

Marine Vegetation Management Plan

Hamilton Reach Development (ULDA)

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1.0 Introduction

1.1 Purpose of Report

This report has been prepared as a supporting document to conduct operational work that is the removal, destruction or damage of marine plants.

The removal destruction or damage of marine plants permit is required due to direct impacts that may result from the pruning of mangroves and or clearing of saltmarsh vegetation associated with the construction of the 'Hamilton Reach' development within the Northshore Hamilton Urban Development Area. Direct impacts may include:

- Clearing of mangroves and saltmarsh plants; and
- Trimming of marine plants.

This report is being submitted in relation to the removal, destruction, or damage of marine plants associated with the construction of the River Walk, Mangrove Walk, Lookout Point and public realm surrounding these areas.

1.2 Background

On 3 July 2009, the State Government approved the Northshore Hamilton Urban Development Area (UDA) Development Scheme. The Northshore Hamilton UDA is the most significant waterfront development opportunity in Brisbane since Expo 88 and Southbank. The Northshore Hamilton UDA is larger than the Brisbane CBD, and its river frontage is greater than the river edges of Southbank and the CBD combined.

This includes construction of new roads, open space parkland and residential developments. The Northshore Hamilton UDA covers 304-hectares of land, with a 3.8 km river frontage. This encompasses land between Kingsford Smith Drive and the Brisbane River, extending from Bretts Wharf to the west and the Gateway Motorway to the east. Key features in and around the Northshore Hamilton UDA include:

- Bretts Wharf;
- Portside Wharf complex including the Brisbane Cruise Ship Terminal;
- Eagle Farm and Doomben racecourses;
- Royal Queensland Golf Course;
- The Brisbane River; and
- Kingsford Smith Drive and the Gateway Motorway.

The Urban Land Development Authority (ULDA) has received approval (ULDA Ref. No: DEV-000007_09 to construct the 'Hamilton Reach' development within the Northshore Hamilton UDA. Condition 32 of the Development Approval (DA1-09 Issue B on the 14th of April 2009) requires submission of a Marine Vegetation Management Plan (MVMP). RPS was engaged to prepare the MVMP for the Hamilton Reach development.

1.3 Scope of Works

The objective of the MVMP is to ensure minimal disturbance to marine vegetation within and surrounding the site and appropriate protection of marine vegetation and associated habitat features.

The scope of this MVMP is in accordance with Condition 32 of the Development Approval, which outlines the following:

- The extent of the MVMP is to include evaluation of all areas including proposed road reserves, walkways, external works and development areas;
- The location and extent of all site works including all proposed infrastructure, walkways and areas of earthworks;
- Detailed design of all civil works is to be cognisant of marine environmental values. Alternative solutions may be required in some instances, to protect significant marine vegetation;
- A description of all measures to be used to protect marine vegetation and habitat features to be retained during construction, including protective fencing; and
- The MVMP is to be certified by a suitably qualified ecologist or environmental specialist.

1.4 Site Description

The Hamilton reach development is located within the Northshore Hamilton UDA adjacent to the Brisbane River, approximately 5 km from the Brisbane CBD and is the subject site of this MVMP (**Figure 1.1**). The site is bound by Macarthur Avenue to the west, the Brisbane River to the south and Queensland Golf Course to the north-east. A tidal channel vegetated with mangroves exists along the north-east boundary of the site. The remainder of the site has been cleared, with a few scattered trees remaining.

The site was previously used as a carpark and formed part of the port operations in Hamilton. The relocation of port operations from Hamilton to Fisherman Island was first investigated in the 1970s when the volume of shipping, longer turnaround times and increasing size of vessels necessitated the development of a deepwater port.

1.5 Marine Plant Protection in Queensland

The *Urban Land Development Authority Act 2007* applies to the development as the Urban Land Development Authority Regulation identifies that the schedule applies to the Northshore Hamilton UDA. This includes the removal, destruction or damage of marine plants.

The protection of marine plants remains under Section 123 of the *Fisheries Act 1994* and the process of assessing and issuing approvals for fisheries related development activities is delivered through the SPA.

The Assessment Manager for the *Fisheries Act 1994* is the Queensland Departments of Employment, Economic, Development, and Innovation (DEEDI). The *Fisheries Act 1994* provides for the management, use, development and protection of fisheries resources such as taking, causing damage to or disturbance to marine plants.

The legislative and policy framework is discussed in **Section 3.1** of this report.



2.0 Description of Proposed Works

2.1 Overview of Project

The Hamilton Reach Development is the public realm function and facilities component of the Northshore Hamilton UDA. This includes:

- Pocket Easement Park,
 - » Transition space linking Macarthur Ave with Mangrove Walk;
- Mangrove Walk,
 - » transition space linking the eastern side of the site;
- Lookout Point,
 - » At key junction, termination of Riverwalk and eastern site access along Mangrove Walk;
- Riverlink,
 - » A short transition space with 3.5m wide pathway linking the River Walk and Australand Development.

Drawing L0.01 of **Appendix 1** shows the conceptual layout of the Hamilton Reach Development, the property boundaries and demolition and removal works. Further detailed drawings of surface finishing, landscape and planting plans can also be viewed in **Appendix 1**.

