APPENDIX E

ECOLOGICAL REPORT – RESTRICTED DEVELOPMENT LANDS

Environmental Assessment

Bagot Road Central Precinct

Lot 5182 , Town of Darwin

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1 Introduction

PLANIT Consultants Pty Ltd (PLANIT) propose development the eastern portion of Lot 5182, Ludmilla in the Town of Darwin. This assessment specifically focuses on the Bagot Road Central Precinct (**Figure 1**).

The purpose of this Environmental Site Assessment is to review the proposed development area through a desktop appraisal and site inspection to determine the potential level of environmental liability that may be attached to the site, and also what management may be required during the planning, construction, and operational phases of the development.

Figure 1: Proposed Development Location

2 Methodology

To identify any existing, and potential constraints on developing the subject site we have conducted:

- Brief desktop searches of available environmental data
- Field visit for ground-truthing vegetation, weeds, and land units
- Report and mapping

Items included in the desktop search include:

- Climate Details (using the Darwin Airport Weather Station)
- Soil Types (NRETAS data request)
- Storm Surge (NRETAS maps)
- Acid Sulphate & Potential Acid Sulphate soils (NRETAS maps)
- Land Systems (NRETAS data request)
- Land Units (NRETAS data request)
- Vegetation Types (NRETAS maps)
- Remnant Vegetation (of the Darwin Municipality)

Data searches of government maps and reports were studied for the project site and ground truthed during a site visit on the 4th October 2011 by two environmental scientists from EcOz. The site visit involved:

- Basic Vegetation Mapping
- Searches for threatened species (EPBC Act and TPWC Act)
- Signs of Weeds
- Signs of Erosion
- Property conditions or activities which could potentially result in soil or groundwater contamination
- Any other notable disturbances (i.e. fire, feral animals, noise, etc)

3 Details of Site Investigation

3.1 Desktop Review

3.1.1 Climate

The subject site area experiences a tropical savannah climate with a distinct wet and dry season. The wet season brings monsoonal rain and during times of cyclones (including the lows before and after cyclones), the project area experiences significant rainfall events. These rainfall events can cause flooding which is determined by the volume, duration and spatial distribution of the rainfall. In contrast, the dry season experiences negligible rain.

Most of the rain falls during the wet season between November and April, while the dry season from May to October brings negligible rainfall. Darwin falls within the Hot Humid zone, with a mean maximum temperature of 32ºC and mean minimum temperature of 23.2ºC (**Figure 2**). The mean rainfall for Darwin is 1715 mm, with 93.5 days of rain, falling mainly within the wet season of November to April (**Figure 3**).

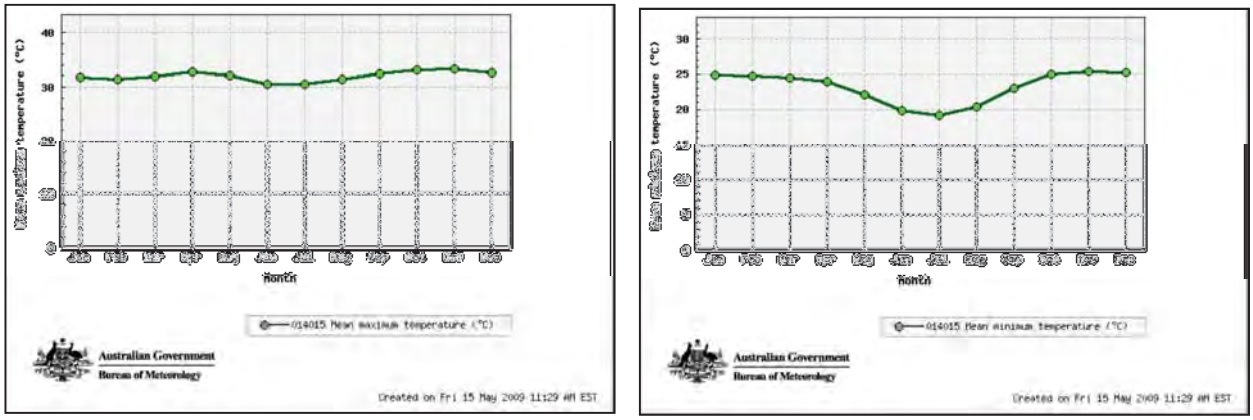


Figure 2: Darwin Airport Mean Maximum and Minimum Temperatures (source BOM 2011)

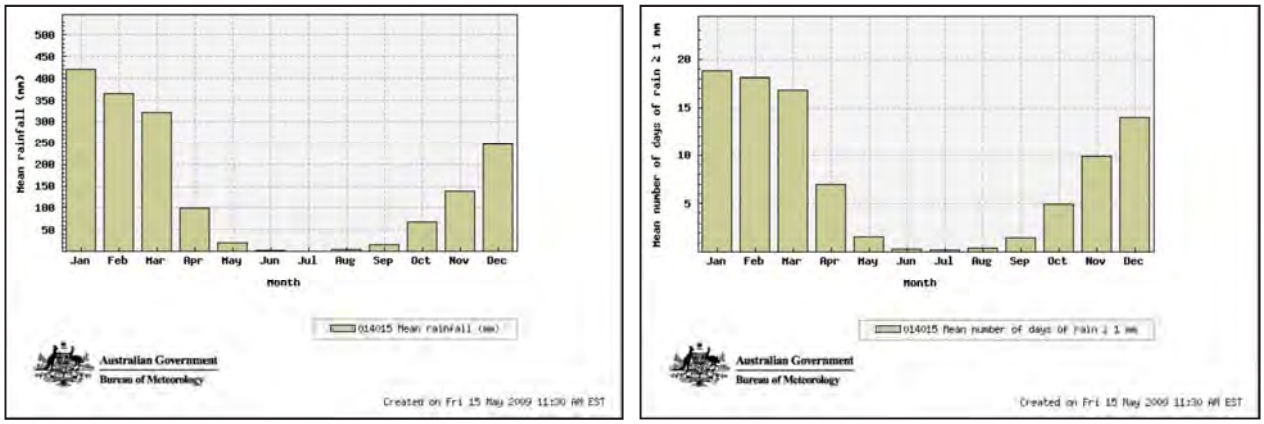


Figure 3: Darwin Airport Rainfall Statistics (source BOM 2011)

3.1.2 Storm Surge

The proposed development site is around 1 km from the high water mark of Beagle Gulf in the Arafura Sea, and is on a gentle slope (~1%) from east to west. The eastern portion of the site is subject to flooding due to primary and secondary storm surge events. **Figure 4** shows the storm surge extent that could be affected by Primary (one in a hundred year event) and Secondary Storm Surges (one in one thousand year event).

Figure 4: Darwin Primary and Secondary Storm Surge Levels

3.1.3 Acid Sulphate Soils

According to NRETAS Potential Acid Sulfate Soils (ASS) mapping (NT Atlas website) most of the central precinct is classified under the heading of '*No Known Occurrence of Acid Sulphate Soils'* **(Figure 5)**. A small section of the site is identified as a high risk ASS development. Therefore, as there is a chance that ASS may occur within the site, plans will need to be established to either determine that no ASS exists (i.e. on-ground sampling program) or construction design does not intersect ASS (i.e. no excavations of ASS layer). As much of the site is subject to seasonal waterlogging and is fairly close to the coastal mangrove line, there is a chance that ASS are more widespread that what is presented in **Figure 5**.

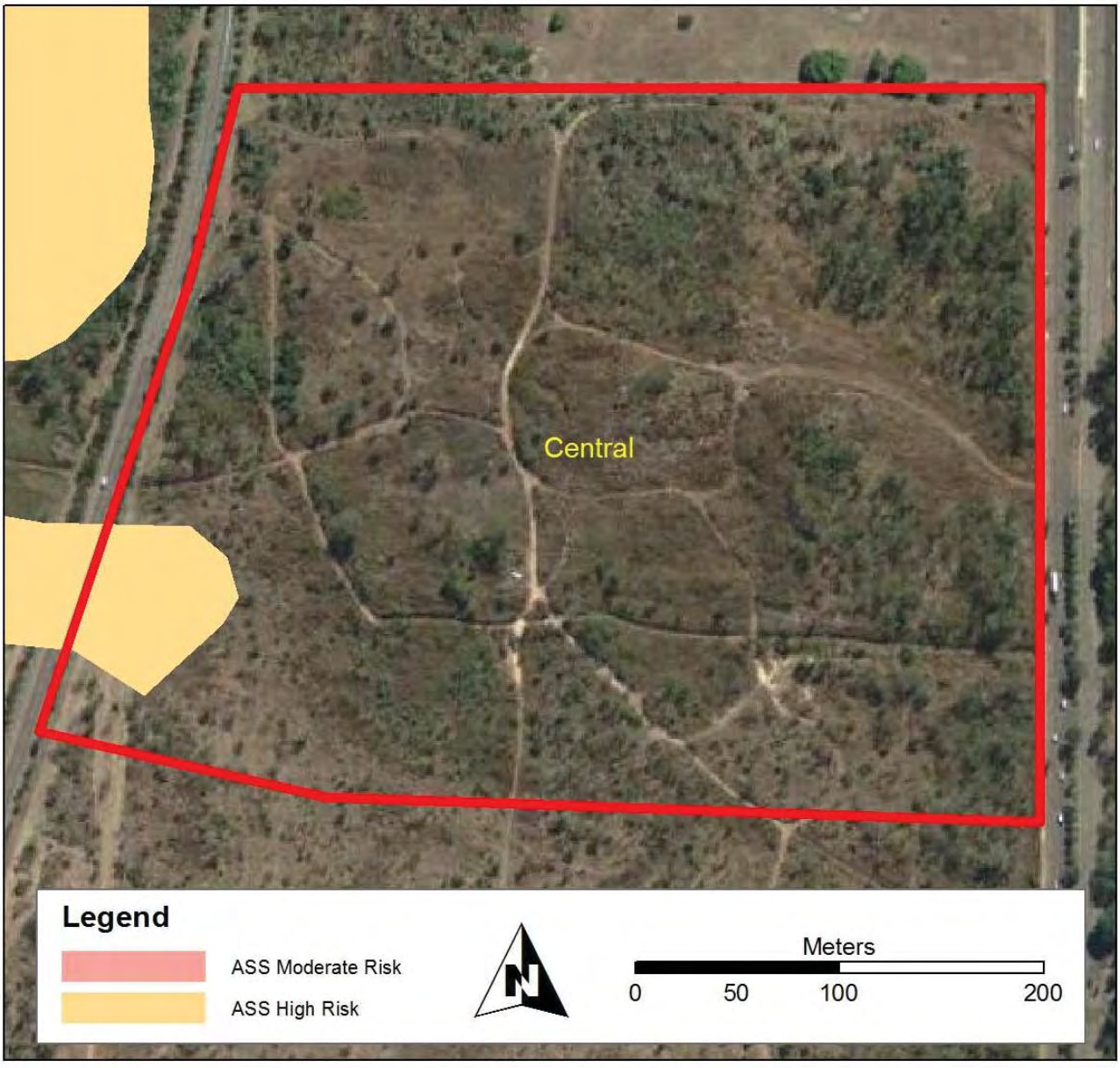


Figure 5: Acid Sulphate Soils and the subject site

3.1.4 Land Units

A land unit is a reasonably homogenous part of a land surface, distinct from surrounding terrain with consistent properties in landform, soil and vegetation (Fogarty *et al.* 1984).

