



# SUMMARY REPORT

## RISK ASSESSMENT AND PRIORITY RANKING OF ACTION



SEPTEMBER 2006

## INTRODUCTION

More than 2,572 Darwin households, stakeholders groups and organisations participated in Council’s Environmental Management Plan (EMP) community consultation program. Due to the large number of issues identified by the community, a priority rating method for determination of the most urgent action for each issue in a particular area (the Environmental Management Unit) was developed. The risk assessment method used, while specifically developed for the EMP, is consistent with national risk assessment standards. (Environmental Action Plan: risk assessment of issues and priority ranking of action, May 2006).

The results of the EMP risk assessment determine the level of threat from environmental issues impacting on each of the known values in each EMU and identify action to address the problems most in need of remedial programs.

## SUMMARY RISK/PRIORITISATION METHODOLOGY

Two (2) sets of factors were taken into account to priority rank issues for each of the 24 EMUs:

1. habitats/landscapes with significant environmental value such as foreshore areas, wetlands of national significance or rare/ endangered fauna or flora;
2. sites with significant Risks from catchment activities, development and/or impacts from environmental issues such as stormwater pollution, litter, beach erosion and weed infestation.

During the assessment a value of: 1 = LOW RISK on value, 2 = MEDIUM RISK on value, 3 = HIGH RISK on value, 4 = VERY HIGH on value, 5 = EXTREME RISK on value was given to each issue identified in the EMU.

The level of risk assigned was directly proportional to the environmental impact the issue would have on the value if not addressed.

As more than one issue affects a particular EMU, the cumulative number of issues and their risk ranking is used to determine the overall environmental risk in each individual EMU. The overall risk score for each issue in each area (EMU) is summarised in Table 1.

Rating 4 (Very High Risk) and Rating 5 (Extreme Risk) issues will be addressed as a high priority in the EMP’s Action Plan.

## SUMMARY RESULTS

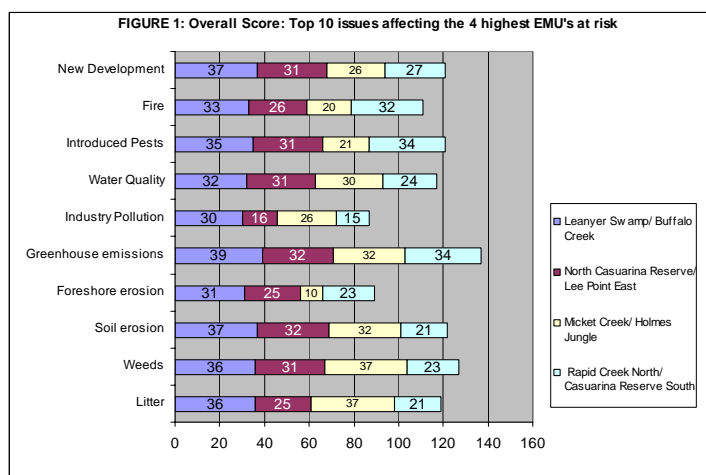
### 1. Assessment

The impact of thirteen (13) issues being: litter, weeds, soil erosion, foreshore erosion, greenhouse emissions, industrial pollution, water quality, native vegetation, introduced pests, fire, new development, endangered fauna/flora and heritage/culture on the identified values of each EMU was assessed. While some of these issues, such as native vegetation or heritage/culture, are values in themselves, they do have the potential of impact on other values. Examples include heritage management that involves restriction of access for management activities, including fire and weed management. Native vegetation also becomes an issue if aggressive species dominate an area impacting on biodiversity. Traditional activities such as the use of endangered fauna/flora as a food source carry the risk of overexploitation. While these risks are low, they nevertheless exist and must be considered in the overall assessment of an area. Figures 5 to 13 show the assessed risk for each issue in each of the 24 areas (EMU) assessed.

### 2. Overall Environmental Risk

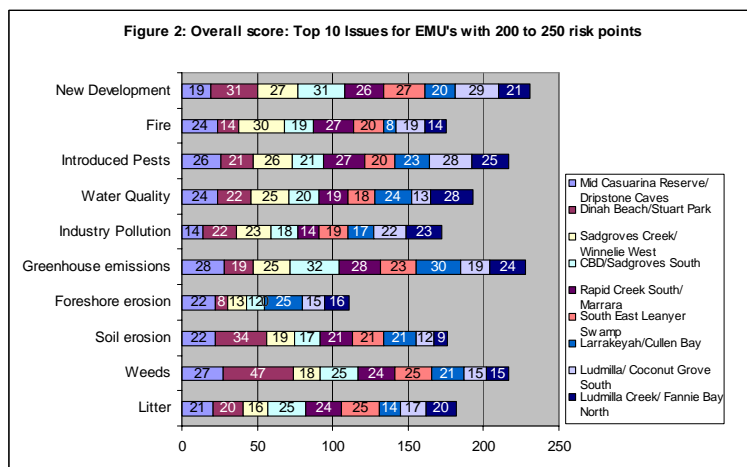
The sum of risk assessment points attained by each issue in each EMU identifies Darwin’s areas most at risk.

Leanyer Swamp/ Buffalo Creek (EMU 22), North Casuarina Reserve/ Lee Point East (EMU 24), Micket Creek/ Holmes Jungle (EMU 18), Rapid Creek North/ Casuarina Reserve South (EMU 14), are the top four (4) areas with overall risk scores of over 250 points. The results reflect the high number of environmental values in these

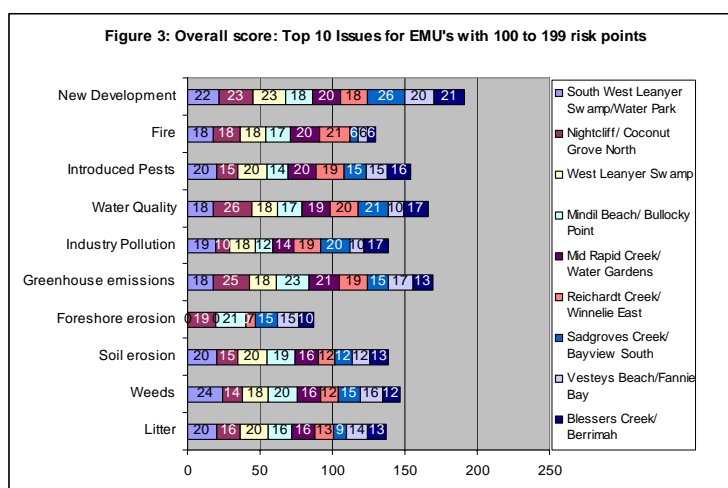


areas potentially subject to impacts from issues such as new development, litter, weeds, deteriorating water quality, greenhouse gas emissions (global warming) and foreshore erosion.

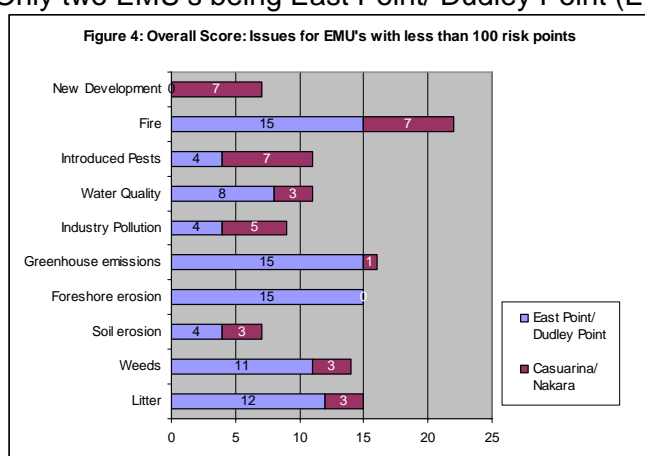
Nine EMU's being Mid Casuarina Reserve/ Dripstone Caves (EMU 23), Dinah Beach/Stuart Park (EMU 5), Sadgroves Creek/ Winnellie West (EMU 7), CBD/Sadgroves South (EMU 1), Rapid Creek South/ Marrara (EMU 17), South East Leanyer Swamp (EMU 19), Larrakeyah/Cullen Bay (EMU 2), Ludmilla/ Coconut Grove South (EMU 12) and Ludmilla Creek/ Fannie Bay North (EMU 11), achieved an overall risk score in excess of 200 risk points requiring that issues attracting very high (4) and extreme (5) risks are addressed as a priority in the EMP's Action Plan.



