

City of Karratha

Cleaverville Foreshore Management Plan

September 2018

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

This page is intentionally left blank

DRAFT

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

Table of contents

1. Introduction 2
   - 1.1 Purpose of this report 2
   - 1.2 Implementation of the plan 2
   - 1.3 Context for management plan 1
   - 1.4 Developing this plan 1
   - 1.5 Planning and policy context 2
2. Cleaverville Foreshore Characteristics 5
   - 2.1 Location description 5
   - 2.2 Environmental values 7
   - 2.3 Cultural values 11
   - 2.4 Recreational values 12
   - 2.5 Resource values 13
3. Managing Recreation 15
   - 3.1 Issues 15
   - 3.2 Recommendations 18
   - 3.3 Implementation 22
   - 3.4 Monitoring and review 23
4. References 25

Table index

Table 3-1 Priority actions 22

Figure index

Figure 1-1 Cleaverville foreshore area and existing infrastructure 1

Figure 2-1 Cleaverville Road 5

Figure 2-2 Existing facilities and infrastructure 6

Figure 2-3 Cleaverville landscape and vegetation 8

Figure 2-4 Vegetation condition across the Cleaverville foreshore area as defined by Trudgen (1988) 10

Figure 2-5 Camping at Cleaverville 12

Figure 2-6 Recreation activities at Cleaverville 13

Figure 2-7 Development concept for Anketell Port 14

Figure 3-1 Example of newly established and unregulated campsites in Cleaverville dunes 15

Figure 3-2 Duplicated and newly established tracks 16

Figure 3-3 Campsite litter 16

DRAFT

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

Figure 3-4 Tracks leading to known Northern Quoll habitat.....17

Figure 3-5 Signage identifying Cleaverville as a turtle nesting area and key nesting beach opposite Honda City.....18

Figure 3-6 Examples of camping signage from Warroora and Ningaloo Statio.....19

Appendices

Appendix A – Desktop Study Report

Appendix B – Stakeholder Engagement Report

Appendix C – Vegetation Condition Assessment Report

Appendix D – Management Plans

DRAFT

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

This page is intentionally left blank

DRAFT

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

1. Introduction

Cleaverville foreshore area is a remote part of the City of Karratha (herein the **City**) located in the Pilbara Region of Western Australia (Figure 1-1). The foreshore is approximately 7 km kilometres in length and exhibits a range of landscapes including sandy beaches, rocky headlands, and a creek lined with mangroves. Both local residents and tourists are attracted to Cleaverville foreshore area by the natural and peaceful environment it presents, the relatively undeveloped nature of the area, and the recreational activities offered by the beaches, access tracks and creek.

The increasing residential and tourist population that utilise the area has resulted in increasing pressures on the natural environment. The area is also bounded by the Anketell Strategic Industrial area to the east and an industry buffer Special Control Area to the south. These uses, together with continuing population growth and development pressure have the potential to significantly impact on the cultural, recreational and ecological values of the site, and require planned management to mitigate any potential loss of highly valued foreshore attributes.

Cleaverville area is valued for a variety of reasons by different people, including government, traditional owners, councils, communities, developers, individuals and special interest groups. The planning and management of the foreshore area must therefore balance environmental, economic and social outcomes, and take into consideration the range of issues and values that stakeholders consider important, consistent with the sustainable development of environmental and cultural values of the area.

A detailed and long-term Foreshore Management Plan (**FMP**) is therefore required to ensure that the unique values of the foreshore are protected for future generations, while at the same time maintaining a sustainable recreational hub.

DRAFT

1.1 Purpose of this report

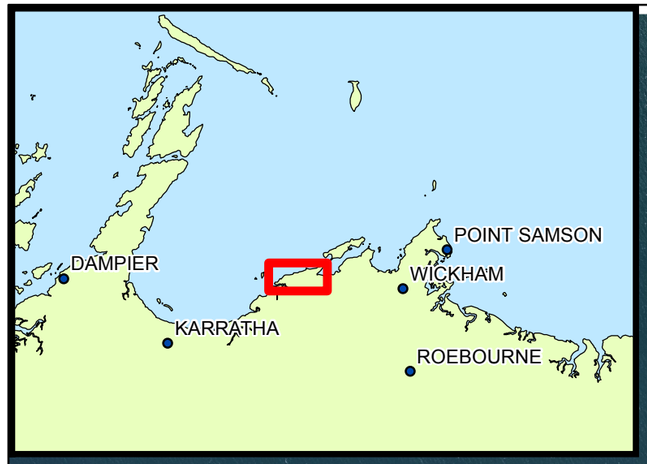
This Cleaverville FMP has been prepared to provide a framework that will guide management of the foreshore in a manner that ensures the long-term preservation of environmental, cultural and social values of the area. The FMP allows appropriate management within the area to foster sustainable recreational and tourism use whilst recognising and incorporating environmental and cultural values.

The purpose of the FMP is to outline current environmental and cultural issues apparent at various locations of the coastal area and suggest management strategies for those identified issues. The FMP is designed to provide overarching management direction and provide information to assist the City in prioritising maintenance schedules to ensure sustainable land use. Ultimately, the FMP will guide the City and the community to protect, maintain and manage the Cleaverville area.

1.2 Implementation of the plan

The development of the Cleaverville FMP and the implementation of the management plan has been undertaken in consultation and partnership with the land's Traditional Owners, the Ngarluma people. At the time of the development of the FMP, no commitments had been formally made by Ngarluma regarding the implementation of a management plan. Implementation of recommendations outlined in the FMP will depend on the resources available and priorities identified by the City, and will be undertaken in consultation with Ngarluma. Specific recommendations and details on implementation are outlined in Section 3 of this FMP.

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.



Legend

- Boat Ramp
- Caretaker
- Information
- Rubbish Bins
- Septic Waste
- Shelter
- Toilet
- Cadastre

Aboriginal Heritage Status

- Lodged
- Registered Site

DRAFT

P402557 1001 FHOLD

The Point

Honda City

Sunset Strip

Rabbit Warren

Sandfly Alley

P195338 543 CROWN

P402557 1000 FHOLD

P195338 543 CROWN

P220920 265 CROWN

P220920 265 CROWN

P401956 3550 FHOLD

P404469 384 FHOLD

P404469 382 ROAD

P077603 428 FHOLD

P401956 3551 FHOLD

P401956 3551 FHOLD

Paper Size ISO A3

0 100 200 300 400 500

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

N

GHD

CITY OF KARRATHA
CLEAVERVILLE FORESHORE MANAGEMENT PLAN

Location map

Project No. **61-36810**
Revision No. **A**
Date **21 Sep 2018**

FIGURE 1-1

G:\61\36810\GIS\Maps\Working\61-36810_002_AboriginalHeritage_RevA.mxd
Print date: 21 Sep 2018 - 09:05

Data source: DAA: Aboriginal Heritage - 20180529; Cadastre & Imagery: Landgate (SLIP); GHD: Existing Infrastructure. Created by: artermulo

1.3 Context for management plan

Cleaverville foreshore is predominantly used by visiting tourists for fishing and camping during the winter months, and by the local community for recreational purposes all year round. These activities are generally uncontrolled and unmanaged creating a pervasive and cumulative negative impact on environmental and cultural values within the area.

Development within the Pilbara region is projected to increase the population in Karratha (City of Karratha, 2016). With the projected increase in residential population, it is a reasonable assumption that there will be an increase in leisure and recreational activities throughout Cleaverville foreshore area, therefore increasing pressures on the natural environment.

With the current unmanaged recreational activities and the predicted increase in leisure activities within the Cleaverville area, there is a significant need to develop a local Cleaverville FMP to appropriately manage the area for long-term sustainability. The FMP will provide a framework to guide the City and the community in terms of access, infrastructure and management to re-establish and protect the important environmental, cultural and social values of the coastal area.

The overarching aims of the Cleaverville FMP are to:

- Contribute to the implementation of local and regional planning objectives and coastal strategies;
- Consolidate community partnerships and build community capacity and ownership of the area including working with the area's Traditional Owners; and
- Foster the sustainable recreational and tourist use of the area through a plan that protects the environmental and cultural values of the area and identifies access arrangements and long-term infrastructure needs.

DRAFT

1.4 Developing this plan

The FMP has been prepared on the basis of the information provided by input from a community consultation program, desktop study and field survey study. Technical reports associated with developing the FMP are provided as appendices, including a desktop study, stakeholder consultation and vegetation condition assessment.

Development of the Cleaverville FMP was funded by Coastwest, a State Government initiative undertaken by the Western Australian Planning Commission (WAPC) and the Department of Planning, Lands and Heritage (DoPLH).

1.4.1 Desktop study

The purpose of the desktop study was to identify species and areas of ecological and conservation significance within the Cleaverville region at both a site specific and broad scale. This information was used to determine areas of likelihood and potential likelihood of Threatened Ecological Communities (TECs), Priority Ecological Communities (PECs), and Declared Rare, Priority and significant flora and fauna. The assessment was combined with a spatial analysis and an on-ground vegetation condition assessment to guide the development of the FMP. The FMP presents a summary of the desktop survey results - full details are presenting in Appendix A.

1.4.2 Consultation

A stakeholder engagement strategy was developed in consultation with the City and in compliance with the City of Karratha's *Community Engagement Policy* and the *International*

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

Association for Public Participation's spectrum. Stakeholders were determined in consultation with the City's Community Engagement and Partnerships team and included Government and non-Government agencies, traditional owner groups, major local industries, sporting and recreation groups, and the general community. The FMP presents a summary of findings from the consultation - full details are presenting in Appendix B.

To consult with a broad range of stakeholders, three (3) workshops were held, an online survey was carried out, and seasonal travellers were interviewed at Cleaverville. Multiple strategies were used to promote the online survey and stakeholder workshops, such as radio interview, listing on websites and social media pages, newspaper, emails and phone calls to target stakeholder groups.

Two community workshops were held; the first was at Karratha Leisureplex on Tuesday 17th April 2018 and the second at Wickham Community Hall on Wednesday 18th April 2018. An agency and industry stakeholder workshop was also held at the City of Karratha office on 20th April 2018. The presentation delivered at all three workshops identified the current uses within the Cleaverville area, the current and future opportunities and threats, and asked for suggestions for improving and managing the foreshore area.

The online survey, provided via the City of Karratha's Website, was available online during a 12-week period during which time 83 community members responded. Twenty-five (25) seasonal travellers were also interviewed at Cleaverville using the online survey structure.

