

**NORTHERN TERRITORY UNIVERSITY  
PROPOSED RECEREATIONAL LAKE & CEREMONIAL ENTRANCE**

**FLORA SURVEY  
for  
PUBLIC ENVIRONMENTAL REPORT**



Report prepared for

SINCLAIR KNIGHT MERZ PY LTD

by

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## FLORA SURVEY

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### Executive Summary

- Sinclair Knight Merz Pty Ltd requested a study to investigate the existing vegetation within the area of the proposed recreational lake and ceremonial entrance at the Casuarina campus of the Northern Territory University.
- The principal aims of the survey were (1) to describe the existing vegetation that would be affected by the construction of the lake, weir and proposed carpark and (2) to make an assessment of the significance of any remnant vegetation found within the site.
- A total of 93 plant species from 42 different families were recorded from within the survey area. Of this total, 26 introduced species (28 %) were recorded, mainly from within the planted open parkland habitat.
- The survey established that much of the site is in a disturbed and poorly managed condition and contains very little remnant vegetation. Existing vegetation mainly comprises dense infestations of Coffee Bush (*Leucaena leucocephala*), a common woody weed in the Darwin region
- Minor areas of mangroves associated with the open drain and the upper intertidal zone of Rapid Creek occur within the site boundary. These mangroves are in a healthy condition and are considered a valuable natural resource and habitat of conservation significance. However, only a few scattered mangrove trees lining the open drain occur within the area of the proposed lake, the main mangrove area is situated 80 to 100 m downstream of the proposed weir.
- Small pockets of remnant vegetation including littoral species characteristic of the mangrove fringe and tall *Eucalyptus*-dominated woodland containing valuable specimen trees occurs within the proposed carpark area. It is recommended that landscape planning for the carpark area might incorporate a buffer zone to maintain the integrity of the mangrove margin. Similarly, given their aesthetic and ecological value, the final design of the carpark area might also incorporate the existing stand of Ghost Gums (*Eucalyptus papuana*).
- The upstream area of the proposed lake includes developed parkland areas fringing the existing canal comprising maintained grassland with sparse planted native and exotic tree species. No significant vegetation occurs within this zone. However, an 8m Banyan tree (*Ficus virens*) located near the main bridge on the southern side of the canal, is a noteworthy landscape specimen tree.
- In conclusion, the area designated for the proposed lake, the weir and immediately downstream of the spillway area does not contain vegetation of conservation significance. The site is disturbed and poorly maintained, largely comprising monospecific stands of Coffee Bush (*Leucaena leucocephala*).
- Minor areas of mangrove and remnant vegetation occurs in the vicinity of the proposed carpark. To maintain the integrity of these pockets of remnant vegetation, it is recommended that the final design for this area incorporate a mangrove buffer zone and as far as practicable retain valuable specimen trees.

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## 1.0 Introduction

As part of the Public Environmental Report for the proposed recreational lake and ceremonial entrance at the Casuarina campus of the Northern Territory University, Sinclair Knight Merz Pty Ltd requested a study to investigate the existing vegetation. Appendix 1 indicates the extent of the survey area which comprises the vacant crown land bounded by the southern ring road of the University to the north, the Alawa recreational reserve to the south and a proposed boundary line to the west. The survey area incorporates the entire upstream section of the large open drain and immediate surrounds (Drainage Reserve Lot 8702).

The vegetation of the site has been previously mapped and described as part of the NTU Landscape Masterplan (Clouston 1992). That document identified the broad pattern of vegetation distribution, delineating areas of mangroves, disturbed and poorly managed vegetation and patches of significant native plant communities. However, a more detailed examination and assessment of the existing vegetation was necessary as part of the requirements for the Public Environmental Report.

The primary aims of the survey were to undertake a field inspection of the site and to describe the existing vegetation that would be impacted by the construction of the lake, the weir and the proposed carpark. If remnant vegetation was found to occur within the survey area, an assessment of its significance was required.

