

Draft Report

# Construction Environmental Management Plan (CEMP): Lee Point Master-planned Urban Development

Prepared for

**Defence Housing Australia**

October 2017



**Ecology and Heritage Partners Pty Ltd**

## Document Control

<b>Assessment</b>	Construction Environmental Management Plan (CEMP)
<b>Address</b>	Lee Point Master-planned Urban Development
<b>Project number</b>	7793
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<b>File name</b>	EHP_7793_EIS2CRU_CEMP_Draft_3110017
<b>Client</b>	Defence Housing Australia

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## Contents

1	INTRODUCTION.....	4
2	PROJECT OVERVIEW .....	5
3	ENVIRONMENTAL MANAGEMENT FRAMEWORK .....	7
4	BIODIVERSITY MANAGEMENT SUB-PLAN.....	10
5	WATER MANAGEMENT SUB-PLAN .....	16
6	EROSION AND SEDIMENT CONTROL PLAN .....	20
7	HERITAGE MANAGEMENT SUB-PLAN .....	26
8	SOCIAL AND ECONOMIC MANAGEMENT SUB-PLAN.....	28
9	NOISE MANAGEMENT SUB-PLAN .....	31
10	AIR QUALITY MANAGEMENT SUB-PLAN .....	35
11	SUPPORTING DOCUMENTS.....	37

## 1 Introduction

The purpose of this Construction Environmental Management Plan (CEMP) is to provide a framework for the management of environmental risks identified through the environmental impact assessment process for the Lee Point Master-planned Urban Development. The CEMP is a condition of assessment under the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) and Northern Territory *Environmental Assessment Act* (EA Act) and has been prepared with reference to the NT EPA's *Guidance for the Preparation of an Environmental Management Plan* (NT EPA 2015). It is to be assessed in conjunction with the overarching Environmental Impact Statement (EIS). The environmental risks identified for the project and addressed in this CEMP, were determined through a formal risk assessment process.

Implementation of the project in accordance with the CEMP will ensure that environmental risks are reduced to As Low As Reasonably Practicable (ALARP), and all environmental obligations are met including those contained in legislation, regulations and conditions of approvals, permits and licences issued to the project.

Due to the nature of the project, the CEMP focuses primarily on the construction phase of the project as there are unlikely to be many ongoing environmental issues once construction has been completed. The ongoing performance and maintenance of the stormwater management system; however, is of importance to the operational phase of the project along with the impacts on migratory shorebirds as a result of increased visitation rates to Casuarina Beach. These risks are also addressed in the CEMP.

The CEMP will be further refined and developed once the detailed construction plan has been finalised, and a head contractor has been awarded to construct the project. The management actions contained within this CEMP are considered to be the minimum commitment that Defence Housing Australia and their contractors will undertake to support approval of the project under relevant legislation and allow the project to proceed to construction phase.

### 1.1 Structure

This CEMP consists of a series of management sub-plans that relate to the key environmental themes that will be the focus of management. They include:

- Biodiversity
- Water
- Erosion and Sediment Control
- Heritage
- Social and Economic
- Noise
- Human Health and Safety
- Air Quality

Each sub-plan clearly articulates management objectives and performance criteria, and outlines the management measures to be applied to avoid and minimise environmental impacts during the relevant

phases of the project. Monitoring and reporting requirements, corrective actions and key responsibilities are also explained.

In addition to the sub-plans, stand-alone management plans have been prepared for Stormwater Management and Water Quality Monitoring, by specialist consultants.

## 2 Project Overview

The Lee Point Master-planned Urban Development will be developed in accordance with the Lee Point Area Plan and Planning Principle's as described in DHA's application to amend the NT Planning Scheme (PA2014/0922). It will accommodate approximately 700 ground-level dwellings, between 30 and 40 rural residential lots, and between 200 and 250 apartments.

The Lee Point Area Plan identifies a tourism and mixed use centre situated along a Main Street precinct in 2CRU running from Lee Point Road through the site in a north-westerly direction where it will terminate at a coastal esplanade. The area will provide most of the high density residence in 3-6 storey apartments. The coastal esplanade runs perpendicular to the Main Street precinct and parallel to the Casuarina Coastal Reserve. It will be an important area of public open space and provide bicycle and walking paths and other recreation facilities. There will also be a small area of open space in the north of the site as part of the preservation of local military history.

The Main Street precinct will provide a mixture of commercial, retail and community services. There are also four tourist sites to be established along the Main Street that will be transferred to the NT Government and will provide for hotel and apartment accommodation in buildings between 2-12 stories.

A Community Hub will be located in Muirhead North, and will include a primary school, child-care facility and sports facilities, covering approximately 3.7 ha. Immediately adjacent to the Community Hub will be an active recreation reserve including an AFL/cricket oval.

In addition to the coastal esplanade in 2CRU, other areas of public open space will include the preservation of 21 ha of Monsoon Vine-thicket and eucalypt woodland on the western side of 2CRU to conserve habitat for the endangered Black-footed Tree-rat and expand the area of the existing Casuarina Coastal Reserve. A further 1.6 ha within Muirhead North supporting sensitive Monsoon Rainforest vegetation will also be protected. The treatment train of bioretention and detention basins to manage stormwater will also be integrated into public open space, contributing an additional 10 ha (approximate). A series of parks and playground areas will be set-aside across the project site.

The current staging plan for the projects proposes a five staged development, with construction scheduled to commence in the south-east corner of 2CRU (Stage 1) in early 2018.

### 2.1.1 Construction

Stage 1 of the project is currently scheduled to commence in early 2018, while the final stage of the project (Stage 5) is expected to be completed by 2025 if demand for housing is as expected. The stage plan will be finalised closer to construction.

The construction footprint will involve the loss of approximately 100 ha of degraded eucalypt woodland. A 21.95 ha area of Monsoon Vine-thicket along the western boundary of 2CRU will be retained as a

conservation reserve. A 1.5 ha patch of native vegetation in Muirhead North containing the sensitive Monsoon Rainforest vegetation community will also be protected.

#### *2.1.2 Operations*

Operational aspects of the project relevant to the CEMP include the performance of detention and bioretention basins and impacts of increased visitors to Casuarina Beach on migratory shorebirds. All other ongoing maintenance activities after construction is completed, such as management of public open space, roads and utilities, is not considered under this CEMP.

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### 3 Environmental Management Framework

Defence Housing Australia's Environmental Management System forms part of the projects Health, Safety, Environment and Quality (HSEQ) Strategy. The EMS provides a framework for identifying and managing environmental risks, and for compliance monitoring and reporting.

This CEMP provides overarching environmental management guidance for the project that will be implemented through the extant EMS processes and procedures of the head contractor. The CEMP establishes a framework of management plans and procedures to address key areas of environmental risk, and incorporates conditions of approval, commitments, and legal and other requirements.

#### 3.1 Roles and Responsibilities for Environmental Management

Table 1 below provides information on the roles and responsibilities of the project's stakeholders in implementing the CEMP. Defence Housing Australia will be ultimately responsible for compliance with the CEMP, and will oversee the performance of the head contractor and sub-contractors in implementing the actions of the CEMP. The relevant environmental regulators are not statutorily required to undertake site audits, but can do at anytime. An independent auditor will review the performance of DHA's and its contractors in complying with the CEMP on a five yearly basis.

**Table 1. Roles and responsibilities**

Organisation	Roles and responsibilities
Defence Housing Australia	<p>Ensures head contractor is complying with CEMP, including implementing actions, monitoring and reporting.</p> <p>Site auditing on a discretionary and strategic basis.</p> <p>Respond to any complaints from the public.</p> <p>Approves corrective actions and notification of regulatory authorities when there is an exceedance, if necessary.</p>
Head contractor	<p>Implementation of all actions of the CEMP, including management actions, monitoring and reporting.</p> <p>Site auditing of sub-contractors on a discretionary and strategic basis.</p> <p>Environmental training.</p> <p>Complaints management.</p> <p>Notifies DHA of any non-compliance with CEMP.</p>
Sub-contractor(s)	<p>Implementation of all actions in relevant sub-plan of CEMP, including management actions, monitoring and reporting.</p> <p>Supervises the environmental performance of each task against the CEMP.</p> <p>Notifies head contractor of any non-compliance with CEMP.</p>
Department of the Environment and Energy (Commonwealth)	<p>Environmental regulator – undertake audits of project site if required, and assess compliance with CEMP in accordance with Commonwealth approvals.</p> <p>Review annual monitoring reports.</p>
Environment Protection Authority (Northern Territory)	<p>Environmental regulator – undertake audits of project site if required, and assess compliance with CEMP in accordance with Commonwealth approvals.</p>

Organisation	Roles and responsibilities
	Review annual monitoring reports.
Independent auditor	Provide an independent audit of the projects' performance against the CEMP (every 5 years).