A further nine EMU's being South West Leanyer Swamp/Water Park (EMU 20), Nightcliff/ Coconut Grove North (EMU 13), West Leanyer Swamp (EMU 21), Mindil Beach/ Bullocky Point (EMU 3), Mid Rapid Creek/ Water Gardens (EMU 16), Reichardt Creek/ Winnellie East (EMU 8), Sadgroves Creek/ Bayview South (EMU 6), Vestey's Beach/Fannie Bay (EMU 4) and Blessers Creek/ Berrimah (EMU 9), attracted an overall score between 100 and 199 risk points. The overall score reflects that many issues are already managed and suburbs are well established. However, more than 100 total risk points still represent a high risk to the environment.



Only two EMU's being East Point/ Dudley Point (EMU 10) and Casuarina/ Nakara (EMU 15), with an overall risk score of 99 and 49 respectively, accumulated a total risk score of less than 100 points. Results may well be due to the fact that East Point is a managed and protected reserve and the EMU 15 area of Casuarina/Nakara is urbanised with very little native habitat remaining. Nevertheless, fire, introduced pests and the effects of global warming have been identified as Very High (4) risks for East Point/Dudley Point area and the effects of climate change, including more intense cyclones, and high-density redevelopment are rated a Very High (4) risk for the amenity of Casuarina/Nakara to be addressed in the EMP Action Plan.



**TABLE 1 OVERALL ENVIRONMENTAL RISK**

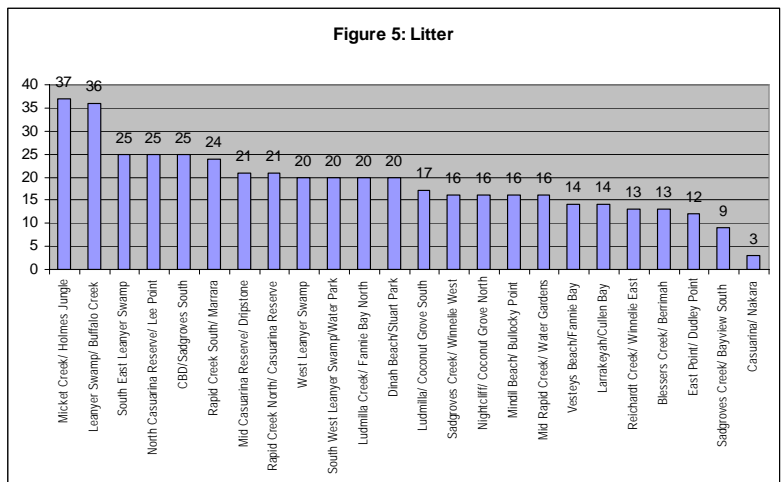
SUMMARY RESULTS: TOTAL RISK SCORE FOR EACH ISSUE IN EACH ENVIRONMENTAL MANAGEMENT UNIT															
EMU number	EMU	Litter	Weeds	Soil erosion	Foreshore erosion	Greenhouse emissions	Industry Pollution	Water Quality	Native vegetation	Introduced Pests	Fire	New Development	Endangered Fauna/Flora	Heritage/Culture	Overall Environmental Risk
22	Leanyer Swamp/ Buffalo Creek	36	36	37	31	39	30	32	9	35	33	37	7	11	373
24	North Casuarina Reserve/ Lee Point East	25	31	32	25	32	16	31	5	31	26	31	7	10	359
18	Micket Creek/ Holmes Jungle	37	37	32	10	32	26	30	6	21	20	26	8	2	287
14	Rapid Creek North/ Casuarina Reserve South	21	23	21	23	34	15	24	7	34	32	27	8	11	280
23	Mid Casuarina Reserve/ Dripstone Caves	21	27	22	22	28	14	24	6	26	24	19	6	9	248
5	Dinah Beach/Stuart Park	20	47	34	8	19	22	22	2	21	14	31	2	5	247
7	Sadgroves Creek/ Winnelle West	16	18	19	13	25	23	25	5	26	30	27	0	11	238
1	CBD/Sadgroves South	25	25	17	12	32	18	20	2	21	19	31	1	12	235
17	Rapid Creek South/ Marrara	24	24	21	0	28	14	19	6	27	27	26	7	10	233
19	South East Leanyer Swamp	25	25	21	0	23	19	18	5	20	20	27	5	9	217
2	Larrakeyah/Cullen Bay	14	21	21	25	30	17	24	2	23	8	20	3	8	216
12	Ludmilla/ Coconut Grove South	17	15	12	15	19	22	13	6	28	19	29	6	10	211
11	Ludmilla Creek/ Fannie Bay North	20	15	9	16	24	23	28	5	25	14	21	5	7	207
20	South West Leanyer Swamp/Water Park	20	24	20	0	18	19	18	5	20	18	22	5	9	198
13	Nightcliff/ Coconut Grove North	16	14	15	19	25	10	26	2	15	18	23	4	7	194
21	West Leanyer Swamp	20	18	20	0	18	18	18	5	20	18	23	5	8	191
3	Mindil Beach/ Bullocky Point	16	20	19	21	23	12	17	5	14	17	18	1	7	190
16	Mid Rapid Creek/ Water Gardens	16	16	16	0	21	14	19	5	20	20	20	4	6	177
8	Reichardt Creek/ Winnelle East	13	12	12	7	19	19	20	4	19	21	18	0	11	175
6	Sadgroves Creek/ Bayview South	9	15	12	15	15	20	21	4	15	6	26	2	6	166
4	Vestey's Beach/Fannie Bay	14	16	12	15	17	10	10	2	15	6	20	4	9	150
9	Blessers Creek/ Berrimah	13	12	13	10	13	17	17	3	16	6	21	3	5	149
10	East Point/ Dudley Point	12	11	4	15	15	4	8	4	4	15	0	5	6	99
15	Casuarina/ Nakara	3	3	3	0	1	5	3	2	7	7	7	0	1	42

**3. VERY HIGH AND EXTREME RISK ISSUES**

Ten (10) of the thirteen (13) issues assessed attracted consistently very high (4) and extreme (5) risk ratings and therefore require priority action, particularly in areas where impact is greatest. These issues are litter, weeds, soil erosion, foreshore erosion, greenhouse emissions, industrial pollution, water quality, introduced pests, fire and new development.

**LITTER**

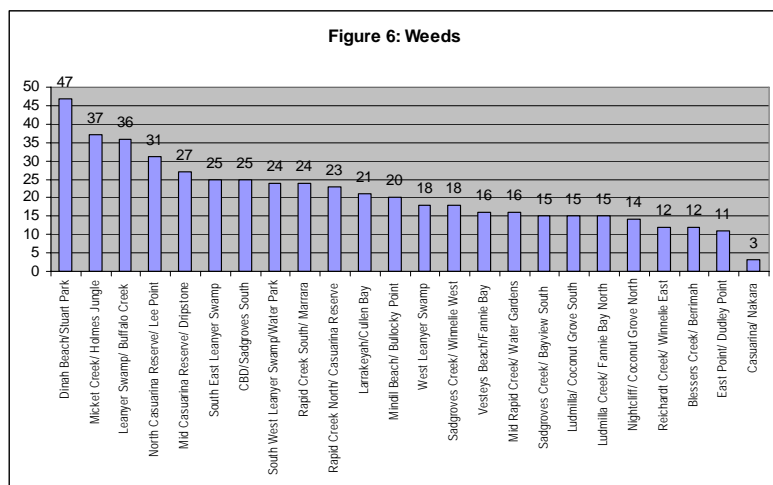
Littering is a serious issue in the wider Darwin region. Litter is unsightly, a health risk to the community and wildlife and leads poor water quality in our creeks and the Harbour. Some impacts from litter are experienced in all areas but risks are higher in popular areas with high recreational values or EMU's where little or no litter management activities are in place. Fourteen (14) of the 24 EMU's assessed received very high (4) or extreme (5) risk ratings for litter.