## 2.0 Methodology

Site inspection was undertaken on 21 May and 2 June 2001 when the site was traversed on foot. Qualitative assessment of the flora included ground truthing for vegetation mapping, description of vegetation structure and species composition. The presence and abundance of weeds was noted and the major vegetation communities were photographed. Plant species not identified in the field were sampled for later identification by the Northern Territory Herbarium. Species lists were compiled for each plant community indicating upper, mid and ground stratum species and their conservation status.

## 3.0 Results

A total of 93 plant species from 42 families were recorded from the five main vegetation communities within the survey area (Appendix 2). Of this total, 26 species (28%) were exotic or introduced plants not native to the area, mainly from within the planted open parkland habitat (Table 1).

**Table 1 : Summary table of plant species recorded during NTU field survey**

|                    | Plant Community              |                                |                                   |                           |              |       |
|--------------------|------------------------------|--------------------------------|-----------------------------------|---------------------------|--------------|-------|
|                    | 1 – Planted<br>open woodland | 2 – Coffee<br>Bush Infestation | 3 – Disturbed<br>native vegetaion | 4 – Remnant<br>vegetation | 5 -Mangroves | Total |
| No. of Families    | 19                           | 6                              | 24                                | 16                        | 16           | 42    |
| No. Species        | 25                           | 10                             | 46                                | 21                        | 21           | 93    |
| No. Introduced Spp | 15                           | 7                              | 13                                | 1                         | 0            | 26    |
| % of total (weeds) | 60%                          | 70%                            | 28%                               | 5%                        | 0%           | 28%   |

he high proportion of exotic species in the existing flora reflects the level of prior human activity at this site. Indeed, the majority of the site is highly disturbed and little remnant vegetation remains.

Existing vegetation mainly comprises dense infestations of Coffee Bush (*Leucaena leucocephala*). A native of Central America, *Leucaena leucocephala* is now well established in coastal settlements of the Northern Territory. Although Coffee Bush is a common woody weed in the Darwin region with the potential to cause serious environmental problems, it is not a declared noxious weed (Smith 1995). It is a species characteristic of disturbed or degraded land, especially around settlements.

Overall, five main vegetation communities were distinguished within the area of interest as indicated in Figure 1 and are described below. Appendix 3 contains photographs of the 5 major vegetation communities.

### **3.1 Planted open parkland**

Much of the area between the southern NTU ring road and Lakeside Drive is planted open parkland in which scattered trees and plantings occur amongst maintained grassland. The area includes two grassed ovals and planted trees include both native and exotic species. In general, trees in open parkland area appear to be relatively young (< 20 years old), typically range from 9 to 14 m in height and presumably represent the cumulative product of landscape works since Cyclone Tracey in 1974.

The upstream section of the drainage reserve is lined with scattered *Acacia auriculiformis* (Darwin Black Wattle) with occasional Red River Gums (*Eucalyptus camaldulensis*) and Banyan Fig trees (*Ficus virens*). Exotic trees are more numerous in this area with *Khaya senegalensis* (African Mahogany), *Gmelina arborea*, *Pterocarpus indicus* (Rosewood) and *Alstonia scholaris* (Cheesewood). Appendix 2 contains a comprehensive list of species found in this area.

Approximately 48% of the area to be cleared for the proposed lake currently comprises planted open parkland. No native or exotic species of conservation significance occur within the lake boundary. However, the 8m high Banyan Fig located next to the main bridge (leading to the carpark) has the potential to become an outstanding landscape tree. Attractive specimen trees such as this Banyan, located within the proposed lake area, could potentially be relocated to the lake edge during construction works.

### **3.2 Coffee Bush infestations**

Approximately 52% of the area to be cleared for the proposed lake comprises monospecific stands of *Leucaena leucocephala* (Coffee Bush). Construction of the weir and spillway will involve further clearing of dense Coffee Bush. This species tends to exclude native vegetation forming thickets to 6 m high that extend right to the edge of the intertidal zone and overhang the canal (Figure 2). Table 1 indicates that few other species were found within areas into which Coffee Bush has spread.