According to NTG information maps, five land units occur within the subject site (**Figure 6**). Descriptions of these land units are provided in **Table 1** and reflect definitions provided by Fogarty *et al.* 1984, which was remapped by the NT Government in April 2007.

Of particular note, land units 4c, 6b, and 8c are prone to moderate to high levels of seasonal waterlogging (**Figure 7**). This was confirmed during the site visit, as the vegetation type observed is typical of waterlogged soils (i.e. Pandanus and Melaleuca communities). A seepage line has been estimated using aerial imagery and GIS filters, however this will need to be ground-truthed during future land capability assessments.

Table 1: Land Units of the proposed development site and surrounds

Land Unit	Heading	Description	Drainage / Waterlogging Potential	Land Capability Rating for subdivision
2b1	Undulating Rises and Side Slopes	Gentle sideslopes; gradient 2-5%; Brown Kandolsols, Open Woodland to Woodland of E. miniata, E. tetrodonta, C. foelscheana, E. tectifica over Sorghum spp	Well Drained, Nil to Low Level of Seasonal Soil Waterlogging	Moderately suited, limitations present
3b	Plains	Flat to gently undulating upland surface; Gradient 0.5 – 2.5%; Brown Kandosols; Woodland of E. miniata, E. tetrodonta over Sorghum spp.	Nil to Low Level of Seasonal Soil Waterlogging	Moderately suited, limitations present
4c	Gently Undulating Lower Slopes	Gentle lower slopes; gradient 0.5-1.5%; deep mottled grey lateritic earths; Kandosolic Redoxic Hydrosols; Open Forest of Eucalyptus spp. over mixed grasses; wet season watertable	Moderate to High Level of Seasonal Soil Waterlogging, often dry season seepage	Low – moderate capability for urban subdivision with few limitations
6b	Broad lowland plains	Gradient < 1.5%; shallow to moderately deep siliceous sands; Tenosolic Redoxic Hydrosols; Tall Shrubland to Low Open Woodland of Grevillea spp., Melaleuca spp., Lophostemon lactifluus over annual Sorghum sp., Heteropogon triticeus	Slow; subject to wet season inundation; Severe Level of Seasonal Soil Waterlogging or Inundation for Extended Periods	Low for urban subdivision due to site drainage, soil drainage, debil debil surface.
8c	Swamps and Floodways	Freshwater lagoons, billabongs and seasonal fringes; Hydrosols; Sedgeland, Herbland and open water.	Perennially flooded, extent is seasonally dependent; Severe Level of Seasonal Soil Waterlogging or Inundation for Extended Periods	Low for urban subdivision due to site drainage

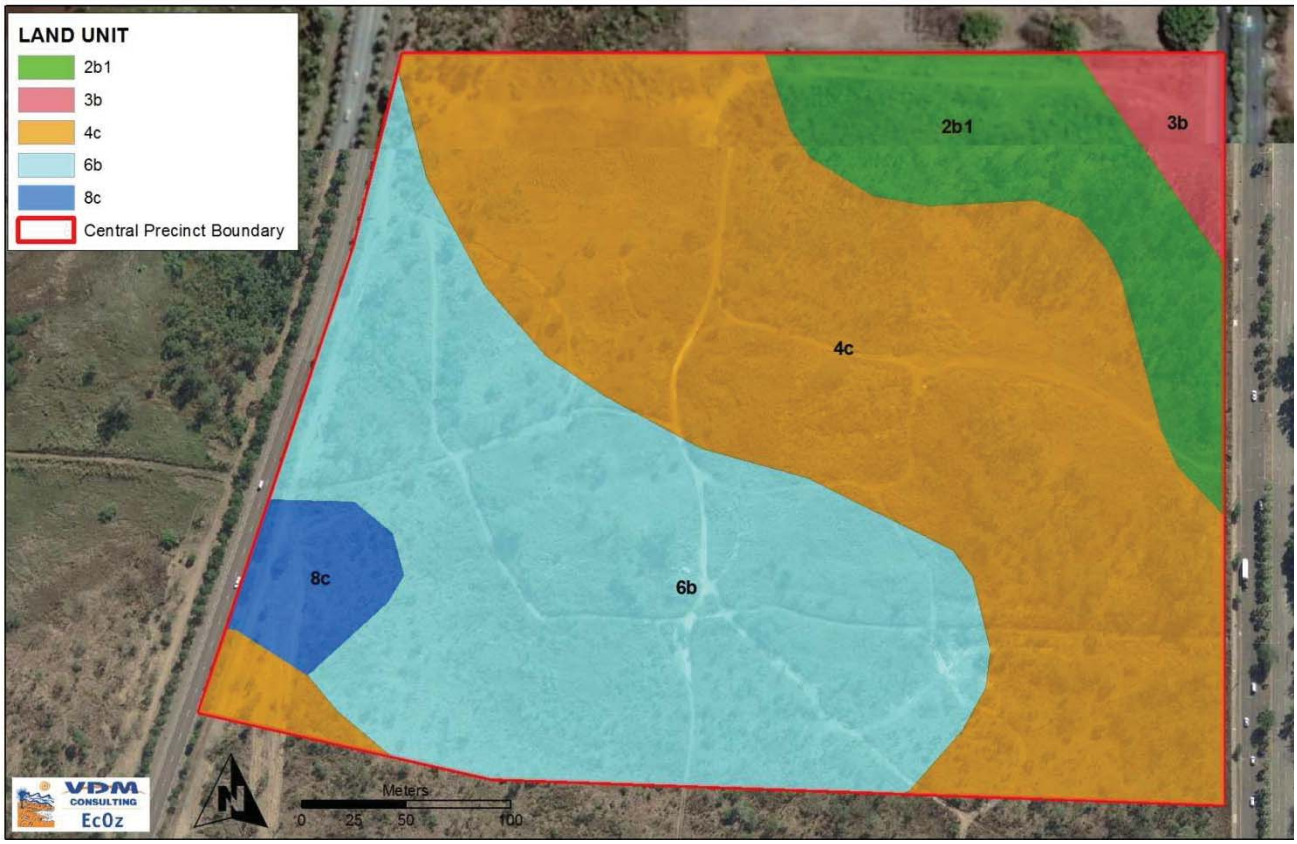


Figure 6: Land Units within the proposed development area

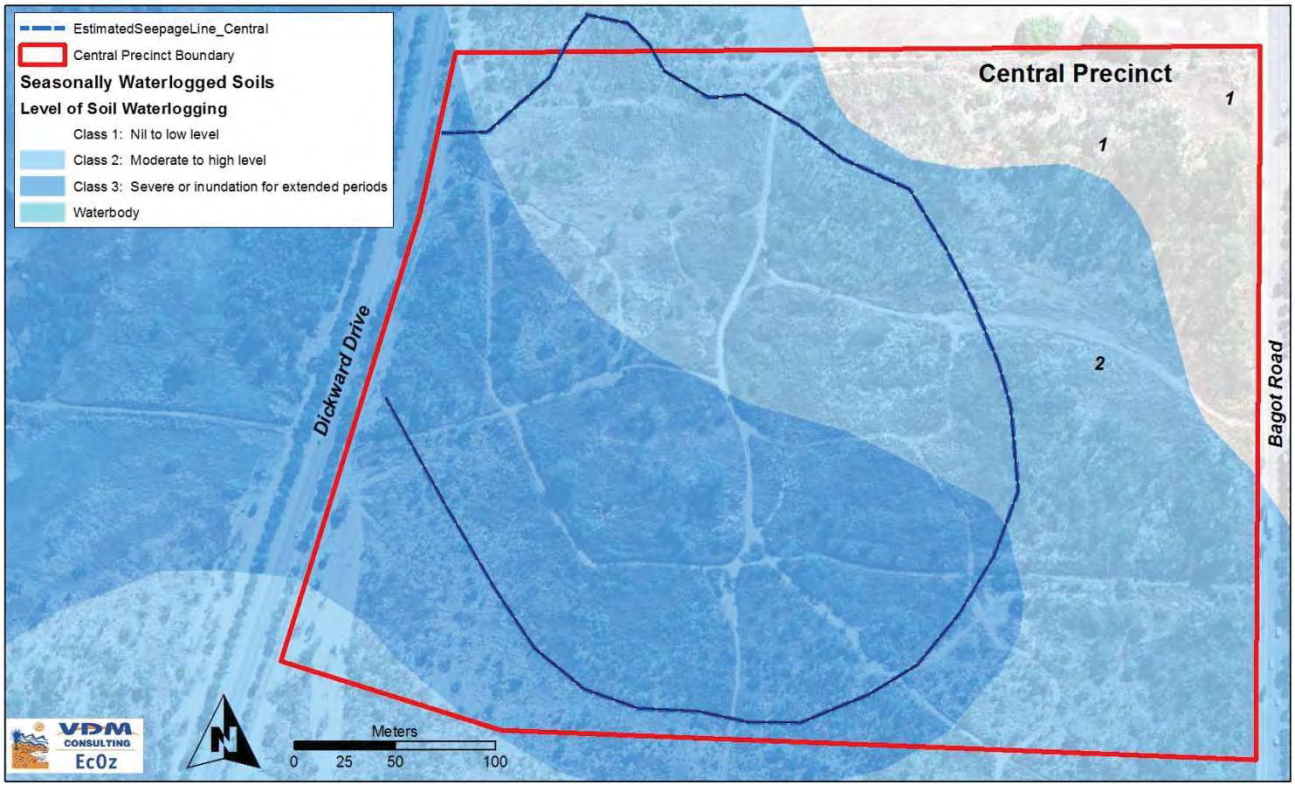


Figure 7: Waterlogged Soils the proposed development area

3.1.5 Vegetation

Remnant Vegetation mapping of the Darwin Municipality suggests there are four different vegetation types on the subject site, shown in **Figure 8** and described in **Table 2**.