## WEEDS

261 weed species have been identified by Natural Resources Environment and the Arts (NREA) and Darwin City Council in the Darwin City area. Of particular concern is the widespread infestation of

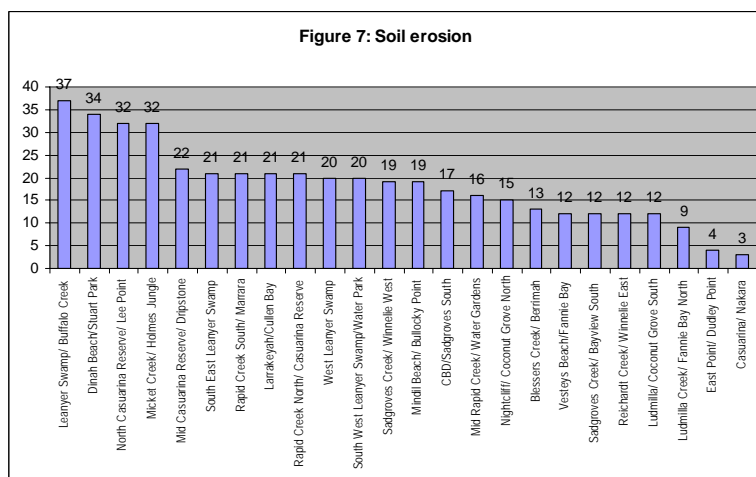
public land by *Mimosa pigra*, a “Weed of National Significance”. 31.7 % of NT government controlled land contains at least 1 weed species. *Mimosa pigra* has been found on 42 land parcels in Darwin City and currently occurs on 5 Council managed sites. 13.79% of all weeds recorded in Darwin occur in wetlands and pose a serious risk if management remains uncoordinated or non-existent. Considerable areas where the dominant cover is introduced weed species have been identified at Lee Point, Kulaluk Community and adjacent to the Casuarina foreshore at Tiwi. Holmes



Jungle, Leanyer Swamp and Winnelle, including the crown land and parts of the Charles Darwin National Park all received very high (4) or extreme (5) risk ratings for weed invasion.

## SEDIMENTATION/SOIL EROSION

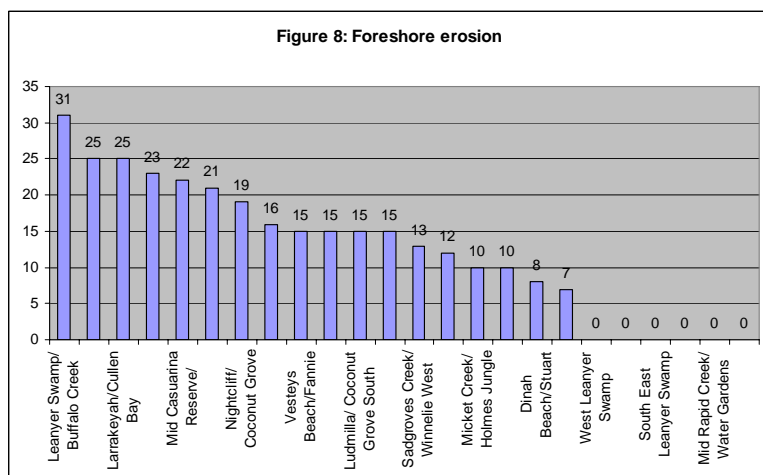
Soil erosion is often caused when heavy rain washes soils from land stripped bare of vegetation by fire or development. Soils and sand from urban areas or development sites, often contaminated with common pollutants such as oils, fuels, herbicides and other domestic and industrial chemicals, are carried through the stormwater system into creeks and the Harbour. Excessive sediment loads smother vegetation, including Mangroves and Seagrasses and deteriorate water quality. Turbidity, low oxygen levels and contamination of the water is often encountered near disturbed urban areas, particularly after rain. Risk assessment results show that the wetlands, harbour and native vegetation habitat are most at risk.



## FORESHORE EROSION

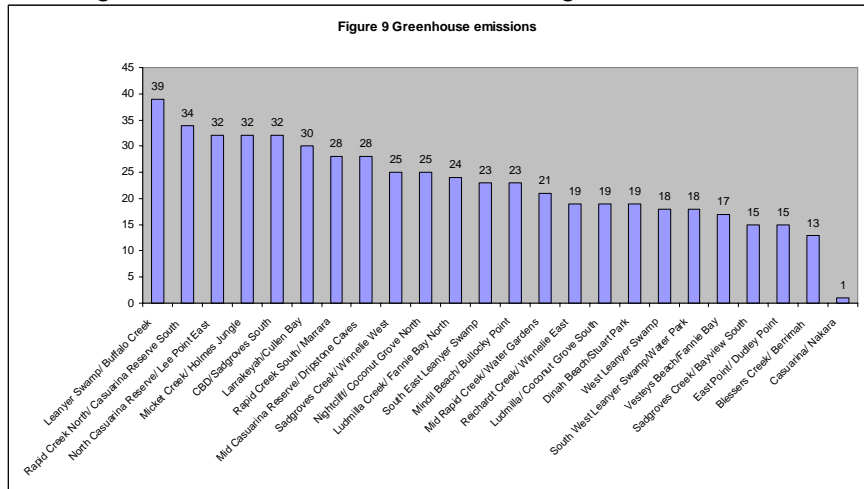
Darwin City's coastline consists of 20.3 km Mangroves/mud flats, 13.4 km beaches, 14.9 km rocky

foreshores or cliffs and 6.0 km constructed armaments. The partial collapse of the cliffs at Nightcliff and East Point Reserve as well as accelerated loss of beach sand from Vestey's Beach during the past years require coordinated investigation and management action from all levels of government. More than 98% of Darwin's 55 km coastline is now affected by erosion. Fourteen (14) of the 24 EMU's assessed received very high (4) or extreme (5) risk ratings for foreshore erosion.



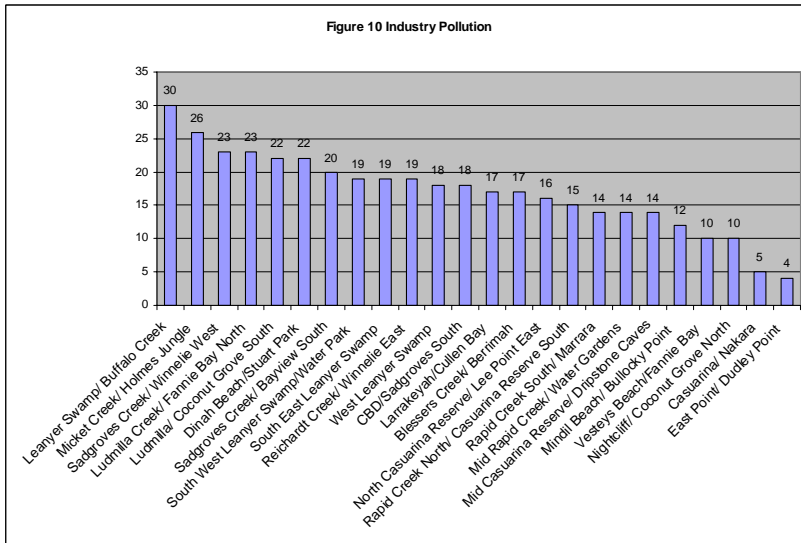
## GREENHOUSE EMISSIONS

Air quality, and in particular greenhouse gas emissions, have been increasing in line with Darwin's development. Cars, air conditioners, sewage plants, landfills, bush fires and burn-offs all contribute significantly to the emission loads in the tropical Top End. While global warming is a world wide issue, the effects, including sea level rises, higher temperatures and more frequent high category cyclones, are very much likely to have an impact on our day-to-day lives and the environment in the near future. Salinity is already impacting on Darwin's aquifers. Wetlands, now fresh to brackish for most of the year may become saline and as a result change vegetation communities and fauna habitats irreversibly. Due to the significant impacts expected from every increasing greenhouse gas emissions 18 of the 24 Darwin areas (EMU) assessed returned very high (4) or extreme (5) risk ratings.

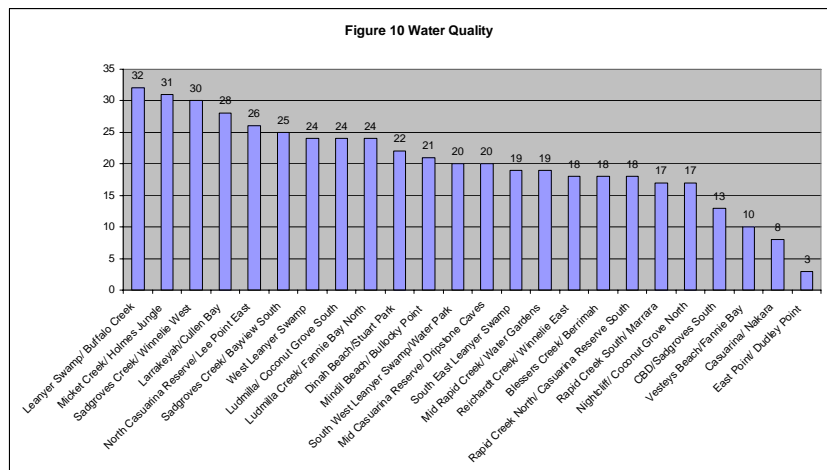


## INDUSTRY POLLUTION

Industrial pollution today is largely confined to the heavy and light industrial areas of Coconut Grove, Stuart Park, Winnellie/Sadgroves, Berrimah and the East Arm. However many foreshore areas, including Nightcliff and the CBD waterfront are already affected by pollution from historic land use. Chemicals, Asbestos, oils, fuels, heavy metals, including Lead from petrol and Arsenic from termite treatments, have lead to groundwater and soil impacts in many such sites. More stringent, enforced planning and environmental legislation is needed for sustainable development in the region in future.