The local values, issues and recommendations outlined during the workshops, online survey and interviews were recorded, reviewed and taken into consideration during the development of the Cleaverville FMP.

DRAFT

1.4.3 Field survey

A vegetation condition assessment for the Cleaverville foreshore area was undertaken on April 23rd 2018 utilising the *Vegetation Condition Scale for the Eremaean and Northern Botanical Provinces* (Adapted from Trudgen 1988). The FMP presents a summary of findings from the vegetation condition assessment - full details are presenting in Appendix C.

Previous vegetation surveys and aerial imagery of the Cleaverville area were reviewed to determine vegetation types, disturbance features and areas with the highest potential for weeds. The entire length and width of the Cleaverville study area was then traversed by vehicle and foot by an experienced botanist, beginning at the westernmost end of the Cleaverville foreshore area, to evaluate the current status of vegetation condition. The review and field survey were used to inform the development of the Cleaverville FMP.

During the field survey, access tracks not considered necessary were identified for closure.

1.5 Planning and policy context

Key planning and policy context for Cleaverville is provided by the following documents. Key outcomes and implications are summarised where possible.

Pilbara Planning and Infrastructure Framework (WAPC, 2012)

The *Pilbara Planning and Infrastructure Framework* defines a strategic direction for the future development of the Pilbara region over the next 25 years. It seeks to ensure that development and change in the Pilbara is achieved in a way that improves people's lives and enhances the character and environment of the region.

The *Pilbara Planning and Infrastructure Framework* notes that the region is highly dependent on outdoor sporting and recreation activities and that due to the climate, water plays an important role in recreation facility provision. Recognised popular coastal activities include recreational

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

fishing and diving facilitated by boat ramps in all the major coastal settlements. The popularity of coastal marine recreation is demonstrated by the Pilbara having some of the highest recreational boat ownership in Australia (WAPC, 2012).

City of Karratha Local Planning Scheme No. 8

City of Karratha LPS No. 8 (2018) outlines the City's planning aims and intentions for the municipal district. It also aims to control and guide land use and development within the district, as well as facilitating community input into planning. The development objectives for pastoral area, as defined in Part IV of lPS No. 8, are:

a. Protect the environmental and recreational qualities of coastal areas, and ensure continued public access to key coastal recreational nodes such as Gnoorea and Cleaverville.

b. Protect the key environmental features and natural landscapes within the City.

State Planning Policy 2.6: State Coastal Planning Policy (2013)

The purpose of the Policy is to provide guidance for decision-making within the coastal zone including managing development and land use change; establishment of foreshore reserves; and to protect, conserve and enhance coastal values. This policy recognises and responds to regional diversity in coastal types; requires that coastal hazard risk management and adaptation is appropriately planned for; and encourages innovative approaches to managing coastal hazard risk, and provides public ownership of coastal foreshore reserves.

The policy provides high order guidance for decision making on coastal planning matters and applies state-wide. The objectives of this policy are to:

1. ensure that development and the location of coastal facilities takes into account coastal processes, landform stability, coastal hazards, climate change and biophysical criteria;
2. ensure the identification of appropriate areas for the sustainable use of the coast for housing, tourism, recreation, ocean access, maritime industry, commercial and other activities;
3. provide for public coastal foreshore reserves and access to them on the coast; and
4. protect, conserve and enhance coastal zone values, particularly in areas of landscape, biodiversity and ecosystem integrity, indigenous and cultural significance.

Policy measures include clauses relating to:

- Development and settlement;
- Water resources;
- Building height limits;
- Coastal hazard risk management and adaptation planning;
- Coastal protection works;
- Protection of public interests
- Identification of coastal foreshore reserves
- Preparation of coastal strategies and management plans, and
- the precautionary principle.

City of Karratha Coastal Management Strategy

The City's Coastal Management Strategy (CMS) sets out the City's objectives for the management of its 350km length of coast.

DRAFT

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

The CMS is the City's overarching coastal management document. The purpose of the CMS is to ensure the City has a consistent and transparent approach towards existing and planned coastal management policies, plans and strategies.

The CMS establishes a framework for the use, management and conservation of the City's coastal environment, namely to achieve four strategic objectives:

- Conservation of coastal biodiversity;
- Management of sustainable coastal recreation;
- Provision of land and access for industrial development; and
- Protections of residential, community. Cultural and heritage assets in a changing climate.

City of Karratha Environmental Strategy

The City's Environmental Strategy provides a framework to achieve better environmental management outcomes. The Environmental Strategy has identified key outcomes with regards to the management of the coast, namely:

- Recognition and enhancement of natural, cultural and recreational values of the coast;
- No further loss or degradation of coastal habitat; and
- Management of assets and protection of values in areas susceptible to coastal vulnerability.

The Environmental Strategy has also identified thirty-three (33) proposed management actions to achieve its objectives. These actions include the development of a climate change strategy and a coastal recreation plan, the ongoing development of foreshore management plans, the delivery of education programs and the on ground implementation of threat eradication programs. The Environmental Strategy, its objectives and proposed actions has been used to guide and inform the development of this FMP.

City of Karratha (formerly Shire of Roebourne) Cleaverville Foreshore Management Plan (draft) 2005

The draft *Cleaverville Foreshore Management Plan* provides a detailed understanding of the coastal environment and its use and management. Through the identification of management issues and development of management strategies and priorities, the Plan aimed to integrate public and industrial use with the natural environment in a sustainable manner.

The information in the *Cleaverville Foreshore Management Plan* was used to inform the development of this FMP.

.

DRAFT

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

2. Cleaverville Foreshore Characteristics

2.1 Location description

Cleaverville foreshore area stretches for approximately 7 km along the Cleaverville coastline. The area is located approximately 42 km northeast of Karratha and is accessed from the south along Cleaverville Road from the Northwest Coastal Highway. Cleaverville Road comprises of approximately 14.7 km limestone/gravel road.



Figure 2-1 Cleaverville Road

2.1.1 Site management

The Cleaverville foreshore area is monitored by the City's Ranger Program and managed by a seasonal Caretaker, who resides on site during the camping season, inclusive of May through to September. The City and the Caretaker manage and maintain the area and have a responsibility to collect camping fees, carrying out rubbish collection and other general management of the site.

2.1.2 Tenure

The area that is the subject of this management plan is reserved for *Conservation, Recreation and Natural Landscapes* in City of Karratha *Town Planning Scheme No 8*.

The foreshore reserve, Reserve No R33775, is owned by the State of WA. Management responsibility for the foreshore reserve rests with the City of Karratha for the purposes of *Recreation and Camping*.

2.1.3 Existing facilities and infrastructure

Cleaverville foreshore currently features numerous campsites, a small boat ramp into Cleaverville Creek and limited facilities including toilets, shade structures, sullage points, rubbish bins and signage. Refer Figure 1-1 and Figure 2-2.

DRAFT

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.



Figure 2-2 Existing facilities and infrastructure

Information signage outlining the conditions of camping are located at the entrance of Cleaverville Road, of the Northwest Coastal Highway, at the main access road of the foreshore area, and another at the main campground adjacent to Caretaker's residence. The main camping areas (from east to west) include (unofficially named by the current Caretakers) - "The

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

Point", "Honda City" (the main campground and location of the Caretaker's residence), "The Rabbit Warren", "Sunset Strip" and "Sandfly Alley". Numerous other un-denoted campsites are staggered along the foreshore area.

Shade structures, toilets and signage towards the eastern and western ends of Cleaverville provide seating, amenities and information for day-trippers and campers; and rubbish bins can be found at numerous locations across the area

A natural boat ramp is located towards the western end of the foreshore area at Cleaverville Creek. This facility is only accessed on high tides and is used by small to medium boats. The area directly behind the boat ramp is used as a parking area for vehicles and trailers.

Access to these campsites and facilities is by means of an extensive network of unsealed (gravel or sand) vehicle roads / tracks.

2.1.4 Climate

Cleaverville foreshore area lies in a semi-arid climate, characterised by low average rainfall, desert vegetation types and persistently hot, dry weather. Summer months, November to April, experience temperatures generally above 30^{o}C and occasionally over 40^{o}C while winter months, May to November, experience daily temperatures generally averaging between 25^{o}C – 30^{o}C (BoM, 2018).

Average annual rainfall is approximately 300mm per year, the majority of which results from scattered thunderstorms and occasional tropical cyclones during the summer period between January and March (BoM, 2018). The majority of rainfall is delivered over a very short time during cyclonic conditions or from rain-bearing depressions.

Cyclone season extends from 1st November to 30th April although very few tropical cyclones have occurred in November. Tropical cyclones can produce very destructive winds, heavy rainfall causing flooding, and damaging storm surges. Destructive winds can cause extensive damage to infrastructure and if storm surge occurs at the same time as high tide then the area inundated can be quite extensive, particularly along the low-lying areas at Cleaverville. The Cleaverville area lies within a 'Storm Surge Risk Special Control Area' as defined in the City of Karratha's Local Planning Scheme.

DRAFT

2.2 Environmental values

2.2.1 Landscape

Cleaverville area is surrounded by the rocky range to the south, a rocky headland to the north and bordered by coastal dunes and plains, refer Figure 2-3. To both the east and west is a low-lying alluvial basin. The area has minimal imported sand/shell from the coastal dunes (due to the rocky headland immediately north of it) and acts as a drainage sink for the surrounding hilly areas. Most of the material in the area is a brown, silty clay loam containing numerous medium sized alluvial/colluvial pebbles (generally > 50mm).

Although the area is generally flat, it does contain drainage scours up to 1 m deep near the western edge. Localised subsidence during dry periods has also resulted in numerous potholes throughout the centre of the basin (Astron 2000). The location of this alluvial basin in a coastal environment and the vegetation it supports is considered to be unusual and locally significant. The basin acts as an ephemeral wetland and houses vegetation species not generally associated with a coastal environment.

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.



Figure 2-3 Cleaverville landscape and vegetation

2.2.2 Vegetation

Cleaverville foreshore lies within the Pilbara Bioregion, with most of the area being located within the Roebourne subregion and a small area within the Chichester Subregion. The Roebourne subregion is described by Kendrick and Stanley (2001) as quaternary alluvial and older alluvial coastal and subcoastal plains with alluvial flats and deltas. The vegetation is characterised by grass savannah of mixed bunch and hummock grasses (refer Figure 2-3). The Chichester Subregion is described as shrub steppe characterised by Acacia inequilateral over *Triodia wiseana* hummock grasslands (Kendrick and Stanley 2001). There are fourteen (14) vegetation assemblages identified within Cleaverville that are generally narrow in width, run parallel to the shoreline, and are dictated by habitat and landform.

