



Vegetation survey of Manari Rd reserve gravel pit

Manari Rd reserve/James Price Point

As part of CPS 11146/1 – DWER Request for Further Information

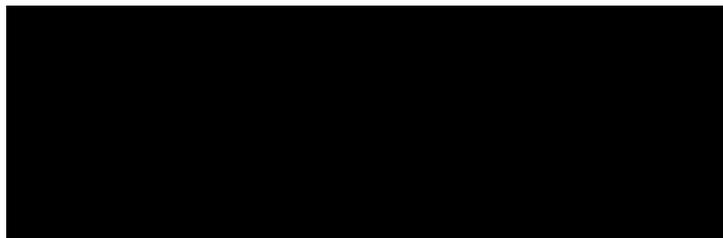


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Acknowledgement of Country

The Shire of Broome acknowledges the Yawuru people as the Traditional Owners and their continuing connection to the land, waters and community. We pay our respects to all members of the Yawuru communities and their cultures, and to Elders past, present and emerging.

1. Introduction

This report has been prepared by the Shire of Broome as part of the Purpose Permit application (Native Vegetation Clearing Permit – NVCP) CPS 11146/1, following a Request for Further Information (RFI) from the Department of Water and Environmental Regulations (DWER) to the Shire. The application was submitted and proposed to clear 0.05 ha on an Unallocated Crown Land at a gravel pit on Manari Rd reserve, James Price Point, Waterbank, WA 6725, for the Shire to create a new track to access the existing pit to take materials for building and maintaining Broome's roads and streetscapes.

This survey was conducted and supported internally by the Shire team: Alan Batt (Parks Coordinator), Lachlan Eyb (Horticulture Supervisor), Long Nguyen (Engineering Technical Officer), Luke Eglin (Operations Coordinator) and Justin Whyte (Works Coordinator). Both this survey and report were carried out following EPA Technical Guidelines for vegetation survey (WA EPA, 2016).

The proposed area, as stated, is located 53 km N of Broome townsite (60 km by road), next to Manari Rd reserve and within Unallocated Crown Land. The area has no permanent residents due to various constraints, however, is well-known for tourism and recreational purposes.

The Shire has already stated mitigation and avoidance measures in the submitted application. These measures have been utilised for an extended period of time as part of its weed management strategy and vegetation management. We will continue to implement them for this proposal.

2. Background

2.1. Scope of work and survey

The removal of native vegetation to create a new track to access the gravel pit raises several environmental concerns and factors. Possible impacts include direct and indirect impacts on:

- Threatened flora and fauna as per DCCEEW: General information.
- Threatened Ecological Community (TEC): Monsoon Vine Thicket.
- Threatened and Priority Flora (TF & PF): Per obtained from DBCA.

Therefore, a detailed survey and targeted survey to delineate TF, PF and TEC were proposed.

2.2. Geology, geological and hydrogeological conditions

The region/area has been relatively untouched and undisturbed compared to metropolitan areas. This leads to ill-informed data available, however literature review and site confirmed the following recent deposit and geology (DEMIRS, 1988) (Geoscience Australia, 2025):

- Fill/topsoil: Typical. This could be simply just gravel fill on roads or a mixture of materials being deposited or carried over time. Unknown geological properties. Up to 1 m deep.
- Colluvium: Silty sand (SM₈ or SM₉, equiv. Q_{ci}/Q_{cs}), light-grey, fine-grained, well-round quartz, occasionally mica and silt content. May be rarely encountered compared to Sm₁₀. Ranging 1 – 20 m deep.

- Quaternary Alluvium: Silty sand or clayey sand (SM₁₀, equiv. Qz/Qs), red, fine to medium-grained, variable silt content, aeolian. Ranging 1 – 40 m deep. Colloquially “Pindan”.
- Bossut Formation: Sand (S₁₄, equiv. Qpb), grey to white, medium-grained, sub-angular, moderately sorted quartz with some gastropod shells. Ranging 50 – 80 m deep.
- Broome Formation/Beds (Mesozoic): Sandstone (SS₃, equiv. Kb), fine to medium-grained, cross-bedded and ripple marked, some siltstone contents. 80 m deep and downwards. Broome/Kimberley main geological formation.