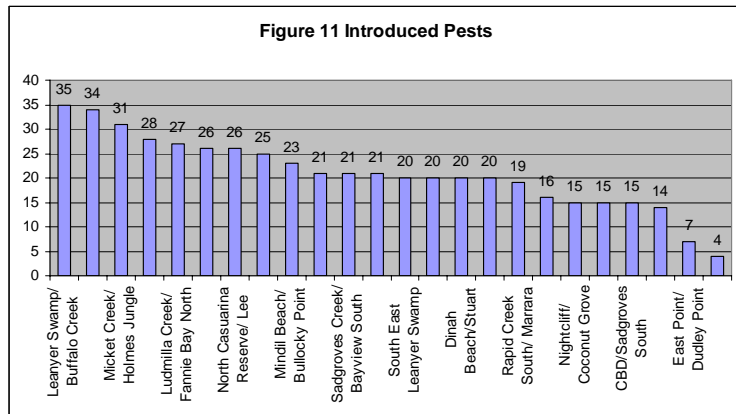
lack of freshwater during the dry season, stormwater contaminated by urban, commercial and industrial pollution and high salinity groundwater, are a significant issue for Darwin's valuable wetlands, Rapid Creek and the Harbour. The high number of new development and building sites across the city add to sediment loads which affect Mangroves and near shore seagrasses and reefs. Untreated and primary treated sewage discharges also bear significant risks over the long-term.



Good quality water is an essential prerequisite for public as well as environmental health and maintenance of the integrity of ecosystems/habitats. Water quality was the top rating concern raised during the community consultation program and achieved very high (4) and extreme (5) risk ratings in 19 of the 24 EMUs assessed.

### INTRODUCED PESTS

Impacts and threats to native bushland habitats and biodiversity from introduced fauna and flora have

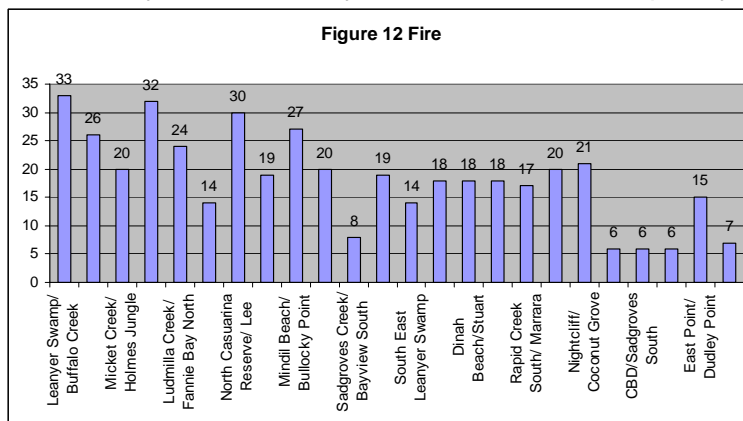


gradually increased over the past decade. Darwin Harbour hosts more international shipping traffic than ever and the International Airport is increasingly Australia's gateway to Asia for trade and tourism. Shipping, including illegal fishing vessels, international travel and the growing aquarium trade present an ever present risk for the introduction of new pest species. The recent advance of the Cane Toad in the Territory has added pressure to native fauna and the discovery of the black stripped mussel on a detained fishing boat

demonstrate the threat clearly. All these risk factors have a bearing on the outcome of the risk assessment which shows that introduced pests are a very high (4) to extreme (5) risk to the environmental values of all 24 EMUs assessed.

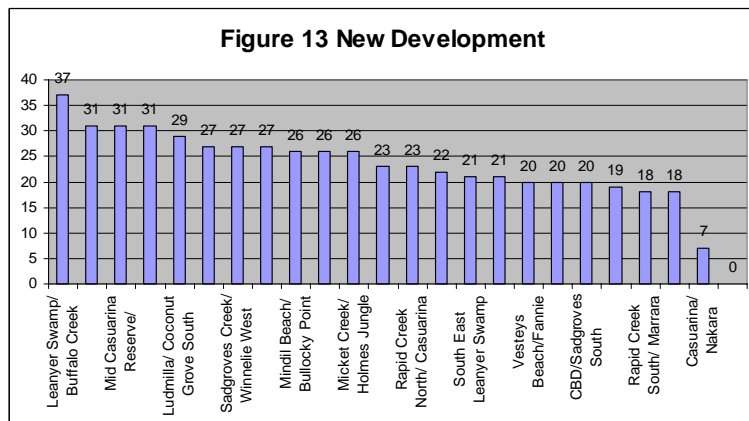
### FIRE

The Australian environment was shaped by fire over many thousands of years. However the frequency of illegally lit wildfires and, in some instances, unsustainable fire management practices over the past decade have lead to negative impacts, particular on more sensitive native vegetation habitats. Air quality issues such as increase of particulate and greenhouse gas emissions from wildfires have affected Darwin's environment and public health during the dry season. Appropriate action is needed to reduce very high (4) and extreme (5) risk ratings in all EMUs, to more acceptable levels.



### NEW DEVELOPMENT

New development and re-development, particular high density housing near foreshores, have changed



the face of Darwin over the past years. Community feedback during the EMP consultation process listed decreasing public open spaces, amenity and lack of reasonable access to foreshore and beaches in the CBD as areas requiring priority action. Many remnant native vegetation habitats are now fragmented or ceased to exist at all much to the detriment of native wildlife. Coordinated planning, integrated assessment and vision for the future is needed to maintain the City's unique environment and attractiveness for residents and tourist alike. Future quality

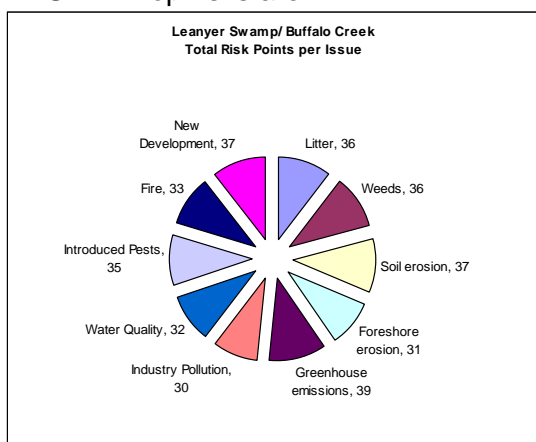
of life for the community, growth in tourism and the sustainable development of Darwin require the preservation of the City's character and identity.

#### 4. LOW RISK ISSUES

As outlined earlier native vegetation, endangered fauna and flora and culture/heritage issues can become a problem in itself, in particular when management activities in a multi value area results in conflict or competition between stakeholder or users. While risks are low, management plans and action must consider all values to ensure not one is lost to protect another. Low risk issues will be monitored and activities coordination advocated as the need arises. Details of low risk ratings and explanations for the risk scores are given in the detailed risk assessment Tables of the *Environmental Action Plan: risk assessment of issues and priority ranking of action, May 2006*.

#### 5. RISK ASSESSMENT RESULTS BY EMU

EMU 22: Top risks are



## ACTION PLAN DEVELOPMENT FOR PRIORITY ISSUES WITH RISK RATING VERY HIGH (4) AND EXTREME (5)

Table 1 LITTER: Very High (4) or Extreme (5) risk ratings for impacts from Litter.