A desktop search identified 394 vascular plant species recorded as occurring within a 20km radius of Cleaverville. The desktop search and field survey[1] identified fifteen (15) priority flora species of conservation significance. The coastal vegetation is considered "susceptible" and in need of protection. "Susceptible" is defined by Gibson *et al.* (1994) and quoted by Astron 2000 as "*a community of concern because there is evidence that it can be modified or destroyed by human acts or would be vulnerable to new threatening processes*".

Mangroves have been designated as "Regionally Significant" (EPA, 2001) and there should be no adverse impacts to mangrove habitat, the ecological function and the maintenance of the ecological processes which sustain them (EPA, 2001). Mangrove forests within the foreshore area occur around the mouth and along the length of Cleaverville Creek.

Vegetation condition within the Cleaverville area varies from Degraded to Excellent (Figure 2-4). Numerous new tracks have been created over the past decade and camping nodes in the dunes have expanded, resulting in the removal of native dune vegetation. Fire has also occurred along the coastal strip, increasing the density of buffel grass. Areas of poor to

[1] One Priority flora species was recorded opportunistically during the vegetation condition survey.

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

degraded condition based on an abundance of weeds, tracks and damaged vegetation, were primarily associated with the leeward side of the beach dunes, where camping activities have occurred over a long period of time. Refer Appendix C for full details of vegetation condition.

The desktop review and field survey identified eleven (11) introduced flora species within the Cleaverville Area. Nine (9) of these species are classified as Environmental Weeds (FloraBase), one as a *Declared Pest and Weeds of National Significance* (WoNS), and one garden plant non-native to Australia at a small memorial site. *Tamarix aphylla*, declared pest and WoNS species, provides shade to a communal camping area. Desert rose (a garden plant, native to Africa and Arabia) was recorded as having been planted at two memorial sites, and two aloe plants were recorded in and on the edge of the main camp site at the eastern end of the Cleaverville foreshore area. Large Athel pine trees occur at the main camp site.

Roads and other similar areas of disturbance increase the likelihood of the spread of introduced species. Astron 2000, reports that between the 1998 and 2000 survey, weed populations significantly increased and spread largely due to the increased disturbance caused by newly made tracks and camping areas. The loosely consolidated sandy coastal sands afford easy ingress for the dominating Pilbara coastal weeds, *Cenchrus ciliaris* and *Aerva javanica*. On stony areas, weeds were generally confined to the sides of tracks but are abundant on the looser dune soils.

DRAFT

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.



DRAFT

Legend

Cadastre

Vegetation Condition

Excellent

Very Good

Good

Poor

Very Poor

Degraded

P402557 1001 FHOLD

P195338 543 CROWN

P402557 1000 FHOLD

P195338 543 CROWN

P220920 265 CROWN

P220920 265 CROWN

P401956 3550 FHOLD

P404469 384 FHOLD

P404469 382 ROAD

P077603 428 FHOLD

P401956 3551 FHOLD

Paper Size ISO A3

0 100 200 300 400 500

Metres

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

GHD

CITY OF KARRATHA
CLEAVERVILLE FORESHORE MANAGEMENT PLAN

VEGETATION CONDITION

Project No. **61-36810**
Revision No. **A**
Date **16 Jul 2018**

FIGURE 2-4

G:\61\36810\GIS\Maps\Working\61-36810_VegCon_RevA.mxd
Print date: 16 Jul 2018 - 08:29

Data source: Cadastre & Imagery: Landgate (SLIP); GHD: Vegetation Condition - 20180704. Created by: artermulo

2.2.3 Fauna

A desktop review of previous surveys of Cleaverville and the surrounding region has revealed very few targeted fauna studies, with most studies focusing on the Cape Lambert Area. The closest fauna survey to the Cleaverville area was the proposed port area of Anketell by Phoenix (2010). The majority of fauna sightings within the area were made opportunistically during botanical surveys. Most of the potential impacts on fauna discussed in previous surveys are based on database searches and interpretation of habitat types.

Fauna richness and diversity is influenced by habitat of the area. Due to the grassy vegetation located within Cleaverville, the animal species within the foreshore area are primarily seabirds, attracted to the area by the mangroves and associated marine environment. Nearby offshore islands provide safe nesting and roosting sites while the mudflats attract wader species (Astron Environmental, 2011).

There are 45 terrestrial fauna species of conservation significance known to occur within Cleaverville or within 20km of the area. This includes 35 birds, 4 mammals, and 6 reptiles. Of the listed bird species, the Curlew Sandpiper, Great Knot, Bar-tailed godwit and the Eastern Curlew are listed as Critically Endangered under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act). A total of 32 bird species are migratory seabirds protected under International Agreement and 8 bird species listed with Priority status by Department of Biodiversity Conservation and Attractions (DBCA).

Of the four mammals listed as conservation significant, the Northern Quoll is listed as Endangered under State and Commonwealth legislation and the Banded Hare Wallaby is listed as Vulnerable under EPBC Act. The Northern Short-tailed Mouse and Western Pebble Mound Mouse both have a Priority 4 status under DBCA. Of the eight reptile species listed, there is one species, Nevin's Slider, considered Endangered and three turtle species listed as Vulnerable under EPBC Act. Cleaverville foreshore provides a nesting area for at least two of these turtle species, Flatback and Hawkesbill Turtles, although limited information is available on usage and population numbers.

The desktop review has revealed nine introduced fauna species within 20km radius of the Cleaverville area. Two species, Red Fox and Dog, are declared pests under the *Biosecurity and Agriculture Management Act 2007* (BAM Act).

2.3 Cultural values

2.3.1 Aboriginal heritage

The Traditional Owners of the Cleaverville area are the Ngarluma people of the western Pilbara area of northwest Australia. They are coastal dwellers of the area around Roebourne and Karratha, and are understood to be the original inhabitants of the Cleaverville.

A formal survey of Aboriginal heritage has not been carried out over the Cleaverville Reserve area. One record exists in the Register of Aboriginal Heritage Sites along the southeastern margin of the Reserve (status 'Lodged') (refer Figure 1-1).

Anecdotal reports from Aboriginal community elders indicate the importance of the hills and the historic and ongoing traditional use of the area for fishing and recreation. In additional, Traditional usage of sand dunes for burial suggests the dune systems may require protection for heritage reasons (Shire of Roebourne, 2005).

With the coast along Cleaverville continuing to be a place of livelihood and cultural significance for the local Aboriginal people, the changing coast and harvesting of its resources remains of

DRAFT

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

particular interest to the Ngarluma people. Their culture requires that this land is protected from activities that have the potential to impact on its heritage values.

2.4 Recreational values

Cleaverville is widely used for a range of recreational activities throughout the year. The most popular activities at the Cleaverville area, noted through the consultation workshops and interviews, are:

- Camping;
- Four wheel driving and off road vehicles (ATVs);
- Fishing, including shore-based, boat-based and spearfishing;
- Watersports, including boating, kayaking/canoes, snorkelling and diving; and
- Day trips activities, including picnics, scenic walks along the beach and hiking behind the dunes.

For the purposes of the FMP, the information gathered from the online survey was used to determine the main recreational activities and use within the area. A total of 83 community members completed the online survey, of which 88% lived in the City of Karratha.

2.4.1 Camping

Camping is extremely popular with visitors during winter months and with the local residents all year round. Informal campsites are available throughout the foreshore area and can be sighted at the edge of vegetation communities, along sand dunes, and on the beach. Refer Figure 1-1 and Figure 2-5.

Camping is permitted for a maximum 28-day stay within any three-month period during the camping season, 1st May to 30th September. The maximum length of stay during the off-season, 1st October to 30th April, is a three-night stay per 28-day period.

The City appoints a Caretaker for Cleaverville during the designated camping season, however, there is limited control of where the caravans set-up or the total number of caravans that occupy the area at any given time.

Camping was the second most popular activity identified in the online survey, with a total of 60% of people who completed the survey confirming that they use the area for camping. The survey revealed that a total of 42% of campers use swags and mats on the ground, 17% use tent or camper trailer and 12% use caravan/motorhome. It is expected that during the winter months, the percentage of caravans will be significant higher than the numbers outlined during the survey.



Figure 2-5 Camping at Cleaverville

DRAFT

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

2.4.2 Four wheel driving and off-road vehicles

Off-roading by four-wheel drive, motorbike and all-terrain vehicles (ATV) is highly popular along the Cleaverville foreshore area (Figure 2-6). Riders / drivers enjoy the recreational sport and ability to access unoccupied beach locations, and beach launch small boats and other watercraft. Off-road vehicles are also used to access remote areas for fishing and camping.

2.4.3 Fishing

Fishing is regarded as one of the main activities within the Cleaverville area, with shore-based fishing recorded as the most popular from the online survey. Visitors to the area are regularly seen fishing at Cleaverville Creek and along the beach.



Figure 2-6 Recreation activities at Cleaverville

2.4.4 Water sports

Boats are launched from the natural boat ramp at Cleaverville Creek during high tide. Directly north of the boat ramp is a large cleared area used as a parking bay for vehicles and trailers. This cleared area helps reduce the associated damage to surrounding vegetation and dunes that comes with boat launching off the beach.

Beach launching of small boats using four-wheel drive and ATVs also occurs through a natural channel in the rocky outcrop opposite The Point.

Water sports, such as diving and snorkelling, are popular activities due to the incredible coral and marine life the Cleaverville coast is host to.

2.4.5 Day use

Many locals visit Cleaverville foreshore area for day-use activities to enjoy the pristine environment the area presents. The online survey indicated that day-trips were the most popular length of stay (59% of survey respondents), with the most popular activities being beach walking and hiking on the rocky outcrops (52% of survey respondents), and family picnics or other social gatherings (54% of survey respondents).

2.5 Resource values

The Government of Western Australia is proposing to develop the Anketell Port as the next major deep-water port for the Pilbara coast. The greenfield site is to be developed as a multi-user, multi-commodity port and associated industrial areas (Government of Western Australia, 2014).

Anketell Port is situated on the West Pilbara coast, 30km east of Karratha and east of the Cleaverville foreshore area. The port is planned as an iron ore export facility with an ultimate capacity of not less than 350 million tonnes per annum, with provision for heavy industry

DRAFT

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

exports, general cargo trade and fuel imports. The planned port consists of three separate land use areas, namely the Port Precinct, Infrastructure Corridor and Industrial areas (Figure 2-7).