Soil types most encountered during the survey were topsoil (of mixture origins, pindan, gravel, etc.) and/or Pindan (Sm₁₀), generally known as the Yeeda land system. Pindan is a good drainage soil as it is clayey – sandy and iron rich (35% fine contents), thus exhibits potential erosion or collapsing behaviour. However, if it is maintained properly, its geological properties, as high maximum dry density (MDD, 17 – 20 kN/m³) at low moisture (~7% to reach 95% MDD), can be preserved, thus minimise erosion or degradation concerns, and an ideal material for construction activities. This is also supported by Schoknecht & Payne (2011), who noted that the land is not prone to degradation unless it is exposed to grazing and burning. MRWA (2024) in their annual report for a nearby gravel pit clearing project also reported no sign of erosion and degradation.

The area is located in a proclaimed area under the *Rights in Water and Irrigation Act 1914*. There are potentials for shallow groundwater (superficial/unconfined aquifer) or water table in the area. Based on a DWER monitoring bore nearby (0.7 km SW of proposed area), a water table is at 3.07 m BGL and aged 1300 – 2200 years old (DWER, 2017). Several geotechnical bores nearby by Woodside Energy also confirmed water table to be about 3 – 5 m BGL (DWER, 2010). This is thought to be by natural cause (infiltration and vegetation), thus minimal concerns on potential disruption of groundwater or violation of the *Act*.

BoM (n.d.) confirmed that there are three aquifers in vicinity, however it is unknown whether they cross or locate the proposed area. These three aquifers remain at Broome Formation; thus, it can safely be assumed that they remain deep (80 m BGL), confined aquifers and unlikely to reach.

2.3. Climate and catchment

Broome’s climate is described as a “hot, semi-arid climate” (Koppen: *BSh*), with some characteristics of a “tropical savanna climate” (Koppen: *Aw*) (BoM, 2009). Similar to any other tropical region in the Northern part of Australia, there are two distinctive seasons: dry season (April – November, usually clear sky up to 30°C, low humidity, little precipitation) and wet season (December – March, up to 35-40°C, tropical rain, wind, with high humidity). Broome is also subject to frequent tropical cyclones, which cause erratic rain, winds and significant damages to the area.

The area is known to be located in the Cape Leveque Coast Basin catchment. This is not classified as a drinking water source area per *Country Areas Water Supply Act 1947*. As there is no drainage in the area, runoff otherwise is then generally towards West to the Indian Ocean (Cardno, 2016). No surface water is located in the area.

3. Methodology and Progress

3.1. Desktop study

A desktop study was conducted to identify flora, fauna and vegetation within the proposed area.

- Site orthophotos (Nearmap).
- EPBC Act Protected Matters Report (DCCEEW, refer Appendix 7.1).
- DBCA Biodiversity Data Respiratory (“Dandjoo”).

- DBCA Request for Threatened and Priority Flora Database (refer Appendix 7.2).
- DBCA Request for Threatened and Priority Fauna Database.
- Atlas of Living Australia (ALA, n.d.).



Figure 1: Site orthophoto (Nearmap).

3.2. Initial site visit

The initial site visit was conducted by Long, Luke and Justin to peg the proposed area using GPS system (Emlid – set to GDA2020) and steel pickets, and conduct photographic records of the site, as part of a previous RFI by DWER. It can be confirmed that the proposed area has been pegged accurately to the submitted shapefile (.shp).

A quick assessment was carried out to identify vegetation, depth of excavation required to connect to the existing gravel pit, weed, erosion and sedimentation signs. A brief spotting of fauna was also organised to spot any trace, call sounds, footprints or scats, in which failed to spot any signs of fauna in the site.

The overall site vegetation was described to be “mostly woodland and bushes, some amount of jigal and wattle trees were presented”. There was no sign of weed spread, erosion or sedimentation signs.

3.3. Field survey

A formal vegetation survey on field was conducted by Alan and Lachlan for detailed, target survey to identify vegetation and flora in the area, as well as spotting out any fauna or TEC, with support from Long to organise surveyed data into GIS files with appropriate datum and coordination.

Traces of disturbance (bushfire, waterlogging, weeds, erosion, sedimentation, illegal dump, etc.) were also conducted to determine any impacts may have on vegetation.

Vegetation was assessed and categorised based on its conditions using Keighery & Trudgen guideline (Trudgen, 1988), ranging “Completely Degraded”, “Degraded”, “Poor”, “Good”, “Very Good”, “Excellent”, and “Pristine”.