### 3.2 Training and Awareness

The head contractor will be responsible for training and awareness. Prior to commencing work, all staff including any contractors/sub-contractors must complete a site induction identifying them of the type and location of sensitive environmental areas and potential threats. The induction will include, as a minimum:

- Location of Casuarina Coastal Reserve, Sandy Creek and Buffalo Creek
- Description of Black-footed Tree-rat and where the species could potentially occur
- Migratory shorebird habitat
- Military heritage
- Area of Monsoon Vine-thicket and Monsoon Rainforest to be retained, and other areas of native vegetation to be retained in public open space.
- Adjoining residents and land-users and their exposure to the project
- The impacts of erosion, weed spread, habitat removal, human disturbance, dust and noise can have on these values.

### 3.3 Incidents and Complaints

An Incident and Complaints register will be established and maintained by the head contractor. Any incidents of non-compliance with the CEMP will be recorded and the DHA will be notified (and relevant environmental regulator if necessary) as soon as possible.

Any complaints received will be recorded in the same register. The head contractor will notify DHA of any complaints received as soon as possible, and DHA will be responsible for provide a response. The register will include a record of when the complaint was received, the nature of the complaint, when it was responded to, by whom and how.

### 3.4 Monitoring, auditing, and reporting

#### 3.4.1 Monitoring responsibility

Monitoring will be undertaken to assess compliance with the CEMP and that the magnitude of impacts are within the approved limits.

There will be ongoing monitoring of the site by a representative of the head contractor who is aware of the prescriptions of the CEMP. The head contractor may also sub-contract aspects of monitoring including specific tasks such as water quality monitoring and migratory shorebird monitoring, if there is no available expertise within their organisation.



#### 3.4.2 Auditing

Defence Housing Australia will undertake random audits periodically throughout the project, and during or after any major corrective actions or remediation works. They will also audit the head contractor to ensure the Incident and Complaint register is being maintained, training and awareness programs are being rolled out, and the monitoring is being undertaken as scheduled. The head-contractor will audit any sub-contractors on a periodic basis to check general environmental performance and compliance with relevant sub-plans of the CEMP.

Environmental regulators may undertake audits during construction phase.

An independent auditor will be engaged to review compliance with the CEMP, whether the CEMP is mitigating environmental impacts as intended, and whether any changes to the CEMP or its implementation are required.

#### 3.4.3 Reporting

An annual CEMP report will be prepared and submitted to DoEE and NT EPA throughout the construction phase of the project. The report will include:

- List of actions from the CEMP that have been implemented including photographic evidence.
- Details of any non-compliance.
- Results of water quality and migratory shorebird monitoring.
- List of complaints received from adjoining residents.
- Number of staff that have completed environmental awareness training.
- Any unexpected impacts to the environment that was not adequately accounted for.
- Any corrective actions implemented (see Section 3.4.4 below).

The annual report will be prepared by DHA and submitted to DoEE and NT EPA prior to the end of the financial year.

#### 3.4.4 Adaptive Management

Mitigation and avoidance measures have been developed as part of this CEMP that are intended to reduce the risk of the project impacting the environment. In the unlikely event that the monitoring shows that the impact has exceeded the performance indicator, the proposed management actions would need to be revised. Any changes to environmental management will be proposed as part of the annual CEMP report (see Section 3.4.3) and will be developed by DHA in conjunction with the head contractor, and in consultation with discipline experts from Government or the private sector as required. Changes to environmental management will only be proposed if the performance indicators outlined in the CEMP are exceeded within the twelve month reporting.

Any approved changes to environmental management will be incorporated into a revised CEMP.

## 4 Biodiversity Management Sub-plan

### 4.1 *Environmental values and risks*

The biodiversity values that occur within the project site, and potential impacts and risks to biodiversity associated with project activities were assessed as part of the EIS. A brief summary of the risks to biodiversity values is provided below.

- Increased access to Casuarina Beach causing disturbance to migratory shorebirds
- Impacts to sensitive vegetation including Monsoon Vine-thicket vegetation and Monsoon Rainforest.
- Loss of native vegetation fragmenting populations of species.
- Loss of habitat for the nationally significant Black-footed Tree-rat.
- Direct mortality of threatened species including Darwin Cycad and Black-footed Tree-rat.
- Dispersal of weeds and pathogens during construction.
- Further degradation of Casuarina Coastal Reserve.
- Increased numbers of recreational fishers causing higher mortality of threatened saw fish species.

In addition, the biodiversity management sub-plan also addresses the risk associated with native vegetation providing a corridor for biting insect movement between the Casuarina Coastal Reserve and 2CRU.

### 4.2 **Management actions**

A list of management actions to be undertaken to avoid and mitigate impacts to biodiversity is provided in the Biodiversity Management Sub-plan below (Table 2). Management actions specific to migratory shorebird habitat has been developed in conjunction with a local migratory shorebird expert (Amanda Lilleyman, Charles Darwin University).

**Table 2. Biodiversity management sub-plan – management actions**

Objective	Management Actions	Monitoring	Performance Indicators
<b>Weed Management</b>			
Reduce the extent of weeds in the project site, and minimise risk of spread into the Casuarina Coastal Reserve and other areas.	<ul style="list-style-type: none"> <li>Continuation of existing weed spraying regime.</li> <li>Spray Gamba Grass and other environmental weeds on site prior to vegetation clearing.</li> <li>Spray any residual weeds after clearing/excavation in unconstructed areas.</li> <li>Use native species in landscaping where practical.</li> <li>Treat any fill that may contain weed propagules, before bringing on site.</li> <li>Wash-down bays for any plant or equipment working in infested areas that will be leaving site.</li> <li>Spray environmental weeds along the boundary of Casuarina Coastal Reserve.</li> <li>Retain 21.95 hectare patch of Monsoon Vine Thicket to buffer any weed incursion into Casuarina Coastal Reserve.</li> </ul>	Annual audit by head contractor in conjunction with appointed weed contractor and ecologist.	No increase in cover or type of environmental weeds on site or in adjoining areas of Casuarina Coastal Reserve
<b>Vegetation Clearing</b>			
Vegetation clearing is limited to the least amount of vegetation loss required for the project.	<ul style="list-style-type: none"> <li>Prior to commencing works, fence-off areas where native vegetation will be retained, i.e. 21.95 ha patch of Monsoon Vine Thicket (2CRU) and 1.5 ha patch containing Monsoon Rainforest (Muirhead North) and any other areas of native vegetation that will be retained in public open space, e.g. coastal esplanade.</li> <li>Use native species in landscaping plans, if practical.</li> <li>No machinery, equipment or laydown areas to be located within areas of native vegetation to be retained.</li> <li>Prior to development of each stage, Darwin Cycads to be salvaged and relocated to area of public open space, or reinstated on other properties in Lee Point area.</li> </ul>	Ongoing site monitoring and audit by head contractor	Area of native vegetation loss is no greater than what has been approved.