At the time of the development of the FMP, the Anketell Port is at project ready stage, with major environmental and Native Title approvals in place.

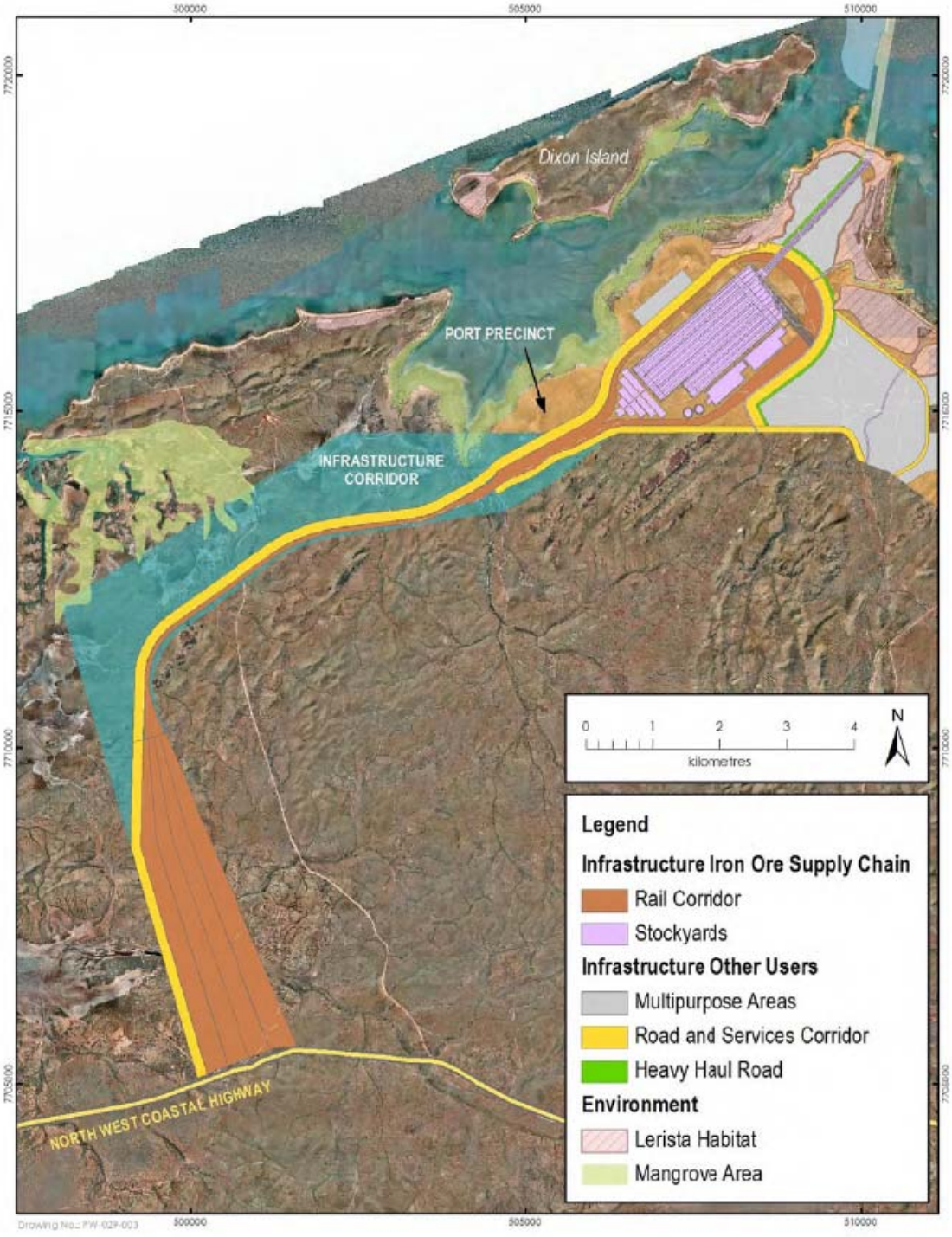


Figure 2-7 Development concept for Anketell Port

Source: Department of State Development, 2014

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

3. Managing Recreation

3.1 Issues

Recreational activities within Cleaverville have directly affected the environment, causing significant environmental and cultural impacts. These impacts are placing pressure on the surrounding pristine natural environment.

A common trend throughout the community consultation program is the expectations of both maintenance and management of the foreshore area. This included issues relating to excess number of access tracks within the area, an increase in ranger presence, and litter collection and prevention.

3.1.1 Campsites

Visitors are continually establishing new camp sites throughout Cleaverville foreshore area on the beach, at the edge of vegetation communities and along access tracks. It is evident that unauthorised clearing of native vegetation has taken place to establish these campsites, Figure 3-1. The loss of vegetation has a significant impact on the surrounding environment including loss of fauna habitats, encouraged weed invasion, and damage to dune stability.



Figure 3-1 Example of newly established and unregulated campsites in Cleaverville dunes

3.1.2 Unauthorised access

Vehicle use along Cleaverville foreshore is largely unmanaged resulting in an extensive network of over two hundred access tracks, ranging in length and width. Many of these tracks are duplicated and unnecessary. Refer Figure 3-2. Vehicle access on this extensive network of unregulated tracks has caused damage to native vegetation, resulting in a change of plant composition, reduction in plant cover and the spread of weeds. Beach driving has caused dune erosion through loosening the sandy soils and destroying vegetation that acts to stabilities the soils.

Limiting access to a number of tracks without eliminating access to the beach and other campsites, will significantly improve the natural environment.

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.



Figure 3-2 Duplicated and newly established tracks

3.1.3 Fishing, boating and water sports

Fishing, boating and water sports are popular activities enjoyed by local residents and visiting tourists. These activities have the potential to negatively impact the environment. New tracks are formed and fragile dune systems are negatively impacted by visitors searching for potential fishing locations. There is also potential for damage to the mangroves at Cleaverville Creek from fishing activities and inappropriate boat launching. Further, anecdotal evidence has suggested that boat launching from non-designated launch areas, such as the beach and mangroves, has significant damaged the coastline through increased erosion and damage of the mangroves.

Discarded fishing gear and pollutants from motor boats can create a hazard for local fauna and overfishing is a potential issue within the area.

Water sports, such as diving and snorkelling, are popular activities, although potential to remove coral from the area poses a threat to the local environment.

3.1.4 Rubbish and litter

Dumping of rubbish within the Cleaverville area has resulted in the spread of weeds, reduced the visual amenity of the area and is a constant source of a fire hazard. Although bins are provided at the caretaker campsite, septic area, and the boat ramp and are emptied regularly, the dumping of rubbish and littering is an ongoing problem throughout the area. The eastern side of Cleaverville foreshore area has also been identified as an area that large amounts of rubbish wash up along the shoreline due to the currents and tides.



Figure 3-3 Campsite litter

A lot of litter consists of toilet paper where campers and day trippers have not used chemical toilets or the toilets provided.

DRAFT

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

3.1.5 Weeds

Invasive weed species are a major threat to biodiversity within the area. Weeds impact on natural values by out-competing native species for nutrients, water, and space, whilst altering the fire regime within the area. Introduced plants occur throughout the entire length of the foreshore area but are most dominant in the modified or previously disturbed areas, particularly along vehicle tracks. In some areas of the coastal fore dunes, weed species (Buffel grass) play an important role in dune stabilisation. Some introduced species also provide recreational amenity such as shade trees.

Uncontrolled vehicle access has also resulted in a loss of vegetation, particularly in the soft sandy soils of the sand dunes. The loosely consolidated coastal sands promote easy ingress for the dominating Pilbara coastal weeds. On stony areas, weeds are generally confined to the sides of tracks but are abundant on the looser dune soils. Invasion of native vegetation and fauna habitats by weeds is a significant environmental management issue in the foreshore area. Astron (2000) reports that in some areas along the Cleaverville coastline weeds have almost totally excluded native vegetation.

3.1.6 Fauna interactions

The Endangered Northern Quoll has been identified within the rocky headland west of Sunset Strip. Refer to Figure 1-1 and Figure 3-4. Conservation of Pilbara Northern Quolls is restricted by limited information on the species ecology, distribution and differences as little research on the Northern Quoll has been undertaken in the Pilbara region. Key threats to the Northern Quoll include predators, habitat loss or fragmentation caused by bushfires or land clearing (DPaW, 2016). Vehicle tracks are present in the rocky area where the Northern Quoll inhabit Cleaverville, and anecdotal evidence suggests that the access tracks have destroyed critical habitat. Access tracks within the rocky outcrops should be closed to prevent further access to the area.

DRAFT



Figure 3-4 Tracks leading to known Northern Quoll habitat

There are three recognised species of sea turtles that are known to breed on the Cleaverville coastline, all of which are considered Vulnerable under the EPBC Act. Turtle nesting occurs between October to February and hatching following six weeks later, between December to April. Department of Parks and Wildlife (DPaW) have noted vehicle tracks along the Cleaverville beach during turtle nesting season, which has the potential to adversely affect the nesting success of marine turtles (DEC, 2008). Nighttime driving can disturb nesting females, disorient emerging hatchings, and crush hatchlings attempting to reach the ocean. Tyre ruts left by vehicles can increase the time turtle hatchlings take to reach the water, increasing the chance to be captured by a predator or die due to heat exhaustion. Driving during the day can cause sand compaction above nests resulting in lower nest success.

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

Signage identifies that turtle's nest on the Cleaverville foreshore area (refer Figure 3-5), but more authoritarian measures should be implemented to regulate driving on key beaches during the nesting season. It will also be important to educate visitors on the ecology of turtles, threats to populations and need for conservation.



Figure 3-5 Signage identifying Cleaverville as a turtle nesting area and key nesting beach opposite Honda City

3.2 Recommendations

The natural environment along Cleaverville foreshore is under increasing pressure from the ever-increasing number of visitors to the area and the associated recreational activities taking place. With the exception of the shade structures at the day-use area and Honda City, there are no formally designated recreational areas or facilities.

Recommendations have been made in order to protect, maintain and where possible enhance the environmental and cultural values of Cleaverville.

The proposed management recommendations are illustrated in Appendix D and discussed in the sections below.

DRAFT

3.2.1 Formalise campsite area

Management of campground

The increasing number of campsites throughout Cleaverville is resulting in significant damage to the surrounding environment, causing impact upon native vegetation, fauna habitat, and dune stability. To effectively manage the environmental impacts from camping activities, it is recommended that designated campsites are implemented, limiting the number of visitors to any one particular area. A total of 15 areas have been proposed as designated 'Camping Zones', accommodating up to 180 short and long-term visitors at any given time. Short-term zones should be no more than a 3-night stay, while long-term zones provide up to a 28-day stay, incline with current time management. While it is not considered necessary at this stage to delineate between short and long term sites, this may be required if popularity increases over the winter period to allow for locals to still have access to camping areas.