Similar to the initial visit, only basic fauna assessment was carried out based on call sounds, footprints or scats trace, based on EPA Technical Guidelines.

3.3.1. *Sampling techniques and survey effort*

A single 50 x 50 m (0.25 ha) quadrat sampling (hereby will then be divided and marked as N, NE, E, SE, S, SW, W, NW due to its size) was carried out for a detailed/target survey, which fully incorporate the proposed area and also cover its margins. Two transect samplings were also carried out within the proposed clearing area, albeit this is overlapped with the quadrat, to support and verify data obtained from quadrat sampling. These sampling proposals were complied with EPA Guidelines (WA EPA, 2016).

James Price Point pit - Survey detail

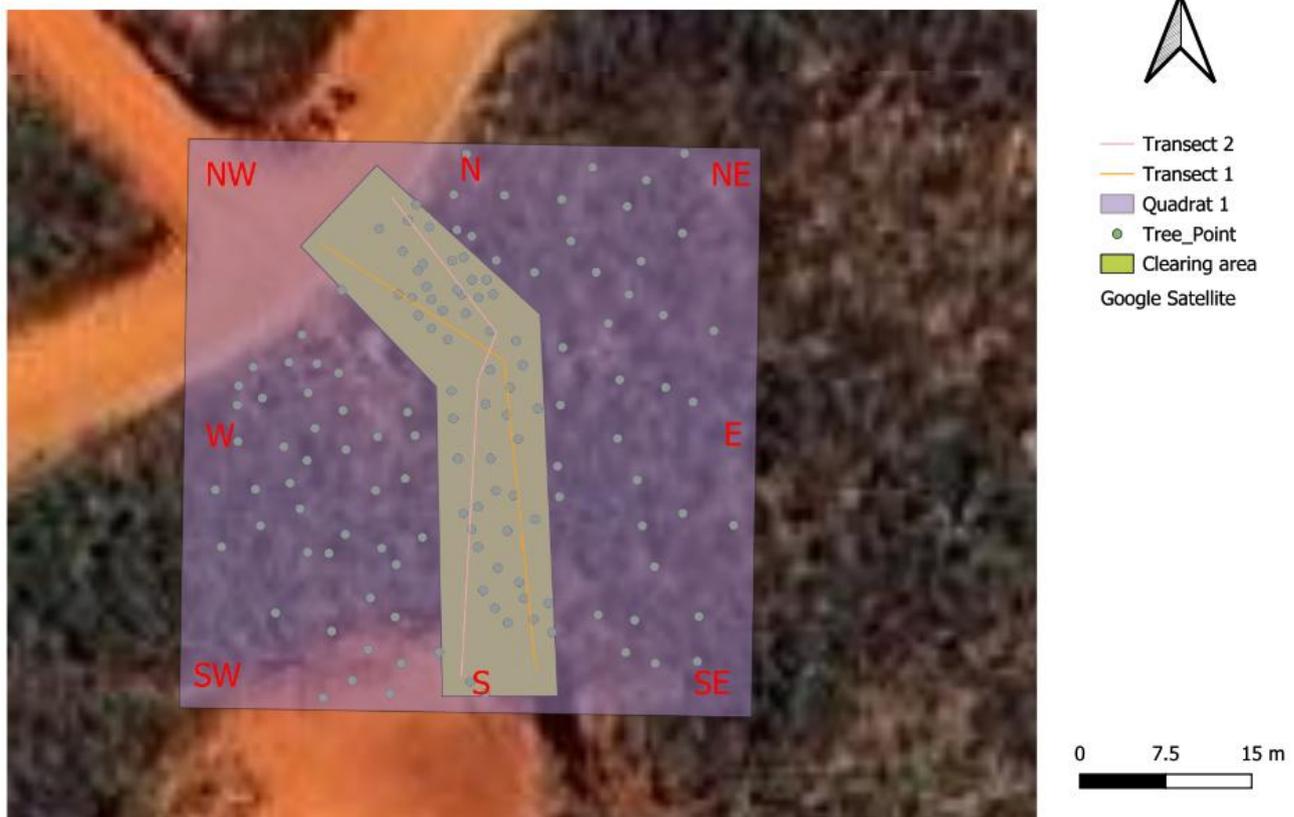


Figure 2: Survey area including one quadrat and two transects.

