



Broome Environmental Consultancy

Report for Broome North Vegetation Management Plan

January 2010

Prepared by



CLIENTS | PEOPLE | PERFORMANCE



Contents

1.	Introduction	3
1.1	Scope of Works	3
1.2	Project Context	4
2.	Existing Environment	8
2.1	Vegetation Types	8
2.2	Vegetation Condition	9
2.3	Fauna habitat	9
2.4	Flora Species	10
2.5	ESA, TECs, Wetlands and Reserves	12
3.	Legal Requirements and Commitments	13
3.1	Legal Requirements	13
3.2	Proposed Commitments	14
4.	Vegetation Management through the Development Phase	16
4.1	Vegetation Clearing	16
4.2	Topsoil Removal and Re-use	18
4.3	Weed Management	19
5.	Post-Development Phase Monitoring and Management	20
5.1	Vegetation Monitoring	20
5.2	Landscaping	20
5.3	Fire	21
5.4	Management of Homeowner Lots	21
6.	Conclusion	22
7.	References	23

1. Introduction

1.1 Scope of Works

The scope of this Vegetation Management Plan is to provide:

- ▶ A description of the existing vegetation within the project area.
- ▶ A description of the legal and statutory requirements associated with vegetation in Western Australia;
- ▶ Identification of environmental aspects associated with vegetation that will require management prior, during and after land development;
- ▶ Management actions to minimise vegetation associated environmental impacts of the proposed land development; and
- ▶ Guidelines for ongoing management of vegetation on site.

It is assumed that the land developers will formulate and implement a Construction Environmental Management Plan (CEMP) or similar document which will ensure adherence to development conditions and planning guidelines. The CEMP will utilise the management actions described in this Vegetation Management Plan.

1.2 Project Context

LandCorp plans to subdivide and develop a total of approximately 725ha of land north of Broome Town site and the Broome airstrip. (Refer to *FIGURE ONE*)

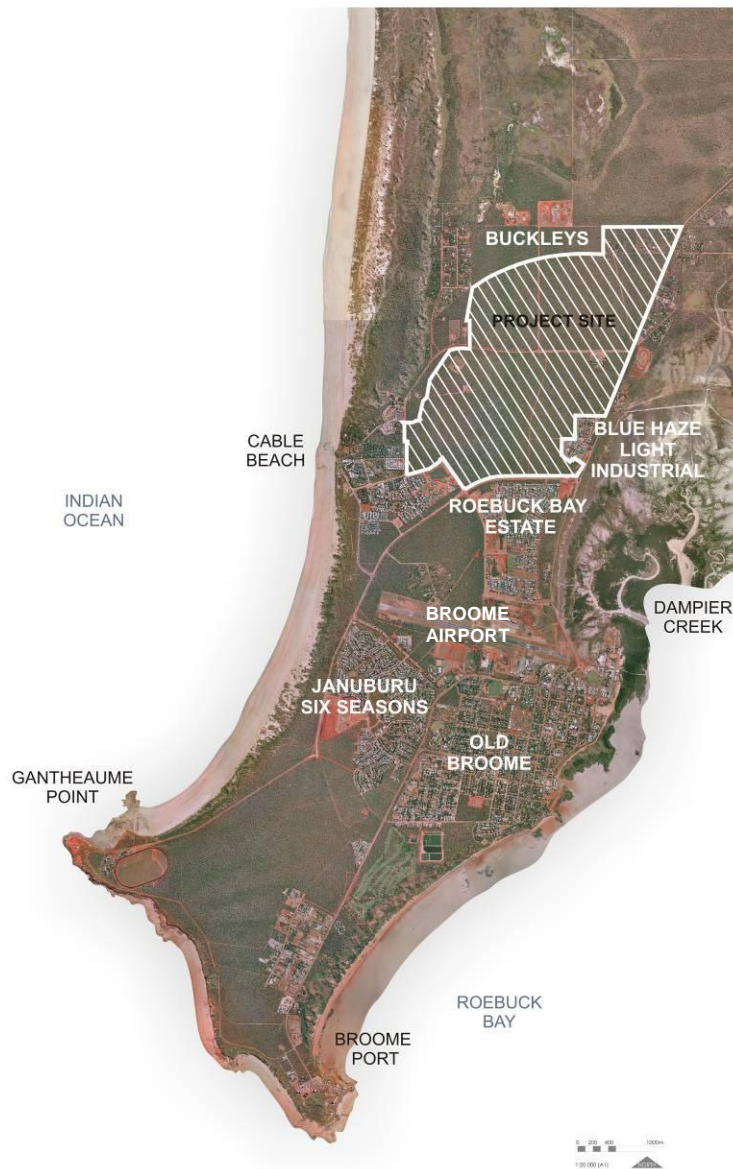


FIGURE ONE: BROOME PENINSULA
Broome North Project Area indicated in white

This development is known as “Broome North” and is located north of Gubinge road and is bordered by Broome road to the east and Lullfitz road to the west. The site is dissected by a number of existing unsealed roads including Fairway Drive and Buckleys Road. A low ridgeline is situated on the west of the site running north south ensuring rainfall runoff flows from this ridgeline to the back of the dunes at Cable Beach on the west and towards the Dampier Creek mangroves to the east as shown in FIGURE TWO.

