.976
CGTW061	14/2/2022, 3:46 PM	Swamp	14333030.24	-1765865.786
CGTW062	14/2/2022, 3:48 PM	Edge of woodland	14333085.78	-1765878.216
CGTW063	14/2/2022, 4:01 PM	Edge of Melaleuca swamp	14333196	-1765943.023
CGTW064	14/2/2022, 4:05 PM	Mel viridiflora over Cyperus	14333196	-1765943.021
CGTW064	14/2/2022, 4:22 PM	Albizia lebbek	14333104.1	-1765953.656
CGTW065	14/2/2022, 4:32 PM	Rosella and boab mound	14333028.41	-1765957.65
CGTW066	14/2/2022, 4:39 PM	Iconic boab in weedy flat	14332992.54	-1765965.602
CGTW067	14/2/2022, 4:45 PM	Bauhinias from rusty gatepost	14332943.22	-1765955.575
CGTW068	14/2/2022, 4:51 PM	Eucalyptus microtheca	14332898.11	-1765970.082

CGTW069	14/2/2022, 4:55 PM	Pond with Acacia coleii	14332861.21	-1765977.884
CGTW071	14/2/2022, 5:00 PM	Big Leucaena patch	14332779.2	-1766024.801
CGTW072	14/2/2022, 5:02 PM	Couch patch towards boab	14332754.33	-1766037.824
CGTW072	14/2/2022, 5:07 PM	Ficus aculeata	14332713.8	-1766075.372
CGTW073	14/2/2022, 5:12 PM	Gap in Heteropogon	14332623.33	-1766139.719
CGTW074	14/2/2022, 5:15 PM	Second gap in Heteropogon	14332586.79	-1766178.674
CGTW075	14/2/2022, 5:16 PM	DOLICHANDRONE FILIFORMIS P1	14332574.19	-1766168.677
CGTW075	14/2/2022, 5:21 PM	Neem/Leucaena buffer	14332512.88	-1766169.544
CGTW077	14/2/2022, 5:25 PM	Weedy flat with sandstone hill on skyline	14332429.44	-1766307.508
CGTW078	14/2/2022, 5:30 PM	Corner fence post	14332337.47	-1766395.083
			14333172.79	-1765866.82
CG0003		Soil sampling site (H. Smolinski)	14332115.08	-1766508.755
CG0002		Soil sampling site (H. Smolinski)	14332253.22	-1766418.424
CG0001		Soil sampling site (H. Smolinski)	14332301.38	-1766381.467
CGTW079	20/2/2022, 6:21 AM	Corner of block	14333577.45	-1766207.225
CGTW080	20/2/2022, 6:27 AM	Northern edge	14333479.37	-1766118.924
CGTW081	20/2/2022, 6:33 AM	Opposite farm pond and fuel tank	14333365	-1766005.06
CGTW082	20/2/2022, 6:39 AM	Melaleuca swamp starts	14333300.44	-1765939.705
CGTW083	20/2/2022, 6:48 AM	Melaleuca swamp	14333242.54	-1765903.624
CGTW084	20/2/2022, 6:58 AM	Sand track	14333230.97	-1766018.374
CGTW085	20/2/2022, 7:04 AM	Mature Ac. tumida	14333304	-1766101.482
CGTW086	20/2/2022, 7:13 AM	Mature Ac. tumida + Sorghum	14333383.81	-1766175.637
CGTW087	20/2/2022, 7:19 AM	Near ML road. Corymbia + T platyptera	14333473.79	-1766263.493
CGTW088	20/2/2022, 7:28 AM	12m ironwood	14333428.78	-1766344.092
CGTW089	20/2/2022, 7:36 AM	BRACHYCHITON TUBERCULATUS P3	14333373.38	-1766295.952
CGTW090	20/2/2022, 7:44 AM	Mature Ac tumida with Sorghum	14333285.57	-1766185.225
CGTW091	20/2/2022, 7:51 AM	Crotalaria in clearing	14333209.73	-1766104.983
CGTW092	20/2/2022, 7:59 AM	White Gomphrena, Mel. Viridiflora	14333120.72	-1766021.382