Table 2: Remnant Vegetation Types on the Proposed Development Site

Remnant Veg type	Community	Description
15	Eucalypt Community	*Eucalyptus tetrodonta, E. miniata* woodland with mixed species mid stratum and grassland understorey
21	Pandanus Community	*Pandanus spiralis* low open woodland to very low open woodland with *Lophostemon lactifluuis* and *Grevillea pteridifolia*. Ground layer dominated by mixed species grasses grasses and sedges.
22	Mixed Species, Woodland to Shrubland	*Eucalyptus clavigera, E. polycarpa, E. tectifica* mixed species low woodland to very open low woodland. Understorey mixed species shrubs and grasses
36	Introduced Species	*Pennisetum polystachion* closed grassland with *Pennisetum pedicillatum*. Other species include *Andropogon gayanus*, *Aeschynomene americans*, and vines *Calopogonium mucunoides* and *Centrosema pubescens*.

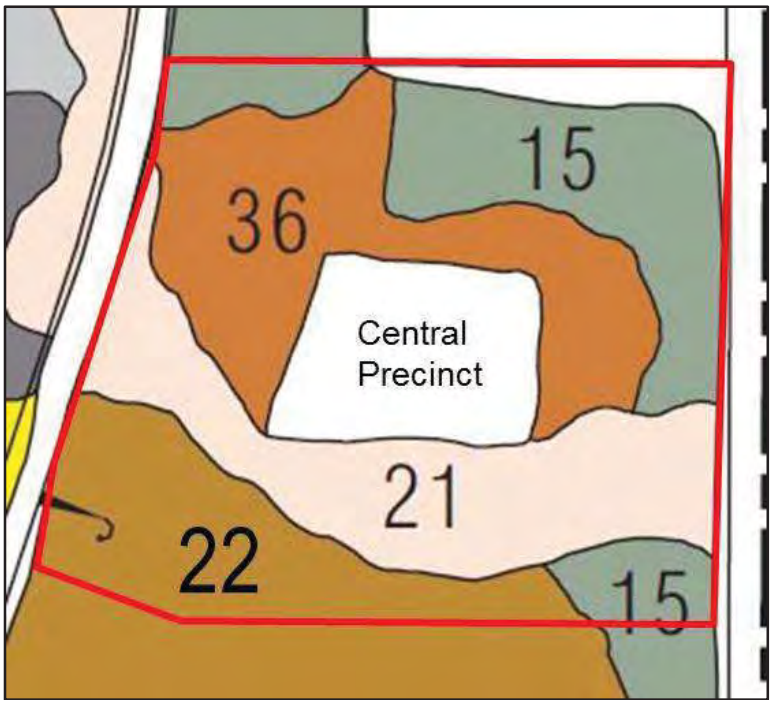


Figure 8: Remnant Vegetation Types within the proposed development area

3.1.6 Weeds: Infonet

The InfoNet search highlighted that 73 weed species have been recorded in the general region of the potential development site. These are listed in the NT NRM Snapshot **(Appendix A).**

3.2 Site Inspection

The subject site was visited by two EcOz Environmental Scientists on Tuesday 4th October 2011. An attempt was made to visit the site on the 3rd of October 2011; however this was cancelled due to a wild Gamba Grass fire (see photos in weed section 3.2.4). The fire burnt several hectares of vegetation and had flames that reached the tree canopy (about 5 to 6 m in height). The fire was successfully controlled by the fire brigade without damage to property or harm to people.

3.2.1 Disturbances

The site visit confirmed that the land and vegetation within the central precinct is highly disturbed. The main disturbances observed were:

- Extensive weed infestations (discussed in **Section 3.2.4**)
- Dumped waste which could potentially have resulted in soil or water contamination at the site:
  - Several cars have dumped near the tracks that run through the site
  - Refrigerators, washing machines and other household appliances
  - Soil piles and building materials
  - 44 Gallon Drums
  - General Waste
- Fire and fire risk. The high density of Gamba Grass within the subject site has increased the fire risk to the site, which will be a risk to future developments to the north and south.
- Soil erosion along existing tracks. This confirms that exposed soils within the site are prone to erosion and sedimentation, and will therefore require controls during the construction phase.
- Noise created by Darwin Airport and the main thoroughfares linking Darwin and the northern suburbs including, Nightcliff, Rapid Creek and Casuarina (Dick Ward Drive and Bagot Road).

The site has been subject to major earthwork in the past (observed soil piles and young vegetation recruitment). There is a chance that it may have been used for Cyclone Tracy dumps and even potentially post war dumps (which may contain materials such as asbestos, car batteries, paints, hydrocarbons, acids etc). Therefore, we recommend that Planit think about commissioning a Site Contamination Assessment (Phase 1 Audit) to confirm the full liability of the site.

Selected photos of surface rubbish, erosion, and fire are included below in **Figures 9, 10,** and **11**.

Figure 9: Surface Rubbish

Figure 10: Examples of erosion within the site

Figure 11: Recent fire activity (Gamba Grass fire that occur the day prior to the site visit)

3.2.2 Vegetation Assessment

The field assessment noted three main communities:

1) Eucalyptus Communities
    a. *Eucalyptus tetrodonta* Woodland/Forest
    b. *Corymbia polycarpa* Woodland
    c. Mixed Species Woodland
    d. Mixed Species Open Woodland
2) Pandanus Communities
    a. *Pandanus spiralis* Woodland
    b. *Pandanus spiralis* and *Melaleuca* sp. Open Woodland
3) Introduced Grassland
    a. Gamba Grass tall grassland (with scattered to isolated *Melaleuca argentania*)

The vegetation types were approximately mapped, which is provided in **Figure 12**. Photos and brief description of each vegetation type within the proposed development are presented in **Table 3**.

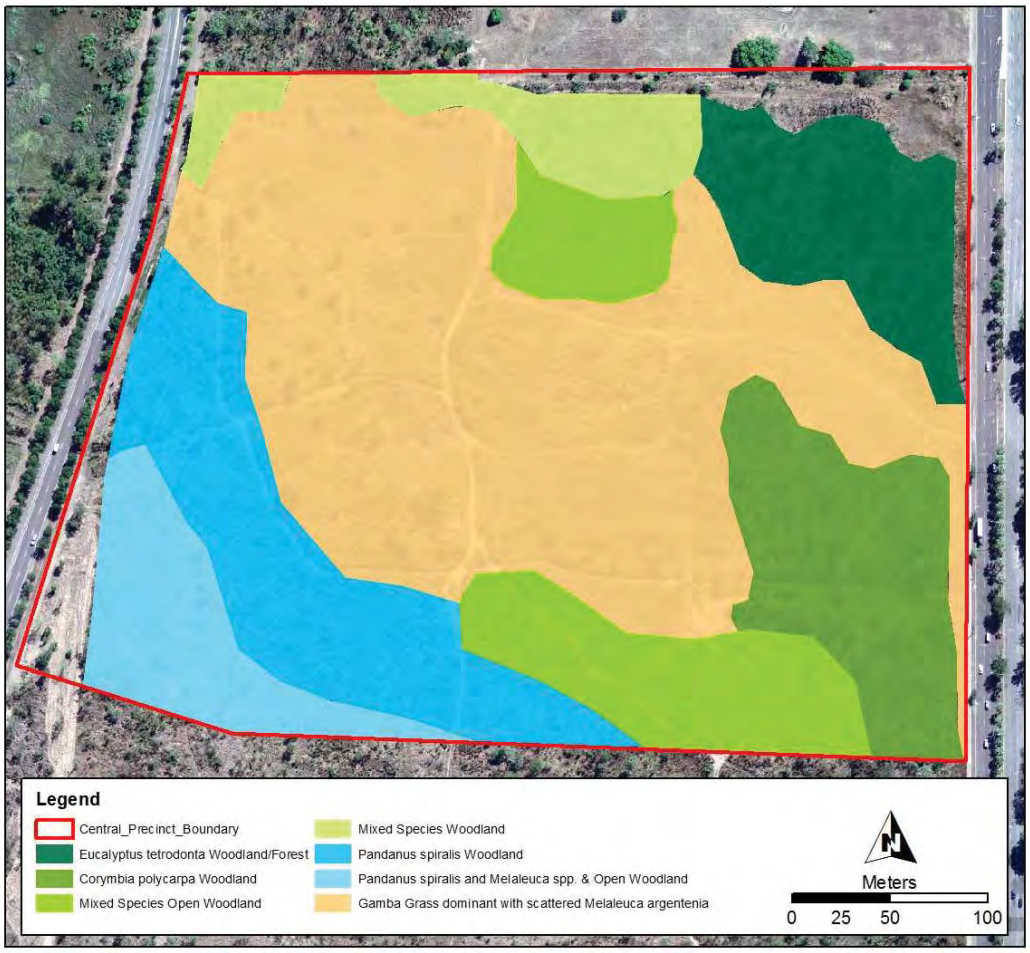


Figure 12 Field verified vegetation map

Table 3 Vegetation Communities within the Central Precinct

	Community	Description	Photo
	***Eucalyptus tetrodonta* Woodland to Forest**		
EUCALYPTUS COMMUNITY		Upper storey dominated by *Eucalyptus tetrodonta,* with scattered Milkwood trees. Mid storey includes *Persoonia falcata, E. tetrodonta, Livistonia humilis, Acacia lamprocarpa, Buchanania obovata*, *Pandanus spiralis, Lophostemon lactifluuis, Cycas armstrongii*. Lower Sratum is dominated by *Andropogon gayanus (*Gamba grass), several native grasses, and *Smilax australis*. Good habitat, with many large Cycads worthy of translocation. Signs of Northern Brown Bandicoot.	
	***Corymbia polycarpa* Woodland**		
EUCALYPTUS COMMUNITY		Dominant upper story is *Corymbia polycarpa.* Mid storey of *Pandanus spiralis, Terminalia ferdinandiana, Lophostomen lactifluuis, Livistonia humilis, Grevillea pteridifolia, Acacia lamprocarpa, Melaleuca nervosa, Petalostigma pubescens, Coffee Bush.* Lower Stratum dominated by *Andropogan gayanus* (Gamba grass), with scattered *Cymbopogan* spp.	
	Mixed Species Open Woodland		
EUCALYPTUS COMMUNITY		Upper stratum is supports fire stressed *Eucalyptus tetrodonta*, *Corymbia polycarpa*. Mid stratum supports *Pandanus spiralis, Cycas armstrongii, Buchanania obovata, Gardenis megasperma, Ficus spp, Syzygium eucalyptoides, Acacia lamprocarpa, Livistona humilis, Melaleuca nervosa* Lower strata is dominated by Gamba Grass.	