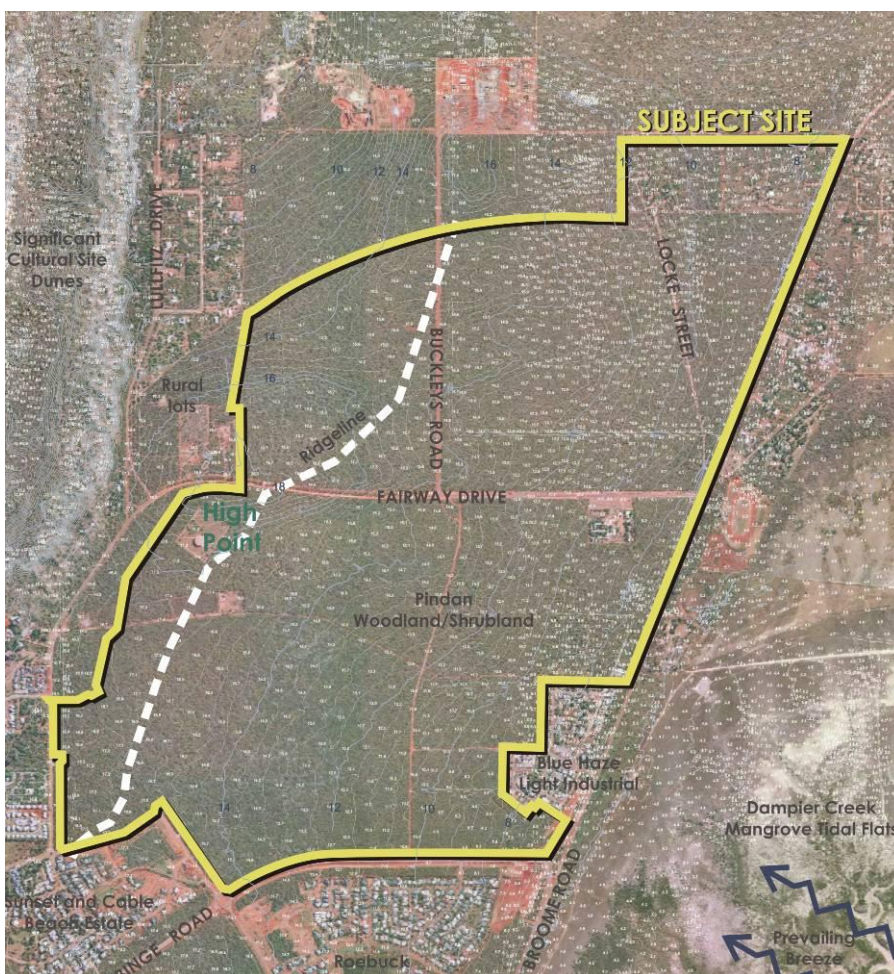


FIGURE TWO: BROOME NORTH SITE

The *Broome North* development is intended to supply the majority of Broome's medium to long term land supply, and has the capacity for several thousand homes as well as schools, workers accommodation, tourism, light industrial and commercial/ retail opportunities.

Through extensive stakeholder and community consultation including a Planning and Design Forum (August 2009), the consultant team, the Shire of Broome, traditional owners and the local community finalised a Draft Concept Plan for the future development.(refer to FIGURE THREE).

It is proposed that the development will respect the cultural and environmental heritage of the area and include elements to help foster 'connection to country' and enhance community.

The biological environment of Broome North is an important part for this project for both cultural and environmental reasons and the existing site has been investigated and documented in a number of previous assessments, including a Preliminary Environmental Impact Assessment, a flora survey and a Level 2 fauna survey (GHD 2009a, GHD 2009b and GHD 2009c).