To enforce designated campsites, it is recommended that signage is installed at the start of each access road, denoting the number of short and long-term stays available in that area. A campsite number should also be installed, refer Figure 3-6 for examples from other nature based camping areas in the Pilbara region, using tyres or sticks.

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.



Figure 3-6 Examples of camping signage from Warroora and Ningaloo Statio

Fencing or other natural material, such as logs or large rocks, could be used to clearly delineate the campsite area and additional signage should be installed to inform visitors that camping outside the designated area is not permitted and penalties apply. The designated campsites should also be numbered (i.e. 1 to 180) using appropriate signage. Campsite delineation would allow the Caretaker to more effectively control camping activities and the unauthorised clearing of new campsites.

The implementation of short and long-term stays in designated areas at Cleaverville will require informing the community of these changes. This could be via the City's website or local paper.

Campsites that have been identified as unnecessary should be closed-off from public use, preventing further access to these areas. These campsites will undergo rehabilitation through weed control and revegetation. Refer to Section 3.2.2.

3.2.2 Restrict access

The limited control and management of vehicle usage has resulted in an extensive network of tracks and informal campsites throughout the Cleaverville foreshore area. It is recommended that access tracks are formalised and any tracks identified as unnecessary are closed-off. There are currently no signs that within Cleaverville.

Unnecessary tracks identified in the development of this FMP include those marked for 'Closure and Revegetation' in Appendix D (Sheet 1 to 8). These tracks (and campsites) are considered unwarranted for the following reason(s):

- The track is duplicated and unnecessary – access is possible though alternate tracks;
- Presence of the track or campsite has caused signification dune erosion;
- Presence of the track or campsite has caused signification loss of native vegetation;
- The track is comprised of soft and deep sand, causing visitors to become frequently bogged, and require recovery aid from the Caretaker; or
- Weeds present on the track threaten surrounding pristine environment.

A total of 31 access tracks and campsites are identified for closure and revegetation based on the above principals.

Closing off unnecessary tracks and campsites will require barriers, such as logs or large rocks, at the entrance to each track. The material used to block access should be durable and

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

resistant to environmental elements, particularly salt water. Rocks like basalt, granite and greywacke would be suitable. It is recommended that signage is installed at the closed off tracks, informing the public that access is not permitted and fines may apply. Revegetation and rehabilitation of these areas may be required.

A site map at the entrance to Cleaverville should then be considered to provide direction and indicate preferred access routes. This should assist to mitigate the risk of new tracks and campsites being development and the associated environmental impacts.

Turtles

Anecdotal evidence has suggested that vehicles have accessed the beach during turtle nesting season, destroying turtle nests and heavily impacting the survival rate of turtle hatchlings. If left uncontrolled, recreational activities will continue to have a negative impact on turtle populations.

Current signage across the Cleaverville area requests visitors to “avoid beach driving” during turtle nesting period (refer Figure 3-5). The anecdotal evidence suggests that this signage is ineffective and that more authoritarian measures are required, in particular for the beach opposite Honda City, which has been identified as the key turtle nesting beach.

It is recommended that the City’s Rangers and Caretaker liaise with visitors regarding the negative impacts beach driving has on turtle nesting. It is also recommended that fines are imposed if vehicles are caught driving on the beach during nesting season, at least for Honda City beach. Information regarding fines imposed will be required at both the entrance to Cleaverville and another at the access points to the turtle nesting beach.

There is also no interpretive signage providing information on turtles and the importance of conserving their natural habitat. It is suggested that interpretive signage, educating the public about the local turtle significance, are installed at the access to Cleaverville and at the main day use area (Appendix D, Sheet 6).

There are opportunities around ecotourism if turtle populations (and other fauna) are given the opportunity to thrive.

3.2.3 Improve facilities and infrastructure

Signage

Signage is an important educational tool, providing information that will be used by the community and visitors to guide their behaviours. There are a number of signs that are recommended to be placed throughout the foreshore area at strategic locations, providing visitors with general guidance on accessible areas. These signs should include the following text:

- Keep off the dunes - Rehabilitation area.
- Rehabilitated area - Please keep out.
- Track closed. Access restricted.
- Beach closed during Turtle nesting season, October to April. Fines apply.
- Illegal dumping is prohibited. Fines apply.

Signage located on the entrance to Cleaverville provides limited information regarding the local area. It is recommended that a site map (i.e. “mud map”) of Cleaverville foreshore is installed at the entrance, providing key information to inform and educate visitors about the area. The site map should include:

- Main access roads;

DRAFT

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

- Camping zones for short and long-term stays;
- Day-use area;
- Location of shelter structures (day-use only);
- Location of public toilets, rubbish bins and sullage point;
- Caretakers location and hours available to pay fees;
- Boat ramp and parking area;
- Turtle nesting area - no vehicle access area during October and April; and
- Northern Quoll habitat area.

Day use areas

There are two designated areas for day-use only. One of these areas has a permanent shade structures, information signage, toilets, sullage point and rubbish bins. All facilities are in good condition and will not require further works. An interpretive sign located in the area provides information regarding Traditional Owners of the region, what to see in City of Karratha, and the seven principles of the 'Leave No Trace' program. Some visitors have camped at the day-use area placing pressure on the surrounding environment and limiting the ability for other visitors to enjoy the facilities.

Recommended improvements for the day use areas are for consideration of:

- Additional signage informing visitors that the area is for day-use only;
- Additional interpretative information regarding turtles and nesting areas

Boardwalk

The mangroves are 'Regionally Significant' species that should not be impacted by visitation to Cleaverville. To ensure visitors maintain the ecological value of the mangroves, it is recommended a boardwalk be constructed along a section of Cleaverville Creek, refer Appendix D, Sheet 8. A boardwalk would provide views of Cleaverville Creek and ease of access to the mouth of the creek system, a popular shore fishing location.

3.2.4 Revegetate degraded areas

The dynamic and sensitive environment within the Cleaverville area should utilise an integrated approach to weed management. In particular areas along the foreshore, weed species such as Buffel Grass act to stabilise the sand dunes. Weed species that serve to stabilise the sands on the dune will need to be monitored to ensure they do not spread into other areas where native vegetation is located. However, where the weed species are isolated, for example on rockpiles, stony areas and road verges, it is recommended that weed control is undertaken to preserve the native vegetation and prevent the further spread of these weeds. This would ensure the natural aesthetics of the area are preserved and a good vegetation condition maintained.

Isolated weeds such as aloe plants, which is reproducing from root nodes, should be hand removed. Athel pine trees provide shade at Honda City and should be left *in situ*, however the area should be monitored and any new populations beyond the main population, should be eradicated. Caltrop in Honda City should be manually removed, as the very sharp spines on the seed capsule are a hazard to bare feet, thongs and bike tyres. It is doubtful that the Desert Rose plants at the memorial sites will spread. The area should be monitored and if the plants do begin to spread, they should be removed and replaced with a local native species.

Fire management should be carefully considered, and knowledge of the species it will encourage and those it will destroy, needs to be taken into account. *Acacia coriacea*, the

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

dominant dune shrub at Cleaverville, is unable to tolerate fire, whereas the density of Buffel Grass weed is accelerated by fire. Loss of dune vegetation from fire, vehicle movement and clearing for campsites, equates to loss of dune stability, which will cause further erosion and blow-outs. Burning of native shrubs and spinifex vegetation should be restricted to areas 20 m x 20 m in size, to prevent monocultures of Buffel Grass forming.

Signage to inform the public of areas undergoing rehabilitation and access to the areas is not permitted. The signs will be strategically located throughout the area.

To address the issue of litter throughout Cleaverville, it is recommended that:

- Additional bins are installed strategically along the Cleaverville area (where warranted);
- Regular clean-ups are carried out, such as on Clean Up Australia Day; and
- Education around appropriate practices is enhanced, including stronger recommendations on the City website around bringing a chemical toilet for camping.

3.2.5 Cultural experience

The coast along Cleaverville continues to be a place of livelihood and cultural significance for the Ngarluma people. Their culture requires that this land is protected from activities that have the potential to impact on its values. With this in mind, the Ngarluma people should be encouraged to be involved in the ongoing management of this place and should share their culture with visitors, potentially by establishing cultural tours, traditional activities and youth education opportunities. Out of respect for their culture, any activities to be undertaken in response to this FMP should be undertaken in partnership with the Ngarluma people.

3.3 Implementation

The recommendations of the FMP are to be undertaken by the City of Karratha in consultation with the Ngarluma people, with assistance from the community and other stakeholders. Priority actions are summarised in Table 3-1.

Table 3-1 Priority actions

Recommendation	Priority
1. Provide signage at key access points to camp sites	High
2. Clearly delineate campsite areas	High
3. Close unnecessary tracks by installing fences, bollards, large rocks or logs	High
4. Undertake weed management	High
5. Strengthen signage to discourage driving on the beach during turtle nesting season	High
6. Update signage at entrance to Cleaverville access road	Moderate
7. Revegetate and rehabilitate degraded and eroded fore dune areas and provide appropriate signage to control access	Moderate
8. Improve education regarding littering	Moderate
9. Install interpretive signage regarding local turtle populations	Moderate
10. Construct boardwalk along Cleaverville Creek	Low

Any ground disturbing works will likely require Aboriginal Heritage Surveys and Section 18 Applications where necessary to meet with the requirements of the *Aboriginal Heritage Act 1972*. Aboriginal Heritage Monitoring may also be required during the undertaking of the ground

DRAFT

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

disturbing works if heritage sites are identified. Cultural Heritage Management Plans should be produced after the Survey work has been completed and all the Aboriginal sites have been located.

Although the actions listed in Table 3-1 are recommended as priorities for implementation, this FMP contains a number of other recommendations which are also suggested to improve the management of the Cleaverville foreshore. It is also recognised that further detailed work will be required, including detailed design and costing of infrastructure, to facilitate implementation in some instances. As such, all information in this plan should be considered as part of future management and/or investment in the region.

3.4 Monitoring and review

It is recommended that the implementation of this FMP is audited annually and outstanding actions incorporated into the City's forward works plan.

The effectiveness of the FMP should be reviewed in 5 years and updated as required.