2.2 Site preparation

Site preparation activities for the Hamilton Reach development have commenced. An area has been designated for lay down and construction activities as well as site facilities. This area will be clearly identified and its boundaries flagged to ensure that construction activities do not extend beyond the designated construction area. This area has already been cleared of vegetation; however any remaining valuable timber will be recovered where practical and reused as part of the site's landscaping program or disposed of in accordance with the requirements of the relevant statutory approval.

Earthworks on land may include may include topsoil stripping, which will be stockpiled for later reuse in the site's landscaping program. The stockpile will be located so that it will not be disturbed during construction activities. Following this, the subsoil will be stripped for reuse in site earthworks and construction activities. Other site preparation activities include the removal of existing concrete and asphalt.

Dumped blue metal rock adjacent to the River Walk will be utilized to stabilize the River Walk bank. Bank erosion is evident along this area and is considered necessary for the longevity of the Hamilton Reach Development.

Management strategies to be applied during site clearing activities for the Hamilton Reach development are discussed in **Section 8.0**.

2.3 Construction

Initial site development will begin with the construction contractor undertaking earthworks, preparing the site and providing temporary facilities for the construction workforce. The contractor will then provide site services including drainage, perimeter fencing and internal roads.

Where possible, any rock, sand, and gravel required for construction materials will be sourced from the materials cut from site leveling process. Where there is a shortfall in the supply of construction materials they will be sought from commercial suppliers.

Work will include construction of the following:

- Pocket Easement park,
 - » Transition space linking Macarthur Ave with Mangrove Walk;
- Mangrove Walk,
 - » transition space linking the eastern side of the site;
- Lookout Park,
 - » At key junction, termination of Riverwalk and eastern site access along Mangrove Walk;
- Riverlink,
 - » A short transition space with 3.5m wide pathway linking the River Walk and Australand Development.

3.0 Legislative and Policy Framework

3.1 Legislative and Policy Framework

This report has been prepared in support for the work that is the removal, destruction or damage of marine plants under the *Urban Land Development Authority Act 2007*.

The Hamilton Reach Development may also be subject to the *Fisheries Act 1994* under the Queensland *Sustainability Planning Act 2009* administered by the Queensland Department of Infrastructure and Planning (DIP).

3.2 Marine Plants Definition

The following provides the definition of a marine plant under Section 8 of the *Fisheries Act 1994*:

- 'Marine plant' includes the following:
 - » A plant (a 'tidal plant') that usually grows on, or adjacent to tidal land, whether it is living or dead, standing or fallen;
 - » The material of a tidal plant, or other plant material on tidal land;
 - » A plant, or material of a plant, prescribed under a regulation or management plan to be a marine plant.
- 'Marine plant' does not include a declared plant under the *Land Protection (Pest and Stock Route Management) Act 2002*.

4.0 Existing Marine Vegetation

The Hamilton Reach development site was initially surveyed in April 2011; however a resurvey was required on the 20th January 2012, due to changes in site construction plans. This report presents the findings of the visual audit conducted in January 2012.

The site was subject to visual audit, where marine vegetation, predominantly mangroves and saltmarsh communities were recorded. Weed species were also noted. Mangrove communities were assessed for health via leaf discolouration. Furthermore, mature (>3m height), juvenile (1-3m height) and seedling (<1m) stages were also recorded.

4.1 Marine Vegetation Communities

Mature (>3m height) *Avicennia marina* (Grey Mangrove) dominate the Mangrove Channel (**Figure 4.1**). High and relatively dense forests of *A. marina* occur across the entire mangrove zone from the Mangrove Channel edge to the landward margin. A previously cleared area is located along the landward margin of the mangrove channel. *A. marina* seedlings are now recolonising this section (**Figure 4.3**).

Seedlings (<1m height) of *A. marina* and *Aegiceras corniculatum* (River Mangrove) were noted sporadically along the Brisbane River bank (**Figure 4.2**). Seedlings were generally present as dense thickets; however single stemmed individuals were occasionally observed. Four saltmarsh species were also noted along the Brisbane River, including:

- *Enchylaena tomentosa* (Ruby Saltbush);
- *Sueda australis* (Australian Sea Blite);
- *Sporobolus virginicus* (Salt Couch); and
- *Sesuvium portulacastrum* (Sea Purslane).



Figure 4.1: *A. marina* community along the Mangrove Channel



Figure 4.2: Mangrove Seedlings and Saltmarsh Plants along the Brisbane River Bank

4.2 Weed Species

The Land Protection Act 2002 (LPA) Declared Weeds must be managed according to the following classifications:

- Class 1: Landholders are required by law to keep their land free of these species;
- Class 2: Landholders are required by law to attempt to keep their land free of these species; and
- Class 3: Landholders may be required to control these species if their land is located adjacent to environmentally significant locations such as National Parks or State Forests.

Table 4.1 illustrates identified weed species on the Hamilton Reach development site. Weed infestation will be eradicated by hand, with non-residual herbicides and or mechanical removal. Appropriate removal techniques are listed in **Section 7.2**.