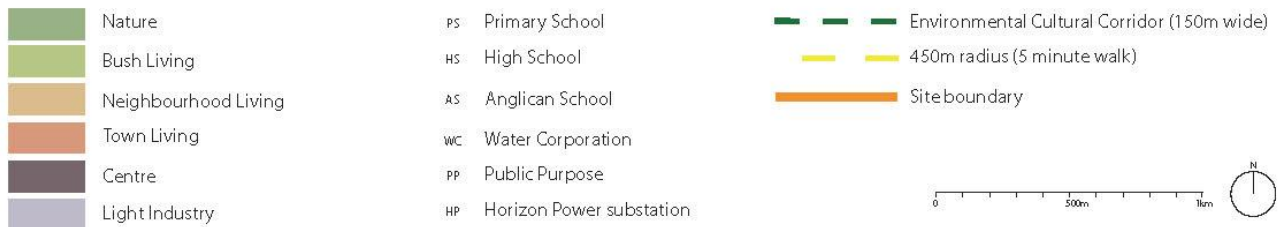
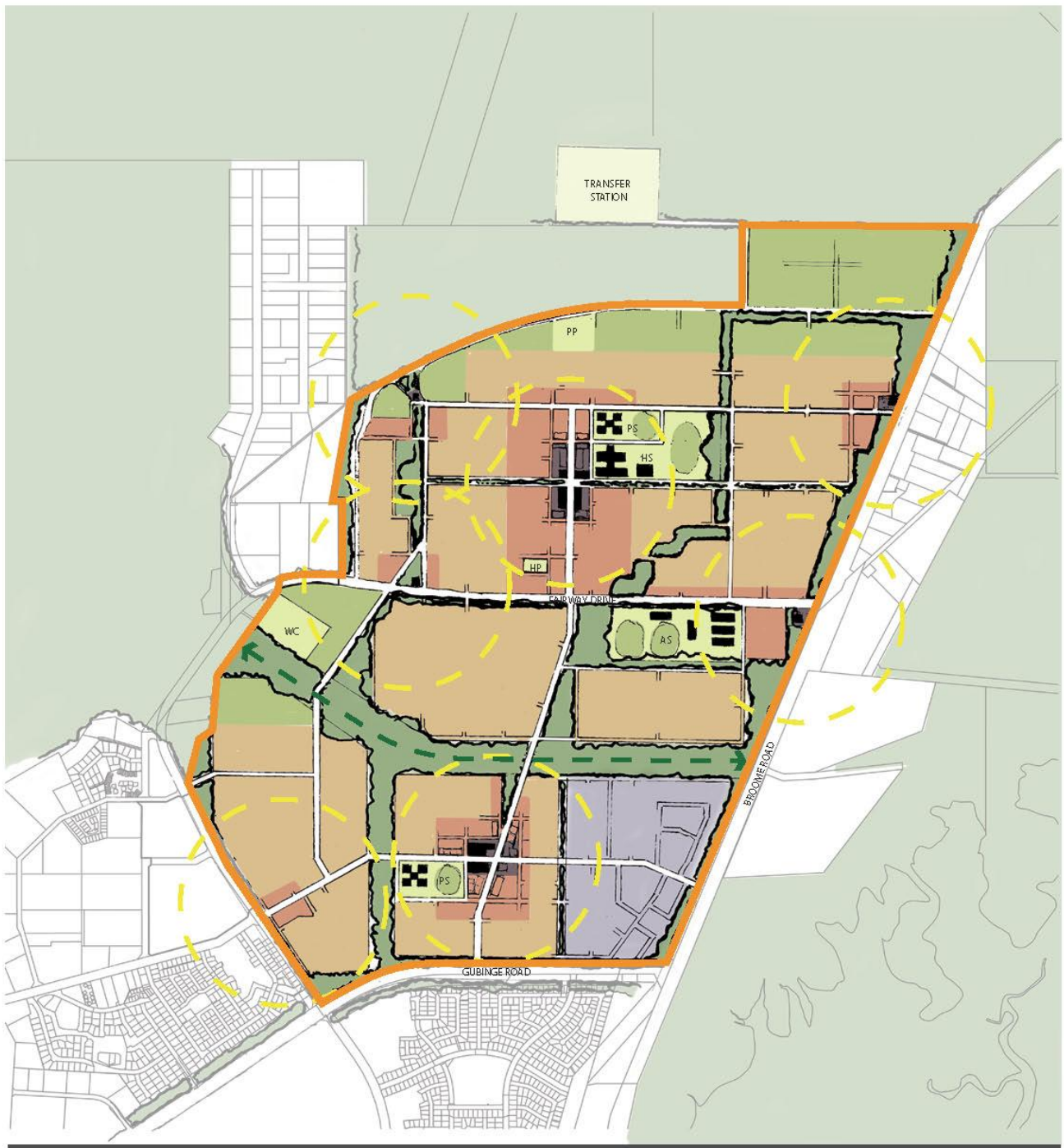


FIGURE THREE: PLANNING DESIGN FORUM DRAFT CONCEPT PLAN

2. Existing Environment

The existing environment of Broome North has been described in detail within previous reports. In 2009 GHD completed a combined Preliminary Environmental Impact Assessment (PEIA) and Biological Survey for Broome North (GHD 2009a and b). The following details have been extracted from the PEIA and Biological Survey.

2.1 Vegetation Types

Broome North contains a relatively uniform vegetation type; Mixed Acacia low woodland.



FIGURE FOUR: EXISTING VEGETATION ON THE DEVELOPMENT SITE

Mixed Acacia low woodland is dominated by the following species: *Acacia eriopoda*, *A. tumida*, *A. coleii* with scattered *Corymbia polycarpa*, *C. zygothylla*, *C. greeniana*, *Bauhinia cunninghamii* and *Gyrocarpos americanus* over *Hakea arborescens*, *H. macrocarpa*, *Persoonia falcata*, over *Acacia adoxa*, *Distichostemon hispidulus*, *Gossypium australe*, **Sida acuta*, *Solanum cunninghamii*, **Calotropis procera*, *Waltheria indica* over herbs and grasses, including: *Trichodesma zeylanicum*, *Heliotropium tenuifolium*, *Ptilotus* sp., *Triodia* sp., **Cenchrus ciliaris*, **Aerva javanica*, *Cymbopogon ambiguus*, *Eragrostis eriopoda*, *Chrysopogon pallidus*, *Aristida holathera*.

The vegetation in disturbed areas, such as areas previously cleared, along tracks, rubbish dumping (household and garden waste), along powerlines and within the light industrial area, shows some variation, with a dominance of disturbance response species and increase in introduced species such as *Trichodesma zeylanicum*, **Aerva javanica*, **Citrullus lanatus*, **Hyptis suaveolens*, **Ocimum basilicum*

and **Cenchrus ciliaris*. Localised variation across the study area in terms of species and structural composition of the vegetation can largely be attributed to fire impacts on the vegetation.

Mixed Acacia low woodland is widespread within the local area and is not considered to be under-represented.