Objective	Management Actions	Monitoring	Performance Indicators
<b>Native fauna</b>			
No direct loss of native fauna	<ul style="list-style-type: none"> <li>Trained animal handler on site during habitat clearing of vegetation. Any captured animals to be released in nearest area of viable habitat.</li> <li>Record the species, location, health, number of animals and date of capture, and details of where animals released.</li> <li>Animal handler to have appropriate permits to handle fauna.</li> </ul>	Animal handler site notes.	No injury, harm or death of native fauna.
<b>Black-footed Tree-rat</b>			
Compensate for the loss of Black-footed Tree-rat habitat	<ul style="list-style-type: none"> <li>Prior to the development of each stage, habitat this is likely to be suitable nesting or feeding habitat for Black-footed Tree-rat will be offset in accordance with the EPBC Act offset policy.</li> </ul>	Head contractor including environmental sub-contractor ensure compliance prior to removal of habitat.	No net loss of Black-footed Tree-rat habitat.
<b>Migratory Shorebirds</b>			
Retain value of Casuarina Beach and mouth of Sandy Creek as migratory shorebird habitat..	<ul style="list-style-type: none"> <li>Beach access to be located at least 100 metres east of Sandy Creek mouth.</li> <li>Barrier fencing to be established and maintained within 100 metres of Sandy Creek mouth</li> <li>Liaise with NT Parks and Wildlife to ensure no-dog zone is being enforced near mouth of Sandy Creek.</li> <li>Interpretative signs to be installed along boardwalk access from project site to beach.</li> <li>Interpretative signs to be installed at locations outside of project site at access points to Casuarina Beach, informing the public of the significance of the site as migratory shorebird habitat, and the threat that human disturbance, dog-walking and motorbike riding can have.</li> </ul>	<p>Migratory shorebird monitoring to be conducted for a period of five years, commencing once the access track to Casuarina Coastal Reserve is constructed. Survey will include:</p> <ul style="list-style-type: none"> <li>One survey per month between September and</li> </ul>	No detectable change in population of migratory shorebirds at Casuarina Beach that can be attributed to project.



Objective	Management Actions	Monitoring	Performance Indicators
	<ul style="list-style-type: none"><li>Engage local community in migratory shorebird monitoring.</li></ul>	<p>April</p> <ul style="list-style-type: none"><li>Surveys to be conducted near mouth of Sandy Creek (impact) and at Lee Point (control)</li><li>Surveys to be conducted for two hours either side of high tide.</li><li>All migratory shorebirds to be counted and activity (e.g. foraging, roosting) recorded.</li><li>All disturbances to migratory shorebirds to be recorded.</li><li>Surveys to be done at 100 m distance to avoid disturbance.</li><li>Monitoring data to be compared against thresholds (see 4.2 of the</li></ul>	

Objective	Management Actions	Monitoring	Performance Indicators
		Migratory Shorebird bird) to determine impact and management response.	
<b>Water</b>			
No impact on biological diversity in Sandy Creek.	<ul style="list-style-type: none"> <li>Implement the Stormwater Management Plan to manage the flow of stormwater exiting the site, and treat stormwater for sediment, pollutants, hydrocarbons and heavy metals.</li> <li>Rehabilitate erosion gullies in the south-west corner of the site in accordance with Erosion and Sediment Control Plan</li> </ul>	Water Quality Monitoring Plan	Water quality to remain within limits of defined Water Quality Objectives (WQOs) which will be determined prior to construction commencing based on combination of pre-construction monitoring data and ANZECC Guidelines.
<b>Biting Insects</b>			
No connectivity between Casuarina Coastal Reserve and 2CRU for biting insects.	<ul style="list-style-type: none"> <li>A 50 metre open wind buffer to be established along the western perimeter of 2CRU. The tree canopy coverage will need to be reduced to 10%.</li> </ul>	Head contractor in consultation with NT Department of Health (Medical Entomology) prior to site occupation.	Dimensions of buffer along western perimeter of 2CRU comply with Biting Insect Management Plan.
<b>Threatened Sawfish</b>			





Objective	Management Actions	Monitoring	Performance Indicators
No impact of increased recreational fishing in Sandy Creek and Buffalo Creek on Dwarf Sawfish and Green Sawfish	<ul style="list-style-type: none"><li>Install signage at local popular fishing spots along Sandy Creek and Buffalo Creek informing public about threatened status of sawfish found in the creeks, identification guides, catch and release methods and contact details of NT G</li></ul>	Liaison between DHA and NT Government about reported threatened sawfish catches from Sandy Creek and Buffalo Creek.	No increased mortality rates of threatened sawfish due to increased fishing pressure along Sandy Creek and Buffalo Creek.

## 5 Water Management Sub-plan

### 5.1 Environmental values and risks

The hydrological values of the project site and adjoining areas that could potentially be impacted by the project include:

- Water quality of Sandy Creek, and potentially downstream receptors such as Casuarina Beach and Beagle Gulf.
- Groundwater that could potentially support a patch of Monsoon Vine-thicket along the western boundary of 2CRU, and vegetation in the eastern section of Muirhead North.
- Monsoon Rainforest patch in the adjoining Muirhead North site, which receives sheetflows from the eastern half of the project site via a culvert beneath Lee Point Road.
- Exposure of acid-sulphate soils in Stage 2B.

Stormwater management also needs to consider the potential for breeding habitat for mosquito habitat. It is unlikely that that project will have an impact on the quality of Buffalo Creek, consider Buffalo Creek is highly degraded and considered the most polluted waterway entering Darwin Harbour.

### 5.2 Management actions

A description of the management actions to mitigate impacts to hydrological values is provided below in Table 3. These actions are derived from the Stormwater Management Plans. The management actions contained within the ESCP (Section 6) will also contribute to achieving the objectives of the Water Management sub-plan.

**Table 3. Water Management Sub-plan – management actions**

Objective	Management Actions	Monitoring	Performance Indicators
<b><i>Sandy Creek and Buffalo Creek</i></b>			
Health and condition of three locations receiving discharge and down-stream receptors is maintained or improved if possible.	<ul style="list-style-type: none"> <li>As detailed in the Stormwater Management Plans, the following management actions will be undertaken as part of a treatment train of bioretention and detention basins, and vegetated swales: <ul style="list-style-type: none"> <li>Maintain the existing flow-rates of run-off from the project site.</li> <li>Remove 80% of Total Suspended Solids (TSS), 30% of Total Nitrogen (TN), 35% of Total Phosphorous (TP) and 93% of Gross Pollutants (GP).</li> </ul> </li> <li>The following commitments are addressed in the Erosion and Sediment Control Plan <ul style="list-style-type: none"> <li>Erosion gullies in south-west corner of site will be filled and revegetated in a staged manner, starting at the head of the gullies and working down the face of the escarpment.</li> <li>Sediment traps located around the boundaries of the property.</li> <li>Avoid works in the wet season.</li> <li>Clearly defined access points and haul roads.</li> <li>Stockpiles to be located upstream of any sediment control and secured with cover or binding agent if necessary.</li> </ul> </li> </ul>	Water Quality Monitoring Plan.	Water quality does not exceed thresholds of Water Quality Objectives defined in Water Quality Monitoring Plan.
<b><i>Groundwater</i></b>			
Maintain the quantity and quality of groundwater	<ul style="list-style-type: none"> <li>Retain the 21.95 ha patch of Monsoon Vine-thicket along the western boundary of the site.</li> <li>Retain a 0.9 ha patch of Monsoon Rainforest in Muirhead North.</li> <li>Maintain the proposed area of permeable surfaces that would ensure recharge of groundwater.</li> <li>Ensure all chemicals are stored and handled in accordance with the Materials Safety Data Sheet (MSDS).</li> </ul>	Monitoring of health of potential Groundwater Dependent Ecosystems as defined in Section 7.3.2.10 of the EIS for a ten year period twice	No decline in health of Monsoon Vine-thicket or Monsoon Rainforest patch.