DRAFT

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

Assumptions and limitations

This report has been prepared by GHD for City of Karratha and may only be used and relied on by City of Karratha for the purpose agreed between GHD and the City of Karratha.

GHD otherwise disclaims responsibility to any person other than City of Karratha arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by City of Karratha and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in the information

DRAFT

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

4. References

Astron Environmental, 2000. *Cleaverville Beach Existing Environment and Management Issues*. Unpublished report for the Shire of Roebourne.

Astron Environmental, 2011. *Cleaverville Beach Tenements M47/359 and M47/464 Vegetation, Flora and Fauna Survey*. Unpublished report prepared for Hanson Construction Materials Pty Ltd.

Australian Government Bureau of Meteorology, Mean Maximum Temperature and Rainfall, accessed on 2nd July 2018, http://www.bom.gov.au/.

City of Karratha, 2016. *Strategic Community Plan 2016 - 2026*. City of Karratha, Western Australia.

Department of Environment and Conservation, 2013. *Murujuga National Park Management Plan 78*. Prepared by DEC on behalf of the Murujuga Park Council.

Department of Environment and Conservation, 2008. *Marine Turtle Recovery Plan for Western Australia (Draft)*. Wildlife Management Program No. xx

Department of State Development, 2014. Anketell Port Master Plan. July 2014

Environmental Protection Authority, 2001. *Guidance for the Assessment of Environmental Factors in accordance with the Environmental Protection Act 1986. Guidance Statement for the protetion of tropical arid zone mangroves along the Pilbara Coastline. Guidance Statement No. 1*. Environmental Protection Authority, Perth.

Gibson, N.L., Burbidge, A.H., Keighery, B.J., Keighery, G.J., and Lyons, M. 1994. *A Floristic survey of the southern Swan Coastal Plain*. Department of Conservation and Land Management and Conservation Council of Western Australia.

Government of Western Australia, 2016. Anketell Port Master Plan June 2014.

Kendrick, P. and Stanley, F. 2001. Pilbara 4 (PIL4 – Roebourne synopsis). From "Bioregional Summary of the 2002 biodiversity Audit for Western Australia". Department of Conservation and Land Management

Phoenix, 2010: *Terrestrial Vertebrate Fauna Survey for Anketel Port Tail Alignment and Port Projects*. Prepared for Australian Premium Iron Management Pty Ltd, July 2010.

Shire of Roebourne, 2005. Draft Cleaverville Foreshore Management Plan. Shire of Roebourne, Western Australia.

Trudgen, M. 1988. A Report of the Flora and Vegetation of the Port Kennedy Area. Unpublished report to Bowman, Bishaw and Associates

WAPC, 2012. Pilbara Planning and Infrastructure Framework. January 2012.

DRAFT

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

DRAFT

Appendices

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

Appendix A – Desktop Study Report

DRAFT

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

CITY OF KARRATHA

CLEAVERVILLE FORESHORE MANAGEMENT PLAN

DESKTOP STUDY

JUNE 2018

Prepared for GHD

vicki long & associates
Living in the Pilbara
PO Box 713, Karratha WA 6714
0428 854 852
ABN: 96 009304 634

CITY OF KARRATHA CLEAVERVILLE MANAGEMENT PLAN
DESKTOP STUDY

Prepared for:
GHD

Job No: VLA043

Reference No: VLA043rv01-RevB

Revision Status

Rev	Date	Description	Author(s)	Reviewer
A	05/06/2018	Draft Issued for Internal Review	L Timmins	V Long
B	11/06/2018	Draft Issued for Client Review	L Timmins	T Hibberd

vla

©Copyright 2015 Vicki Long & Associates. All rights reserved.
This document and information contained in it has been prepared by VLA under the terms and conditions of its contract with its client. This report is for the clients use only and may not be used, exploited, copied, duplicated or reproduced in any form or medium whatsoever without the prior written permission of VLA or its client.

Table of Contents

1. INTRODUCTION 4
2. EXISTING ENVIRONMENT 4
2.1 Interim biogeographic regionalisation of Australia 4
2.2 Land Systems 4
3. METHODOLOGY 5
4. RESULTS 5
4.1 Flora 5
4.2 Mangroves 6
4.3 Introduced flora 6
4.4 Vegetation 7
4.5 Threatened and priority ecological communities 8
4.6 Fauna 8
4.7 Introduced Fauna 10
5. CONCLUSION 10
6. REFERENCES 11
7. APPENDIX 13
7.1 LEGISLATIVE CONTEXT 13

1. INTRODUCTION

Cleaverville foreshore area (the Study Area) is approximately 42 km northeast of Karratha and is accessed from the south along Cleaverville Road from the Northwest Coastal Highway. Cleaverville currently features a number of campsites, a small boat ramp into Cleaverville Creek and limited facilities including a sullage point, rubbish bins and a picnic shade structure.

The environment is protected by State, Commonwealth and International legislation. Refer to Appendix A for a summary of the key Acts relating to conservation in Western Australia.

The purpose of this desktop study is to identify species and areas of ecological and conservation significance within the study area at both a site specific and broad scale. This information will then be used to determine areas of likelihood and potential likelihood of Threatened Ecological Communities (TECs), Priority Ecological Communities (PECs), Declared Rare, and Priority and significant flora and fauna. The assessment will be combined with a spatial analysis and an on-ground vegetation condition assessment to guide the development of the City of Karratha's Cleaverville Foreshore Management Plan.

2. EXISTING ENVIRONMENT

2.1 Interim biogeographic regionalisation of Australia

The Interim biographic regionalisation of Australia (IBRA) divides the Australian continent into 85 bioregions and 403 sub-regions based on landscape, climate and other variables (Thackway and Creswell 1995). The Study Area lies within the Pilbara Bioregion, with most of the area being located within the Roebourne (PIL4) subregion and a small area within the Chichester Subregion (PIL1) (Kendrick and Stanley 2001).

The Roebourne (PIL4) subregion is described by Kendrick and Stanley (2001) as quaternary alluvial and older colluvial coastal and subcoastal plains with alluvial flats and deltas. The vegetation is characterised by grass savannah of mixed bunch and hummock grasses. The Chichester Subregion is described as shrub steppe characterised by *Acacia inequilatera* over *Triodia wiseana* hummock grasslands (Kendrick and Stanley 2001).

2.2 Land Systems

The land systems of the Pilbara region were mapped for the Western Australia Department of Agriculture & Food (Van Vreeswyk *et. al.* 2004), where biophysical resources and vegetation conditions were described. The Pilbara was divided into 102 land systems. Two of these land systems occur within the Study Area which are described as:

- **Littoral -** Bare coastal mudflats with mangroves on seaward fringes, samphire flats, sandy islands, coastal dunes and beaches. Hummock Grasslands of soft spinifex, scattered shrubs of *Acacia coriacea*.
- **Ruth -** Hills and ridges of volcanic and other rocks supporting hard spinifex (occasionally soft spinifex) grasslands. Rocky lower slopes and stony plains, ridges with surface mantles of pebbles, cobbles of volcanic rock, shale or chert. Soils are red, shallow loams with associated hummock grasslands of hard spinifex (*Triodia wiseana*) with scattered *Acacia* and *Senna* spp.

3. METHODOLOGY

The desktop review was completed on two levels as outlined in the Proposal for Cleaverville Foreshore Management Plan prepared by GHD (Quotation VP84440). On a broad scale information data was obtained from many sources including the databases listed in Table 1.

Database	Focus of Search	Data Accessed
Threatened and Priority Database (DBCA)	Listed threatened and priority taxa	25/05/2018
NatureMap (DBCA)	Taxa of conservation significance	13/02/2018
Threatened and Priority Ecological Communities Database (DBCA)	Listed threatened and priority ecological communities	25/05/2018
WA Herbarium Flora Database (DBCA)	Listed threatened and priority flora	25/05/2018
Western Australian Organisms List	Declared pests under the BAM Act	25/05/2018

On a more refined level, previous environmental surveys of the Study Area or adjacent to the Study Area were reviewed which included Astron 2000; Astron 2011 prepared for Hanson Construction Materials Pty Ltd; Phoenix 2010; and AECOM 2011.

4. RESULTS

4.1 Flora

A search identified 394 vascular plant species recorded as occurring within a 20km radius of the Study Area. A search of the previous environmental surveys recorded 85 vascular plant taxa representing 27 families and 60 genera. The most common being Fabaceae with 21 species and Poaceae with 10 species. This is within a 20 km radius (broad level). You need to also include what was found in the actual study area (refined area) as per Astron 2000.

The search identified five priority flora species of conservation significance recorded within a 20km radius of the Study Area. A search of FloraBase identified a further nine from the same IBRA Subregion. These included:

Species name	Conservation code	Astron 2000	Astron May 2011	AECOM May 2011	Within 20km	FloraBase search
Abutilon sp. Pritzelianum	P1				X	X
Heliochrysum oligochaetum	P1				X	X
Tephrosea rosea var. Port Hedland	P1				X	X
Acacia glaucocaesia	P3			X	X	
Eragrostis lanicaulis	P3				X	X
Eragrostis surreyana	P3					X
Gomphrena cucullata	P3					X
Gymnanthera cunninghamii	P3					X
Oldenlandia sp. Hamersley Station	P3					X
Schoenus punctatus	P3					X
Stackhousia clementii	P3					X
Terminalia supranitifolia	P3					X
Vigna Triodiophila	P3					X
Rhynchosia bungarensis	P4					X

In previous surveys of Cleaverville (Astron 2000, Astron 2011), no declared rare flora, priority flora or flora of significance were recorded in the Study Area. AECOM (2011) confirmed the DBCA reported populations of *Acacia glaucocaesia* (Priority 3) on the Cleaverville Road 4km north of the North West Coastal Highway, however this is outside the Study Area.

Although no species of conservation significance were reported in previous surveys, coastal vegetation is considered "susceptible" and in need of protection. "Susceptible" is defined by Gibson *et al.* (1994) and quoted by Astron 2000 as "a community of concern because there is evidence that it can be modified or destroyed by human acts or would be vulnerable to new threatening processes. "

4.2 Mangroves

Mangroves adjacent to the Study Area have been designated as "Regionally Significant" by the EPA (2001) and there should be no adverse impacts to mangrove habitat, the ecological function and the maintenance of the ecological processes which sustain them (Guideline 1: EPA 2001). Mangrove forests included in this designation occur around the mouth and along the length of Cleaverville Creek.