2.2 Vegetation Condition

Developed for Bush Forever, the vegetation Condition Rating is a scale that recognises the quality and biodiversity of vegetation, which is defined by the following (Government of WA, 2000):

- ▶ Completeness of structural levels;
- ▶ Extent of weed invasion;
- ▶ Historical disturbance from tracks and other clearing or dumping; and
- ▶ The potential for natural or assisted regeneration.

The scale therefore consists of six (6) rating levels from *Pristine* to *Completely Degraded*.

The vegetation condition of the study area was rated during the GHD 2008 field survey using the Vegetation Condition Rating Scale.

The majority of the study area shows some evidence of disturbance however was generally in good condition and was rated Condition 3 - 4 (*Very Good – Good*). Areas of disturbance were most evident along roads and tracks, within and adjacent to the light industrial area, private properties and other previously cleared areas. These areas were rated Condition 4 to 6 (*Good to Completely Degraded*). Small localised areas of disturbance occur in areas where cars, household and garden waste have been dumped.

The study area shows evidence of frequent use by local people for various purposes. The purposes include Buckleys Road being used as Broome's waste station route with general access to private properties adjacent. Additional uses include recreation (four wheel driving, motor bikes and BMX), and illegal rubbish dumping, given its close proximity to the Broome town site and Cable Beach.

There has been a long history of fire in the Broome area as a result of wildfires and controlled fires. The variable appearance and density of the vegetation, in particular the Acacias, relates directly to the history and intensity of fire and their re-generation cycles. There was evidence of a low intensity fire within the last two years in the area right of Buckleys Road and left of Locke Street.

2.3 Fauna habitat

No significant fauna species were identified during field assessments, which included searching and trapping.

No habitats were recorded that are considered to be specific to the study area and no permanent or semi-permanent water points were located within the study area.

A healthy and diverse understorey, as found across the project area, is important habitat for mammals and reptiles. The study area also contains a number of microhabitats that would be utilized by reptile species, such as areas of thick leaf litter, logs and loose sand.

Northern Brushtail Possums were recorded within the study area inhabiting established eucalypt woodland. Aged *Corymbia* species contain suitable hollow logs for fauna to utilize, primarily the Northern Brushtail Possum. Hollow logs take many years to develop and are valuable fauna habitat. LandCorp propose to maintain sufficient possum habitat and corridor options in Broome North to allow the possum population to remain in the area.

2.4 Flora Species

Broome North can be described as having moderate flora species diversity. A total of 95 taxa from 33 families were recorded from the survey area. Of these, 80 taxa were native plant species.

No Declared Rare or Priority Flora species were recorded from the survey area.

2.4.1 Introduced Species

Fifteen introduced species were recorded from Broome North. Most of these are weed species that have naturalised and may be widespread throughout the Kimberley region. Weeds found in the study area included Kapok (**Aerva javanica*), Buffel Grass (**Cenchrus ciliaris*), Rubber Tree/Calotropis (**Calotropis procera*), Noogoora Burr (*Xanthium strumarium*), Curry Bush (**Senna occidentalis*), Bellyache Bush (**Jatropha gossypifolia*), Rosella (**Hibiscus sabdariffa*), Verano Stylo (**Stylosanthes hamata*), Wild Passionfruit (**Passiflora foetida* var. *hispida*), Zornia (**Ziziphus mauritiana*), Pie Melon (**Citrullus lanatus*), Basil Bush (**Ocimum basilicum*), Mint Bush (**Hyptis suaveolens*) **Triumfetta petandra*, and **Sida acuta*.

The presence of a number of these species reflects the extent of disturbances across the study area as a result of human activities such as clearing, rubbish dumping, roads and tracks, and infrastructure such as the light industrial area and water tank. Previous clearing and grazing has also occurred within some parts. Weed species were most dominant along the tracks and roads, within and adjacent to the light industrial area, and amongst rubbish dumped within the study area.

2.4.2 Declared Plants

Weeds that are, or may, become, a problem to agriculture or the environment can be formally classified as Declared Plants under the *Agriculture and Related Resources Protection Act, 1976*. The Department of Agriculture and Food Western Australia (DAFWA) and the Agriculture Protection Board maintains a list of Declared Plants for Western Australia. If a plant is declared for the whole of the State or for particular Local Government Areas, all landholders are obliged to control that plant on their properties.

Declarations specify a category, or categories, for each plant according to the control strategies or objectives which the Agriculture Protection Board believes are appropriate in a particular place.

Three introduced species recorded within the study area are listed as Declared Plants; the Bellyache Bush, Rubber Tree/*Calotropis* and the Noogoora burr.

- ▶ The Bellyache Bush is listed as P1 for the whole of the State and P4 for all the municipal districts in that portion of the State north of the 26th parallel.
- ▶ The Rubber Tree/*Calotropis* is listed as P1 for all municipal districts in that portion of the State North of the 26th parallel of latitude, except the municipal districts of Ashburton, Broome, Halls Creek, Derby-West Kimberley and Wyndham-East Kimberley and as P2 for the municipal districts of Ashburton, East Pilbara, Port Hedland and Roebourne. Therefore, there is no control category assigned for the municipal district of Broome.
- ▶ The Noogoora burr is listed as P1 for the whole of the State and P4 for the municipal districts of Broome.
- ▶ As per Environs Kimberley's recommendation the following additional weed species are to be monitored and managed:
 - - Camel Melon *Citrullus lanatus*
 - - Butterfly Pea *Clitoria ternatea*
 - - Siratro *Macroptilium atropurpureum*
 - - Hairy Merremia, *Merremia aegyptia*
 - - White Creeper *Merremia dissecta*
 - - Stinking Passion Vine *Passiflora foetida*
 - - Neem *Azadirachta indica*
 - - Coffee Bush *Leucaena leucocephala*
 - - Taylor Fruit *Ziziphus mauritiana* Declared plant P1, P5
 - - Gallons Curse *Cenchrus biflorus*
 - - Buffel Grass *Cenchrus ciliaris*
 - - Mossman River Grass *Cenchrus echinatus*
 - - Mintweed *Hyptis suaveolens*
 - Mossman River Grass *Cenchrus echinatus* - *Triumfetta*, *Triumfetta petandra*