Objective	Management Actions	Monitoring	Performance Indicators
	<ul style="list-style-type: none"> <li>Any chemical spill is treated immediately.</li> <li>Excavate and remediate any potential contamination of groundwater.</li> </ul>	<p>yearly, which includes for Monsoon Vine-thicket in 2CRU:</p> <ul style="list-style-type: none"> <li>Two transects running from top to bottom of slope.</li> <li>At one meter intervals along transect record percentage cover and live/dead cover for ground layer, shrub layer and overstorey layer.</li> </ul> <p>For Monsoon Rainforest-patch, monitor:</p> <ul style="list-style-type: none"> <li>At five locations through patch establish photo-monitoring points.</li> <li>Map the boundary of patch.</li> <li>Estimate canopy cover of overstorey species.</li> </ul>	

Objective	Management Actions	Monitoring	Performance Indicators
		- Identify all species presence and allocate a CAB rating.	
<b>Monsoon Rainforest Patch (Muirhead North)</b>			
Maintain the flow of stormwater to Monsoon Rainforest Patch.	<ul style="list-style-type: none"> <li>The Stormwater Management Plan for 2CRU provides for: <ul style="list-style-type: none"> <li>Upgrades to the culverts beneath Lee Point Road</li> <li>Managing the rate and volume of flow between 2CRU and the Muirhead North patch.</li> </ul> </li> </ul>	Ongoing site monitoring and auditing by head contractor.	Pre-construction flow rates and volumes to Monsoon Rainforest patch are sustained.
<b>Biting insects</b>			
Retain amenity for users by preventing habitat for biting insect habitat from establishing.	<ul style="list-style-type: none"> <li>Treatment train to be developed as part of Stormwater Management Plans to comply with recommendations of the Biting Insect Report.</li> </ul>	Resident complaints, site auditing, liaison with entomologists	Compliance with Biting Insect Plan.
<b>Acid-sulphate Soils</b>			
Avoid exposing acid-sulphate soils during construction	<ul style="list-style-type: none"> <li>Test pits to be established throughout Stage 2B, before construction commences for this Stage.</li> <li>If acid-sulphate soils are encountered, an acid-sulphate soils management plan will be developed.</li> </ul>	Test pits to be established prior to construction commencing in Stage 2B.	Any acid-sulphate soils encountered to be managed in accordance with approved acid-sulphate management plan.

## 6 Erosion and Sediment Control Plan

### 6.1 Environmental values and risks

#### 6.1.1 Erosion and sediment control

Land clearing and earthworks are likely to cause erosion in some areas if surface water flows associated with construction works are not appropriately controlled and managed. As part of the CEMP, an Erosion and Sediment Control Plan (ESCP) will be prepared to manage erosion and sedimentation across the development site for each stage of construction. The ESCP will be prepared by a suitably qualified person in accordance with the International Erosion and Association Guidelines. The ESCP will be submitted for each stage of the development for review and approval by the Department of Infrastructure, Planning and Natural Resources (DIPNR) as part of future Development Applications, and in accordance with approval processes established under the NT Planning Act the development will not be given approval to proceed without an approved ESCP.

The key objective of undertaking erosion and sediment control measures is *'to take all reasonable and practicable measures to minimise short and long-term soil erosion and the adverse effects of sediment transport.'* (IECA Best Practice Erosion & Sediment Control). The intended outcomes of sediment and erosion control is to prevent or at least minimise environmental harm caused by the project.

The following key principles as outlined in the IECA Guidelines are to be adhered to during the construction phase of the project:

1. Appropriately integrate the development into the site.
2. Integrate Erosion and Sediment Control (ESC) issues into the site and construction planning.
3. Develop effective and flexible Erosion and Sediment Control Plans (ESCP) based on anticipated soil, weather and construction conditions.
4. Minimise the extent and duration of soil disturbance.
5. Control water movement through the site.
6. Minimise soil erosion.
7. Promptly stabilise disturbed areas.
8. Maximise sediment retention on the site
9. Maintain all ESC measures in proper working order at all times.
10. Monitor the site and adjust ESC practices to maintain the required performance standard.

The NT tropics consist of a wet and dry season. These seasons have a significant impact on ESC issues and appropriate measures need to be considered. During the dry season the key focus is on dust control and the displacement of sediment by the wind. During the wet season the key focus is on the control of water movement and the displacement of sediment through erosion. It is common for the construction phase to stretch across both the seasons and the ESCP must be designed to accommodate this.

#### 6.1.2 Rehabilitation of gully erosion (2CRU)

There are a number of severely eroded gullies in the south-west corner of the 2CRU as can be seen in the aerial photo with contour overlay overleaf. These gullies are eroded up to 4 m deep in places and approximately 3 – 10 m across. It is likely that the area generally had sheet flows without any concentrated



water flows previously. The gullies are likely to have formed from an initial concentration arising from vehicle tracks in the area followed by localised erosion along vehicle tracks and eventually gully erosion commencing from the lower slopes.

The gullies are dangerous and the excessive sediments being moved are causing localised flooding and siltation within and adjacent to Sandy Creek. Advice from Medical Entomology at Royal Darwin Hospital indicates that this also poses a public safety risk from biting insects.

Water flows down the gullies are intermittent and only occur during and immediately after storm events. Minor seepage is evident in a couple of the lowest points of the gullies.

The rehabilitation works will require significant intervention including major earthworks. The total area affected is approximately 5,000 m<sup>2</sup>

The key objectives of undertaking rehabilitation of the gullies are:

- 1 reduce public safety risks associated with falls
- 2 resolve erosion and sedimentation issues
- 3 control potential biting insect breeding sites arising from erosion and sedimentation.

In determining the best approach to the rehabilitation works, it is understood that this area will in time be handed over to Parks and Wildlife and be an extension of the Casuarina Coastal Reserve. Currently there are a number of Mountain Bike Tracks throughout the area, and the terrain is well suited for this sport with appropriate planning and design of the tracks.

The final rehabilitated area is expected to be a combination of:

- restored native vegetation
- combination of grassed and shaded parkland and shared tracks
- water flows being a combination of sheet flow (where areas are fully stabilised and velocities/ flows are low) and naturalised flow paths (vegetated creek lines with rock drop structures and other energy dissipation methods)
- MTB tracks integrated with other uses

The final design, extent and character of these works would be subject to detailed discussions and agreement with Parks and Wildlife.

The works will likely be undertaken across a couple of dry seasons. In works of this nature, it is important to ensure the water flows are effectively dealt with at the top of the catchment prior progressing down the slope. In addition, sufficient time and suitable techniques need to be employed that will ensure all stabilisation works are complete prior to the onset of the wet season. The following stages and sequences of work summarises the current intent:

## 6.2 Management actions

The proposed management actions for the ESCP are detailed below in Table 4, and are separated according to dry season actions, wet season actions, dry and wet season actions, and actions to be undertaken to rehabilitate the erosion gullies in the south-west of 2CRU. The timing and sequencing is critical in the success

of ESC. While every stage of the project will be slightly different generally the sequence of events should follow something along the lines of below:

1. No works to start until prior approval of the ESCP has been attained by DIPNR.
2. All ESC measures are to be in place prior to clearing and bulk earthworks.
3. The sequencing of the control measures are broadly outlined in the following;
  - a. Install nominated site access point and wash down measures
  - b. Install extent of clearing bunting fence
  - c. Commence clearing and place mulch in nominated stockpile area
  - d. Commence topsoil stripping and place in nominated stockpile area
  - e. Commence earthworks.
  - f. Excavate and install stormwater pipes and pits
  - g. Implement inlet protection measures for stormwater pits
  - h. Progressively stabilise (grass / mulch / soil binder / landscaping) batters and cleared areas on completion of earthworks as early as practicable
  - i. Maintain and monitor all ESC measures as directed.

The ESCP will overlap with management actions implemented as part of the Air Quality Management and Water Management Sub-plans contained in this CEMP.

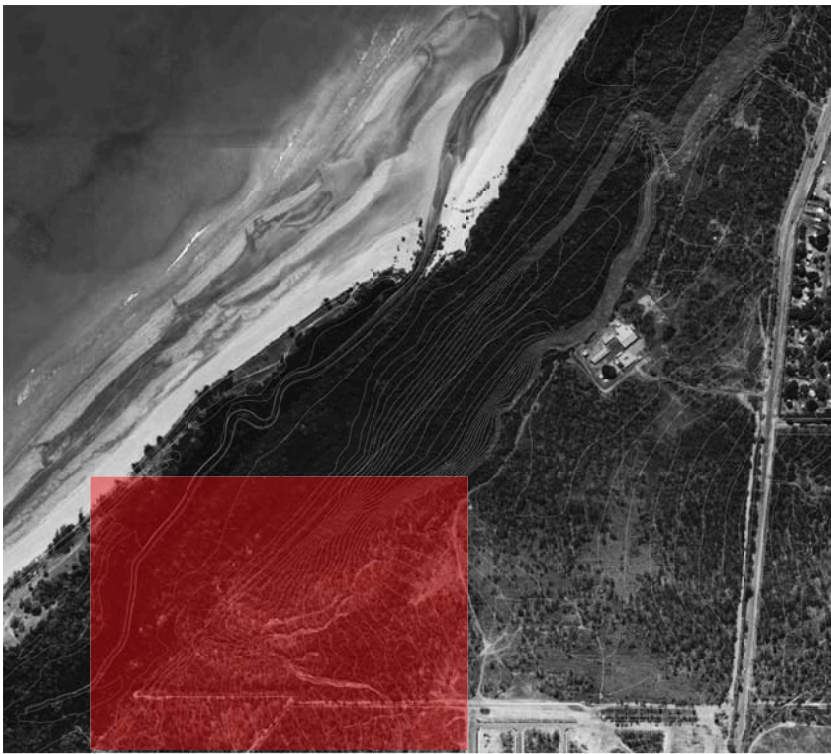
**Table 4. Erosion and Sediment Control Plan - management actions**