The presence of this species detracts from the environmental quality of the area and creates management problems. Consequently, clearing of this species will improve the amenity and visual quality of the upper Rapid Creek area. *Leucaena* produces vast quantities of seed and further weed control measures will be necessary after clearing.





Figure 2 : Coffee Bush (*Leucaena leucocephala*) infestation

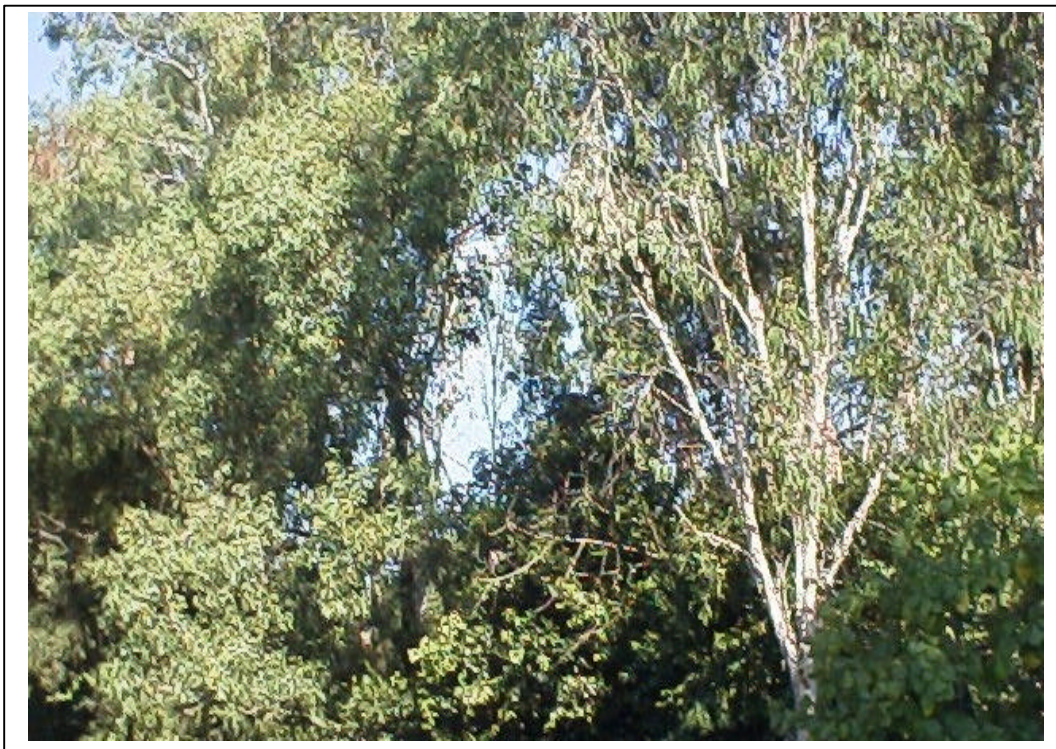


Figure 3 : Remnant vegetation containing valuable specimen trees



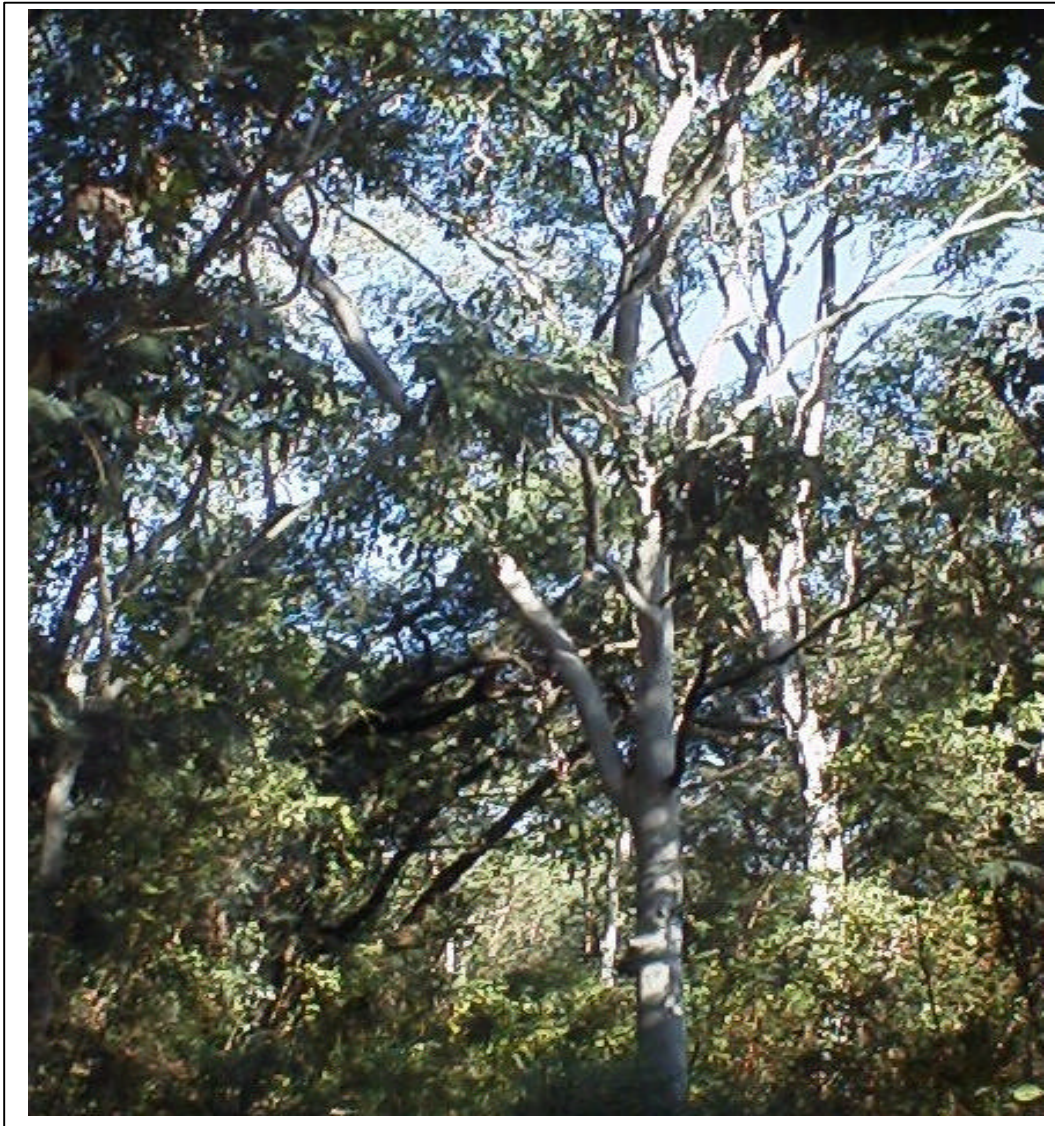


Figure 4 : Ghost Gums (*Eucalyptus papuana*) in the vicinity of the proposed carpark

### 3.3 Poorly managed and disturbed native vegetation

Small areas of native vegetation showing various degrees of prior disturbance occur within the survey area. These areas are characteristically *Eucalyptus* dominated woodland habitat (including *Eucalyptus miniata*, *E. papuana* and *E. confertiflora*) with a sparse understorey layer. This community is relatively species rich with a total of 46 species recorded in this habitat. Common mid-stratum species include *Pandanus spiralis* and *Planchonia careya* above a dense grass layer. Mission Grass (*Pennisetum polystachion*), an introduced noxious weed, is common in these areas along with other native and exotic grass species (Appendix 2). A layer of smothering introduced vines that exclude native species (eg. *Passiflora foetida*, *Centrosema pubescens*, *Calopogonium mucunoides*) is common in this habitat. The high proportion of introduced species (28%) is indicative of disturbance to the native vegetation from frequent fire, clearing and terrain disturbance.