It is deemed appropriate to utilise the above sampling techniques for this survey due to the size of the area and potential existence or appearance of TEC namely Monsoon Vine Thicket in the area. While small, it is guaranteed that the accuracy still remains at a high level and best effort was undertaken during the survey.

The survey was conducted between 20 Oct and 28 Oct 2025. It is acknowledged that this timeframe was out of EPA Guidelines which recommends a wet season (Jan – Mar) timing (WA EPA, 2016). However, due to the urgent nature of request from DWER and other resource constraints within Shire, there was no other choice but to continue with the survey.

3.3.2. Limitation

The most significant limitation in this survey was that due to the timing of survey in Broome, identification of vegetation and flora was difficult. Contrary to EPA suggestion as above, current time is dry season, in which average precipitation in the area is 1.4 mm monthly, which is typically the lowest in annual precipitation. There has not been a single rainfall/precipitation in the whole Shire area from May to Oct (which is typical in the season) however there were still water droplets caused by fog, wind and high humidity. This caused the absence of flowers, fruit or seed pods of certain vegetation and flora. Fauna did not appear in the area as lack of fruit or pods as food source.

While there was no formal address or public notice of bushfire in the area, during field assessments, it was deemed that a bushfire might have been in the area or passed through at some points. This was revealed through signs of burnt leaves and vegetation. This is consistent with word-of-mouth from those who regularly travelled to the area in around early to mid Sep 2025. Such disturbance may accidentally destroy flora and vegetation, and fauna retreat from the area.

There are concerns on the experience, accuracy and competency of survey team. Both Alan and Lachlan hold relevant Diplomas and other qualifications in Horticulture with over 25 and 10 years of experience in surveying and preserving plants in the region, therefore, the concern is minimal, and it is deemed appropriate to lead this survey to ensure appropriate outcome. Long holds a Bachelor of Civil Engineering (Honours) and only provided background support, assessed geological aspects and transforming survey data to GIS.

4. Results and Discussion

The results are also reflected in the supplied GIS files, which are supported by GPS system and set to GDA2020.

4.1. Vegetation and flora

The following table represents the identified vegetation and flora in the area.

Table 1: Identified species within the surveyed area.

Family	Species	Common name	Habitat
Fabaceae	<i>Acacia colei</i>	Cole's wattle	Sand dune in arid
	<i>Acacia eriopoda</i>	Broome wattle	Sand dune in arid
	<i>Acacia hippuroides</i>	Hippuroid wattle	Coastal dune, pindan woodland
	<i>Acacia monticola</i>	Pilbara wattle	Rocky hills, sandy soil
	<i>Lysiphyllum cunninghamii</i>	Jigal tree	Sandy soil in open woodland
Sapindaceae	<i>Dodonaea lanceolata</i>	Hopbush	Rocky hills, open woodland
Malvaceae	<i>Gossypium australe</i>	Native cotton	Rocky hills in arid region
Boraginaceae	<i>Ehretia saligna</i>	Native willow	Open woodland, sandy soil
Euphorbiaceae	<i>Euphorbia mitchelliana</i>	Mitchell's spurge	Sandy soil, open woodland, grassland
Convolvulaceae	<i>Evolvulus alsinoides</i>	Morning glory	Open woodland in tropical region

	<i>Jaquemontia paniculata</i>	Cluster vine	Coastal dune in tropical region
Moraceae	<i>Ficus aculeata</i>	Sandpaper fig	Rocky hills
Proteaceae	<i>Hakea arborescens</i>	Hakea/Boomerang hakea	Open woodland, sandy soil
	<i>Hakea macrocarpa</i>	Desert hakea	Sandy soil in arid
Acanthaceae	<i>Distichostemon hispidulus</i>	Blue trumpet	Open woodland, sandy soil
Cucurbitaceae	<i>Momordicia balsamina</i>	Wild cucumber	Grassland in tropical region
Poaceae	<i>Panicum decompositum</i>	Australian millet	Grassland in arid region
	<i>Sorghum ecarinatum</i>	Wild sorghum	Open woodland
Asteraceae	<i>Pterocaulon sphacelatum</i>	Apple bush/Button grass	Open woodland in sandy soil
Santalaceae	<i>Santalum lanceolatum</i>	Desert quandong	Sandy soil in arid region
Solanaceae	<i>Solanum cunninghamii</i>	Shrubby nightshade	Rocky hills, open forest area
Rubiaceae	<i>Spermacoce auriculata</i>	Buttonweed	Grassland in tropical region
Combretaceae	<i>Terminalia cunninghamii</i>	Pindan walnut	Coastal dune
	<i>Terminalia ferdinandiana</i>	Kakadu plum	Open woodland
	<i>Terminalia petiolaris</i>	Marool plum	Sandy soil