	Community	Description	Photo
	Mixed Species Low Open Woodland		
EUCALYPTUS COMMUNITY		Upper stratum is scattered *Corymbia polycarpa* and *Eucalyptus alba* Mid stratum supports *Pandanus spiralis, Cycas armstrongii, Buchanania obovata, Gardenis megasperma, Ficus spp, Syzygium euc. eucalyptoides, Acacia lamprocarpa, Livistona humilis, Melaleuca nervosa* Lower strata is dominated by Gamba Grass.	
	Open Melaleuca and Pandanus Low Woodland		
PANDANUS COMMUNITY		No Upper Stratum Mid stratum mainly includes *Melaleuca spp* and *Pandanus spiralis* with scattered woodland species. Lower stratum is dominated by Gamba grass.	
	***Pandanus spiralis* low open woodland**		
PANDANUS COMMUNITY		Upper stratum includes scattered *Eucalyptus* spp. Mid stratum is dominated by *Pandanus spiralis* Lower stratum is expected to be dominated by Gamba Grass (however burnt at the time of survey).	

	Community	Description	Photo
	Gamba Grass Dominant with isolated *Melaleuca* spp.		
	Upper stratum is very sparse with scattered *Melaleuca argentania, Eucalyptus camaldulensis*.. Mid stratum was fairly non-existent, but some areas supported *Pandanus spiralis* Lower stratum (dominant stratum) was totally dominated by Gamba Grass (however burnt at the time of survey). Other introduced species were identified, however these were often associated with swampy depressions (species listed in weed section).		

Table 4: Threatened species that may be present in the region

Group	Common Name	Scientific Name	NT Status	National Status
Cycads	Armstrong`s Cycad	*Cycas armstrongii*	VU	.
Insects	Atlas Moth	*Attacus wardi*	EN	
Reptiles	Mertens` Water Monitor	*Varanus mertensi*	VU	
	Yellow-spotted Monitor	*Varanus panoptes*	VU	
Birds	Emu	*Dromaius novaehollandiae*	VU	
	Red Goshawk	*Erythrotriorchis radiatus*	VU	VU
	Australian Bustard	*Ardeotis australis*	VU	
	Australian Painted Snipe	*Rostratula australis*	VU	VU
	Masked Owl	*Tyto novaehollandiae*	EN/VU	EN/VU
	Masked Owl (northern mainland)	*Tyto novaehollandiae kimberli*	VU	VU
	Gouldian Finch	*Erythrura gouldiae*	EN	EN
Mammals	Northern Quoll	*Dasyurus hallucatus*	CR	EN
	Northern Brush-tailed Phascogale	*Phascogale pirata*	VU	
	Bare-rumped Sheath-tailed Bat	*Saccolaimus saccolaimus*		CR

CR = Critically Endangered EN = Endangered VU = Vulnerable DD = Data deficient

3.2.3 Threatened Species

An NT INFONET NRM Snapshot for the area around the subject site **(Appendix A)** shows 22 species that are classed as either Vulnerable or Endangered by the Northern Territory or Commonwealth Governments. Eight of those species are marine based species, and will therefore not occur on the site and have been omitted from our table (**Table 4**). The majority of these listed species are unlikely to reside or utilise existing habitat within the subject site due to different habitat requirements, and/or current disturbances within and adjacent to the vegetation communities.

At the subject site **Armstrong's Cycad (*Cycas armstrongii*)**, listed as Vulnerable under the NT *TPWC Act,* and was the only threatened species identified at the site (**Figure 13**). There were many old specimens that exceeded 100cm, and were multi-stemmed, which are sought after landscaping plants. The cycad density was reasonably high within the Eucalyptus woodland communities (with the exception of the *Corymbia polycarpa* woodland which did not support any cycads), with an estimated number of 200 individuals over 100cm tall. Many cycads within the site had thick trunks (i.e. over 100mm), which suggests that *Cycas armstrongii* has hybridized with *Cycas maconochiei* (not threatened under the TPWC Act). Nonetheless, hybrids of *C. armstrongii* are still a protected species which should be salvaged during land clearing operations.

Liddle (2009) states that there is concern about the sustainable management of NT cycads due to land clearance and fire regimes as they grow so slowly, and little is known about their ecology. Under the management plan (Liddle, 2009) cycads likely to be destroyed by legitimate development should be salvaged using a clearing permit.

Figure 13: *Cycas armstrongii* (potentially hybridized with *C. maconochiei*) at the subject site

The Darwin Coastal Bioregion Conservation Values and Environmental Resources map shows that two other vulnerable species, the **Red Goshawk *(Erythrotriorchis radiatus*)** and the **Northern Quoll (*Dasyurus hallucatus*)** are known to exist in the vicinity of the subject site. The Northern Quoll's preferred habitat consists of rocky escarpment associated with open forest and/or open woodland, which is not supported within the subject site. The Red Goshawk favours coastal and sub coastal tall open forests and woodlands and the edges of rainforest, which does not occur within the subject site. Northern Quolls and Red Goshawks have not been identified in the general areas for many years, despite intensive survey effort by local enthusiasts.

3.2.4 Weed Species

The subject site is highly infested with weeds, which will impact on vegetation clearing and removal plans for the construction phase of the project. It is likely that NRETAS will require a detailed weed management plan for the project to give them confidence that weeds will not spread due to the projects acceptance. We envisage that this could form part of a Construction Environmental Management Plan (CEMP) for the project (which would several other environmental risk topics such as erosion and sediment control, fire, waste, noise etc).

The following weed species were identified on site during the brief site visit in October 2011:

Listed Weeds (discussed further below)

- Mimosa (*Mimosa pigra)* A/C and WONS
- Gamba Grass (*Andropogon gayanus*) B/C
- Perennial Mission Grass (*Pennisetum polystachion*) B/C

Environmental Weeds (not discussed)

- Annual Mission (*Pennisetum pedicellatum)*
- Cooch Grass (*Cynodon dactylon*)
- Sabi Grass (*Urochloa mosambicensis*)
- Tully Grass (*Urochloa humidicola*)
- Centro (*Centrosema molle*)
- Coffee Bush (*Leucaena leucocephala*)
- Wild passion Fruit (*Passiflora foetida*)

Figure 14: Weed Patch within the site (adjacent to Dickward Drive)

Mimosa (*Mimosa pigra*) has been declared a Weed of National Significance (WoNS), and is listed as Class B and C weed for the Darwin region under the *Weeds Management Act (NT)*. Mimosa was found in several locations within the site, and these areas had many new seedlings beginning to establish. Its current distribution is very low at the site; however it must be managed and not spread as a result of any proposed earthworks or development at the site.

Mimosa is a thorny shrub, native to South America, which was introduced to Australia in the 1800s. It can grow in dense stands up to 6m high with little understorey, and one mature plant can produce up to 200,000 seeds per year.

Both the Commonwealth and Northern Territory Governments have released management plans for the control of Mimosa. The 'Mimosa pigra National Best Practice Management Manual' was released by the Commonwealth Government in 2009 and can be found at the following website address:

http://www.nt.gov.au/nreta/natres/weeds/find/mimosa/pdf/introduction.pdf

The NT Government's Weed Management Plan for Mimosa (*Mimosa pigra)* 2010 can be found here:

http://www.nt.gov.au/nreta/natres/weeds/find/mimosa/pdf/mimosa_mgnt_plan_final_oct10.pdf

Figure 15: Mimosa (*Mimosa pigra*) at the subject site

Gamba grass is declared as a Class B and a Class C weed for the Darwin region, under the *Weeds Management Act (NT).* It is widespread across the central precinct and totally dominates the lower stratum in all vegetation communities at the site, and produces a very high fire fuel load (see right picture in **Figure 16**). A fire that occurred on the 3rd October 2011 burnt a few hectares of bush before fire fighters were able to gain control. The high amount of Gamba at the site means that vegetation clearing and potential removal from the site will need to be discussed and approved by the NT Weeds Branch of NRETAS.

Gamba Grass is a tall (2-3m) African perennial grass introduced into Australia as a pasture crop. It has since been shown to be a highly invasive weed species that can severely impact the landscapes of the NT (NRETAS 2010). As a Class B weed, the growth and spread of Gamba grass is to be controlled in the area, and as a Class C weed it should not be introduced to any are of the NT (NRETAS 2010).

Gamba grass is a major fire risk. The fuel load of the weed is typically 4 – 7 times greater than native grasses. Gamba grass can burn up to 25 times hotter, and much higher than native grasses (NALM, 2009). This can put mid, and upper storey trees at risk of death by fire which reduces tree canopy cover (Setterfield, *et. al* 2005). Gamba grass will also colonise bare ground quicker than native species after fire has disturbed an area.

Gamba grass is a very invasive weed. Unlike many weed species Gamba grass can establish itself in undisturbed ecosystems, but is also a very effective disturbed area colonizer which will out-compete native species (Setterfield and Douglas, 2007). As of 2010, it was estimated to cover an area of 10-15,000km^2 within a 350km range of Darwin (NRETAS 2010).

The Northern Territory Government released a management plan document for Gamba grass in 2010. The Weed Management Plan for *Andropogon gayanus* (Gamba Grass) sets out best practice techniques to manage the weed in the Northern Territory. All landholders are ***required*** to meet the management objectives outlined in the plan, which can be found at the following address on the NT government's website: http://www.nt.gov.au/nreta/natres/weeds/find/gamba/pdf/FINAL_WMP_GAMBA_GRASS.pdf .