Other high threat weeds that have been located close to the site should be on the control list, should they later be located within the development zone:

- - Tiger paw *Ipomoea pes-tigridis*
- - Rubber vine *Cryptostegia madagascariensis* Declared plant P1, P2
- - Coffee Senna, *Senna occidentalis* Declared plant P1, P2
- - Candle Bush *Senna alata*
- - Khaki weed *Alternanthera pungens*
- - Praxelis *Praxelis clematidea* Declared plant P1/ National Alert list species

2.5 ESA, TECs, Wetlands and Reserves

No Environmentally Sensitive Areas (ESAs) are situated within Broome North.

The study area is partially located within the buffer zones of one 'Vulnerable' Threatened Ecological Community (TEC); 'vine thickets on the coastal sand dunes of Dampier Peninsula'. However, no TECs or Priority Ecological Community (PEC) have been identified within the study area;

No wetlands or watercourses are located within the study area.

There are no State reserves or conservation areas within close proximity to Broome North. A coastal dune reserve is present to the west of Broome North, but is buffered by privately owned 'hobby farm' lots, other bushland and a proposed new reserve for the Yawuru people.

3. Legal Requirements and Commitments

3.1 Legal Requirements

The examination of the environmental issues associated with vegetation management for Broome North has been conducted with respect to the environmental legislation and standards described in Table 1.

Table 1 Key Environmental Legislation and Standards relating to Vegetation

Legislation/Standard	General Description	Source	Issues Relevant to Broome North
Environment Protection and Biodiversity Conservation Act 1999	This Act is the primary Commonwealth legislation directed to protecting the environment in relation to Commonwealth land and controlling significant impacts on matters of national environmental significance. The Act requires assessment and approval of actions that are likely to have a significant impact on a matter of national environmental significance, or are undertaken by a Commonwealth agency or involve Commonwealth land and will have a significant impact on the environment.	Com.	No flora or fauna species, communities or issues considered as matters of NES on the Broome North site.
Environmental Protection Act 1986 <ul style="list-style-type: none"> ▶ Environmental Protection (Clearing Native Vegetation) Regulation 2004 	An Act to create an Environmental Protection Authority, for the prevention, control and abatement of environmental pollution, for the conservation, preservation, protection, enhancement and management of the environment. The <i>Environmental Protection Act 1986</i> (EP Act) is the overarching environmental legislation that deals with the protection of the environment and environmental offences. The EP Act is administered and enforced by the Western Australia Department of Environment and Conservation (DEC).	WA	Native vegetation clearing will be dealt with as part of the WAPC process for land development. Clearing permits will only be required if land beyond the requirements for the subdivision is cleared.
Wildlife Conservation Act 1950 <ul style="list-style-type: none"> ▶ Wildlife Conservation (Reptiles and Amphibians) Regulations 2002 ▶ Wildlife Conservation Regulations 1970 	An Act to provide for the conservation and protection of wildlife. The Act designates the regulations surrounding the collection and taking of flora and fauna, and administers protection of flora and fauna throughout the State, and the special protection of flora and fauna as declared by notice published in the <i>Government Gazette</i> . Conservation of flora and fauna is currently administered through the DEC.	WA	No flora or fauna species listed under the Wildlife Conservation Act have been identified on the Broome North.

Legislation/Standard	General Description	Source	Issues Relevant to Broome North
The <i>Agriculture and Related Resources Protection Act</i> 1976.	The <i>Agricultural and Related Resources Protection Act</i> Act provides for the management, control and prevention of certain plants and animals, for the prohibition and regulation of the introduction and spread of certain plants and of the introduction, spread and keeping of certain animals, for the protection of agriculture and related resources generally, and for incidental and other purposes.	WA	Two plants on the site are listed under this Act. They are Bellyache Bush and Rubber Tree. Management of the species is required.
Bush Fire Act 1954	An Act to make better provision for diminishing the dangers resulting from bush fires, for the prevention, control and extinguishment of bush fires, and the repeal of the <i>Bush Fires Act 1937</i> .	WA	Relates to the ongoing management of fire within the Broome North area.

3.2 Proposed Commitments

LandCorp have considered environmental objectives associated with the development of Broome North. Those objectives directly associated with vegetation management are:

- ▶ To maintain the integrity of local ecosystems (including biodiversity, habitat etc)
- ▶ To protect and enhance native flora and fauna.

Through consideration of the existing landscape, the local spatial order and cultural understanding, LandCorp hope to set a new benchmark for development in the North West Region. The Planning Design Forum Draft Concept Plan (FIGURE THREE) and a Draft Landscape Masterplan Report (UDLA, 2009) describe and map a number environmental open space initiatives associated with the vegetation at Broome North.