Table 4.1: Weed Species Identified on Site

Scientific Name	Common Name	LPA Class
<i>Ipomoea cairica</i>	Coastal Morning Glory	-
<i>Megathyrsus maximus</i> var <i>maximus</i>	Guinea Grass	-
<i>Neonotonia wightii</i>	White Glycine	-
<i>Opuntia stricta</i>	Prickly Pear	2
<i>Schinus terebinthifolius</i>	Broad-leaved Pepper Tree	3
<i>Bidens pilosa</i>	Cobbler's Pegs	-
<i>Conyza bonariensis</i>	Flax-leave Fleabane	-

- not listed under the LPA

4.3 Regional Ecosystems and Fish Habitat Areas

The mangrove channel is mapped as 12.1.3 (Mangrove shrubland to low closed forest on marine clay plains and estuaries; Least Concern). The site is not mapped as a Fish Habitat Area by the Department of Primary Industries (DPI).



Marine Vegetation Communities

Figure 4.3

Project:
Marine Vegetation
Management Plan

Client:
ULDA

Compiled by: JC Date: 04/04/2012

Approved by: PF Date: 04/04/2012

Source: Base topographic data
© Hyperlites, 25/01/2012.
Other Data supplied by Supplier from DERM



Datum: GDA94

RPS

Legend

- Open Mixed Mangroves
- Saltmarsh Isolated Patches
- Closed Avicennia
- Open Avicennia
- Site Boundary

5.0 Disturbance to Marine Plants

5.1 Direct Impacts

It is anticipated that a small area of mangrove and saltmarsh vegetation will be directly impacted by the Hamilton Reach development. Direct impacts to marine plants may result from:

- Rock relocation plans, as per **Drawing L01.01** in **Appendix 1**;
- Minor trimming of mature *A. marina* along the creek above the Mangrove Walk; and
- Minor filling required to create a platform between the road and the creek.

The area to be trimmed is approximately 170m² (85m length X 2-3m width). Trimming will only occur on branches overhanging the Mangrove Walk, as per **Drawing L0.01** in **Appendix 1**.

5.2 Indirect Impacts

Indirect impacts to mangroves and saltmarsh plants may occur as a result of degradation to the habitat from construction of the Mangrove Walk, River Walk, Lookout Point and Pocket Easement Park through:

- Increased sedimentation;
- Water quality deterioration through increased sediment runoff and/or contaminants (oils, greases, chemicals); and
- Pollution or potential disturbance of acid sulphate soils.

A reduction in water quality through elevated levels of Total Suspended Solids (TSS), and increased sedimentation from erosion or fugitive dust and pilling activities may result in smothering of mangrove pneumatophores and saltmarsh/saltpan habitats during periods of inundation. Smothering by sediment can cause increased stress to mangroves depending on the depth and numbers of pneumatophores covered.

5.3 Restoration

Salt tolerant species will be planted between Highest Astronomical Tide (H.A.T) and existing rock wall, as per **Drawing L5.03** of **Appendix 1**. Restoration of disturbed areas should be equivalent of surrounding area as a minimum. Species selected should also be similar to those identified in the original survey.

6.0 Vegetation Management Framework

This MVMP has been prepared to set the framework necessary to ensure that the mitigation measures and control strategies identified are employed in a manner that minimises any potential environmental impacts during the pre-construction, construction and operational phase of the development. Management Actions have been developed in accordance with the following structure:

Performance Objectives / Indicators

- Describe the criteria against which the level of achievement of the stated objective / target shall be measured and the desired outcome.

Responsibility

- Assign responsibility for carrying out each task / action to a relevant person and/or organisation.

Management Actions

- Describe the steps to be taken to implement the nominated strategy, including any necessary approvals, applications, consultation and monitoring requirements.

Relevant Legislation

- Outline and comply the relevant environmental legislation that must be addressed.

Monitoring

- Nominate a time frame in which each of the tasks / actions are to be carried out and/or completed (e.g. daily, monthly, and prior to commencement of use).

Corrective Actions

- Describe what shall be done if the stated objectives / targets are not being met or maintained, including whom is responsible for taking the required actions.

Reporting / Auditing

- Describe the required reporting and review arrangements (including auditing) for each task (e.g. how often, by whom, to whom).

6.1 Training Requirements

The effectiveness of the MVMP will depend on those responsible for its implementation. Those responsible must be familiar with the content of the MVMP to ensure successful implementation of the specified management actions. The Site Supervisor will ensure that all relevant individuals are trained in the procedures of the MVMP and are capable of its implementation. This may involve a site induction or "toolbox" training outlining the contents of the MVMP including the vegetation removal / retention plan

prior to the construction phase. A copy of this MVMP is to be retained and displayed at the site office at all times during the construction phase of the project.

6.2 Roles / Responsibilities

All employees and contractors have a general duty of care under the *Environmental Protection Act 1994*. Notwithstanding any specifications in this MVMP, the developer and the contractors must:

- Report any environmental incidents to their immediate superior and participate in the investigation and corrective actions required to reduce potential environmental harm or the re-occurrence of the incident; and
- Comply with the requirements of relevant environmental legislation.

ULDA should ensure that all relevant contractual documents specify the MVMP as a responsibility. The roles and responsibilities assigned to individuals are outlined in **Table 4.1**.