Overall, 24 species were identified, with all vegetation and flora were of “Least Concern” and are commonly found in the vast Kimberley area, where tropical climate with arid/semi-arid characteristics and sandy soils presents.

The dominant vegetation besides general open woodland and common grass, in the area was found to be *Acacia eriopoda* (Pindan wattle). This is a common tree typically exists in Broome across undisturbed pindan area.

Santalum lanceolatum (Desert quandong) is the second common tree in the area. The species is commonly distributed in central Australia rather than in northwestern part of the country where arid climate exists.

It is also interesting that *Sorghum ecarinatum* are typically found near Manari Rd and road reserve while *Panicum decompositum* (Australian millet) are commonly found near the existing pit. It is unclear whether there is a certain distribution of vegetation, or this is of natural cause.

An overall rating condition based on area (as noted in Section 3.3.1) is assessed in Appendix 7.2.

4.2. Fauna, Threatened and Priority Fauna

Only basic fauna assessment was carried out based on call sounds, footprints or scats trace, based on EPA Technical Guidelines.

Review of dataset obtained from DBCA and DCCEEW, within 100 km radius of proposed site, there are 10 threatened and priority fauna in which has habitat in the vicinity of clearing, in which 7 are “likely to occur within area” and 3 are “known to occur within area”. There are also 23 other threatened and priority migratory fauna. Marine species have been filtered out as there is no possibility for them to live in this area.

Table 2: Threatened and Priority Fauna within 100 km radius.

Taxon/Species	Common name	Current status	Conser. status (*)	Habitat	Likelihood
<i>Aipysurus apraefrontalis</i>	Short-nosed Sea Snake	“Likely”	CR	Shallow coral reefs/water	Low
<i>Charadrius leschenaultii</i>	Greater Sand Plover	“Likely”	VU	Coastal mudflats	Low
<i>Falco hypoleucos</i>	Grey Falcon	“Likely”	VU	Arid and semi-arid inland, open <i>Acacia sp.</i>	Medium
<i>Limosa lapponica menzbieri</i>	Northern Siberian Bar-tailed Godwit	“Likely”	EN	Mudflats, mangrove	Low
<i>Macrotis lagotis</i>	Greater Bilby	“Known”	VU	Arid and semi-arid deserts, open <i>Acacia sp.</i>	High
<i>Phaethon rubricauda westralis</i>	Red-tailed Tropicbird	“Known”	EN	Tropical and subtropical marine islands	Low
<i>Rostratula australis</i>	Australian Painted Snipe	“Likely”	EN	Tropical and subtropical marine islands	Low
<i>Saccolaimus saccolaimus nudicluniatus</i>	Bare-rumped Sheath-tailed Bat	“Likely”	VU	Tropical open forests	Low
<i>Tiliqua scincoides intermedia</i>	Northern Blue-tongued Skink	“Known”	CR	Open woodland, grassland	High
<i>Trichosurus vulpecula arnhemensis</i>	Northern Brushtail Possum	“Likely”	VU	Woodland, monsoon forest	Low

(*) DBCA Conservation Category/Status. Number denotes Priority level. Letter denotes Threatened level.

Of all species, *Macrotis lagotis* and *Tiliqua scincoides intermedia*, typically appear in Pilbara and Kimberley regions, have the highest chances of being in the area, as there are *Acacia sp.* Vegetation with sandy soil. Semi-arid climate in area also makes it a suitable habitat. *Falco hypoleucos* also has relatively medium chances existing in the area as its habitat is similar to *Macrotis lagotis*, however, it tends to avoid coastal or forested areas.

Despite effort to target the above fauna, as well as observe other fauna in the area, the team failed to identify one. Some traces of footprint were spotted, however they were unclear as ground vegetation layer was thick and covered with various vegetation as identified above.