Figure 16: Gamba Grass fire on the 3rd Oct 2011 (left), and its fuel load at the subject site

Perennial Mission Grass is also declared as a Class B and a Class C weed under the *Weeds Management Act (NT)*, which should not be introduced to anywhere new in the NT, and its current spread should be controlled. It is a native African grass that can grow up to 3m tall, which was introduced into Australia as a pasture species, and has spread across the Top End (GreeningNT 2010).

The subject area does not have high levels of Mission Grass (image below is not from subject site), as the species was only identified in a weed patch on the eastern boundary.

Mission Grass is a large fire risk in the NT. It remains green until late in the dry season and has a fuel load 3-5 times greater than the native grasses it outcompetes (GreeningNT 2010). These factors can cause very hot fires late in the dry season. The species is encouraged by repeated burning, allowing the grass to outcompete native grass species (GreeningNT 2010).

Mission Grass is a highly invasive weed. It creates large quantities of seed which can be dispersed by wind, and on animals and vehicles. The species can colonise disturbed, or undisturbed areas, and it can become a risk to the Vulnerable species *Cycas spp.* and endemic shrubs such as *Helicteres spp.*

The Northern Territory Government have produced a fact sheet for Perennial Mission Grass , which details different methods to control the weed species and prevent its spread. This can be found at http://www.nt.gov.au/nreta/natres/weeds/find/pdf/weed_notes_mission_grass_per_mar10.pdf

Source: WeedsNT, 2007.

Figure 17: Mission Grass (this photo was not taken within the subject site)

4 Environmental Constraints

4.1 Weeds

Best practice weed management will be required during the vegetation clearing and construction phase of the development as three declared weeds occur within the site (with Gamba Grass being prolific). We envisage that a weed management plan be incorporated into a Construction Environmental Management Plan prior as part of the development consent approvals. Ideally, the Weeds Branch of the NTG should be contacted in early stages to agree on vegetation removal techniques and an appropriate transport and disposal area. The top soil will be highly infested with weed seed, and they may require that all vegetation and soil material is kept onsite. It should also be clearly stipulated that all vehicles and machinery that come into contact with vegetation and soil should be washed down prior to leaving the site to ensure that chance of weed spread is minimised. The positive of developing this land is that it will no longer be a weed source area for surrounding properties.

4.2 Fire

The site currently carries a very high fuel load as a result of the Gamba Grass infestation across the site. Therefore, if Planit choose to develop portions of the site they will need to present a fire management plan in order to ensure that proposed infrastructure is not threatened by hot Gamba Grass fires. As like weeds, a positive for developing this site will reduce the fire threat in the local area. Dry season fires that occur at the site are often aggressive that can form extensive smoke clouds in a short time period which attract birds of prey (mainly Black Kites and Whistling Kites) which are potential bird strike species for Darwin International Airport. Therefore, developing this site will result in increased fire management and therefore help reduce the chance of bird strike for the airport.

4.3 Threatened Species

Armstrong's cycad (*Cycas armstrongii)* was the only threatened species likely to be impacted by the proposed development. It was found in relatively high numbers within the woodland communities at the subject. This species is listed as vulnerable under the TPWC Act. The NT government has produced a cycad management program to provide for the use of these cycads which would otherwise be destroyed through clearing associated with development. Therefore, we suggest that Planit implement a Cycad Salvaging Program prior to land clearing, with a target of salvaging as many cycads as possible (try for <100 within the central zone). EcOz can help liaise with local sub-contractors and NT Parks and Wildlife staff to approve translocation of the cycads.

There are no other species or vegetation communities of conservation significance within the subject area.

4.4 Waterlogged Soils

Seasonal waterlogged soils are a major constraint for the proposed development within the central precinct. It is likely that areas regarded as being highly waterlogged (about 50% of the central precinct) will be deemed "out-of-bounds" for development (by NRETAS). Therefore to gain development approval, Planit will need to produce detailedengineering plans and solutions for building within these areas.

The main soil type within the site is hydrosols, which are a group of soils that are prone to moderate to high level of seasonal waterlogging. The site is known to flood out during the wet season, and is inaccessible for several months after the wet season. The land use and land unit mapping suggest that the site has low to moderate suitability for urban subdivision with limitations due to drainage, a high seasonal water table, and a hard setting surface. In order to gain development approval the developer will need to be prepared to adopt

appropriate engineering and drainage to make this area suitable for the proposed development for the above issues. Furthermore, half of the central precinct falls within the Primary and Secondary Darwin Storm Surge zone.

4.5 Acid Sulphate Soils

The potential for ASS within the waterlogged zones of the central precinct may justify further investigation in case excavations etc expose ASS. If ASS are discovered, management recommendations can be made to mitigate impact on receiving environs.

4.6 Soil Erosion & Sedimentation

Soils within the site (mainly hydrosols and kandolsols) have a low to moderate level of erodability, which is confirmed by evidence of gully erosion on existing tracks within the site (see photos in **Figure 10**). Land clearing and construction activities within the site will expose the soils which will lead to erosion or sedimentation if they are not managed appropriately. EcOz recommend that Planit aim to get their construction sub-contractor/engineer to produce an Erosion and Sediment Control Plan (ESCP). This will be a requirement from NRETAS (Soil Conservation Unit) during the development approval process.

4.7 Onsite Waste

The site has been used as a general dumping ground for building materials, old cars, and household appliances. The building materials should be investigated for asbestos and, if required, safely removed before further development. There is also a chance that the site was used for Cyclone Tracey dumps or even historical dumps from WWII. EcOz that Planit look into investigating the possibility of conducting a Phase 1 Contamination Audit, which will confirm an legacy's within the site. EcOz can help organise these audits.

5 Recommendations

5.1 Construction Environmental Management Plan

The central precinct and its surrounding proposed development areas have several environmental constraints for land clearing and construction phase of the project that will need to be covered prior to development approvals. EcOz suggest that Planit commission a Construction Environmental Management Plan (CEMP) that neatly compiles all relevant information into one document that can be assessed by NT Government and Development Consent Authority and also be useful to sub-contractors undertaking earthworks and construction at the site.

The main management plans that will form this document include:

- Weed Management Plan
- Erosion and Sediment Control Plan
- Cycad Management Plan
- Fire Management Plan
- Noise Management Plan Dust Management
- Waste Management Plan

5.2 Cycad Salvaging Program

Armstrong's Cycads (*Cycas armstrongii*) are vulnerable within the NT (under the TPWC Act) and should be salvaged where possible. EcOz suggest that Planit plan to salvage as many cycads as possible, as this will likely result in a smoother approvals process (and also be good for PR).

5.3 Landscaping

We suggest that Planit aim to re-plant (or ideally leave *in situ*) as many Armstrong's Cycads salvaged from the site in proposed landscaping plans. Firstly, this keeps the cycads close to their original locality and secondly, they are also a sought after species that will lift the aesthetic value of the development (some of these cycads can be sold for thousands of dollars).

Planit should consider only planting local native species (like the Bunnings landscaping across the road).

5.4 Phase 1 Contamination Audit

EcOz suggest that Planit look into conducting a Phase 1 Contamination Audit to determine if there are contamination legacy issues associated with the site.

5.5 Acid Sulphate Soil Investigations

Conduct sampling within the waterlogged zone to determine if ASS exist, and if management will be required as a result of proposed earthworks.

6 References

Brock. J. 1994-1995 Remnant Vegetation of the Darwin Municipality, Greening Australia (NT)

Bureau of Meteorology (BOM) 2011 Climate statistics for Australian locations, viewed 12/06/2011 *http://www.bom.gov.au/climate/averages/tables/cw_014015.shtml*

Fogarty, P.J. Lynch, B. and Wood, B. 1984 The Land Resources of the Elizabeth, Darwin and Blackmore Rivers Land Conservation Unit Conservation Commission of the Northern Territory

GreeningNT 2010, Mission grass, perennial, 'Pennisetum polystachion' Northern Territory Government viewed 04/08/11 http://www.nt.gov.au/nreta/natres/weeds/find/pdf/weed_notes_mission_grass_per_mar10.pdf

Isbell, R 2002 The Australian Soil Classification: Revised Edition. Australian Soil and Land Survey Handbooks, Series 4

Liddle, D.T. 2009. Management Program for Cycads in the Northern Territory of Australia

2009-2014. Northern Territory Department of Natural Resources, Environment, the Arts and

Sport, Darwin. A management program prepared under the Territory Parks and Wildlife Conservation Act.

North Australian Land Manager (NALM), 2009, Managing weeds for wildlife conservation - Gamba Grass Andropogon gayanus, viewed 04/08/2011 http://www.savanna.org.au/view/179446/managing-weeds-for-wildlife-conservation---gamba-grass--andropogon-gayanus.html

NRETAS, 2010. Weed Management Plan for 'Andropogon gayanus' (Gamba Grass) 2010. Natural Resources Division, Department of Natural Resources, Environment, The Arts and Sport, Palmerston

Setterfield, S. A., Douglas, M.M. & Hutley, L.B. 2005, 'Effects of canopy cover and ground layer disturbance on establishment of an invasive grass in an Australia savanna', Biotropica 37: 25–31

Setterfield S., & Douglas M. 2007 'Evidence in on the impact of gamba grass' in Savanna Links, Issue 34.Tropical Savannas CRC

Wood B.G., Fogarty P.J. & Day K.J. 1985 The Land Systems of the Darwin Region Technical Report Number 24. Conservation Commission of the Northern Territory, Darwin N.T

Appendix A – NRM INFONET Snapshot

Dick Ward Drive

Dick Ward Drive encompasses an area of 10.1 sq km extending from 12 deg 23.0 min to 12 deg 24.0 min S and 130 deg 50.0 min to 130 deg 52.0 min E.
Dick Ward Drive is located in the Darwin Coastal, bioregion(s)