Table 6.1: Project Positions and Responsibilities

Position	Responsibilities	Activities
Site Supervisor	Overseeing construction works	▪ Ensure processes are in place to include the necessary provisions of the MVMP into works/projects; ▪ Ensure that the contractual arrangements with the contractors specify the need for adequate training to be provided to all members of the construction/ extraction crew involved in the project; ▪ Ensure construction workers are trained in the procedures of the MVMP; ▪ Implement monitoring programs; ▪ Undertake and record corrective actions; and ▪ Report to regulatory authorities.
Civil Contractor	Construction	▪ Implement the requirements of the MVMP throughout the construction phase.
Landscape Contractor	Landscaping works	▪ Undertake landscaping works in accordance with the landscape plans.

7.0 Vegetation Management

7.1 Overview

The following section includes detailed management and mitigation measures for controlling direct and indirect impacts (**Table 7.1**) from construction and operation activities associated with the Hamilton Reach development which may impact the surrounding marine vegetation. A potential Environmental Diary has also been provided in Appendix

7.2 Vegetation Management Actions

7.2.1 Vegetation Protection

Best practice methodologies will be used to trim mangroves directly impacted by construction. Mangroves along the clearing boundary of the Mangrove Walk should be trimmed by an arborist thereby minimising the area of disturbance. Direct and indirect management and mitigation measures are detailed in

Table 7.1: Marine Vegetation Management Plan

Element/Issue	Marine Vegetation Management
Operational Policy or Management Objective	To limit impacts to marine vegetation as a result of the Hamilton Reach development activities to those areas directly and indirectly impacted.
Performance criteria	No unplanned or unapproved damage to marine flora. Restoration to disturbed areas Sensitive clearing techniques are employed; ▪ No unnecessary disturbance to native vegetation located within designated retained vegetation areas; ▪ No injuries to fauna; and ▪ No discharge of contaminated waters in excess of BCC construction phase water quality objectives as follows: - pH: 6.5 – 8.5 - Total Suspended Solids: 50 mg/L
Implementation Strategy	<u>Mangrove clearing</u> Subcontractors will include mitigation methods in construction management plans to minimise disturbance to marine plants. Mitigation measures include: ▪ To minimise disturbance, overhanging mangroves will be tied back during works; ▪ The use of excavators or other suitable machinery will be no greater than the capacity required for the purpose; ▪ Chain saws or other suitable equipment will be used to trim mangroves and will minimise disturbance where possible; ▪ The line of least marine plant disturbance will be used for trimming. Mangroves are to be pruned or trimmed by no more than a third of their height; ▪ Mangrove root systems will be maintained at all times; ▪ In accordance with the Code for Self-assessable Development (MP02 September 2010) marine plant disturbance via maintenance activities will only occur up to an additional 1m

Element/Issue	Marine Vegetation Management
	around the perimeter of the disturbed area footprint (with 5m buffer); ▪ Trimming of marine plants will be carried out in accordance with the Code for Self-assessable Development (MP02 September 2010) and where possible take place between April and October to minimise impacts to flowering and fruiting plants; ▪ Mangrove branches greater than 25mm in diameter will be pre-cut to prevent splitting. Cutting equipment is kept sharp and clean at all times. ▪ Chemicals will not be used on marine plants and marine plants will not be burned; ▪ Pre-works and post-works notification could be provided to a district officer of the nearest Fisheries Queensland Regional Fisheries Centre for all maintenance pruning and trimming of marine plants undertaken; and ▪ Any marine plant material that is removed will be disposed of appropriately.
	<u>Surface water management</u> Indirect impacts to marine plant habitat caused by changes in hydrology will be mitigated through the implementation of the Construction EMP for the Hamilton Reach project. Surface water will be contained and diverted away from the site. Stormwater drains associated with the Hamilton Reach will be located in areas where there is minimal saltmarsh and following the natural drainage features of the site so that normal hydrological flow regimes are maintained. Mitigation measures to reduce the indirect impacts of altering local hydrology and coastal processes via construction include: ▪ Minimising the extent of clearing coastal vegetation; ▪ Install and maintain erosion and sediment control measures, including: - Stockpile should be located on flat ground, upstream, of a grass buffer zone and should not exceed a height of 2m, - Sediment fencing will be installed downstream and of soil stock piles and where appropriate above HAT, - Stockpiles that exist longer than one month should be overseeded with an approved grass mix, - Topsoil stockpiles will be located in areas outside drainage lines and will be protected from erosion, - Diversion banks will be used upstream to divert clean water away from any site disturbance, - Water will be used for dust suppression when required, - Vehicles and machinery will be used at the appropriate speeds to prevent erosion, - Access tracks will be set back from major flow paths to help prevent erosion, and - Minimise spoil sites; ▪ To manage potential risks during earthwork activities an EMP will be implemented by the construction contractor; ▪ An ASS Management Plan will be developed and implemented as part of the construction contractor's EMP prior to works with all detailed mitigation measures, developed as part the EMP adhered to; ▪ Water spraying will be utilised as required to dampen dust on working areas and stockpiles as required; and ▪ Monitor wind conditions to assist with daily management of wind blown dust from unconsolidated soil surface.