CGTW093	20/2/2022, 8:08 AM	G. pteridifolia, Acacia coleii	14333120.72	-1766021.382
CGTW094	20/2/2022, 8:13 AM	Mature Ac. tumida + Sorghum	14332979.08	-1766146.889
CGTW095	20/2/2022, 8:21 AM	Mature Ac. tumida + Cochlospermum	14333113.82	-1766276.736
CGTW096	20/2/2022, 8:28 AM	Lone Euc. Tetrodonta	14333212.24	-1766407.051
CGTW097	20/2/2022, 8:34 AM	Hyptis mound with Ironwood	14333255.42	-1766510.924
CGTW098	20/2/2022, 8:42 AM	Heavy Hyptis under Ac. tumida	14333155.53	-1766590.384
CGTW099	20/2/2022, 8:51 AM	Two Cochlospermum Fraseri	14333045.98	-1766469.512
CGTW100	20/2/2022, 8:58 AM	Mature Ac. Tumida with Sorghum	14332950.18	-1766343.348
CGTW101	20/2/2022, 9:05 AM	Sorghum, Ac. Tumida & Mel. Viridiflora	14332846.73	-1766219.995
CGTW102	20/2/2022, 9:10 AM	Rosella swamp and house	14332766.48	-1766184.208
CGTW103	20/2/2022, 9:14 AM	Mound on swamp edge	14332678.8	-1766204.377
CGTW104	20/2/2022, 9:19 AM	Boab in Neem thicket	14332668	-1766231.203
CGTW105	20/2/2022, 9:25 AM	G pteridifolia, Neem, Mel. Viridiflora	14332724.68	-1766346.956
CGTW106	20/2/2022, 9:32 AM	Sand track, tall Ac. tumida	14332825.87	-1766542.811
CGTW107	20/2/2022, 9:38 AM	Hyptis, G agrifolia and Ac. tumida	14332910.54	-1766689.643
CGTW108	20/2/2022, 9:47 AM	Hyptis mound + mauve Polymeria	14333036.96	-1766735.953
CGTW109	20/2/2022, 9:57 AM	Euc tetrodonta opp Drendel's Place Rd	14333105.15	-1766700.07

CGTW110	20/2/2022, 10:04 AM	Mulligan's Lagoon Rd, NW side	14333395.75	-1766412.267
CGTW111	20/2/2022, 10:22 AM	W side Mulligan Lagoon road, Neem	14333395.75	-1766412.267
CGTW112	20/2/2022, 10:26 AM	Hyptis, Crotalaria, G. agrifolia, Sorghum	14332902.06	-1766809.766
CGTW113	20/2/2022, 10:32 AM	Hyptis, Sorghum, G agrifolia, Ac. tumida	14332806.29	-1766708.344
CGTW114	20/2/2022, 10:38 AM	Crotalaria, Hyptis, G agrifolia	14332731.62	-1766604.26
CGTW115	20/2/2022, 10:42 AM	Rosella under Ac. tumida	14332695.8	-1766495.455
CGTW116	20/2/2022, 10:47 AM	Melaleuca line on sand	14332642.87	-1766429.659
CGTW117	20/2/2022, 10:51 AM	Rosella, Sorghum, Ac. colej, Neem	14332591.05	-1766366.125
CGTW118	20/2/2022, 10:55 AM	Fenceline view, Neem, Ac. Colei	14332582.08	-1766311.797
CGTW119	20/2/2022, 10:58 AM	Boab from fence line	14332537.02	-1766359.847
CGTW120	20/2/2022, 11:02 AM	View to SW across fence line	14332505.76	-1766387.055
CGTW121	20/2/2022, 11:08 AM	View from large neem SE S SW	14332423.91	-1766477.22
CGTW122	20/2/2022, 11:14 AM	Crotalaria cunninghamii patch	14332471.49	-1766543.044
CGTW123	20/2/2022, 11:20 AM	Weedy flat	14332560.57	-1766635.045
CGTW124	20/2/2022, 11:27 AM	Weedy flat	14332683.38	-1766718.378
CGTW125	20/2/2022, 11:32 AM	Hyptis edge, Crot. cunn ., Aristida	14332768.84	-1766830.305
CGTW126	20/2/2022, 11:38 AM	Edge of road buffer veg	14332787.7	-1766972.739