It is also thought that fauna may not present in the area due to a fire passed through at some points in Sep 2025, as mentioned. This caused fauna to migrate to other areas.

4.3. Threatened and Priority Flora (TF/PF)

The DBCA TF/PF request was made by the Shire for DBCA to supply TF and PF Database within 100 km radius of the proposed area. The following table represents the Database obtained from DBCA.

Table 3: DBCA Threatened and Priority Flora Database within 100 km radius.

Taxon/Species	Conser. status (*)	Likelihood	No. of occurrence	Habitat	Nearest location (**)
<i>Aphyllodium glossocarpum</i>	3	Low	3	Sand dune	22 km
<i>Fuirena incrassata</i>	3	Very Low	1	Swamp Shallow water	69 km
<i>Glycine pindanica</i>	3	Low	5	Pindan Acacia shrubland	31 km
<i>Gomphrena pusilla</i>	2	Very Low	1	Coastal dune	45 km
<i>Goodenia byrnesii</i>	3	Very Low	1	Open woodland	54 km
<i>Ipomoea tolmerana</i> <i>subsp. occidentalis</i>	1	Low	1	Pindan Open woodland	38 km
<i>Nymphoides beaglensis</i>	3	Low	5	Swamp Shallow water	73 km
<i>Pittosporum timorense</i>	4	High	1	Coastal dune	1.5 km

(*) DBCA Conservation Category/Status. Number denotes Priority level. Letter denotes Threatened level.

(**) Nearest location to the proposed area.

Review of supplied data, *Pittosporum timorense* (or *Pittosporum moluccanum*), commonly called the Atlas moth plant (as known for being a host for *Attacus atlas* – Atlas moth) is the closest and has good likelihood of located in the area. It also thought to be adequately surveyed and known based on conservation status (4 – Near Threaten). Therefore, much effort was undertaken to identify this species however other species were also searched to ensure coverage.



Figure 3: Examples of *Pittosporum timorense* flowers and fruits.

Pittosporum timorense is known for its small, fragrant flowers that appear in clusters, followed by woody, orange-brown, dehiscent capsules containing glossy black seeds.

Despite efforts to spot out TF and PF by the team, **none were found** in the area at the time of survey.

4.4. Threatened Ecological Community (TEC)

As supplied by DCCEE and DBCA, one TEC (Monsoon Vine Thickets on the coastal sand dunes of Dampier Peninsula) is pointed out and described as a type of rainforest and/or community consisting of various fruity trees and climber plants (vines) (Kenneally et al., 1996). It is assumed that this TEC may comprise approximately 15% (0.008 ha) of the proposed area, based on DBCA information.

DBCA (n.d.) specifically notes this TEC to be “common tree and tall shrub species include *Terminalia petiolaris* (marool or blackberry tree), *Grewia breviflora* (goolmi, currant or coffee fruit), *Celtis strychnoides* (goonj), *Diospyros humilis* (birimbiri or ebony wood), *Sersalisia sericea* (nangi), *Exocarpos latifolius* (broad-leaved cherry), *Mimusops elengi* (walara), *Lysiphyllum cunninghamii* (bauhinia or jigal tree), *Gyrocarpus americanus subsp. pachyphyllus* (helicopter tree), *Flueggea virosa subsp. melanthesoides* (dogwood), *Croton habrophyllus* and *Dodonaea platyptera* (broad-winged hop bush). The most common climbers are *Abrus precatorius* (crab’s eyes), *Capparis lasiantha* (bush caper), *Tinospora smilacina* (snake vine), *Jasminum didymum*, *Caesalpinia major* and *Vincetoxicum cinerascens* (oyster-catcher bill)”.

General visual spotting this TEC is to “look for dense, closed-canopy forests with a high diversity of plant species, particularly vines and lianas, growing on deep sandy soils often near coastal dunes or permanent water sources” (McKenzie et al., 1991). Thus, some key indicators include the presence of palms, the distinctive high humidity, and the specific plant genera associated with these habitats.



Figure 4: Examples of Monsoon Vine Thickets of Dampier Peninsula (DBCA).

Despite efforts to spot out Monsoon Vine Thickets by the team, **none were found** in the area at the time of survey.

4.5. Assessment of potential impacts of clearing based on DWER guidelines

An assessment was carried out against ten principles as listed in Schedule 5 of the *Environmental Protection Act 1986* (the Act) to ensure clearing proposal does not adversely affect the environment.