Objective	Management Actions	Monitoring	Performance Indicators
<b>Dry season</b>			
Limit impacts of dust pollution on human health and vegetation	<ul style="list-style-type: none"> <li>• Ensure exposed soil surfaces are kept in a moist condition. Alternatively dust suppressants such as soil binders can be used.</li> <li>• Traffic movements on exposed surfaces shall be minimised.</li> <li>• Areas of soil disturbance at any given time shall be minimised and controlled to an immediate area.</li> <li>• Areas where works are completed shall be promptly stabilised through measures such as landscaping, mulching, soil binders or grassing.</li> </ul>	<p>Ongoing site monitoring and audit by head contractor.</p> <p>Dust complaints from adjoining residents, workers.</p> <p>WQMP for Sandy Creek.</p>	<p>No increase in sedimentation.</p> <p>No impacts on human health.</p>
<b>Wet season</b>			
Minimise erosion and pollution of water-ways	<ul style="list-style-type: none"> <li>• Construct sediment catchment devices, typically a temporary basin.</li> <li>• Install sediment control devices such as silt fencing, berms and swales.</li> <li>• Construct plant wash down bay and entry/exit shaker to ensure no mud attached to vehicles leaves the site.</li> <li>• Divert upstream storm water runoff away from disturbed areas of the site and into existing intact native vegetation, sediment control devices or existing drainage systems.</li> </ul>	<p>Ongoing site monitoring and audit by head contractor.</p> <p>Implementation of Stormwater Management Plans.</p> <p>WQMP for Sandy Creek.</p>	<p>No increase in pollution of waterways.</p> <p>Bioretention and detention basins working to specification.</p>
<b>Wet and dry season</b>			

Objective	Management Actions	Monitoring	Performance Indicators
Minimise erosion and pollution of water-ways, and limit impacts of dust pollution on human health and vegetation	<ul style="list-style-type: none"> <li>Control all traffic into and out of the site including movement of traffic within the site.</li> <li>No additional clearing or disturbance beyond the limit of works of a particular stage.</li> <li>Maintenance and monitoring of the ESC measures are to be undertaken for the life of the project.</li> <li>Stripped topsoil for re-use is to be stockpiled appropriately and protected from wind / runoff erosion and weed infestation.</li> <li>Revegetation / stabilisation works are to occur as early as practicable on cleared / disturbed areas.</li> <li>Staff working on the site need to be trained and informed of the importance of maintaining good ESC procedures.</li> </ul>	<p>Ongoing site monitoring and audit by head contractor.</p> <p>Implementation of Stormwater Management Plans.</p> <p>WQMP for Sandy Creek.</p> <p>Dust complaints from adjoining residents, workers.</p>	<p>No increase in pollution of waterways.</p> <p>Bioretention and detention basins working to specification.</p> <p>No increase in sedimentation.</p> <p>No impacts on human health.</p>
<b>Gully erosion rehabilitation (2CRU)</b>			
Stabilise erosion gullies to prevent further erosion, sedimentation of Sandy Creek, breeding of biting insects and human safety risks.	<ul style="list-style-type: none"> <li>Undertake detailed survey of the entire site, including all areas of the upstream catchment</li> <li>Preliminary design of the residential subdivision to identify which parts of the catchment may be cut off from this flow path and how it will be drained.</li> <li>Subject to timing of the residential development, undertake necessary upper catchment stormwater diversion and control works.</li> <li>Consult with Parks and Wildlife and agree overall end point condition and intended public use of the area.</li> <li>Undertake Stage 1 rehabilitation works on minor gullies and upper reach of major gully. Works to comprise: <ul style="list-style-type: none"> <li>filling and compaction of the gullies</li> <li>construction of diversion banks, spreader banks, silt fences and minor drop structures</li> <li>establishment of vegetation (type of vegetation subject to agreed treatments, irrigated grass likely to be dominant as part of overall visitor use intention)</li> <li>construct drop structures/energy dissipaters at lower end of the Stage 1 works</li> </ul> </li> </ul>	<p>WQMP for Sandy Creek.</p> <p>Regular visits of work site by head contractor and sub-contractor responsible for rehabilitation works.</p> <p>Consultation with Medical Entomology regarding breeding habitat for biting insects.</p>	<p>Return of land-form to natural topography.</p> <p>Improvement in water quality at discharge point into Sandy Creek.</p> <p>Increase in suitable habitat for native fauna including Black-footed Tree-rat.</p>



Objective	Management Actions	Monitoring	Performance Indicators
	<ul style="list-style-type: none"><li>• Monitor and repair works during first wet season, maintain and ensure full establishment of stable vegetation cover.</li><li>• Undertake Stage 2 rehabilitation on lower end of major gully. Works to comprise:<ul style="list-style-type: none"><li>○ filling and compaction of the gullies</li><li>○ construction of diversion banks, spreader banks, silt fences and minor drop structures</li><li>○ establishment of vegetation (type of vegetation subject to agreed treatments, irrigated grass likely to be dominant as part of overall visitor use intention)</li><li>○ construct drop structures/energy dissipaters and possible sedimentation basin at lower end of the Stage 2 works immediately adjacent to existing coastal reserve track; where there are concentrated flows</li><li>○ construction of piped outfall to suitable location within the tidal zone of sandy creek.</li></ul></li><li>• Key considerations in completion of the Stage 2 works will be elimination of any low flows or ponding of stormwater at or above the high tide mark.</li><li>• Monitor and repair works during second wet season, maintain and ensure full establishment of stable vegetation cover.</li><li>• Prepare and implement long term monitoring and maintenance program prior to removing all temporary erosion control structures.</li></ul>		