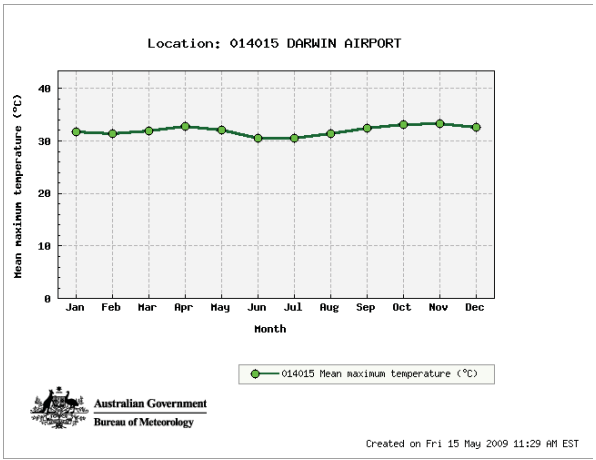
Location of Dick Ward Drive

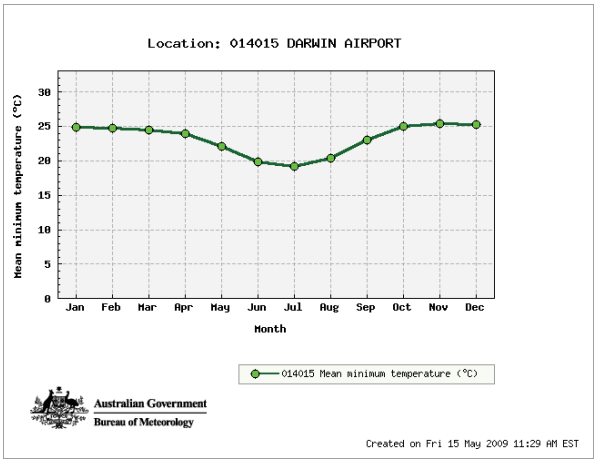
Dick Ward Drive Climate

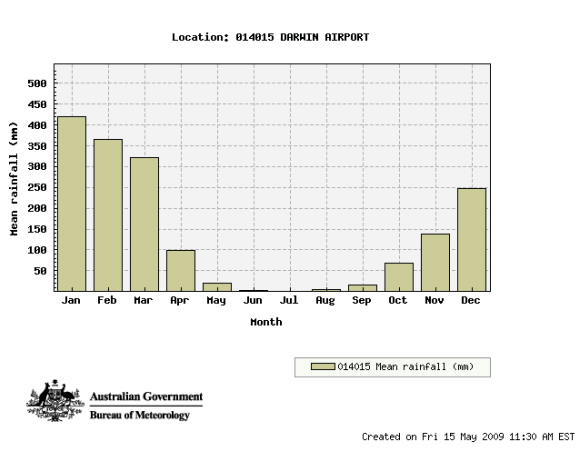
The closest long-term weather station is DARWIN AIRPORT (12 deg 25.0 min S, 130.8925E) 5 km SE of the center of selected area

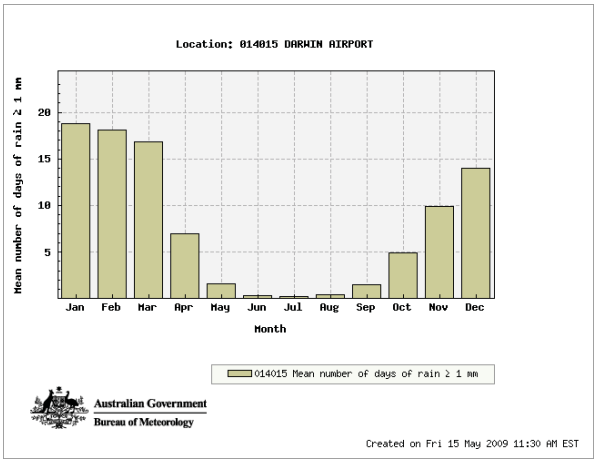
Statistics	Annual Values	Years of record
Mean max temp (deg C)	32.0	68
Mean min temp (deg C)	23.2	68
Average rainfall (mm)	1715.0	68
Average days of rain	93.5	68

Climate summaries from Bureau of Meteorology (www.bom.gov.au)









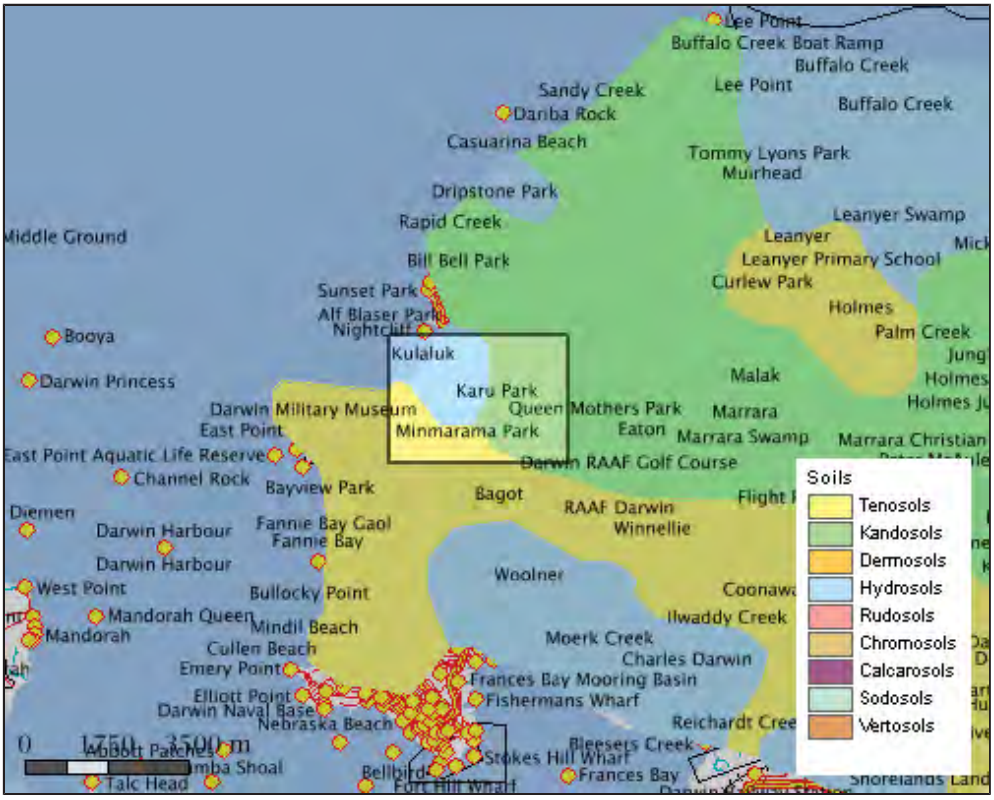
Dick Ward Drive Soils

Soil Types

Area of soil types (Northcote Factual Key)

Selected area is too small to produce reliable statistics

Soil Types

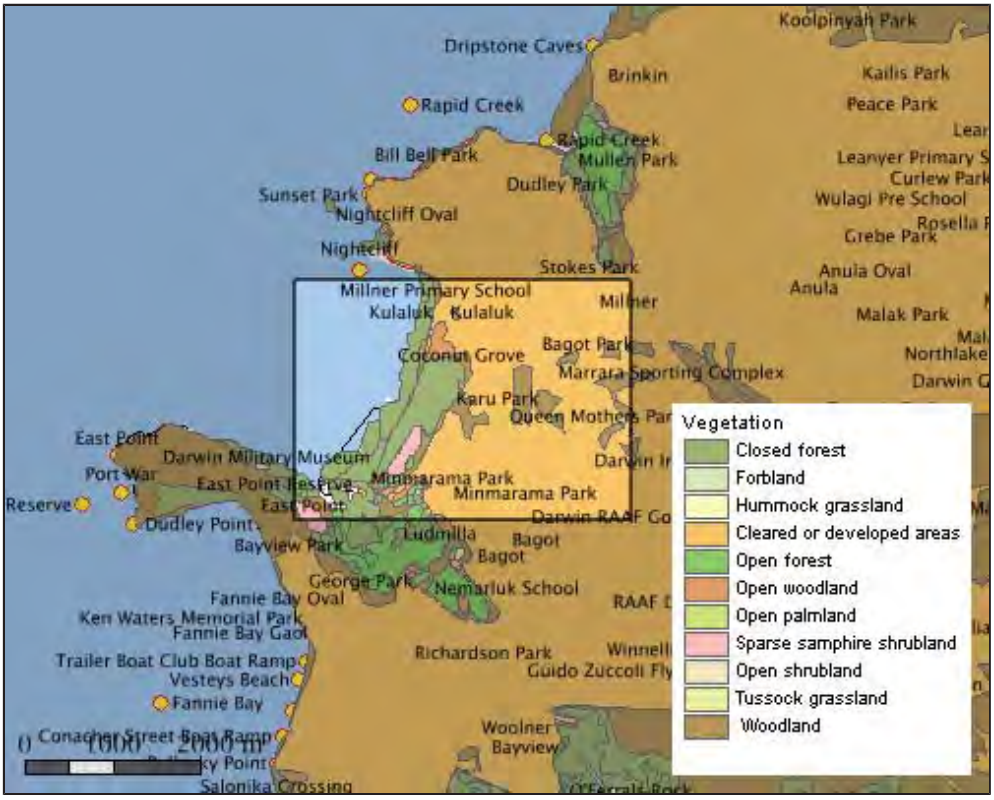


Soils 1:2M Layer is a copy of the NT portion (1:2,000,000 scale dataset) of the CSIRO Atlas of Australian Soils - K.H. Northcote et al. Data scale: 1:2,000,000 ANZLIC Identifier: 2DBCB771205D06B6E040CD9B0F274EFE
More details: Go to www.nt.gov.au/nreta/nretamaps/ and enter the ANZLIC identifier in the Spatial Data Search

Dick Ward Drive Vegetation

Vegetation Communities	Area of vegetation communities
Selected area is too small to produce reliable statistics	