EMU Number	EMU	Very High (4) or Extreme (5) Risk Rating on Value	ACTION: LITTER
1	CBD/Sadgroves South	Harbour (aquatic environment), Recreation, Parks/Open Spaces	<p>Reduction of litter and littering in the municipality will be achieved by the following action:</p> <ul style="list-style-type: none"> <li>• Education campaigns,</li> <li>• Enforcement of by-laws,</li> <li>• Development of by-lateral agreements to reduce litter,</li> <li>• Systematic waste bin audits and waste bin replacement program,</li> <li>• Introduction of public places recycling</li> <li>• Preparation of a Litter strategy,</li> <li>• Advocating for the eradication of litter,</li> <li>• Conduct quarterly media campaigns until all high priority are complete.</li> <li>• Implement the recommendation of the Gross Pollution Trap (GPT) Master Plan to combat stormwater litter</li> </ul>
2	Larrakeyah/Cullen Bay	Fauna and Flora, Doctor's Gully Reserve, Cullen Bay Marina	
3	Mindil Beach/Bullocky Point	Foreshore	
5	Dinah Beach/Stuart Park	Foreshore, One Mile Dam	
13	Nightcliff/Coconut Grove North	Foreshore, Parks/Open Spaces	
14	Rapid Creek North, Casuarina Reserve South	Foreshore, Casuarina Coastal Reserve	
16	Mid Rapid Creek/ Water Gardens	Native Vegetation Habitats, Rapid Creek, Flora and Fauna, Parks/Open Spaces	
17	Rapid Creek South/Marrara	Native Vegetation Habitats, Rapid Creek Reserve, Flora and Fauna, Parks/Open Spaces, Threatened Species, Marrara Swamp	
18	Micket Creek/Holmes Jungle	Micket Creek Complex, Holmes Jungle, Darwin Harbour Wetlands, Native Vegetation Habitats, Flora and Fauna, Parks/Open Spaces, Bird Species and the rare Mangrove <i>Avicennia integra</i>	
19	South East Leanyer Swamp	Wetlands, Micket Creek Complex, Holmes Jungle, Native Vegetation Habitats, Flora and Fauna, Parks/Open Spaces	
20	South West Leanyer Swamp/ Water Park	Wetlands, Leanyer Swamp, , Native Vegetation Habitats, Flora and Fauna, Parks/Open Spaces	
21	West Leanyer Swamp	Wetlands, Leanyer Swamp, , Native Vegetation Habitats, Flora and Fauna, Parks/Open Spaces	
22	Leanyer Swamp/Buffalo Creek	Casuarina Beach, Wetlands, Buffalo Creek, Flora/Fauna, Native Vegetation Habitats, Sandy Creek	
24	North Casuarina Reserve/Lee Point East	Foreshore	

## ACTION PLAN DEVELOPMENT FOR PRIORITY ISSUES WITH RISK RATING VERY HIGH (4) AND EXTREME (5)

Table 2 WEEDS Very High (4) or Extreme (5) risk ratings for impacts from Weeds

EMU Number	EMU	Very High (4) or Extreme (5) Risk Rating on Value	ACTION: WEEDS
1	CBD/Sadgroves South	Remaining Native Vegetation Habitats	<p>Improved weed management in the municipality will be achieved through the following action:</p> <ul style="list-style-type: none"> <li>• Facilitate the establishment of a weed management agreement with all relevant agencies:</li> <li>• Eradicate listed weeds on Council land</li> <li>• In conjunction with the NT government establish a native gardening education program</li> <li>• Promote the use of native species on World Environment Day and Arbor Day. School program: native seed distribution by balloon</li> <li>• Complete Significant Tree audits to update database</li> </ul>
2	Larrakeyah/Cullen Bay	Foreshore, remaining Native Vegetation Habitats, Fauna and Flora	
3	Mindil Beach/Bullocky Point	Foreshore, remaining Native Vegetation Habitats	
4	Vestey's Beach/Fannie Bay	Foreshore	
5	Dinah Beach/Stuart Park	Duke Street Rainforest	
7	Sadgroves Creek/ Winnellie West	Native Vegetation Habitats,	
9	Blessers Creek/Berrimah	Estuarine and Marine Habitats,	
13	Nightcliff/Coconut Grove North	Aboriginal Heritage areas,	
14	Rapid Creek North, Casuarina Reserve South	Foreshore, Casuarina Coastal Reserve, Flora/Fauna, Native Vegetation Habitats, Parks/Open Spaces	
15	Casuarinas/Nakara	Parks/Open Spaces	
16	Mid Rapid Creek/ Water Gardens	Native Vegetation Habitats, Rapid Creek, Flora and Fauna, Parks/Open Spaces	
17	Rapid Creek South/Marrara	Native Vegetation Habitats, Rapid Creek Reserve, Flora and Fauna, Parks/Open Spaces, Threatened Species, Marrara Swamp	
18	Micket Creek/Holmes Jungle	Micket Creek Complex, Holmes Jungle, Darwin Harbour Wetlands, Native Vegetation Habitats, Flora and Fauna, Parks/Open Spaces, Bird Habitats,	
19	South East Leanyer Swamp	Wetlands, Micket Creek Complex, Holmes Jungle, Native Vegetation Habitats, Flora and Fauna, Parks/Open Spaces	
20	South West Leanyer Swamp/ Water Park	Wetlands, Leanyer Swamp, , Native Vegetation Habitats, Flora and Fauna, Parks/Open Spaces	
21	West Leanyer Swamp	Wetlands, Leanyer Swamp, , Native Vegetation Habitats, Flora and Fauna,	
22	Leanyer Swamp/Buffalo Creek	Casuarina Beach/Lee Point, Wetlands, Buffalo Creek, Flora/Fauna, Native Vegetation Habitats, Sandy Creek	
23	Mid Casuarina Reserve/Dripstone Caves	Foreshore, Casuarina Coastal Reserve	
24	North Casuarina Reserve/Lee Point East	Foreshore, Casuarina Beach/Lee Point, Native Vegetation Habitats, Flora/Fauna, Dunes	

## ACTION PLAN DEVELOPMENT FOR PRIORITY ISSUES WITH RISK RATING VERY HIGH (4) AND EXTREME (5)

**Table 3 SEDIMENT/SOIL EROSION Very High (4) or Extreme (5) risk ratings for impacts from sediments/soil erosion**

EMU Number	EMU	Very High (4) or Extreme (5) Risk Rating on Value	ACTION: SEDIMENT/SOIL EROSION
1	CBD/Sadgroves South	Foreshore	<p>Improved Soil and sediment erosion control measures in the municipality will be achieved by the following action:</p> <ul style="list-style-type: none"> <li>• Gross Pollution Trap Master plan: introduction of sediment traps in key areas</li> <li>• Facilitate the introduction of sediment control plans for construction sites with the Housing Industry Association NT and Australia</li> <li>• Advocate for legislative and regulatory change to introduce best practice sediment control plans in the Northern Territory</li> <li>• Review potential application of by-laws to reduce sediment/soil erosion from development/building sites</li> </ul>
2	Larrakeyah/Cullen Bay	Doctor's Gully	
3	Mindil Beach/Bullocky Point	Foreshore, remaining Native Vegetation Habitats, Fauna/Flora	
5	Dinah Beach/Stuart Park	Foreshore, One Mile Dam	
7	Sadgroves Creek/ Winnellie West	Fauna/Flora, Native Vegetation Habitats	
9	Blessers Creek/Berrimah	Native Vegetation Habitats	
13	Nightcliff/Coconut Grove North	Foreshore	
14	Rapid Creek North, Casuarina Reserve South	Foreshore, Casuarina Coastal Reserve, Native Vegetation Habitats,	
15	Casuarinas/Nakara	Parks/Open Spaces	
16	Mid Rapid Creek/ Water Gardens	Native Vegetation Habitats, Rapid Creek, Flora and Fauna	
17	Rapid Creek South/Marrara	Native Vegetation Habitats, Rapid Creek Reserve, Flora and Fauna, Marrara Swamp	
18	Micket Creek/Holmes Jungle	Micket Creek Complex, Holmes Jungle, Darwin Harbour Wetlands, Native Vegetation Habitats, Flora and Fauna, Parks/Open Spaces, Bird Habitats and the rare Mangrove <i>Avicennia integr</i> a	
19	South East Leanyer Swamp	Wetlands, Micket Creek Complex, Holmes Jungle, Native Vegetation Habitats, Flora and Fauna, Parks/Open Spaces	
20	South West Leanyer Swamp/ Water Park	Wetlands, Leanyer Swamp, , Native Vegetation Habitats, Flora and Fauna, Parks/Open Spaces	
21	West Leanyer Swamp	Wetlands, Leanyer Swamp, , Native Vegetation Habitats, Flora and Fauna,	
22	Leanyer Swamp/Buffalo Creek	Casuarina Beach/Lee Point, Wetlands, Buffalo Creek, Flora/Fauna, Native Vegetation Habitats, Sandy Creek	
24	North Casuarina Reserve/Lee Point East	Foreshore, Casuarina Beach/Lee Point, Native Vegetation Habitats, Flora/Fauna, Dunes, Parks & Open Spaces	