### 3.4 Remnant vegetation containing valuable specimen trees

The mangrove fringe on the southern boundary of the NTU campus comprises a narrow band of remnant vegetation. Tree species include mature *Melaleuca leucadendra* (Paperbark), *Eucalyptus papuana* (Ghost Gum) and tall *Acacia auriculiformis* (Darwin Black Wattle) in the upper stratum. Other species of interest include *Diospyros calycantha*, *Diospyros littorea*, *Guettarda speciosa* and *Timonius timon* (Figure 3). The vegetation in this area forms a natural buffer for mangroves in the adjacent intertidal zone and future development of the lake and carpark should maintain the integrity of this remnant littoral woodland.

A pocket of remnant vegetation including a tall stand of Ghost Gums (*Eucalyptus papuana*) and native species associated with monsoon vine forest habitats occurs close to the mangrove margin and within the proposed carpark area (Figure 1). It is however, surrounded by exotic species (*Khaya senegalensis*, *Leucaena leucocephala*), plantings of native species (*Ficus benjamina*, *Melaleuca* spp.) and native vegetation in disturbed condition.

Although occupying only a small area, a healthy stand of Ghost Gums occurs amongst Paperbarks (*Melaleuca leucadendra*) and tall *Acacia auriculiformis*, forming an attractive pocket of native vegetation (Figure 4). Beneath the canopy formed by the Eucalypts, saplings of *Carallia brachiata*, *Carpentaria acuminata*, *Terminalia microcarpa* and *Wrightia saligna* occur. This pocket of vegetation contains valuable specimen trees and could be retained as a landscape feature, potentially providing shade to the carpark area.

### 3.5 Mangroves

Mangroves occur as either a thin band often only one tree in width, or as sporadic trees/ shrubs along the main tidal channel as far upstream as the first bridge. Common mangrove species recorded in this habitat include *Lumnitzera racemosa*, *Avicennia marina*, *Acrostichum speciosum* and *Excoecaria ovalis*. Upstream of the bridge the margins of the channel are more formalised and mangroves do not occur in this area.



The upper reaches of Rapid Creek support extensive mangroves that extend up to the southern boundary of the NTU campus. These mangroves are dense closed canopy forests to 7 m high, typically comprising a landward fringe of *Lumnitzera racemosa*, *Diospyros littorea*, *Ceriops australis*, *Acanthus ilicifolius* and *Scyphiphora hydrophyllaceae*. Appendix 2 contains a full list of species recorded in the landward mangrove zone.

Mangrove ecosystems are of recognised conservation significance (Clouston 1992) due to their value as a natural, scientific and educational resource (Clough 1992, EcoSystems 1993, Underwood and Chapman 1995). The proposed development will not involve clearing in mangrove areas. Sparse mangrove trees lining the downstream tidal channel will be removed but overall the weir will be located 80 m distant from the main intertidal areas and will not impinge on mangrove habitats. However, the design of the proposed carpark may require some refinement to allow an adequate buffer between construction areas, the mangrove fringe and adjacent remnant littoral woodland.

#### **4.0 Overview of flora survey results**

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In conclusion, the area designated for the proposed lake, the weir and immediately downstream of the spillway does not contain vegetation of conservation significance. Indeed, aside from the landscaped areas, the majority of the site is disturbed and poorly maintained, largely comprising monospecific stands of Coffee Bush (*Leucaena leucocephala*).

Minor areas of mangroves recognised as habitats of some conservation significance, occur 80 to 100 m downstream of the weir and extend to the edge of the proposed carpark. Landscape planning for the carpark area could incorporate a buffer zone to maintain the integrity of the mangrove margin and might consider the incorporation of pockets of significant remnant vegetation and/or valuable specimen trees, also found in this area, in the final design. Figure 1 indicates the distribution of these vegetation communities in relation to the proposed carpark.

No rare or endangered species or plant communities of restricted distribution were found within the site. The major potential impact on flora of the proposed development will involve clearing of dense *Leucaena* thickets and scattered specimen trees planted around the open drain. Overall, the removal of the *Leucaena* infestations will have a positive effect on the ecological and aesthetic value of the area.

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