Element/Issue	Marine Vegetation Management
	<u>Marine Water and Sediment</u> Erosion and sediment control measures will be implemented in accordance with the <i>Soil and erosion Sediment Control Engineering Guidelines for Queensland Construction Site</i> (the institute of Engineers, Australia Queensland division June 1996), as per the Condition 14 of the DA. However, other documents such as the Best Practice Erosion and Sediment Control – for building and construction sites, 2008 may also be utilised. The following measures are recommended for inclusion in the ESCP: ▪ Avoid the disturbance of any known areas of contamination. If avoidance is not possible, the contaminated material shall be excavated and be remediated or disposed of at an approved facility. Work to be undertaken in accordance with DERM requirements; ▪ Sheet piling will be used to contain sediment disturbance due to material placement. Silk curtains will also be used during construction works to minimise disturbance from material placement; ▪ Establishing and maintaining a hazardous material register recording the location and quantities of hazardous substances including their storage, use and disposal; ▪ Diverting uncontaminated stormwater runoff around areas disturbed by petroleum activities or where contaminants or wastes are stored or handled; ▪ Contaminated stormwater runoff and incident rainfall is collected and treated and reused; ▪ Revegetate exposed or disturbed areas as soon as practicable; ▪ Erosion control structures are placed to minimise erosion of disturbed areas and sediment control structures to prevent the contamination of any waters; ▪ Works in bed and banks of the river or in mangrove areas (e.g. stormwater outlets) shall be stabilised at the end of each working day using geofabric and rock or similar; ▪ Use top soil diversion banks, sandbags or rock filter dams to limit water inflows to bed and bank works (e.g. stormwater outlets) and pump retained water to sediment basins; ▪ Key construction personnel will be trained in erosion and sediment control procedures; ▪ Installation of temporary drainage works (channels and bunds) in areas required for sediment and erosion control and around storage areas for construction materials; ▪ Stage construction and stabilisation of earth batters (steeper than 6H:1V) in 2m vertical increments where practicable and reasonable; ▪ Implement an inspection and maintenance program for the erosion and sediment control features at an adequate frequency but in particular after each storm event. The developed must rectify any damage or non-performing erosion control devices and clean up any sediment that has left the site or is on the roads within and external to the site; ▪ All fuels and chemicals will be stored and handled in accordance with AS 1940 and AS 3780 (as applicable) to minimise the potential for contamination of stormwater runoff from the site; ▪ A visual turbidity monitoring program will be implemented throughout construction. Should visible turbid plumes occur as a result of construction works, construction works will decrease until the plume reduces to prevent causing harm to surrounding marine vegetation; and ▪ Conduct sediment disturbance activities in a timely fashion to minimise the extent of sediment disturbance and subsequent impacts to mangrove and saltmarsh communities. <u>Soils</u> For any material that is displaced above LAT or its current elevation the following management and monitoring strategies are recommended: ▪ Excavated soil will be segregated and tested for AASS/PASS at a NATA accredited

Element/Issue	Marine Vegetation Management
	laboratory. If AASS/PASS is present, it will be transported to a designated treatment area and treated with lime. Following treatment, the soil will be managed onsite. Soil tests should identify liming rates; ▪ The AASS/PASS treatment area will be bunded and compacted to hinder water infiltration; ▪ Any stockpile of AASS/PASS material will be located at least 30m from the nearest surface water; ▪ Stockpiles will be designed to be hydraulically isolated with an approved impermeable barrier or compaction; ▪ Stockpiles and bunds will be inspected at least daily to confirm they are functioning and materials/leachate are not causing contamination outside of the treatment area; ▪ Daily visual monitoring of the intertidal region, excavated areas and material stockpiles will occur to determine the presence of ASS as a result of key indicators, including: - Unusually clear or milky blue-green drainage water within or flowing from the area (aluminum released by the ASS acts as a flocculating agent), - Jarosite containing horizons (a pale yellow mineral deposit which can precipitate as pore fillings and coatings on fissures), - Iron-oxide mottling in auger holes or recently dug surfaces. With a fluctuating water table, jarosite may be found along cracks and root channels in the soil, - Extensive iron stains on any infrastructure surfaces of iron-stained water and ochre deposits, - Sandy soils and shell fragments scattered throughout the soil profile, - Corrosion of infrastructure, piles etc, - Water pH of less than 5, - Field soil pH of less than 5, and - Sulfurous smell after rain following a dry spell, or when the soils are oxidised or disturbed; ▪ Only aglime (fine grained) is to be used for neutralising soil, not quicklime or slaked lime; ▪ Thorough mixing of the aglime - following excavation of the material, it must be dried and ploughed, followed by lime dosing, followed by further ploughing and harrowing; ▪ ASS material should be placed in layers less than 300mm thick to allow for adequate drying, ploughing and subsequent treatment with aglime; ▪ ASS must not be stockpiled for longer than 18 hrs unless it is neutralised first; ▪ All stockpiles should have bunded drains surrounding them to allow collection, containment and treatment of surface runoff and leachate from the stockpile; the drains should flow to catchponds; ▪ During construction, the contractor will have stored on site at all times, at least 500 kg of aglime to ensure that potentially hazardous situations can be controlled should the need arise; ▪ For sudden drops in water pH across the site, the contractor must have hydrated or slaked lime available for adding to any low pH waters; ▪ Leachate and runoff from excavation areas containing AASS/PASS stockpiles and AASS treatment areas will be captured and contained or directed to leachate treatment ponds prior to discharge; and ▪ Personnel conducting AASS and leachate treatment will be trained in handling of chemicals and test equipment.