Table 4: Assessment of clearing proposal against EPA 1986.

Principles as per the Act: “Native vegetation should not be cleared if – ...”	Rationale
<i>(a) it comprises a high level of biodiversity</i>	Compliant. Despite 24 vegetation/flora species, they are commonly found in the Kimberley region, not just at the area. There are fauna species with EN and CR status however survey did not spot one.
<i>(b) it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna</i>	Compliant. No fauna found in the area.
<i>(c) it includes, or is necessary for the continued existence of, threatened flora</i>	Compliant. No threatened flora found in the area.
<i>(d) it comprises the whole or a part of, or is necessary for the maintenance of, a threatened ecological community</i>	Compliant. No TEC found in the area.
<i>(e) it is significant as a remnant of native vegetation in an area that has been extensively cleared</i>	Compliant. There are large areas adjacent to proposed area where uncleared vegetations exist.
<i>(f) it is growing in, or in association with, an environment associated with a watercourse or wetland</i>	Compliant. The area is not part of a wetland. Nearest significant wetland (Willie Creek) is approximately 15 km S of area.
<i>(g) the clearing of the vegetation is likely to cause appreciable land degradation</i>	Compliant. Soil may exhibit erosion behaviour however is unlikely to cause land degradation as clearing area is small and not widely exposed to winds. Also supported by past study (Schoknecht & Payne, 2011).
<i>(h) the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area</i>	Compliant. There is no adjacent or nearby conservation area. Nearest conservation area (Coulomb Point Natural Reserve) is at least 25 km N/NW of the proposed area.
<i>(i) the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water</i>	Compliant. No surface water recorded. Possible groundwater in vicinity. Confined aquifers are at least 80 m BGL, and they remain in main geological formation of the region which is highly unlikely to achieve.
<i>(j) the clearing of the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding</i>	Compliant. May rarely have flooding due to no extensive drainage however can be relieved as small area and per soil properties as noted in Section 2.2 and 2.3.

As stated and assessed, this clearing proposal would not be adversely environment, given its small area, low bio/ecological values and no historical issues surrounding environmental factors.

5. Conclusion

In general, 24 vegetation and flora species were identified within the area. All were of “Least Concern”. No fauna, TF & PF and TEC were spotted in the area. Therefore, an assessment against DWER clearing guidelines was performed and found the proposed clearing to be appropriate and would not heavily damage or deteriorate the environment.

6. References

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7. Appendices

7.1. Survey photographs and assessment

Quadrat 1 N



Figure 5: Quadrat 1 N.

Upper layer: *Ehretia saligna*, *Acacia eriopoda*, *Terminalia ferdinandiana*, *Terminalia cunninghamii*.

Middle layer: *Acacia colei*, *Hakea arborescens*, *Santalum lanceolatum*, *Acacia monticola*.

Ground layer: Common grass, *Solanum cunninghamii*, *Sorghum ecarinatum*.

Soil: Red sandy soil. Some brown sand potentially gravelly soil blow from Manari Rd.

Condition: Very Good – Excellent.

Quadrat 1 NE



Figure 6: Quadrat 1 NE.

Upper layer: *Hakea macrocarpa*, *Dodonaea lancelolata*, *Acacia eriopoda*,

Middle layer: *Ficus aculeata*, *Acacia colei*, *Acacia eriopoda*, *Santalum lanceolatum*.

Ground layer: Common grass, *Sorghum ecarinatum*, *Momordicia balsamina*.

Soil: Red sandy soil.

Condition: Good.