The main opportunity, known as an Environmental and Cultural Corridor (ECC) has been used successfully delivered within other developments in Broome. Within the Broome North development LandCorp proposes to set aside a 150m wide tract of land east-west across the development site to remain undeveloped. The location and width of the ECC was chosen in co-operation with the Yawuru through a series of meetings. The ECC addresses both cultural and environmental issues including:

- Natural buffer /linkage for people to move through;
- Fauna corridor and habitat;
- Retains a significant portion of local bushland (connection to country);
- Allows education and traditional practices to continue on the land;
- Supports biodiversity and local ecology; and,
- Provides important connections between significant sites.

Rural style post and wire fencing will be installed around the perimeter of the ECC to ensure animals and breezes can move across the site, however, discouraging vehicles and associated rural litter (illegal dumping) from entering the area.

It is important to note that the ECC will include linear drainage swale systems along its perimeter. These swales will occupy no more than 20m of the ECC boundary and the low batters will be rehabilitated with site topsoil, site mulch and local vegetation.

In addition to the ECC a number of other multi use corridors have been designated within the plan. These secondary corridors will fulfil a variety of environmental and cultural requirements similar to the ECC, such as;

- Provide space for a linear natural and urban drainage network;
- Opportunity for animal and plant access across the site;
- Opportunity for pedestrian and cycleway networks;
- Provide opportunity for Connection to 'country' (Local planting and materials);
- Flora and fauna linkages;
- Cultural linkages;
- Community opportunities (Kick about areas, formal play, Exercise equipment); and,
- Public and community art opportunities.

These multiuse corridors will connect to informal and formal open space areas such as neighbourhood parks and will feature areas of retained and supplemented local vegetation where possible. The linear parkland will vary in width up to approximately 50m. Swale drainage will be rehabilitated with local vegetation and will navigate significant existing trees with rock pitching and anti scouring devices installed where necessary.

The retention of areas of native vegetation together with commitment to the management actions listed within this document will ensure impacts to vegetation from the development of Broome North are comparatively kept to a minimum.

4. Vegetation Management through the Development Phase

4.1 Vegetation Clearing

It is anticipated that the development of Broome North will occur in stages, spanning a number of decades, primarily from the south to the north. It is possible that the vegetation condition will alter over the time of the land development.

4.1.1 Potential Impacts

Clearing for development of subdivisions within Broome North will result in direct loss of plants and loss of habitat for fauna. It is important that clearing is kept to the minimum necessary. LandCorp are committed to retaining a sustainable amount of vegetation within Broome North. This will be retained in a number of ways:

- ▶ Environmental Cultural corridor (East West direction);
- ▶ Multi Use Corridors (predominant North South direction);
- ▶ Vegetated interrelated Lot Drainage swales;
- ▶ Public open Space areas; and,
- ▶ Retention of Vegetation on Housing lots.

Broome North contains a large number of trees, although few are over 5 or 6 metres high. Of significance are *Lysiphyllum cunninghamii* (Bauhinia), *Corymbia* (eucalypt) species and *Gyrocarpus americanus* (Colliman or Helicopter Tree), due to the fact that they are not killed by fire as are the dominant *Acacia* trees. LandCorp proposes for larger individual trees to be identified and retained as parts of POS, road reserves etc. where possible.

Vegetation clearing will disturb local fauna. LandCorp aims to maintain possum habitat linkages throughout Broome North, in particular within the ECC, other corridors and public open space. Management actions are provided below which will limit the impact of construction upon fauna species.

Clearing has the potential to change surface hydrology altering soil moisture and causing erosion. Construction works also increase the risk of fire and changes in fire regimes may alter vegetation composition and structure.

4.1.2 Management Measures

The land developers shall ensure that the following management measures are implemented:

- ▶ Prior to any disturbance, clearing zones will be marked by pegs or flagging and on construction plans;
- ▶ Seeds and landscaping materials will be collected off the land prior to clearing;
- ▶ The ECC will be fenced prior to clearing. The fence will be a permanent fixture;

- ▶ Vegetation clearing lines will be checked prior to the commencement of clearing operations by the construction contractor(s). This will be checked by LandCorp or its representative to ensure that it is correctly defined. Clearing will not occur outside the marked clearing lines;
- ▶ The construction contractor(s) will develop detailed construction procedures and a clearing checklist to minimise clearing of native vegetation. The checklist will include hold points that require Superintendent approval;
- ▶ Trees of particular significance e.g *Lysiphyllum cunninghamii*, *Gyrocarpus americanus* and larger *Corymbia* species shall be conserved wherever practicable and shall be clearly marked prior to the commencement of clearing;
- ▶ Trees that are to be removed shall be felled in a manner that they fall within the approved clearing area;
- ▶ Dumped rubbish, including garden waste, will be removed from bushland prior to clearing and disposed of at the Shire of Broome transfer station;
- ▶ Access tracks, vehicle parking and temporary materials storage will be located on existing cleared areas or on disturbed sites which incur minimum loss of trees and shrubs;
- ▶ Stockpiles shall only be placed in existing cleared areas;
- ▶ Clearing of vegetation shall be undertaken in stages and along one front to allow fauna to move to adjacent separate habitats;
- ▶ Trap and move Northern Brushtail possums or other native fauna from the area prior to clearing if necessary;
- ▶ The use of a fauna clearance team should be used to remove and relocate disturbed fauna and venomous animals, during any periods of vegetation clearing for subdivision development;
- ▶ No burning of cleared vegetation shall be permitted within the project site other than that agreed with the Shire of Broome and FESA;
- ▶ Cleared native vegetation will be mulched and reused for soil stabilisation and rehabilitation in POS, drainage swales etc. following construction;
- ▶ Through contract specification recommendation that a monetary value is placed on individual trees and vegetation indicated to be retained. For example any damage to existing vegetation shall be assessed as follows:

<i>Significant Trees (> 5.0m height)</i>	<i>\$10,000.00 each</i>
<i>Minor Trees (2.0-5.0m height)</i>	<i>\$5,000.00 each</i>
<i>Major Tree Limbs (> 100mm diameter)</i>	<i>\$500.00 each</i>
<i>Minor Tree Limbs (≤ 100mm diameter)</i>	<i>\$200.00 each</i>
<i>Major Shrubs (> 2.0m height)</i>	<i>\$500.00 each</i>
<i>Minor Shrubs (≤ 2.0m height)</i>	<i>\$50.00 ea or \$18 /sq m</i>
<i>Grassland and/or Dune Vegetation</i>	<i>\$25.00 per sq metre</i>
<i>Established Lawn or Grass</i>	<i>\$10.00 per sq metre</i>

Any clearing or damage to any vegetation, within or beyond the extent of works, without the written authorisation of the Superintendent, shall be assessed according to the above table and such monetary value(s) shall be deducted from the monies payable under this Contract.

Irrespective of the payment of any penalties, any damage caused by the Contractor to vegetation, landforms or fauna habitat outside approved clearing areas must be reinstated at the Contractor's cost in consultation with the Superintendent and relevant Authorities. (Extract from UDLA standard specification, 2009)

Compliance Criteria

No refuse or garden waste plants will remain in the bushland areas.

No vegetation shall be damaged outside the agreed clearing zone (recommend penalties apply and monitored during construction contract), except where necessary for the removal of refuse.

Cleared and chipped native vegetation shall be available for use in rehabilitation.

4.2 Topsoil Removal and Re-use

4.2.1 Potential Impacts

Topsoil contains native seeds which is a valuable resource. Topsoil must be carefully protected where possible or otherwise removed, stored and re-used where appropriate. LandCorp plans to limit removal of topsoil. Topsoil removed during construction is to be stockpiled for a short period only and reused in many areas including POS, drainage swales, lots etc.

4.2.2 Management Measures

The following actions will be undertaken:

- ▶ Following vegetation clearing, topsoil within disturbance zones and other areas where earthworks will occur will be stripped to a depth of 150 mm and temporarily stockpiled within an already cleared area that is free of any Declared weed species;
- ▶ Machines used for pushing and heaping operations will be fitted with root rakes or similar equipment and operated in a manner such that as little topsoil as possible is removed and heaped with the cleared vegetation material;
- ▶ Topsoil that has been removed and cannot immediately be used will be stockpiled in locations approved by the construction Superintendent. These stockpiles will be located as in areas that will not restrict or interfere with site drainage or vegetation to be retained;
- ▶ Compaction of the topsoil during stockpiling will be avoided. Topsoil will be left in the stockpiles for a maximum period of six months. As far as is practicable, stockpiles will be kept to a maximum height of 1.2m;
- ▶ The quality of topsoil in stockpiles will be maintained by measures including protection against contamination from other materials, minimising stockpiling periods and prevention of erosion by surface runoff or wind;
- ▶ Monitoring for erosion and erosion risk will be undertaken regularly to ensure that any erosion that does occur is promptly mitigated;
- ▶ Any spoil will be removed from site and taken to a site agreed with the Shire of Broome; and
- ▶ Topsoil will be respread where applicable along with mulched native vegetation in POS, drainage swales or degraded areas which can be rehabilitated.

Compliance Criteria

Suitable topsoil will be removed as specified and stored for the minimum period possible.

Any erosion effects will be mitigated within a maximum of seven days of being identified.

4.3 Weed Management

4.3.1 Potential Impacts

There is a risk that construction works may introduce new weed species into the area or spread or increase the abundance of weeds within the remaining native vegetation within and adjacent to the site.

Management actions for controlling weeds during construction are presented below. Further on-going weed control measures, in particular for the declared plants, are presented in section 5.1.

4.3.2 Management Measures

Recommended actions are as follows:

- ▶ The movement of weed seeds and weed seed contaminated soils needs to be minimised by ensuring that machinery is cleaned of loose dirt and vegetative material before entering or leaving the construction area;
- ▶ Areas of remnant native vegetation should not be disturbed by soil excavation and vehicle access, or by stockpiling of materials;
- ▶ Clean down of all vehicles and machinery of plant material and soil before entering the work site from other work sites which may contain weed species should occur. Clean down should consist of either brushing, gouging and/or scraping to remove any compacted soils or plant material, accompanied and followed by jetting with compressed air/water such that all soil and plant residue is removed;
- ▶ Any imported soil or materials will be sourced from areas that are free from noxious weeds or significant environmental weeds;
- ▶ Soil from the areas where Declared Plants and other identified, significant, environmental weeds occur will be isolated and will remain at, or as close as possible to the source location;
- ▶ Any spoil containing Declared Plants or from areas where they were present will be disposed to an area which is not at threat from weed infestation or from which the weeds cannot spread (e.g. a designated landfill site);
- ▶ As per Environs Kimberley's recommendation seasonal selective weed control will be included. This responds to the flush of growth promoted by the wet season. Earth works should be timed in order to prevent seed spread. \
- ▶ Invasive weeds are to be monitored and sprayed where and when outbreaks occur during civil / landscape works and during two year maintenance period.