Element/Issue	Marine Vegetation Management
	<u>Staff environmental awareness</u> Provide training for staff regarding the sensitivity of wetland ecosystems. ▪ Interpretive signage will be used to notify construction staff of the reasons why trespassing on these ecosystems is prohibited and the impacts this might have; and ▪ Fences will be erected around marine flora to visually and physically enforce the need for avoidance of disturbance to these areas. <u>Fisheries</u> ▪ A total ban on fishing, crabbing activities on all project related personnel and contractors.
Monitoring and Auditing	Compliance audits will be conducted in accordance with the developed facility EMP, the construction procedures, relevant legislation, license and permit conditions and industry standards. All inspection and audit reports of environmental performance will be stored in a relevant electronic database to enable corrective actions identified during the inspection/auditing process to be recorded, tracked and closed out. The information will be made available to the relevant regulatory authorities as required. In addition to the monitoring and reporting requirements documented in the relevant sections of the EMP, the following auditing regime is recommended: ▪ During construction phase, internal audits will be undertaken at regular intervals to verify that all work is proceeding in accordance with the EMP. The following records will be maintained: ▪ Regular monitoring and reporting of mangrove clearing works. All incidental damage occurring within the 10m buffer of the disturbed area footprint will be reported to the appropriate regulatory body; ▪ No contaminated waste will be intentionally discharged; ▪ Spill response equipment and appropriate training of personnel; ▪ Spill response plan; ▪ Use favourable weather, tide and current conditions as far as reasonably practicable to limit effects when relocating rocks along the Brisbane River; and ▪ Management measures for reclamation to reduce turbidity. Management of leaks and spills will include: ▪ Appropriate storage and handling procedures of hazardous chemicals, hydrocarbons and marine discharges; ▪ Spill contingency plans prepared to ensure appropriate measures are taken to manage refueling, storage and spill management; ▪ Spill response kits will be located in close proximity to storage areas for prompt response in the event of a spill; ▪ Use of absorbent material to mop up minor oil or chemical spills and disposed of appropriately as contaminated material; and ▪ The avoidance of spills through the initial design integrity built into process and utility equipment, materials handling and operating and maintenance procedures. This may include the use of spill trays and temporary banded areas for any refuelling.

Element/Issue	Marine Vegetation Management
Reporting and Corrective Action	Reporting of environmental performance data will include: ▪ Reporting, investigation and management of corrective actions associated with environmental events (including incidents, hazards, near misses, non-compliance events and third party complaints); ▪ Incidental damage to marine plants occurring outside the disturbance area; ▪ Any third party complaints will be recorded in a complaints register and appropriate corrective actions will be implemented and closed out within a reasonable timeframe; and ▪ Any incidents of marine flora disturbance will be reported to the Construction Manager, or the Project Manager and appropriate regulatory body as necessary. The following constitute an incident or failure to comply in regard to marine flora management: ▪ Unauthorised disturbance of marine vegetation outside the defined construction areas. ▪ Unauthorised disturbance of marine habitat. In the event of a failure to comply, investigations will be undertaken into the cause of the incident of failure to comply and the appropriate corrective actions taken to overcome the problem and prevent recurrence.

7.2.2 Weed Control and Rubbish Removal

Weed management procedures will be implemented to prevent the spread of weeds both on and off site, including:

- A weed washdown certificate for all vehicles and machinery must be present before entering the site. This will prevent new introduction of weeds
- Prickly Pear and Broad Leafed Pepper Tree, Class 2 and 3 respectively, declared weeds will be appropriately controlled prior to the construction stage;
- All cleared weed species will be stockpiled separately, and removed off site. Weed material is not to be re-used as part of site rehabilitation;
- If practical, clearing will commence in areas of low weed infestation, and move towards areas of high weed infestation; and
- Weed adjacent to the Mangrove Channel and Brisbane River will be eradicated without the use of non-residual herbicide. Appropriate weed removal techniques are outlined in **Table 7.2**.

Table 7.2: Weed Removal Techniques

Weed Type	Removal Technique	Method
Woody Weeds	Cut and Paint	- Make a horizontal cut through the stem close to the ground using secateurs, loppers or a bush saw; and - Immediately apply herbicide to the exposed flat stump surface.
	Stem Injection	- At the base of the tree drill holes at a 45 degree angle into the sapwood; - Fill each hole with herbicide immediately; and - Repeat the process at 5 cm intervals around the tree.
	Frilling or Chipping	- At the base of the tree make a cut into the sapwood with a chisel or axe; - Fill each cut with herbicide immediately; and - Repeat the process at 5 cm intervals around the tree.
Small Plants	Hand removal	- Remove any seeds or fruits and carefully place into a bag; - Grasp stem at ground level, rock plant backwards and forwards to loosen roots and pull out; and - Tap the roots to dislodge any soil, replace disturbed soil and pat down.
Vines and Scramblers	Hand removal	- Take hold of one runner and pull towards yourself; - Check points of resistance where fibrous roots grow from the nodes; - Cut roots with a knife or dig out with a trowel and continue to follow the runner; - The major root systems need to be removed manually or scrape/cut and painted with herbicide; and - Any reproductive parts need to be bagged.
	Stem Scraping	- Scrape 15 to 30 cm of the stem with a knife to reach the layer below the bark/outer layer; and - Immediately apply herbicide along the length of the scrape.
Weeds with Underground Reproductive Structures	Hand removal	- Remove and bag seeds or fruits; - Push a narrow trowel or knife into the ground beside the tap root, carefully loosen the soil and repeat this step around the taproot; - Grasp the stem at ground level, rock plant backwards and forwards and gently pull removing the plant; and - Tap the roots to dislodge soil, replace disturbed soil and pat down.
	Crowning	- Remove and bag stems with seed or fruit; - Grasp the leaves or stems together so the base of the plant is visible; - Insert the knife or lever at an angle close to the crown; - Cut through all the roots around the crown; and - Remove and bag the crown.