## ACTION PLAN DEVELOPMENT FOR PRIORITY ISSUES WITH RISK RATING VERY HIGH (4) AND EXTREME (5)

**Table 4 FORESHORE EROSION Very High (4) risk ratings for impacts from foreshore erosion**

EMU Number	EMU	Very High (4) Risk Rating on Value	ACTION: FORSHORE EROSION
1	CBD/Sadgroves South	Foreshore, Recreation	<p>Better foreshore erosion management in the municipality will be achieved by the following action:</p> <ul style="list-style-type: none"> <li>• Develop and implement Foreshore Management Plan</li> <li>• Work with the community to stabilise dunes and foreshore areas where possible</li> <li>• Facilitate partnerships with Darwin Harbour Advisory Committee and other relevant agencies and organisations to investigate and combat foreshore erosion on Darwin's 55 km coastline.</li> <li>• Obtain external/internal funding to introduce erosion reduction measures, including formal public access/walkways/boardwalks to protect sensitive dune areas.</li> </ul>
2	Larrakeyah/Cullen Bay	Foreshore, Doctor's Gully, Peel's Well	
3	Mindil Beach/Bullocky Point	Foreshore, Parks & Open Spaces, remaining Native Vegetation Habitats, Fauna/Flora	
4	Vestey's Beach/Fannie Bay	Foreshore, remaining Native Vegetation Habitats	
10	East Point/Dudley Point	Foreshore, Native Vegetation Communities, Fauna/Flora, East Point Reserve	
11	Ludmilla Creek/Fannie Bay North	Foreshore, Native Vegetation Communities, Fauna/Flora, Parks & Open Spaces, East Point Reserve	
12	Ludmilla/Coconut Grove South	Foreshore, Native Vegetation Communities, Fauna/Flora	
13	Nightcliff/Coconut Grove North	Foreshore, Parks & Open Spaces	
14	Rapid Creek North, Casuarina Reserve South	Foreshore, Casuarina Coastal Reserve, Native Vegetation Habitats,	
19	South East Leanyer Swamp	Micket Creek Complex, Native Vegetation Habitats, Flora and Fauna, Parks/Open Spaces	
22	Leanyer Swamp/Buffalo Creek	Casuarina Beach/Lee Point, Flora/Fauna, Native Vegetation Habitats	
23	Mid Casuarina Reserve/Dripstone Caves	Foreshore, Native Vegetation Communities, Casuarina Coastal Reserve, Dripstone Caves, Parks & Open Spaces	
24	North Casuarina Reserve/Lee Point East	Foreshore, Casuarina Beach/Lee Point, Native Vegetation Habitats, Flora/Fauna, Dunes, Parks & Open Spaces	

## ACTION PLAN DEVELOPMENT FOR PRIORITY ISSUES WITH RISK RATING VERY HIGH (4) AND EXTREME (5)

Table 5 GREENHOUSE EMISSIONS High (4) or Extreme (5) risk ratings for impacts from greenhouse emissions/global warming

EMU Number	EMU	Very High (4) or Extreme (5) Risk Rating on Value	ACTION: GREENHOUSE EMISSIONS
1	CBD/Sadgroves South	Foreshore, Wildlife corridors, remaining Native Vegetation Habitats, Fauna/Flora, Harbour (aquatic environment)	<p>Reduction greenhouse gas emissions from the municipality will be achieved by the following action:</p> <ul style="list-style-type: none"> <li>• 25 % reduction of greenhouse gas emissions from 2001 values by 2010 for Council activities.</li> <li>• Work with the Community to cut greenhouse emissions by a further 10% from 2005 values 2010 from.</li> <li>• Advocate for the introduction of energy efficient street lighting</li> <li>• Exploration and introduction were possible, of alternate energy sources for Council buildings and vehicles.</li> <li>• Council provide incentives to staff and elected members car pooling or use of public transport or bicycles</li> <li>• Education campaigns and demonstration workshops for industry, commerce, the community and government</li> <li>• Facilitate information dissemination regarding carbon credits (renewable energy certificates)</li> </ul>
2	Larrakeyah/Cullen Bay	Foreshore, Doctor's Gully, Native Vegetation Habitats, Fauna/Flora, Cullen Bay Marina, Peel's Well	
3	Mindil Beach/Bullocky Point	Foreshore, remaining Native Vegetation Habitats, Fauna/Flora	
4	Vestey's Beach/Fannie Bay	Foreshore, Parks/Open Spaces	
5	Dinah Beach/Stuart Park	Foreshore, Fauna/Flora,	
6	Sadgroves Creek/Bayview South	Foreshore, Native Vegetation Habitats,	
13	Nightcliff/Coconut Grove North	Foreshore, Fauna/Flora, Parks/Open Spaces, Aboriginal Heritage	
14	Rapid Creek North, Casuarina Reserve South	Foreshore, Fauna/Flora, Casuarina Coastal Reserve, Native Vegetation Habitats, Parks/Open Spaces,	
15	Casuarinas/Nakara	Tree of Significance ( <i>Fiscus elastica</i> )	
16	Mid Rapid Creek/ Water Gardens	Native Vegetation Habitats, Rapid Creek, Flora and Fauna, Tree of Significance ( <i>Fiscus virens</i> ), Parks/Open Spaces	
17	Rapid Creek South/Marrara	Native Vegetation Habitats, Rapid Creek Reserve, Flora and Fauna, Marrara Swamp, Threatened Species (Black footed rat & Bladderwort plant)	
18	Micket Creek/Holmes Jungle	Micket Creek Complex, Holmes Jungle, Darwin Harbour Wetlands, Native Vegetation Habitats, Flora and Fauna, Parks/Open Spaces, Bird Habitats and the rare Mangrove <i>Avicennia integra</i>	
19	South East Leanyer Swamp	Wetlands, Micket Creek Complex, Holmes Jungle, Native Vegetation Habitats, Flora and Fauna, Parks/Open Spaces	
20	South West Leanyer Swamp/ Water Park	Wetlands, Leanyer Swamp, , Native Vegetation Habitats, Flora and Fauna	
21	West Leanyer Swamp	Wetlands, Leanyer Swamp, , Native Vegetation Habitats, Flora and Fauna,	
22	Leanyer Swamp/Buffalo Creek	Casuarina Beach/Lee Point, Wetlands, Buffalo Creek, Flora/Fauna, Native Vegetation Habitats, Sandy Creek	
23	Mid Casuarina Reserve/Dripstone Caves	Foreshore, Native Vegetation Communities, Dripstone Strong Point, Flora/Fauna, Dripstone Caves, Parks & Open Spaces	
24	North Casuarina Reserve/Lee Point East	Foreshore, Casuarina Beach/Lee Point, Native Vegetation Habitats, Flora/Fauna, Dunes, Parks & Open Spaces	

## ACTION PLAN DEVELOPMENT FOR PRIORITY ISSUES WITH RISK RATING VERY HIGH (4) AND EXTREME (5)

Table 6 INDUSTRY POLLUTION High (4) or Extreme (5) risk ratings for impacts from industry pollution