5. Post-Development Phase Monitoring and Management

5.1 Vegetation Monitoring

Vegetation monitoring will primarily consist of ongoing weed monitoring and control. Three Declared Plants are known to occur within Broome North.

- ▶ The Bellyache Bush and Noogoora burr are listed as P1 for the whole of the State and P4 for the municipal district of Broome.
- ▶ The Rubber Tree/*Calotropis* is listed as P1 for all municipal districts in that portion of the State North of the 26th parallel of latitude, except the municipal districts of Ashburton, Broome, Halls Creek, Derby-West Kimberley and Wyndham-East Kimberley. Therefore, there is no control category assigned for the municipal district of Broome. Although there is no mandatory requirement for control of Rubber Tree/*Calotropis* it would be best practice to control its spread.

Where a plant is declared for the whole of the State or for particular Local Government Areas, all landholders are obliged to control that plant on their properties. Occurrences of Declared Plants need to be controlled using recommended methods outlined by the Western Australian Department of Agriculture and Food.

The control of Declared Plants is likely to be an on-going requirement for relevant land managers and the Shire of Broome. Although Declared Weeds should be removed prior to the development of housing, there is the potential for re-establishment, particularly if future landowners are not aware of these species.

5.1.1 Management Measures

- ▶ Land managers will undertake measures to control the Declared Plants, Bellyache Bush and Noogoora Burr on areas of retained vegetation that is not within private ownership;
- ▶ The relevant land manager for the area will undertake ongoing monitoring of POS, ECC and other corridors;
- ▶ LandCorp and appropriate land developers should provide education to land owners of the requirements for declared plant control on their properties.

5.2 Landscaping

A landscaping or revegetation plan for Public Open Space (POS) and the multi use corridors will be completed in later design stages. Broad management guidelines relating to vegetation and landscaping are described below. These should be considered when compiling the landscaping plan.

- ▶ The landscaping master plan suggests a range of native and non-native species for revegetation and street plantings. Wherever possible native locally-sourced species should be planted.
- ▶ Dead, standing or fallen timber should be retained as habitat, wherever possible and used if any rehabilitation of areas is undertaken.

- ▶ Where drainage swales are located in public spaces these should be vegetated with native vegetation.
- ▶ Broome North will demand high levels of plant stocks, consultation should take place with local nurseries at an early stage to ensure adequate stock.

5.3 Fire

Much of the vegetation in the Kimberley is fire tolerant and requires some level of controlled burning to regenerate. The region's pindan, woodland, heathland and spinifex vegetation requires periods of between at least 5 years free of fire to develop sufficient seed stocks to re-establish following fire. It is possible that retained vegetation within Broome North will require a prescribed fire in the future. Burning off is not permitted within Broome Townsite.

The opportunities for undertaking prescribed controlled burning within the ECC and other broad corridors with retained native vegetation should be discussed with representatives of the Yawuru and the local DEC office.

5.4 Management of Homeowner Lots

5.4.1 Potential Impacts

Introduced plant species, in addition to requiring high levels of maintenance and care, have the potential to become invasive, i.e. garden escapees, and cause future problems with weed management and their removal. (E.g. Neem and Fig Trees). LandCorp are committed to encouraging the use and availability of local native plant species for both POS and homeowners. Endemic species compliment their unique conditions, provide habitat and food for the survival of local fauna and continue to support local ecosystems.

5.4.2 Management Actions

- ▶ Landowners should be encouraged to develop sustainable gardens, use high percentage of native plant species in garden, retain native vegetation on blocks and provide wildlife friendly gardens.
- ▶ Provide education packs to land developers, land purchasers and homeowners. This should include a list of invasive plants that should not be used in gardens and the requirements for managing declared plants.

6. Conclusion

It is the intention of LandCorp to ensure that the Broome North development recognises the important role of existing vegetation, habitat and landform.

For this reason, vegetation management and design strategies acknowledge opportunities to protect and enhance this unique local environment.

The resultant strategies were developed through understanding the existing site, recognition of legal and statutory requirements and identification of environmental aspects associated with vegetation management prior, during and after land development.

7. References

UDLA (2009) *Broome North Landscape Master Plan Report*. Prepared for LandCorp

GHD (2009a) *Report for Environmental Consultancy: Broome North (Area A) Preliminary Environmental Impact Assessment and Biological Survey*. Prepared for LandCorp

GHD (2009b), *Report for Environmental Consultancy: Broome North (Area B) Preliminary Environmental Impact Assessments and Biological Survey*. Prepared for LandCorp

GHD (2009c) *Report for Broome Industrial Land Targeted Fauna Survey*. Prepared for LandCorp

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Revision

Rev.	Author	Reviewer	Date
		Name	
1	S.Swindail	A. Napier (GHD)	11-09-2009
2		Greg Grabasch (UDLA)	17-09-2009
3		Broome North Project Team	18 -09-2009
4		Greg Grabasch (UDLA)	25-01-2010