Vegetation Communities



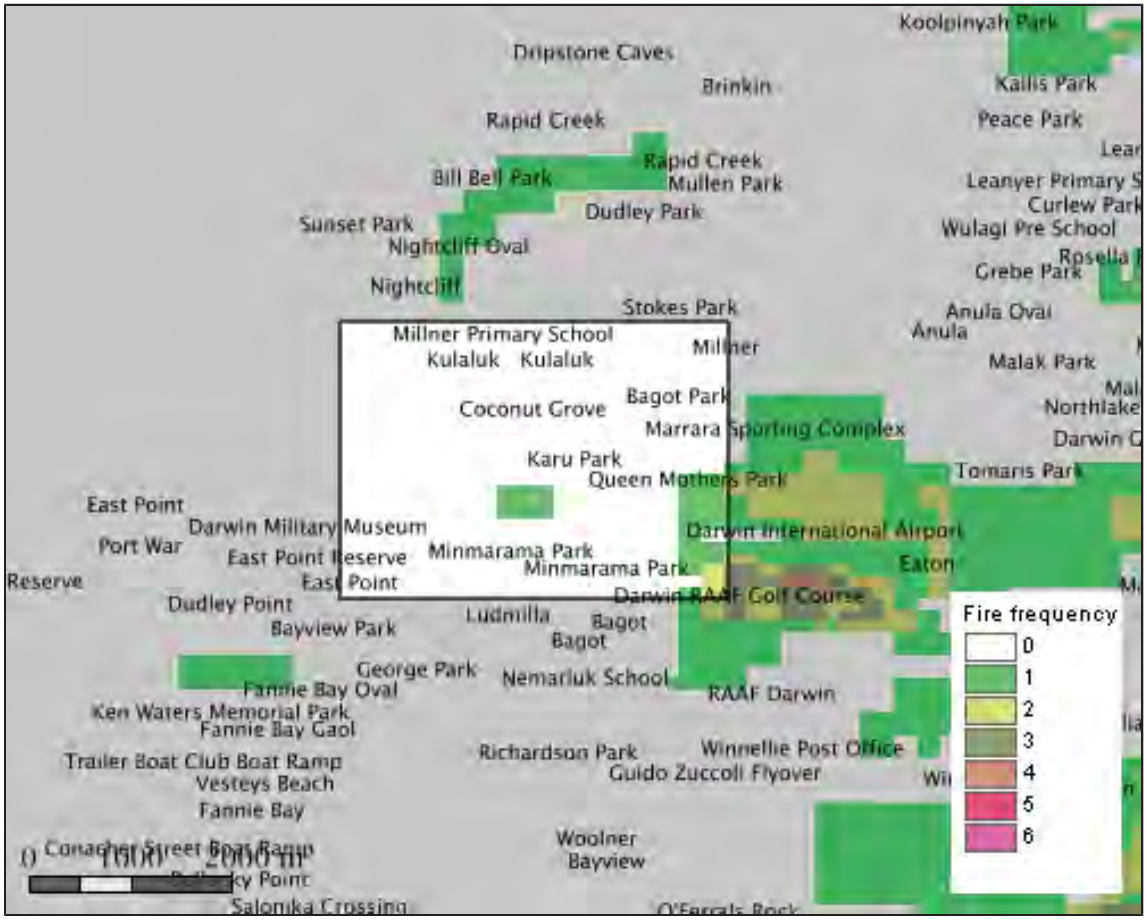
The NVIS 2005 Layer is compiled from a number of vegetation and land unit survey maps that were recoded and re-attributed for the National Vegetation Information System (NVIS)
Data scale variable depending on location. ANZLIC Identifier:2DBCB771207006B6E040CD9B0F274EFE
More details:Go to www.nt.gov.au/nreta/nretamaps/ and enter the ANZLIC identifier in the Spatial Data Search

Dick Ward Drive Fire History

Years burnt 2004-2009 and area burnt in each category

Selected area is too small to produce reliable statistics

Years burnt 2004-2009



The fire frequency(250m) Layer is derived from satellite imagery sourced from the Moderate Resolution Imaging Spectroradiometer (MODIS) on the NASA Terra satellite
Spatial Resolution: 250m x 250m pixels (at Nadir). Extent: NT to approx 19 Deg S only

Dick Ward Drive Threatened Species

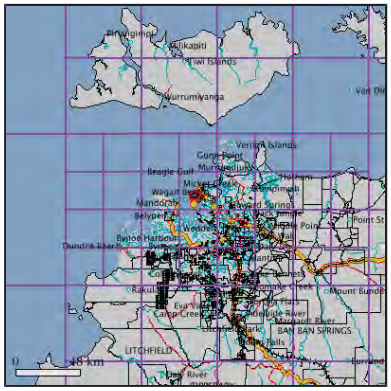
Threatened species recorded in the grid cell(s) in which Dick Ward Drive occurs

Group	Common Name	Scientific Name	NT Status	National Status	ID
Cycads	Armstrong`s Cycad	*Cycas armstrongii*	VU	.	351085
Insects	Atlas Moth	*Attacus wardi*	EN	.	183182
Fish	Dwarf Sawfish	*Pristis clavata*	VU	.	176943
Fish	Green Sawfish	*Pristis zijsron*	VU	VU	176965
Reptiles	Green Turtle	*Chelonia mydas*	.	VU	176291
Reptiles	Hawksbill Turtle	*Eretmochelys imbricata*	.	VU	176298
Reptiles	Olive Ridley	*Lepidochelys olivacea*	.	EN	176305
Reptiles	Flatback Turtle	*Natator depressus*	.	VU	176284
Reptiles	Mertens` Water Monitor	*Varanus mertensi*	VU	.	347295
Reptiles	Yellow-spotted Monitor	*Varanus panoptes*	VU	.	347307
Birds	Emu	*Dromaius novaehollandiae*	VU	.	176363
Birds	Red Goshawk	*Erythrotriorchis radiatus*	VU	VU	176391
Birds	Australian Bustard	*Ardeotis australis*	VU	.	176354
Birds	Australian Painted Snipe	*Rostratula australis*	VU	VU	246428
Birds	Masked Owl	*Tyto novaehollandiae*	EN/VU	EN/VU	177895
Birds	Masked Owl (northern mainland)	*Tyto novaehollandiae kimberli*	VU	VU	594609
Birds	Gouldian Finch	*Erythrura gouldiae*	EN	EN	176370
Mammals	Northern Quoll	*Dasyurus hallucatus*	CR	EN	176443
Mammals	Northern Brush-tailed Phascogale	*Phascogale pirata*	VU	.	177965
Mammals	Bare-rumped Sheath-tailed Bat	*Saccolaimus saccolaimus*	.	CR	177111
Mammals	Blue Whale	*Balaenoptera musculus*	DD	EN	233883
Mammals	Humpback Whale	*Megaptera novaeangliae*	DD	VU	280686

EX = Extinct EW = Extinct in the Wild ER= Extinct in the NT EN = Endangered
EN/VU = One Endangered subspecies/One Vulnerable subspecies
VU=Vulnerable
VU/- = One or more subspecies vulnerable EN/- = One or more subspecies endangered

More species info: Go to www.landmanager.org.au/view/index.aspx?id=####
where #### is the ID number from the tables above for the species of interest.

Species listed in the table above were recorded from all the grid cells shown below (red/blue line) that overlap Dick Ward Drive



Dick Ward Drive Weeds and Potential Weeds

Introduced plants recorded in the grid cell(s) in which Dick Ward Drive occurs and that have been identified as problem weeds in one or more locations in northern Australia. Occurence based on Department of Natural Resources, Environment and The Arts databases.

Common Name	Scientific Name	NT Status	National Status	Other Status	ID
African Mahogany	*Khaya senegalensis*	.	.	*C&E*	361295
African Tulip Tree	*Spathodea campanulata*	.	.	*Q3 WeedsAus*	292854
American Rat`s Tail Grass	*Sporobolus jacquemontii*	.	.	*Q2 G&M*	292904
Awnless Barnyard Grass	*Echinochloa colona*	.	.	*DEU*	290114
Barleria	*Barleria prionitis*	*A C*	*ALERT*	*MP K2 C&E G&M*	288734
Bellyache Bush	*Jatropha gossypiifolia*	*B C*	.	*K2 WA1 WA4 Q2 C&E G&M CYP DEU*	113957
Bitter Broom	*Scoparia dulcis*	.	.	*DEU*	292424
Blue Trumpet Vine	*Thunbergia grandiflora*	.	.	*Q2 C&E CYP*	293124
Branched Porterweed	*Stachytarpheta australis*	*B C*	.	.	361505
Calopo	*Calopogonium mucunoides*	.	.	*MP C&E CYP*	288904
Caltrop	*Tribulus terrestris*	*B C*	.	*CYP SA*	361555
Candle Bush	*Senna alata*	*B C*	.	*WA1 WA2*	292444
Caribbean Stylo	*Stylosanthes hamata*	.	.	*DEU*	292974
Cayenne Snakeweed	*Stachytarpheta cayennensis*	*B C*	.	*NSW*	292924
Centro	*Centrosema molle*	.	.	*MP*	289184
Cinderella Weed	*Synedrella nodiflora*	.	.	*C&E*	293024
Clustering Fishtail Palm	*Caryota mitis*	.	.	*C&E WeedsAus*	361015
Coast Morning Glory	*Ipomoea cairica*	.	.	*NSW*	290774
Coffee Bush	*Leucaena leucocephala*	.	.	*MP C&E G&M CYP*	290894
Columbus Grass	*Sorghum almum*	.	.	*NSW*	361495
Common Sensitive Plant	*Mimosa pudica*	*C*	.	*WA1 WA2*	291294
Common Sensitive Plant	*Mimosa pudica var. hispida*	*C*	.	*WA1 WA2*	291294
Common Stylo	*Stylosanthes guianensis*	.	.	*DEU*	292964
Cow Itch	*Mucuna pruriens var. utilis*	.	*ALERT*	*NAQS C&E*	291384
Creeping Wood-sorrel	*Oxalis corniculata*	.	.	*NSW*	291584
Cupid`s Flower	*Ipomoea quamoclit*	.	.	*C&E*	371932
Fierce Thornapple	*Datura ferox*	*A C*	.	*WA1 WA3 WA4 G&M*	289904
Flannel Weed	*Sida cordifolia*	*B C*	.	*WA1 G&M DEU*	292594
Fringed Spiderflower	*Cleome rutidosperma*	.	.	*NAQS Gr*	289494
Gamba Grass	*Andropogon gayanus*	*A C*	.	*MP K1 Q2 WA2 C&E G&M CYP*	179446
Gambia Pea	*Crotalaria goreensis*	.	.	*MP*	183442
Golden Shower	*Cassia fistula*	.	.	*WeedsAus*	289034
Gomphrena Weed	*Gomphrena celosioides*	.	.	*DEU*	290514
Grader Grass	*Themeda quadrivalvis*	*B C*	.	*G&M CYP DEU*	107883
Guinea Grass	*Megathyrsus maximus*	.	.	*MP DEU*	291184
Hyptis	*Hyptis suaveolens*	*B C*	.	*G&M*	290734
Indian Bluegrass	*Bothriochloa pertusa*	.	.	*DEU*	288804
Indian Heliotrope	*Heliotropium indicum*	.	.	*DEU*	290584
Ivy Gourd	*Coccinia grandis*	.	.	*WA1 WA2 C&E*	289524
Jamaican Snakeweed	*Stachytarpheta jamaicensis*	*B C*	.	.	292924
Jaragua Grass	*Hyparrhenia rufa*	.	.	*G&M*	290694
Lantana	*Lantana camara*	*B C*	*WONS*	*K2 WA1 Q3 Gr G&M CYP DEU NSW SA*	237738
Mexican Clover	*Richardia brasiliensis*	.	.	*DEU*	292244
Mimosa	*Mimosa pigra*	*A (S of 14 deg S) B (N of 14 deg S) C*	*WONS*	*MP K2 WA1 WA2 Q1 G&M CYP SA*	291304
Mission Grass (annual)	*Pennisetum pedicellatum*	.	.	*WeedsAus*	291864
Mission Grass (perennial)	*Pennisetum polystachion*	*B C*	.	*MP K2 C&E G&M*	291884
Mission Grass (perennial)	*Pennisetum polystachion subsp. polystachion*	*B C*	.	*MP K2 C&E G&M*	291884
Mission Grass (perennial)	*Pennisetum polystachion subsp. setosum*	*B C*	.	*MP K2 C&E G&M*	291884