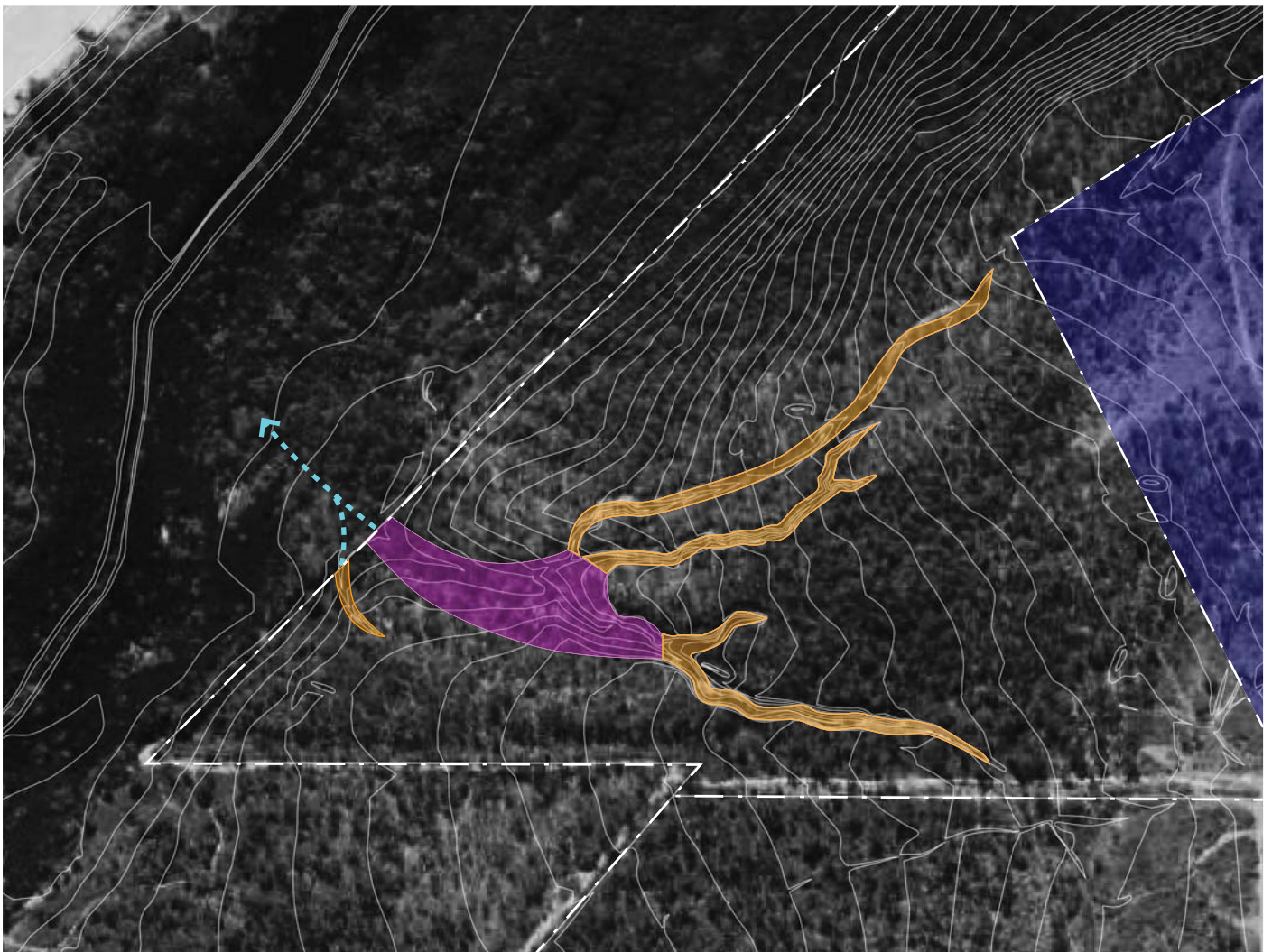


LOCATION MAP

1:15000@A3

## LEGEND

- Approximate new residential development area. Control and engineered management of stormwater as part of development works.
- Stage 1 rehabilitation works  
- Stabilisation of minor gullies and upstream areas
- Stage 2 rehabilitation works  
- Stabilisation of downstream gullies
- Stage 2 Stormwater outfall works  
- Management of ponding risks and discharge to tidal zone of Sandy Creek.

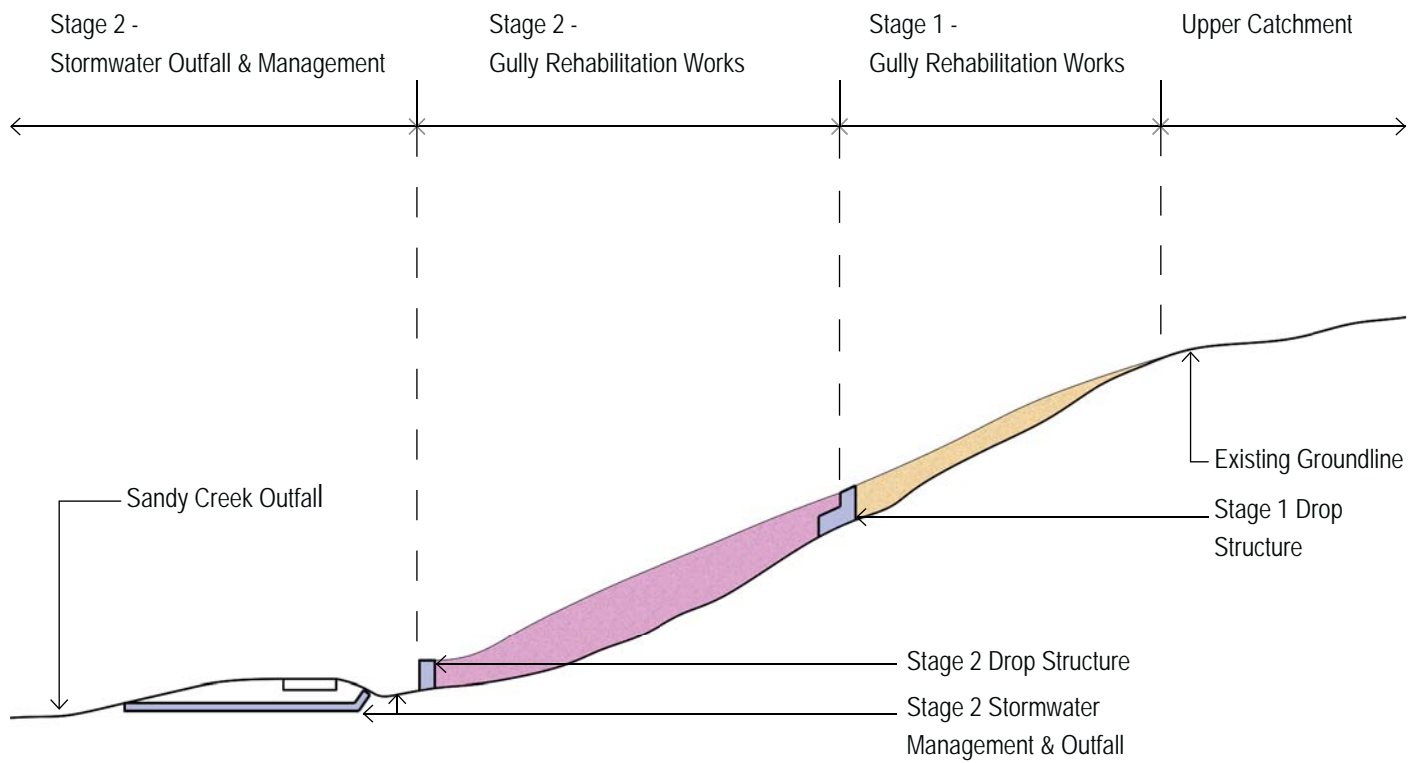


WORKS & STAGING PLAN

1:4000@A3

## GULLY REHABILITATION - SITE PLAN

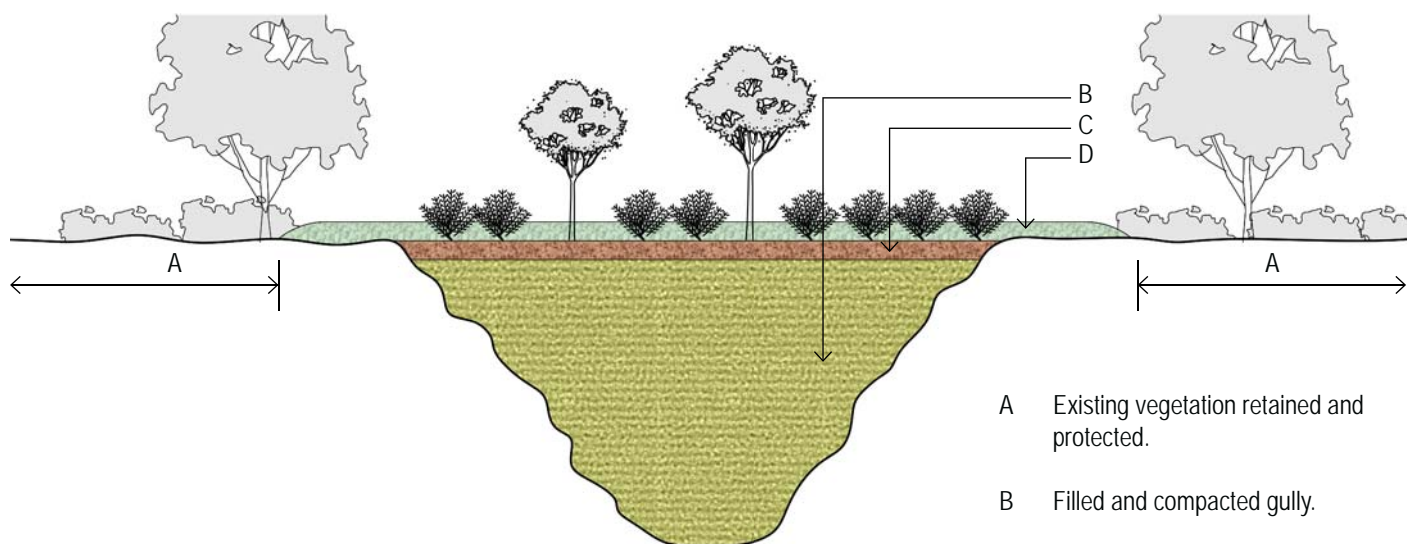




### LONG SECTION

H: 1:2500@A4

V: 1:500@A4



- A Existing vegetation retained and protected.
- B Filled and compacted gully.
- C Topsoil and new planting.
- D Diversion banks and flow dissipators at regular intervals.