EMU Number	EMU	Very High (4) or Extreme (5) Risk Rating on Value	ACTION: INDUSTRY POLLUTION
5	Dinah Beach/Stuart Park	Foreshore, Native Vegetation Habitats, One Mile Dam	Industrial pollution mitigation in the municipality will be achieved by the following action: <ul style="list-style-type: none"> <li>• Advocate for the enforcement of the Waste Management and Pollution Control Act and Water Act for industry discharges and waste</li> <li>• Develop standard industry waste discharge conditions for inclusion as Council requirement in DCA approvals</li> </ul>
6	Sadgroves Creek/Bayview South	Foreshore, Fauna/Flora, Native Vegetation Habitats, Mangal Traditional Food Source	
8	Reichardt Creek/Winnellie East	Mangal Traditional Food Source	
9	Blessers Creek/Berrimah	Estuarine and Marine Habitats, Fauna/Flora, Native Vegetation Habitats, Mangal Traditional Food Source	
13	Nightcliff/Coconut Grove North	Foreshore, Parks/Open Spaces, Aboriginal Heritage	
16	Mid Rapid Creek/ Water Gardens	Native Vegetation Habitats, Rapid Creek, Flora and Fauna	
18	Micket Creek/Holmes Jungle	Micket Creek, Bird species & habitats	
19	South East Leanyer Swamp	Wetlands, Micket Creek Complex, Holmes Jungle, Native Vegetation Habitats, Flora and Fauna	
20	South West Leanyer Swamp/ Water Park	Wetlands, Leanyer Swamp, , Native Vegetation Habitats, Flora and Fauna	
21	West Leanyer Swamp	Wetlands, Leanyer Swamp, Native Vegetation Habitats, Flora and Fauna,	
22	Leanyer Swamp/Buffalo Creek	Casuarina Beach/Lee Point, Wetlands, Buffalo Creek, Flora/Fauna, Native Vegetation Habitats, Sandy Creek	

## ACTION PLAN DEVELOPMENT FOR PRIORITY ISSUES WITH RISK RATING VERY HIGH (4) AND EXTREME (5)

Table 7 WATER QUALITY High (4) or Extreme (5) risk ratings for impacts from poor water quality

EMU Number	EMU	Very High (4) or Extreme (5) Risk Rating on Value	ACTION: WATER QUALITY
2	Larrakeyah/Cullen Bay	Foreshore, Doctor's Gully, Cullen Bay Marina, Peel's Well	<p>Water quality improvements and water conservation objectives in the municipality will be achieved by the following action:</p> <ul style="list-style-type: none"> <li>• 20-year Water sustainability program</li> <li>• Gross Pollution Trap (GPT) Masterplan for Darwin,</li> <li>• Groundwater monitoring program</li> <li>• Lobbying the NT Government and PW to introduce legislation/licence changes to improve discharges from sewer outfalls</li> <li>• Develop and implement Water quality and conservation education programs with partner groups</li> </ul>
3	Mindil Beach/Bullocky Point	Foreshore	
4	Vestey's Beach/Fannie Bay	Foreshore, Parks/Open Spaces	
5	Dinah Beach/Stuart Park	Foreshore , Native Vegetation Habitats, One Mile Dam	
6	Sadgroves Creek/Bayview South	Foreshore, Fauna/Flora, Mangal Traditional Food Source	
8	Reichardt Creek/Winnellie East	Mangal Traditional Food Source	
9	Blessers Creek/Berrimah	Estuarine and Marine Habitats, Fauna/Flora, Native Vegetation Habitats, Mangal Traditional Food Source	
11	Ludmilla Creek/Fannie Bay North	Lake Alexander	
13	Nightcliff/Coconut Grove North	Foreshore, Fauna/Flora, Parks/Open Spaces, Aboriginal Heritage	
14	Rapid Creek North, Casuarina Reserve South	Foreshore, Fauna/Flora, Casuarina Coastal Reserve, Native Vegetation Habitats,	
16	Mid Rapid Creek/ Water Gardens	Native Vegetation Habitats, Rapid Creek, Flora and Fauna, Parks/Open Spaces	
17	Rapid Creek South/Marrara	Native Vegetation Habitats, Rapid Creek Reserve, Flora and Fauna, Marrara Swamp	
18	Micket Creek/Holmes Jungle	Micket Creek Complex, Holmes Jungle, Darwin Harbour Wetlands, Native Vegetation Habitats, Flora and Fauna, Bird Habitats and the rare Mangrove <i>Avicennia integra</i>	
19	South East Leanyer Swamp	Wetlands, Micket Creek Complex, Holmes Jungle, Native Vegetation Habitats, Flora and Fauna, Parks/Open Spaces	
20	South West Leanyer Swamp/ Water Park	Wetlands, Leanyer Swamp, , Native Vegetation Habitats, Flora and Fauna	
21	West Leanyer Swamp	Wetlands, Leanyer Swamp, , Native Vegetation Habitats, Flora and Fauna,	
22	Leanyer Swamp/Buffalo Creek	Casuarina Beach/Lee Point, Wetlands, Buffalo Creek, Flora/Fauna, Native Vegetation Habitats, Sandy Creek	
23	Mid Casuarina Reserve/Dripstone Caves	Foreshore, Native Vegetation Communities, Flora/Fauna, Casuarina Coastal Reserve	
24	North Casuarina Reserve/Lee Point East	Foreshore, Casuarina Beach/Lee Point, Native Vegetation Habitats, Flora/Fauna, Dunes, Casuarina Coastal Reserve	

## ACTION PLAN DEVELOPMENT FOR PRIORITY ISSUES WITH RISK RATING VERY HIGH (4) AND EXTREME (5)

Table 8 INTRODUCED PESTS High (4) or Extreme (5) risk ratings for impacts from introduced pests

EMU Number	EMU	Very High (4) or Extreme (5) Risk Rating on Value	ACTION: INTRODUCED PESTS
1	CBD/Sadgroves South	Harbour (aquatic environment)	Effective Introduced pest management in the municipality will be achieved by the following action: <ul style="list-style-type: none"> <li>• Continue working with Frogwatch to help with the eradication and control of the Cane Toad,</li> <li>• Darwin City Council to take a leadership role in the development and introduction of coordinated education and eradication programs with responsible bodies (Quarantine, Customs, NT Government's Marine Pest Group, Weeds Group, Fisheries)</li> </ul>
2	Larrakeyah/Cullen Bay	Fauna/Flora, Cullen Bay Marina, Peel's Well	
5	Dinah Beach/Stuart Park	Duke Street Rainforest, One Mile Dam/Duck Pond	
7	Sadgroves Creek/ Winnellie West	Estuarine and Marine Habitats, Vulnerable Species (False Water Rat), Mangal Traditional Food Source, Foreshore	
8	Reichardt Creek/Winnellie East	Mangal Traditional Food Source, Estuarine and Marine Habitats, Vulnerable Species (False Water Rat),	
9	Blessers Creek/Berrimah	Estuarine and Marine Habitats, Fauna/Flora, Mangal Traditional Food Source	
10	East Point/Dudley Point	Foreshore, Native Vegetation Communities, Fauna/Flora, East Point Reserve	
11	Ludmilla Creek/Fannie Bay North	Fauna/Flora, Lake Alexander, Vegetation Communities/Habitats, Foreshore, East Point Reserve	
12	Ludmilla/Coconut Grove South	Foreshore, Native Vegetation Communities, Ludmilla Creek, Fauna/Flora, Parks and Open Spaces	
13	Nightcliff/Coconut Grove North	Fauna/Flora, Aboriginal Heritage	
14	Rapid Creek North, Casuarina Reserve South	Foreshore, Fauna/Flora, Casuarina Coastal Reserve, Native Vegetation Habitats	
16	Mid Rapid Creek/ Water Gardens	Rapid Creek, Flora and Fauna	
17	Rapid Creek South/Marrara	Rapid Creek and Reserve, Flora and Fauna, Marrara Swamp, Threatened Species (Black footed rat & Bladderwort plant), national Heritage Sites: RAAF precinct	
18	Micket Creek/Holmes Jungle	Micket Creek Complex, Holmes Jungle, Darwin Harbour Wetlands, Native Vegetation Habitats, Flora and Fauna, Bird Habitats and the rare Mangrove <i>Avicennia integra</i>	
19	South East Leanyer Swamp	Wetlands, Micket Creek Complex, Holmes Jungle, Native Vegetation Habitats, Flora and Fauna	
20	South West Leanyer Swamp/ Water Park	Wetlands, Leanyer Swamp, , Native Vegetation Habitats, Flora and Fauna, Parks & Open Spaces	
21	West Leanyer Swamp	Wetlands, Leanyer Swamp, , Native Vegetation Habitats, Flora and Fauna, Parks & Open Spaces	
22	Leanyer Swamp/Buffalo Creek	Casuarina Beach/Lee Point, Wetlands, Buffalo Creek, Flora/Fauna, Native Vegetation Habitats, Sandy Creek	
23	Mid Casuarina Reserve/Dripstone Caves	Foreshore, Native Vegetation Communities, Dripstone Strong Point, Flora/Fauna, Dripstone Caves Casuarina Coastal Reserve,	
24	North Casuarina Reserve/Lee Point East	Foreshore, Casuarina Beach/Lee Point, Native Vegetation Habitats, Flora/Fauna, Dunes, Casuarina Coastal Reserve	