Common Name	Scientific Name	NT Status	National Status	Other Status	ID
Mossman River Grass	*Cenchrus echinatus*	*B C*	*.*	*NSW*	289124
Mother-In-Law`s Tongue	*Sansevieria trifasciata*	*.*	*.*	*C&E CYP*	292384
Nutgrass	*Cyperus rotundus*	*.*	*.*	*DEU SA*	289844
Paddy`s Lucerne	*Sida rhombifolia*	*B C*	*.*	*MP G&M DEU*	292604
Para Grass	*Urochloa mutica*	*.*	*.*	*MP G&M*	293304
Parkinsonia	*Parkinsonia aculeata*	*B C*	*WONS*	*MP K2 WA1 WA4 Q2 G&M CYP DEU NSW SA*	114160
Pink Periwinkle	*Catharanthus roseus*	*.*	*.*	*C&E*	289064
Purpletop Chloris	*Chloris barbata*	*.*	*.*	*DEU*	289314
Rangoon Creeper	*Quisqualis indica*	*.*	*.*	*C&E*	292204
Red Natal Grass	*Melinis repens*	*.*	*.*	*DEU*	291224
Rhodes Grass	*Chloris gayana*	*.*	*.*	*DEU*	289334
Roadside Leafbract	*Malachra fasciata var. lineariloba*	*.*	*.*	*CYP*	361325
Sabi Grass	*Urochloa mosambicensis*	*.*	*.*	*DEU*	293294
Shoe-button	*Ardisia elliptica*	*.*	*.*	*C&E*	288544
Shrubby Stylo	*Stylosanthes scabra*	*.*	*.*	*G&M DEU*	292994
Sicklepod	*Senna obtusifolia*	*B C*	*.*	*WA1 WA2 Q2 G&M CYP DEU*	131903
Singapore Daisy	*Sphagneticola trilobata*	*.*	*.*	*Q3 C&E CYP*	292884
Siratro	*Macroptilium atropurpureum*	*.*	*.*	*C&E*	291024
Soft Lovegrass	*Eragrostis pilosa*	*.*	*.*	*DEU*	372338
Spearpod	*Ruellia tuberosa*	*.*	*.*	*C&E*	292314
Spiny Amaranth	*Amaranthus spinosus*	*.*	*.*	*WA1 WA2*	288384
Spiny Sida	*Sida spinosa*	*.*	*.*	*DEU*	292614
Spiny-head Sida	*Sida acuta*	*B C*	*.*	*WA1 G&M*	292584
Starburr	*Acanthospermum hispidum*	*B C*	*.*	*.*	288214
Townsville Lucerne	*Stylosanthes humilis*	*.*	*.*	*DEU*	292984

Status Codes:

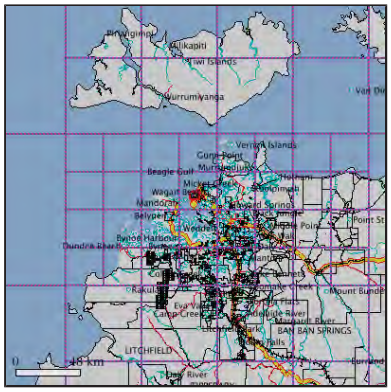
1. NATIONAL STATUS CODES
WONS, Weeds of National Significance
Alert, Alert List for Environmental Weeds (Please call Exotic Plant Pest Hotline 1800 084 881 if you think you have seen this weed)
Sleeper, National Sleeper Weed
Target,Targeted for eradication. (www.landmanager.com.au/view/index.aspx?id=449837)

2. NT STATUS CODES
A, NT Class A Weed (to be eradicated)
B, NT Class B Weed (growth & spread to be controlled)
C, NTClass C Weed (not to be introduced) (www.landmanager.com.au/view/index.aspx?id=449869)

3. OTHER STATUS CODES
C&E, Csurhes, S. & Edwards, R. (1998) Potential Environmental Weeds in Australia. Candidate Species for Preventative Control. Environment Australia, Canberra (www.landmanager.com.au/view/index.aspx?id=394504)
CYP, Draft Cape York Peninsula Pest Management Plan 2006-2011 (www.landmanager.com.au/view/index.aspx?id=371200)
DEU, Plants listed as environmental weeds by the Desert Uplands Strategic Land Resource Assessment (www.landmanager.com.au/view/index.aspx?id=332123)
G&M, Grice AC, Martin TG. 2005. The Management of Weeds and Their Impact on Biodiversity in the Rangelands. Cooperative Research Centre (CRC) for Australian Weed Management and CSIRO Sustainable Ecosystems. Commonwealth Australia (www.landmanager.com.au/view/index.aspx?id=163572)
Gr, Groves et al. 2003. Weed categories for natural and agricultural ecosystem management. Bureau of Rural Sciences (www.landmanager.com.au/view/index.aspx?id=388018)
K0, High Priority Weeds not yet established in the Katherine region
K1, High Priority Weeds posing environmental threats in the Katherine region
K2, High Priority Weeds posing existing threats in the Katherine region, as described in the Katherine Regional Weed Management Strategy 2005-2010 (www.landmanager.com.au/view/index.aspx?id=130286)
MP, Northern Territory Parks & Conservation Masterplan (www.landmanager.com.au/view/index.aspx?id=144141)
NAQS, North Australian Quarantine Strategy Target List (www.landmanager.com.au/view/index.aspx?id=449416)
NSW, Declared Noxious Weed in NSW (www.landmanager.com.au/view/index.aspx?id=449983)
Q1, QLD Class 1 Weed (not to be introduced, kept or supplied-
Q2, Class 2 Weed (eradicate where possible, not to be introduced, kept or supplied)
Q3, Qld Class 3 Weed (to be controlled near environmentally sensitive areas- not to be supplied/sold without a permit) (www.landmanager.com.au/view/index.aspx?id=190714)
SA, Declared Plant in South Australia (www.landmanager.com.au/view/index.aspx?id=449996)
WeedsAus, Listed as a significant weed by Weeds Australia (www.landmanager.com.au/view/index.aspx?id=14576)
WA1,WA Weed Class P1 (movement prohibited)
WA2, WA Weed Class P2 (aim to eradicate)
WA3, WA Weed Class P3 (control infestations)
WA4, WA Weed Class P4 (prevent spread)
WA5, WA Weed Class P3 (control infestations on public land) (www.landmanager.com.au/view/index.aspx?id=449884).

More species info: Go to www.landmanager.org.au/view/index.aspx?id=####
where #### is the ID number from the tables above for the species of interest.

Plants listed in the table above were recorded from all the grid cells shown below (red/blue line) that overlap Dick Ward Drive



Dick Ward Drive Pest and Potential Pest Animals

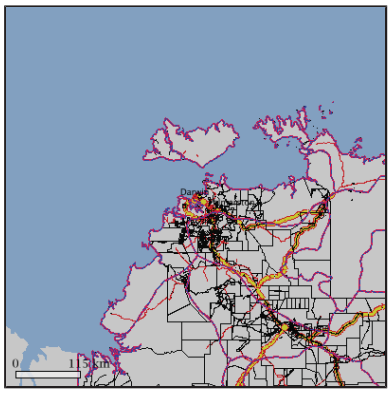
Animals with pest potential recorded in the bioregion(s) in which Dick Ward Drive occurs. Occurence based on Department of Natural Resources, Environment and The Arts databases.

Common Name	Scientific Name	NT Status	National Status	ID
Cane Toad	*Chaunus marinus*	P	.	183252
Asian House Gecko	*Hemidactylus frenatus*	P	.	188964
Flower-pot Blind Snake	*Ramphotyphlops braminus*	P	.	189084
King Quail	*Excalfactoria chinensis*	P	.	450567
Rock Dove	*Columba livia*	P	.	183336
Red-tailed Black-Cockatoo	*Calyptorhynchus banksii*	N	.	223765
Sulphur-Crested Cockatoo	*Cacatua galerita*	N	.	223772
Common Starling	*Sturnus vulgaris*	P	.	188980
House Sparrow	*Passer domesticus*	P	.	183322
Eurasian Tree Sparrow	*Passer montanus*	P	.	450580
Agile Wallaby	*Macropus agilis*	N	.	223786
House Mouse	*Mus musculus*	P	.	187720
Black Rat	*Rattus rattus*	P	.	183236
Dingo / Wild dog	*Canis lupus*	N	.	183280
Cat	*Felis catus*	P	.	183259
Donkey	*Equus asinus*	P	.	183287
Horse	*Equus caballus*	P	.	183315
Pig	*Sus scrofa*	P	.	183329
Swamp Buffalo	*Bubalus bubalis*	P	.	183245
Cattle	*Bos indicus / Bos taurus*	P	.	183266

NT STATUS CODES:
P, Prohibited species (all exotic vertebrates except those listed as non-prohibited (www.landmanager.com.au/view/index.aspx?id=450509)
Int, Introduced species (all non-prohibited vertebrates, and all other exotic species (www.landmanager.com.au/view/index.aspx?id=280771)
N, Native species with pest potential.

More species info: Go to www.landmanager.org.au/view/index.aspx?id=####
where #### is the ID number from the tables above for the species of interest.

Potential pest animals listed in the table above were recorded from the bioregions shown below (red/blue line) that overlap Dick Ward Drive



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