Quadrat 1 E

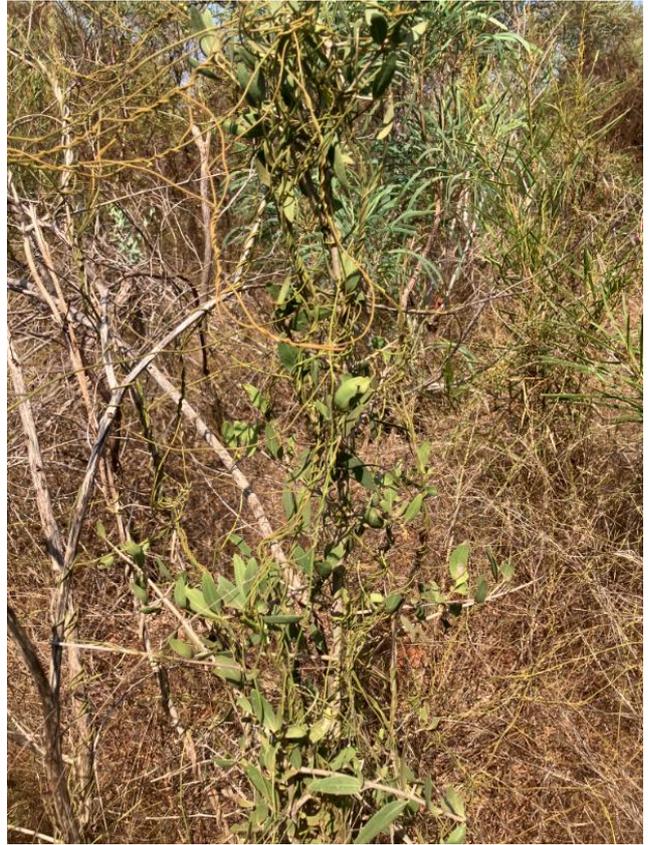


Figure 7: Quadrat 1 E.

Upper layer: *Acacia coleii*, *Terminalia cunninghamii*, *Hakea arborescens*

Middle layer: *Acacia coleii*, *Hakea macrocarpa*.

Ground layer: Common grass, *Sorghum ecarinatum*, *Dodonaea lanceolata*, *Gossypium australe*.

Soil: Red sandy soil.

Condition: Good

Quadrat 1 SE



Figure 8: Quadrat 1 SE.

Upper layer: *Acacia eriopoda*, *Lysiphyllum cunninghamii*.

Middle layer: *Panicum decompositum*.

Ground layer: Common grass, *Spermacoce auriculata*, *Panicum decompositum*, *Euphorbia mitchelliana*.

Soil: Red sandy soil.

Condition: Good.

Quadrat 1 S



Figure 9: Quadrat 1 S.

Upper layer: *Acacia colei*.

Middle layer: *Panicum decompositum*.

Ground layer: Common grass, *Panicum decompositum*, *Acacia eriopoda*.

Soil: Red sandy soil.

Condition: Poor.

Quadrat 1 SW



Figure 10: Quadrat 1 SW.

Upper layer: *Acacia coleii*.

Middle layer: *Panicum decompositum*.

Ground layer: Common grass, *Panicum decompositum*, *Euphorbia mitchelliana*, *Evolvulus alsinoides*.

Soil: Red, brown sandy soil.

Condition: Poor to Good.

Quadrat 1 W



Figure 11: Quadrat 1 W.

Upper layer: *Lysiphyllum cunninghamii*, *Acacia colei*.

Middle layer: *Terminalia ferdinandiana*.

Ground layer: Common grass, *Acacia hippuroides*, *Momordicia balsamina*.

Soil: Red sandy soil.

Condition: Good.

Quadrat 1 NW



Figure 12: Quadrat 1 NW.

Upper layer: *Lysiphyllum cunninghamii*, *Acacia colei*.

Middle layer: *Dodonaea lanceolata*, *Terminalia petiolaris*

Ground layer: Common grass, *Acacia hippuroides*.

Soil: Red sandy soil.

Condition: Good.

Transect 1



Figure 13: Transect 1.

Upper layer: *Santalum lanceolatum*, *Lysiphyllum cunninghamii*, *Hakea arborescens*.

Middle layer: *Acacia colei*, *Acacia eriopoda*, *Terminalia petiolaris*, *Distichostemon hispidulus*.

Ground layer: Common grass, *Sorghum ecarinatum*, *Dodonaea lanceolata*, *Jaquemontia paniculata*, *Acacia hippuroides*.

Soil: Brown sandy soil, sand dunes.

Condition: Very Good to Excellent.

Transect 2





Figure 14: Transect 2.

Upper layer: *Acacia colei*, *Santalum lanceolatum*.

Middle layer: *Ficus aculeatia*, *Santalum lanceolatum*, *Distichostemon hispidulus*.

Ground layer: Common grass, *Momordicia balsamina*, *Dodonaea lanceolata*, *Panicum decompositum*, *Acacia hippuroides*.

Soil: Red, deep sandy soil.

Condition: Poor to Good.