## ACTION PLAN DEVELOPMENT FOR PRIORITY ISSUES WITH RISK RATING VERY HIGH (4) AND EXTREME (5)

Table 9 FIRE High (4) or Extreme (5) risk ratings for impacts from fire

EMU Number	EMU	Very High (4) or Extreme (5) Risk Rating on Value	ACTION: FIRE
1	CBD/Sadgroves South	Wildlife corridors, remaining Native Vegetation Habitats	<p>Better Fire management in the municipality will be achieved by the following action:</p> <ul style="list-style-type: none"> <li>Support NT Government and other organisation's efforts in fire management</li> </ul>
5	Dinah Beach/Stuart Park	Duke Street Rainforest, One Mile Dam	
7	Sadgroves Creek/ Winnellie West	Charles Darwin National Park, Fauna/Flora, Native Vegetation Habitats, NT Threatened Species ( <i>Nervilla plaicata</i> , <i>Cycas armstrongii</i> ), Foreshore	
8	Reichardt Creek/Winnellie East	Charles Darwin National Park, Fauna/Flora, Native Vegetation Habitats, NT Threatened Species ( <i>Cycas armstrongii</i> )	
10	East Point/Dudley Point	Native Vegetation Communities, Fauna/Flora, East Point Reserve	
11	Ludmilla Creek/Fannie Bay North	East Point Reserve	
13	Nightcliff/Coconut Grove North	Foreshore, Fauna/Flora, Aboriginal Heritage	
14	Rapid Creek North, Casuarina Reserve South	Foreshore, Fauna/Flora, Ichthyosaur and Wood Fossils, Casuarina Coastal Reserve, Native Vegetation Habitats, Parks & Open Spaces	
16	Mid Rapid Creek/ Water Gardens	Native Vegetation Habitats, Rapid Creek, Flora and Fauna	
17	Rapid Creek South/Marrara	Native Vegetation Habitats, Rapid Creek and Reserve, Flora and Fauna, Marrara Swamp, Threatened Species (Black footed rat & Bladderwort plant), national Heritage Sites: RAAF precinct	
18	Micket Creek/Holmes Jungle	Micket Creek Complex, Holmes Jungle, Darwin Harbour Wetlands, Native Vegetation Habitats, Flora and Fauna, Bird Habitats and the rare Mangrove <i>Avicennia integra</i>	
19	South East Leanyer Swamp	Wetlands, Micket Creek Complex, Holmes Jungle, Native Vegetation Habitats, Flora and Fauna	
20	South West Leanyer Swamp/ Water Park	Wetlands, Leanyer Swamp, , Native Vegetation Habitats, Flora and Fauna	
21	West Leanyer Swamp	Wetlands, Leanyer Swamp, , Native Vegetation Habitats, Flora and Fauna	
22	Leanyer Swamp/Buffalo Creek	Casuarina Beach/Lee Point, Wetlands, Buffalo Creek, Flora/Fauna, Native Vegetation Habitats, Sandy Creek, Casuarina Coastal Reserve	
23	Mid Casuarina Reserve/Dripstone Caves	Foreshore, Native Vegetation Communities, Dripstone Strong Point, Flora/Fauna, Dripstone Caves Casuarina Coastal Reserve,	
24	North Casuarina Reserve/Lee Point East	Casuarina Beach/Lee Point, Native Vegetation Habitats, Flora/Fauna, Casuarina Coastal Reserve	

## ACTION PLAN DEVELOPMENT FOR PRIORITY ISSUES WITH RISK RATING VERY HIGH (4) AND EXTREME (5)

Table 10 NEW DEVELOPMENT High (4) or Extreme (5) risk ratings for impacts from new development

EMU Number	EMU	Very High (4) or Extreme (5) Risk Rating on Value	ACTION: NEW DEVELOPMENT
1	CBD/Sadgroves South	Wildlife corridors, remaining Native Vegetation Habitats, NT Heritage listed buildings, Parks & Open Spaces	<p>Increased sustainability in New Developments in the municipality will be achieved by the following action:</p> <ul style="list-style-type: none"> <li>• Darwin City Council to take a lead role in maintaining public access to foreshores, protecting foreshores for future generations and ensuring that new development has minimum impact of the foreshore environment.</li> <li>• Encourage energy efficient architecture and construction</li> <li>• Darwin City Council provide comment on new developments to the NT Government DCA, with particular note on: <ul style="list-style-type: none"> <li>▪ Foreshore development</li> <li>▪ Density</li> <li>▪ Public open space</li> <li>▪ Energy efficiency</li> <li>▪ Water conservation</li> <li>▪ Appropriate tropical architecture</li> <li>▪ Harmful emission minimisation</li> </ul> </li> </ul>
2	Larrakeyah/Cullen Bay	Parks & Open Spaces	
3	Mindil Beach/Bullocky Point	Foreshore, Trees of Significance, Parks/Open Spaces, remaining Native Vegetation Habitats, Fauna/Flora and rare plant <i>Crateva religiosa</i>	
4	Vestey's Beach/Fannie Bay	Foreshore, Trees of Significance, Native Vegetation Habitats, Parks & Open Spaces	
5	Dinah Beach/Stuart Park	Foreshore ,Duke Street Rainforest, Parks & Open Spaces,Trees of Significance, Native Vegetation Habitats, Fauna/Flora, One Mile Dam	
6	Sadgroves Creek/Bayview South	Foreshore, Parks & Open Spaces, Fauna/Flora, Native Vegetation	
7	Sadgroves Creek/ Winnellie West	Mangrove Communities, Trees of Significance, Parks & Open Spaces	
8	Reichardt Creek/Winnellie East	Mangrove Communities	
9	Blessers Creek/Berrimah	Estuarine and Marine Habitats, Fauna/Flora, Native Vegetation Habitats, Trees of Significance, Mangal Traditional Food Source	
11	Ludmilla Creek/Fannie Bay North	Fauna/Flora, Native Vegetation Habitats, Foreshore, Trees of Significance, Parks/Open Spaces	
12	Ludmilla/Coconut Grove South	Foreshore, Native Vegetation Communities, Ludmilla Creek, 2 National Estate registered sites, Fauna/Flora, Trees of Significance	
13	Nightcliff/Coconut Grove North	Foreshore, Fauna/Flora, Trees of Significance	
14	Rapid Creek North, Casuarina Reserve South	Trees of Significance	
15	Casuarinas/Nakara	Tree of Significance ( <i>Fiscus elastica</i> ), Parks/Open Spaces	
16	Mid Rapid Creek/ Water Gardens	Tree of Significance, Native Vegetation Habitats, Flora and Fauna, Parks/Open Spaces	
17	Rapid Creek South/Marrara	Native Vegetation Habitats, Flora and Fauna, Threatened Species (Black footed rat & Bladderwort plant), Marrara Swamp, Parks/Open Spaces	
18	Micket Creek/Holmes Jungle	Flora and Fauna, Native Vegetation Habitats, Parks/Open Spaces, Micket Creek, Darwin Harbour Wetlands, Bird Habitats and the rare Mangrove <i>Avicennia integra</i>	
19	South East Leanyer Swamp	Wetlands, Flora/fauna, Parks/Open Spaces, Micket Creek Complex,	

## ACTION PLAN DEVELOPMENT FOR PRIORITY ISSUES WITH RISK RATING VERY HIGH (4) AND EXTREME (5)

EMU Number	EMU	Very High (4) or Extreme (5) Risk Rating on Value	ACTION: NEW DEVELOPMENT
		Holmes Jungle, Native Vegetation Habitats,	
20	South West Leanyer Swamp/ Water Park	Wetlands, Leanyer Swamp, Native Vegetation Habitats, Flora and Fauna, Parks/Open Spaces,	
21	West Leanyer Swamp	Wetlands, Leanyer Swamp, Native Vegetation Habitats, Flora and Fauna, Parks/Open Spaces, 3 National Heritage listed sites	
22	Leanyer Swamp/Buffalo Creek	Casuarina Beach/Lee Point, Wetlands, Buffalo Creek, Flora/Fauna, Native Vegetation Habitats, Parks/Open Spaces	
23	Mid Casuarina Reserve/Dripstone Caves	Parks/Open Spaces	
24	North Casuarina Reserve/Lee Point East	National Heritage listed sites, NT Heritage listed sites, Native Vegetation Habitats, Parks/Open Spaces, Casuarina Coastal Reserve, Flora/Fauna, Dunes	