4.3 Introduced flora

The desktop review of databases identified 25 introduced flora species within 20km radius and six recorded within the Study Area. A review of previous botanical surveys (Astron 2000; Astron 2011 and AECOM 2011) identified six introduced species occurring in the Study Area.

Two weeds listed under the *Agriculture and Related Resources Protection Act* 1976 and listed as Weeds of National Significance (WoNS) are recorded within 20km of the Study Area. One is recorded within the Study Area (*Tamarix aphylla*), however it's presence is being observed and is providing shade to a communal camping area. AECOM 2011, reported *Prosopis pallida* (WoNS) from one quadrat outside of the Study Area.

Scientific name	Common name	Astron 2000	Astron 2011	AECOM 2011	Within Study Area
Aerva javanica	Kapok Bush	X	X	X	X
Arunda donax	Giant Reed				X
Cenchrus ciliaris	Buffel Grass	X	X	X	X
Flaveria trinervia	Speedy Weed			X	
Malvastrum americanum		X	X		X
Prosopis pallida (WoNS)	Mesquite			X	
Stylosanthes hamata	Verano Stylo	X	X		X
Tamarix aphylla (WoNS)	Tamarisk				X

Roads and similar areas of disturbance increase the likelihood of the spread of introduced species. Astron 2000, reports that between the 1998 and 2000 survey, weed populations have significantly increased and spread. This is largely due to the increased disturbance caused by newly made tracks and camping areas. The loosely consolidated sandy coastal sands afford easy ingress for the dominating Pilbara coastal weeds, *Cenchrus ciliaris* and *Aerva javanica*. On stony areas, weeds were more of less confined to the sides of tracks but are abundant on the looser dune soils. Astron 2000 reports that in some areas along the Cleaverville coastline weeds have almost totally excluded native vegetation.

4.4 Vegetation

Beard (1975) mapped vegetation across the Pilbara region at a scale of 1:1,000,000. The Study Area is generally located in the Fortescue Botanical District which is part of the Eremaean Botanical Province (Beard 1975). The general description by Beard (1975) described the area as predominantly open grassy plains or mixed grasses and spinifex with shrub steppe occurring further inland on the granite plains. The coastal plains are vegetated with *Acacia* spp. over mixed hummock (*Triodia* spp.) and tussock grasses (*Eragrostis* spp., *Cenchris ciliaris*).

Astron (2000) reports that the vegetation along Cleaverville appears simple but is in fact relatively varied with 14 fourteen vegetation assemblages identified. Assemblages in the Study Area are generally narrow, usually running parallel to the shoreline and are very much dictated by habitat and landform. Each of the assemblages are described below according to the Muir's Vegetation classification System (Muir 1977).

Vegetation Associations
1. Low Mangrove Forest B dominated by *Avicennia marina* subsp. *marina* with *Ceriops tagal* and *Rhizophora stylosa* along tidal creeks
2. Dwarf Scrub D of *Tecticornia halocnemoides* subsp. *tenuis* with Very Sparse Open Grassland of *Sporobolus virginicus*
3. Very Open Dwarf Scrub D of *Scaevola crassifolia* and *Salsola australis* with Open Grassland of *Spinifex longifolius*. There is also Very Open Herbs of *Euphorbia* spp. with very occasional *Sporobolus virginicus*
4. Low Heath B or *Acacia coriacea* and *A. bivenosa* with Dwarf Scrub C of *Aerva javanica, Scaevola crassifolia* and *Adriana tomentosa*, over Mixed Tussock Grass of S*pinifex longifolius, Cenchrus ciliaris, Whiteochloia airoides* and occasional *Eulalia aurea* and *Triodia epactia*
5. Heath B of *Acacia coriacea, A bivenosa, Ehretia saligna, Rhagodia eremaea, R. preissii, Dichrostachys spicata, Capparis spinosa,* with *Tinospora smilicina* creeping over, and with a mixed grassland of *Cenchrus ciliaris, Triodia epactia* and *Whiteochloia airoides*
6. Very Open Low Scrub B of *Acacia bivenosa, A inaequilatera, A transluscens*, over Open Dwarf Scrub C of *Trianthema turgidifolia* and *Tephrosia rosea*. There is also a Mixed Low Grassland of *dense Cenchrus ciliaris* with *Triodia epactia* and *T. angusta*
7. Mixed Heath B of *Acacia bivenosa*, *A. inaequilatera* and *A. coriacea*, over Mid-Dense Grassland of *Cenchrus ciliaris* with occasional *Triodia epactia* and *T. angusta*
8. Low Heath C of *Aerva javanica* with Open Herbs of *Malvastrum americanum, Pterocaulon sphaeranthoides, Ptilotus gomphrenoides and Indigofera* sp. There is also a Mid-Dense Grassland of *Cenchrus ciliaris* with occasional *Setaria dielsii* and *Eragrostis eriopoda*
9. Low Open Scrub of *Acacia inaequilatera, A. bivenosa, A. coriacea and Dichrostachys spicata*, with a Mid-Dense Hummock Grassland or *Triodia epactia* and *T. wiseana*
10. Very sparse Open Dwarf Scrub C of *A. bivenosa, Scaevola spinescens* and *Indigofera monophylla*, with an Open Herbland of *Euphorbia myrtoides*. There is also a Mid-Dense Hummock Grassland of *T. epactia* and *T. wiseana*
11. Mid-Dense Tussock Grassland of *Eragrostis xerophila, Sporobolus mitchellii* and *Eriachne benthamii.* The area is fringed by an Open Dwarf Scrub D of *Trianthema turgidifolia* with *Triodia wiseana*. The drainage gullies are characterized by dense *Cyperus* sp. with the annual *Sesbania cannabina*
12. Open Low Woodland of *Ficus virens, Pittosporum phylliraeoides* and *Acacia coriacea*, over Mixed Heath B of *Myoporum acuminatum, Rhagodia preissii, Capparis spinosa* and *Stylobasium spathulatum*, over sparse grass, *Cymbopogon ambiguous*, and sedge, *Cyperus cunninghamii*, in rock crevices
13. Low Scrub B of *Acacia bivenosa, Senna glutinosa* subsp. *glutinosa, Scaevola spinescens* and *Grevillea pyramidalis*, over Mid-Dense Hummock Grassland and Very Open Herbs
14. Heath B of *Acacia coriacea*, over Dwarf Scrub C of *Aerva javanica* and Dense Grassland of *Cenchrus ciliaris*

Vegetation assemblage 11 was described by Astron (2000) as being 'distinctly different' from the remainder of the more typical coastal type vegetation. This assemblage supports an ephemeral wetland, some species of which still need to be identified, which provides an important habitat for birds. Anecdotal evidence describes many bird species including waders utilising the wetland when inundated.

4.5 Threatened and priority ecological communities

The desktop review of databases has revealed no TECs are listed for the Study Area.

One PEC (Roebourne Plains Coastal Grasslands) occurs within the vicinity of the Study Area:

> *"The Roebourne Plains Coastal Grasslands occur on deep cracking clays surrounded by clay plains, clay flats, and sandy coastal and alluvial plains. Gilai depressions are characterised by tussock grasslands dominated by Sorghum* sp. *and Eragrostis xerophila alongside Astrebla pectinata, Eriachne benthamii, Chrysopogon fallax, and Panicum decompositum. This PEC has been located at Sherlock Station, Roebourne Common, and between Dampier and Karratha, and is threatened by grazing and clearing for mining infrastructure."*

Astron (2011) reported that two locations of the Roebourne Plains Coastal Grassland PEC occur within the vicinity of Cleaverville Beach, although the Survey Area occurs beyond the DBCA buffer zone for those two locations.

4.6 Fauna

Fauna richness and diversity is influenced by habitat and Astron (2000) describe six potential habitats being present in the Study Area. The table below outlines these potential habitat types.

Potential Habitat Types
1. Mixed tall and low grasses under the sparse to moderate low shrub canopy of the seaward face and crest of the dunes
2. The landward faces of dunes containing low grasses and a dense dwarf scrub canopy of *Aerva javanica*
3. Sparse woodland canopy on the rocky headland
4. Dense bunch grasses in the drainage scours of the alluvial basins
5. Mid-dense hummock grasslands and sparse low assemblages on the stony plains
6. Dense forest of the mangroves near the southern shorelines.

The desktop review of previous surveys of the Study Area and the surrounding region has revealed very few targeted fauna studies, with most studies focusing on the Cape Lambert Area. The closest fauna survey to the Study Area was the proposed port area of Anketell by Phoenix (2010). Most of the fauna sightings within the Cleaverville Study Area were made opportunistically during botanical surveys. Most of the potential impacts on fauna discussed in previous surveys is based on database searches and interpretation of habitat types listed above on the vegetation descriptions.

The desktop review identified from databases, that 425 fauna species occur within 20km radius of the Study Area. For the purposes of this report, cetaceans and marine fish are excluded as they fall outside the scope of the project. There are 45 fauna species of conservation significance known to occur in the Study Area or within 20km of the Study Area. 32 of these species are either migratory or sea birds. These species and their conservation status are displayed in the table below.