Weed Type	Removal Technique	Method
	Stem Swiping	Remove any seed or fruit and bag; and Using an herbicide applicator, swipe the stems/leaves.

7.3 Future Maintenance Activities

It is anticipated that the disturbance of marine plants may be required for landscaping, maintenance and or repairs of walkways, site batters and stormwater systems. Maintenance trimming of mangroves will be performed to ensure visual amenity and safety of the general public. Maintenance pruning and trimming will be performed in accordance with the *Code of Self-assessable Development-Maintenance works on existing lawful structures (other than power lines and on-farm drains) in a declared fish habitat area or involving, the removal destruction and or damage of marine plants* (MP02 September 2010). Pruning and trimming will occur (where possible) between April and October to minimize disturbance during flowering and fruiting stages. Pruning and trimming will also be conducted in accordance with the following requirement:

- Mangroves are to be pruned or trimmed by no more than a third of their height;
- Mangrove branches greater than 25mm in diameter must be pre-cut to prevent splitting;
- Cutting equipment is kept sharp and clean at all times and is of no greater capacity than required for the purpose;
- The line of least marine plant disturbance will be used; and
- Marine plant disturbance via maintenance activities will only occur up to an additional 1m around the perimeter of the disturbed area footprint (with 5m buffer).

Appendix I

Site Plan Drawings

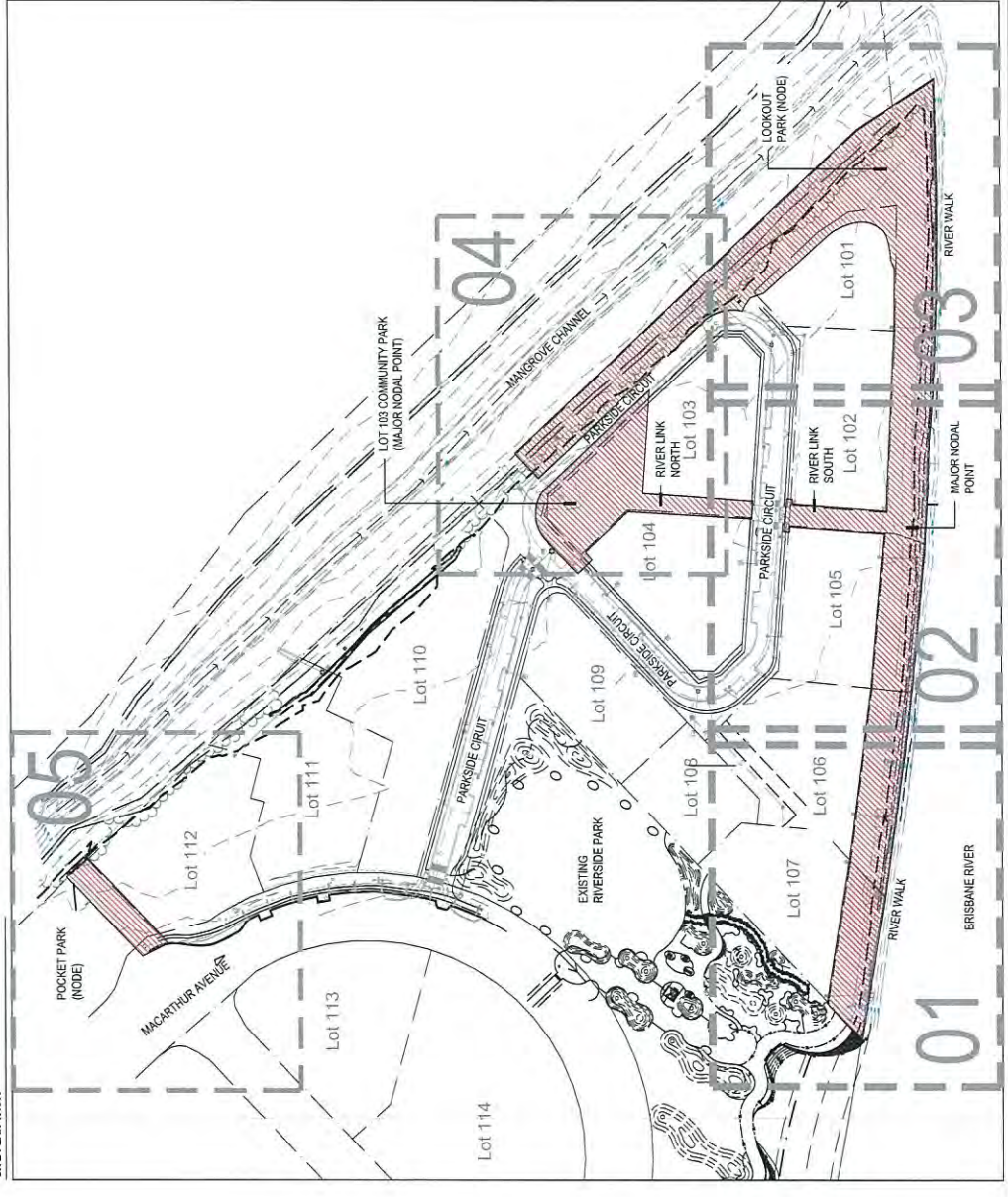
NORTHSHORE HAMILTON LOT 100 WALKS AND PARKS
URBAN LAND DEVELOPMENT AUTHORITY

LANDSCAPE DOCUMENTATION

ISSUE: TENDER ISSUE

DATE: 22-03-2012

SITE PLAN 1:1000



DRAWING SCHEDULE

Draw No.	Drawing Title	Issue
1000A-CDA-0.00	COVER SHEET	01
1000A-CDA-0.01	GENERAL REQUIREMENTS	01
1000A-CDA-0.02	PLANT SCHEDULE	01
1000A-CDA-1.01	SURFACE FINISHES PLAN	01
1000A-CDA-1.02	PAVING FINISHES PLAN	01
1000A-CDA-1.03	PAVING FINISHES PLAN	01
1000A-CDA-1.04	PAVING FINISHES PLAN	01
1000A-CDA-1.05	SURFACE FINISHES PLAN	01
1000A-CDA-1.06	SURFACE FINISHES PLAN	01
1000A-CDA-2.01	LANDSCAPE DETAIL PLAN	01
1000A-CDA-2.02	LANDSCAPE DETAIL PLAN	01
1000A-CDA-2.03	LANDSCAPE DETAIL PLAN	01
1000A-CDA-2.04	LANDSCAPE DETAIL PLAN	01
1000A-CDA-2.05	LANDSCAPE DETAIL PLAN	01
1000A-CDA-2.06	LANDSCAPE DETAIL PLAN	01
1000A-CDA-2.07	LANDSCAPE DETAIL PLAN	01