### CROSS-SECTION

1:100@A4

## GULLY REHABILITATION - TYPICAL SECTIONS

## **7 Heritage Management Sub-plan**

### **7.1 Environmental values and risks**

The historic and cultural heritage values that occur within the project site and potential impacts and risks to historic and cultural heritage values associated with project activities are described in Chapter 7 of the EIS. The historic and cultural heritage values include:

- Military heritage such as the Lee Point Bunkers and Konfrontasi Cruciform
- Background scatter of Aboriginal stone artefacts.

The site does not support any items listed on the Commonwealth or Northern Territory cultural heritage lists.

### **7.2 Management actions**

The management actions that support the Heritage Management Sub-plan are provided below in Table 5.

**Table 5. Heritage Management Sub-plan – management actions**

Objective	Management Actions	Monitoring	Performance Indicators
<b><i>Military heritage</i></b>			
Preserve important heritage items that reflect the site's military history, where possible.	<ul style="list-style-type: none"> <li>Retain the Lee Point bunkers and Konfrontasi Cruciform.</li> <li>Work with local NT Heritage Branch to develop signage and interpretation material of Lee Point Bunkers and Konfrontasi Cruciform.</li> </ul>	Not applicable	Residents have an understanding of the military history of the site.
<b><i>Stone scatters</i></b>			
Destruction of stone scatters is in accordance with heritage regulations.	<ul style="list-style-type: none"> <li>Apply for a work approval under Section 72 of the NT <i>Heritage Act</i> before carrying out any works within the area of the stone scatters.</li> </ul>	Not applicable	Compliance with NT <i>Heritage Act</i>
<b><i>Aboriginal sacred sites</i></b>			
There are no listed sacred sites within the project site or adjoining areas; however, an Authority Certificate will be obtained from the AAPA before commencing works.	<ul style="list-style-type: none"> <li>Obtain Authority Certificate from AAPA before commencing works.</li> </ul>	Not applicable	Compliance with NT <i>Aboriginal Sacred Sites Act</i> .

## **8 Social and Economic Management Sub-plan**

### **8.1 Socio-economic values and risks**

The social economic values and risks of the project are described in Chapter 8 of the EIS. The project will have a number of positive impacts including supply of affordable housing, demand for construction services during a period of downturn in the mining and resources sector, and ongoing employment in the education and hospitality sectors

Some of the potential negative impacts of the project could include:

- Oversupply of housing and commercial land
- Lack of skilled workforce
- Draw labour and skills away from other projects
- High demand on local amenity including Casuarina Coastal Reserve and Buffalo Creek Boat Ramp
- Shortfall of social services
- Adverse amenity impacts
- Impact on the viability of nearby commercial areas.

### **8.2 Management actions**

Management actions that will be undertaken as part of the Social Economic Management Sub-plan are described below in Table 6.

**Table 6. Social and Economic Management Sub-plan – management actions**

Objective	Management Actions	Monitoring	Performance Indicators
<b><i>Oversupply of Housing and Commercial land</i></b>			
Provide housing and commercial land that meets the demand of the local community.	<ul style="list-style-type: none"> <li>Align staging and development with growth rates per Darwin Regional Land Use Plan (or updated policies and projections)</li> <li>Provide commercial land in accordance with needs analysis (ie avoid over supply), which considers the current and future provision of commercial and centre-type facilities (including the planned Muirhead centre)</li> </ul>	Monitor local and regional land values and demand.	Maintenance and/or growth of pricing and consistency of sales.
<b><i>Workforce</i></b>			
A suitably qualified workforce can service the project without any impacts on other projects, including permanent positions in hospitality and retail that will be generated.	<ul style="list-style-type: none"> <li>Development in accordance with projected commercial, accommodation and social infrastructure demand based on population projections, to ensure service provision doesn't exceed demand created by population.</li> <li>Provision of appropriate training opportunities for local market. Importation of skills as a last resort.</li> <li>Ensure staging and timing of construction aligns with anticipated population and housing growth rates for the Darwin Region</li> </ul>	Monitor local job advertisements and employment statistics.	<p>Majority of workforce sourced locally.</p> <p>No unreasonable effect on access to trades/constructions services/retail and hospitality workforce.</p>
<b><i>Amenity</i></b>			
No imposition to existing users of local amenity, such as Casuarina Coastal Reserve and Buffalo Creek Boat Ramp	<ul style="list-style-type: none"> <li>Buffalo Creek Boat Ramp has recently been upgraded and access is limited by tidal movement. Continual monitoring required upon occupation to determine impact on use patterns.</li> <li>Contribute 21.95 ha of Monsoon Vine Thicket to Casuarina Coastal Reserve, and 1.5 ha patch of Monsoon Rainforest in Muirhead North to public open space.</li> <li>Provide access to Casuarina Beach from project site, to reduce pressure at other access points.</li> </ul>	DHA and NT Government to monitor use of facilities	Appropriate access to all facilities.
<b><i>Social Services</i></b>			



Objective	Management Actions	Monitoring	Performance Indicators
Achievement of Lead Practice Principles and Benchmarks per social needs analysis.	<ul style="list-style-type: none"><li>• Ensure adequate serviced land is available for community and social infrastructure in accordance with needs analysis.</li></ul>	Ongoing liaison with NT Government.	Adequate availability of social services for local residents.



## **9 Noise Management Sub-plan**

### **9.1 Environmental values and risks**

The potential impacts and risks associated with noise is described in Chapter 9 of the EIS. They include the effects of noise and vibration on:

- Health
- Sleep
- Annoyance
- Structural forms.

### **9.2 Management actions**

The management actions proposed as part of the Noise Management Sub-plan is provided below in Table 7.

**Table 7. Noise Management Sub-plan – management actions**

Objective	Management Actions	Monitoring	Performance Indicators
<b>Operational Noise</b>			
Preserve workers and adjoining residents health, and adjoining residents sleep.	<ul style="list-style-type: none"> <li>Noise barriers or receiver façade upgrades</li> <li>Low noise asphalt, reduced speed limits</li> </ul>	Complaints, deterioration in workers health	No deterioration in workers health or adjoining residents, no complaints from residents.
<b>Construction Noise</b>			
Preserve workers and adjoining residents health, and adjoining residents sleep.	<ul style="list-style-type: none"> <li>Avoid construction at night, temporary noise barriers or temporary relocation of most affected receivers</li> <li>Temporary noise barriers or provide respite periods</li> <li>Offer gifts (movie tickets for noisy periods) to adjoining residents.</li> <li>Mulchers should be located away from noise sensitive receivers</li> <li>Reduce the number of plant operating at one time where works are required to be carried out outside of standard hours and close to existing sensitive receivers</li> <li>Preference should be for electric powered plant over combustion engine powered plant</li> <li>Preference should be for hydraulic or electric powered plant over pneumatic powered plant</li> <li>Avoid metal to metal contact on equipment to reduce impulsive or scraping noise consultation with residents</li> <li>Provision of noise attenuating controls at the source, such as mufflers, acoustic screens</li> <li>Keeping plant and equipment well maintained</li> <li>Locating static sources of noise such as the generators as remotely as possible from noise sensitive receivers</li> <li>Use of broadband reversing alarms, or “quackers”, on mobile equipment in accordance with the relevant health and safety regulations</li> <li>Informing potentially affected receivers with adequate notice of the</li> </ul>	Complaints, deterioration in workers health	No deterioration in workers health or adjoining residents, no complaints from residents.