1000A-CDA-3.01	PLANTING PLAN	01
1000A-CDA-3.02	PLANTING PLAN	01
1000A-CDA-3.03	PLANTING PLAN	01
1000A-CDA-3.04	PLANTING PLAN	01
1000A-CDA-4.01	LANDSCAPE DETAILS	01
1000A-CDA-4.02	LANDSCAPE DETAILS	01
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1000A-CDA-4.07	LANDSCAPE DETAILS	01
1000A-CDA-4.08	LANDSCAPE DETAILS	01
1000A-CDA-4.09	LANDSCAPE DETAILS	01
1000A-CDA-4.10	LANDSCAPE DETAILS	01
1000A-CDA-4.11	LANDSCAPE DETAILS	01

IMPORTANT NOTE

- [illegible]

06	TENDER ISSUE	22/03/2012	SAF
05	TENDER ISSUE	16/03/2012	SAF
04	PROVIDE TENDER BILLS FOR CLIENT APPROVAL	22/03/2012	JN
03	TENDER ISSUE FOR CLIENT APPROVAL	15/3/2011	SAF
02	DESIGN DEVELOPMENT COORDINATION	26/06/2011	AKA
01	DESIGN DEVELOPMENT SNOFF	24/06/2011	DB

PLEASE NOTE:

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client

URBAN LAND DEVELOPMENT AUTHORITY

PROJECT
NORTHCLOVE LARABEE TONAL

**NORTHSHORE HAMILTON
LOT 100 WALKS AND PARKS**

COVER SHEET

scale
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1:1000
(AT A1 SIZE SHEET)

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drawn	approved	date
SH		22/03/2012

project number	participant
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106045-CD

drawing number	06
size	06

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PA2 PLANT SCHEDULE

The contractor shall review the plant schedules to ensure that drawings and schedules occur, where significant detail or discrepancies may exist on either the plans or the schedule. It is the contractor's responsibility to resolve immediately with the Landscape Architect and/or the project manager any discrepancies that may exist in order to avoid any delay in the project. The contractor shall be responsible for providing timely information to the project manager and the Landscape Architect in order to avoid any delay in the project.

CODE	SPECIES	COMMON NAME	POTSIZE	MATURE HT/SPRD	DENSITY	STAKE	QTY
		GROUNDCOVERS					
SPO W	SPOROBOLUS VIRGINICUS	SALT WATER COUCH	Tubetask	-	4/m ²	-	334
SAM 4	SARCOFARMA QUINQUEFLOA	BEARD SAMPHIRE	Tubetask	-	4/m ²	-	116
FIN 20	FIMBISTYLIS POLYTRICHODES	RUSTY SEDGE	Tubetask	-	4/m ²	-	116
HAU 200	HAUSTRARIA POLYTRICHODES	BLACK SELDED SAMPHIRE	Tubetask	-	4/m ²	-	116

RPS

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LOT 100 WALKS AND PARKS

PLANT SCHEDULE

Source: *Author's calculations.*

(ATTACH SHEET)

8.17

project number

03-540901

10.02



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