Objective	Management Actions	Monitoring	Performance Indicators
	<p>construction program and any planned activities that may exceed noise and vibration targets</p> <ul style="list-style-type: none"> <li>• Modification of work activities where noise or vibration is found to cause unacceptable impact</li> <li>• Implementing a procedure for dealing with complaints to ensure that all complaints are registered and dealt with appropriately</li> <li>• Ensure that managers effectively communicate acceptable and unacceptable work practices for the site, through staff site inductions, notice boards, and prestart meetings</li> <li>• Avoid the need for reversing in the construction area by creating a loop road or similar</li> <li>• Avoid dropping materials from height</li> <li>• Workers should avoid shouting, minimise talking loudly, and avoid slamming vehicle doors</li> </ul>		
<b>Operational Vibration</b>			
Preserve building integrity, workers and adjoining residents health, and adjoining residents sleep.	<ul style="list-style-type: none"> <li>• Road design and avoid speed bumps</li> </ul>	Complaints, deterioration in workers health	No deterioration in workers health or adjoining residents, no complaints from residents.
<b>Construction Vibration</b>			
Preserve building integrity, workers and adjoining residents health, and adjoining residents sleep.	<ul style="list-style-type: none"> <li>• Select suitable plant when near vibration sensitive receivers</li> <li>• Avoid vibration intensive work at night to minimise the risk of sleep disturbance</li> <li>• Informing potentially affected receivers with adequate notice of the construction program and any planned activities that may exceed noise and vibration targets</li> <li>• Modification of work activities where noise or vibration is found to cause</li> </ul>	Complaints, deterioration in workers health	No deterioration in workers health or adjoining residents, no complaints from residents.



Objective	Management Actions	Monitoring	Performance Indicators
	<p>unacceptable impact</p> <ul style="list-style-type: none"><li>• Implementing a procedure for dealing with complaints to ensure that all complaints are registered and dealt with appropriately</li><li>• Ensure that managers effectively communicate acceptable and unacceptable work practices for the site, through staff site inductions, notice boards, and prestart meetings</li><li>• Avoid dropping materials from height</li></ul>		

## **10 Air Quality Management Sub-plan**

### **10.1 Environmental values and risks**

The potential impacts and risks to air associated with project activities are described in Chapter 5 of this EIS. An Odour Impact Assessment was undertaken and the project site was found to be over one kilometre away from the plume extent from the Leanyer Sanderson Water Treatment Plant.

The potential risks to air quality associated with the project relates to dust and asbestos contamination from removal of two 450 metre long parallel asbestos pipes.

### **10.2 Management actions**

A list of the management actions to be undertaken as part of the Air Quality Management Sub-plan is provided below in Table 8.

**Table 8. Air Quality Management Sub-plan – management actions**

Objective	Management Actions	Monitoring	Performance Indicators
Avoid contamination of air with asbestos	<ul style="list-style-type: none"> <li>Removal of two 450 metre long parallel asbestos pipes in 2CRU to be undertaken by trained and certified removal company.</li> </ul>	Certification of responsible contractor	No impact of asbestos on human health due to removal of pipes.
Maintain the respiratory health of workers and adjoining residents, and no adverse impacts on vegetation.	<ul style="list-style-type: none"> <li>Notify adjoining residents prior to works commencing</li> <li>Vegetation cleared in a staged manner</li> <li>Limit the amount of excavation required to clear vegetation</li> <li>Watering on haul roads, and exposed areas</li> <li>Vehicles obey speed limits and stick to formed road</li> <li>Trafficable areas clearly marked</li> <li>Stabilise long exposed areas</li> <li>Rehabilitate as soon as possible.</li> </ul>	Complaints by adjoining residents	No decline in respiratory health of staff/adjoining residents, or decline in vegetation health, that can be attributed to the project. sf

## **11 Supporting Documents**

The following documents support the actions proposed in this CEMP and can be found in the appendices of the CEMP. A list of guidelines that have been referenced in preparing this document are also provided.

### **11.1 Technical Studies and Reports**

NT Department of Health 2016. Muirhead North and 2CRU Biting Insect Report. Final report prepared for Defence Housing Australia. Medical Entomology Centre for Disease Control, NT Department of Health, Darwin.

The Odour Unit Pty Ltd 2017. Odour Impact Assessment - field odour inspection of Leanyer-Sanderson WWTP, Darwin NT, Final Report prepared for Defence Housing Authority. The Odour Unity Pty Ltd, Perth, WA.

Lilleyman A 2017. Report on potential impacts from disturbance to migratory shorebirds in Darwin: Defence Housing Authority – Lee Point Master-planned Urban Development. Report prepared for EcOz Environmental Consultants, January 2017.

Cardno 2016a. Noise Impact Assessment. Darwin 2CRU Development. Final Report Prepared for Defence Housing Authority, December 2016.

Cardno 2016b. Noise Impact Assessment. Darwin Muirhead North Development. Final Report Prepared for Defence Housing Authority, December 2016.

### **11.2 Stand-alone Management Plans**

Cardno 2017a. Stormwater Management Plan. 2CRU – Lee Point Road, Lee Point. Final Report Prepared for Defence Housing Authority, October 2017.

Cardno 2017b. Stormwater Management Plan. 2CRU – Lee Point Road, Lee Point. Final Report Prepared for Defence Housing Authority, October 2017.

Ecology and Heritage Partners Pty Ltd 2017. Lee Point Master-planned Urban Development – Water Quality Monitoring Plan. Draft report prepared for Defence Housing Australia, October 2017.

### **11.3 Guidelines**

NT EPA 2015. Guidance for the Preparation of an Environmental Management Plan. Northern Territory Environment Protection Authority, Darwin, NT.

NT EPA 2013. Guidelines for the Preparation of a Social Economic Impact Assessment. Northern Territory Environment Protection Authority, Darwin, NT.

IECA 2016. Best Practice Erosion and Sediment Control Guidelines. International Erosion Control Association Australian Chapter, Picton, NSW.

## Appendix A – CEMP Inspection Checklist

Date:	Inspected by/company:	Stage(s) of development:
<b>Biodiversity</b>		
Weed spraying completed. If yes, what dates where and by whom?		
Any evidence of increased weed spread or potential introduction of weed seed to site?		
Have wash-down bays been made available and in use?		
All areas of native vegetation to be retained have been appropriately fenced off prior to works commencing?		
Any disturbance in areas of native vegetation to be retained that could be attributed to project, i.e. vehicles, machinery or equipment?		
No. of Darwin Cycads salvaged, and location where Darwin Cycads have been relocated.		
Has an animal handler been present prior to any vegetation removal?		
Has Black-footed Tree-rat offsets been obtained prior to the removal of any Black-footed Tree-rat habitat?		
Are residents and visitors to the project site, using the provided access track to access Casuarina Beach?		
Has vegetation monitoring of Monsoon Rainforest and Monsoon Vine-thicket been completed or scheduled?		
Has migratory shorebird monitoring been completed for this month?		
<b>Water</b>		
Water quality monitoring of Sandy Creek been completed?		
Bioretention and detention basins inspected and working to specifications?		
No interactions with groundwater during clearance work or excavations?		
No contamination spills that may polluted groundwater?		
Any pooling of water observed which may be suitable habitat for biting insects?		
<b>Erosion and Sediment Control</b>		
Any complaints from surrounding residents or workers about dust?		



Water or soil binders applied to exposed soil?
Traffic movements confined to dedicated roads?
Sediment catching devices in places, e.g. silt fencing, berms or swales?
Stormwater diverted away from disturbed areas?
Revegetation of exposed areas completed?
Stage 1 gully erosion rehabilitation works commenced? What works have been completed?
Stage 2 gully erosion works rehabilitation commenced? What works have been completed?
<b>Heritage</b>
No damage or destruction of military heritage sites to be conserved?
<b>Social and Economic</b>
Has uptake of housing and commercial sites kept up with supply?
Is there enough suitably qualified people to resources the current development phase?
Has the project contributed to the inability for people to access facilities in the Lee Point area, e.g. Buffalo Creek Boat Ramp or Casuarina Beach, due to population increase or impediments to access?
What community space has been made available?
<b>Noise</b>
Has any construction work occurred at night? If so when, and what type of work?
Have any noise barriers been used?
Has there been any complaints received by adjoining residents or landowners?
Has there been any modifications to standard work procedures to compensate for noise impacts?
Has adjoining residents/landowners been informed of potential noise disturbance?
<b>Air Quality</b>
Have haul roads been watered?
Are trafficable areas cleared marked?

Any complaints from adjoining land-owners or residents?

Further comments including any communication with referral/regulatory authorities about potential breaches of CEMP?