Species Name	Common Name	Class	WA Ranking	EPBC Ranking
Actitis hypoleucos	Common Sandpiper	BIRD	IA	MI
Amytornis striatus striatus	Striated Ggrasswren	BIRD	P4	
Apis pacificus	Fork-tailed Swift	BIRD	IA	MI
Arenaria interpres	Ruddy Turnstone	BIRD	IA	MI
Calidris acuminate	Sharp-tailed Sandpiper	BIRD	IA	MI
Calidris alba	Sanderling	BIRD	IA	MI
Calidris canutus	Red Knot, knot	BIRD	IA (& VU at subsp. level)	EN & MI
Calidris ferrufinea	Curlew Sandpiper	BIRD	VU & IA	CR & MI
Calidris ruficollis	red-necked stint	BIRD	IA	MI
Calidris subminata	Long-Toed Stint	BIRD	IA	MI
Calidris tenuirostris	Great Knot	BIRD	VU & IA	CR & MI
Charadrius leschenaultii	Greater Sand Plover, Large Sand Plover	BIRD	IA (& VU at subsp. level)	VU & MI
Charadrius mongolus	Lesser Sand Plover	BIRD	EN & IA	EN & MI
Falcon peregrinus	Peregrine Falcon	BIRD	OS	
Gelochelidon nilotica	Gull-billed Tern	BIRD	IA	MI
Glareola maldivarum	Oriental Pratincole	BIRD	IA	MI
Hydroprogne caspia	Caspian Tern	BIRD	IA	MI
Limosa lapponica	Bar-tailed Godwit	BIRD	IA (& VU at subsp. level)	MI (& VU or CR at subsp. level)
Limosa limosa	Black-tailed Godwit	BIRD	IA	MI
Numenius madagascariensis	Eastern Curlew	BIRD	VU & IA	CR & MI
Numenius minutus	Little Curlew, Little Whimbrel	BIRD	IA	MI
Numenius phaeopus	Whimbrel	BIRD	IA	MI
Onychoprion anaethetus	Bridled Tern	BIRD	IA	MI
Pandion cristatus	Osprey, Eastern Osprey	BIRD	IA	MI
Pluvialis fulca	Pacific Golden Plover	BIRD	IA	MI
Pluvialis squatarola	Grey Plover	BIRD	IA	MI
Sterna dougallii	Roseate Tern	BIRD	IA	MI
Sterna hirundo	Common Tern	BIRD	IA	MI
Sternula albifrons	Little Tern	BIRD	IA	MI
Thalasseus bergii	Crested Tern	BIRD	IA	MI
Tringa brevipes	Grey-tailed Tattler	BIRD	IA & P4	MI
Tringa glareola	Wood Sandpiper	BIRD	IA	MI
Tringa nebularia	Common Greenshank, Greenshank	BIRD	IA	MI
Tringa stagnatilis	Marsh Sandpiper, Little Greenshank	BIRD	IA	MI
Xenus cinereus	Terek Sandpiper	BIRD	IA	MI
Dasyurus hallucatus	Northern Quoll	MAMMAL	EN	EN
Lagostrophus fasciatus subsp. *fasciatus*	Banded Hare-Wallaby	MAMMAL	T	VU
Leggadina lakedownensis	Northern Short-tailed / Lakeland Downs Mouse	MAMMAL	P4	
Pseudomys chapmani	Western Pebble-mound Mouse	MAMMAL	P4	
Chelonia mydas	Green Turtle	REPTILE	VU	VU
Ctenotus angusticeps	Airlie Island Ctenosus	REPTILE	P3	VU
Eretmochelys imbricata	Hawksbill Turtle	REPTILE	VU	VU
Lerista nevinae	Nevin's Slider	REPTILE	EN	EN
Natator depressus	Flatback Turtle	REPTILE	VU	VU
Notoscincus butleri	Lined Soil-crevice Skink	REPTILE	P4	

4.7 Introduced Fauna

The desktop has revealed nine introduced fauna species within 20km radius of the Study Area. Two species are declared pests under the *Biosecurity and Agriculture Management Act 2007* (BAM Act).

Scientific name	Common name	Declared Pest under BAM Act
Canis lupus subsp. *familiaris*	Dog	X
Columba livia	Domestic Pigeon	
Felis catus	Cat	
Hemidactylus frenatus	Asian House Gecko	
Mus musculus	House Mouse	
Passer domesticus	House Sparrow	
Rattus rattus	Black Rat	
Streptopelia chinensis	Spotted Turtle-Dove	
Vulpes vulpes	Red Fox	X

5. CONCLUSION

This desktop report demonstrates:

- Several flora and vegetation surveys of the Study Area have been conducted over the years, however very few fauna surveys have occurred.
- No priority or declared rare flora species have been recorded in the Study Area however the Priority Flora List has changed since surveys were conducted within the Study Area in 1998 and 2000.
- Six weed species have been recorded in various botanical surveys of the areas and an additional two are recorded in the databases. This includes two weeds of National significance; however, one was recorded in the Anketell Area outside of the Study Area.
- The abundance and spread of the two dominant weed species increased between 1998 and 2000 surveys. Weeds were more dominant on loosely consolidated dune sands associated with track and camping activities but were more contained to near tracks on rocky areas.
- 45 fauna species of conservation significance are known to occur in the Study Area with 32 of these migratory bird species.
- Nine introduced fauna species are known to occur within 20km of the Study Area.
- No TECs are found within the study area and one PEC is found in two locations near the Study Area.
- There are areas of high biodiversity and conservation significant values within the boundaries of the Study Area which is in accordance with the fact that the Study Area sits within one of the 15 National biodiversity hotspots.

6. REFERENCES

AECOM 2011, *Anketell Port Proposal Level 2 Flora and Vegetation Assessment*. Unpublished report prepared for API (Australian Premium Iron) Management Pty Ltd.

Astron Soil and Water Pty Ltd, 2014: *Proposed Landfill Level 2 Flora and Vegetation Survey and Level 1 Fauna Survey, Cheedatha.* Unpublished report for Cleanaway Pty Ltd.

Astron Environmental Services, 2014: *Reserve 40879 Karratha Road Mt Anketell Level 1 Flora and Vegetation Survey.* Unpublished report prepared for ERM Australia.

Astron Environmental Services 2010b. *West Pilbara Iron Ore Project Proposed Anketell Point Port Area Vegetation Survey.* Unpublished report prepared for API Management Pty Ltd

Biota, 2008: *Rio Tinto Iron Ore Rail Duplication Fauna Survey: Cape Lambert Variation*. Prepared for Rio Tinto Iron Ore, September 2008.

Department of the Environment and Energy, 2018. http://environment.gov.au/biodiversity/threatened/communities/

Department of the Environment and Energy, 2018.

http://environment.gov.au/epbc/protected-matters-search-tool

Department of Biodiversity, Conservation and Attractions (DBCA), 'Threatened and Priority Flora database', DBCA, Kensington.

Department of Biodiversity Conservation and Attractions (DBCA), *NatureMap Database Search*, https://naturemap.dpaw.wa.gov.au/.

Department of Biodiversity, Conservation and Attractions (DBCA), 'Threatened and Priority Ecological Communities database', DBCA, Kensington.

Department of Biodiversity, Conservation and Attractions (DBCA), 'West Australian Herbarium Database', DBCA, Kensington.

Department of, Biodiversity, Conservation and Attractions (DBCA),'Threatened and Priority Fauna database', DBCA, Kensington.

Environmental Protection Authority 2001, *Guidance for the Assessment of Environmental Factors in accordance with the Environmental Protection Act 1986. Guidance Statement for the protetion of tropical arid zone mangroves along the Pilbara Coastline. Guidance Statement No. 1.* Environmental Protection Authority, Perth.

Environmental Protection Authority 2004b, *Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia, Guidance Statement 51*, Environmental Protection Authority, Perth.

EcoLogical Australia 2012 *Roebourne Environmental Scoping Level 1 Flora and Fauna Survey*. Unpublished report prepared for Essential Environmental.

Emerge Associates, 2011: *Flora and Fauna Assessment Stove Hill, Karratha*.

Muir B. G. (1977). *Biological survey of the Western Australian Wheatbelt. Part 2: Vegetation and habitat of Bendering Reserve.* Rec. WA Mus, Supp. 3.

Ninox Wildlife Consulting, 2008: *A Vertebrate Fauna Survey of Cape Lambert Iron Ore Project Area near Karratha, Western Australia*, Prepared for Cape Lambert Iron Ore Limited.

Pendoley (2008). Marine Turtle Beach Survey, Delambre, Dixon and Bezout Islands, Unpublished report to Maunsell Australia., Pendoley Environmental Pty Ltd.

Phoenix, 2010: *Terrestrial Vertebrate Fauna Survey for Anketel Port Tail Alignment and Port Projects*. Prepared for Australian Premium Iron Management Pty Ltd, July 2010.

Van Vreeswyk AME, Payne AL, Leighton KA, Hennig P. 2004. *An inventory and condition survey of the Pilbara Region, Western Australia*. Department of AgricultureTechnical Bulletin No 92

7. APPENDIX

7.1 LEGISLATIVE CONTEXT

The protection of flora and fauna in Western Australia (WA) is principally governed by three acts:

- Commonwealth *Environmental Protection and Biodiversity Act 1999* (EPBC Act)
- *Western Australian Wildlife Conservation Act 1950* (WC Act)
- *Western Australian Environmental Protection Act 1986* (EP Act)

The *WA Biodiversity Conservation Act 2016* (BC Act) will eventually replace the WA Act, once the necessary Biodiversity Conservation Regulations have been made.

International legislation

Migratory birds are listed under the EPBC Act in recognition of species listed under international treaties such as:

- China Australia Migratory Bird Agreement
- Japan Australia Migratory Bird Agreement
- Convention on the Conservation of Migratory Species of Wild Animals
- Republic of Korea Australia Migratory Bird Agreement

Commonwealth legislation

The EPBC Act is administered by the Federal Department of the Environment and Energy (DoEE). Under the EPBC Act, actions that have, or are likely to have a significant impact on a Matter of National Environmental Significance (NES), require approval from the Australian Government Minister for the Environment through a formal referral process. The EPBC Act provides for the listing of threatened native flora, fauna and threatened ecological communities (TECs) as matters of NES and are assigned one of six conservation categories:

- Extinct (EX); Critically Endangered (CR); Endangered (EN); Vulnerable (VU); Conservation Dependent (CD); and Vulnerable or more severely threatened.

Ecological communities can be listed as Threatened Ecological Communities (TECs) under the EPBC Act, and have three categories which include: Critically Endangered, Endangered and Vulnerable.

State legislation

The WC Act provides for the listing of species which are under identifiable threat of extinction as specially protected (Rare or Threatened Flora and Threatened Fauna). Under current classifications, threatened species are assigned to one of seven categories (schedules):

- Schedule 1 (S1) – likely to become extinct or rare as Critically Endangered (CR) taxa
- Schedule 2 (S2) – likely to become extinct or rare as Endangered (EN) taxa
- Schedule 3 (S3) – likely to become extinct or rare as Vulnerable (VU) taxa
- Schedule 4 (S4) – presumed to be extinct (EX).
- Schedule 5 (S5) – international agreements relating to the protection of migratory birds
- Schedule 6 (S6) – dependent on ongoing conservation interventions
- Schedule 7 (S7) – in need of special protection, otherwise than for the reasons mentioned.

The Department of Biodiversity Conservation and Attractions (DBCA) administers the WA Act and also maintains a non-statutory list of Priority taxa. Taxa that have not yet been adequately surveyed to be listed under Schedule 1 or 2 are added to the Priority Flora and Priority Fauna Lists under one of five categories, P1 (highest) – P4 (lowest), based on level of knowledge or concern. P5 is for taxa that are dependent on existing conservation programs.

Legislation relating to Threatened and Priority Ecological Communities

Under the EPBC Act, the Minister for Environment may list ecological communities which are at risk. The DBCA maintains a list of ministerial-endorsed threatened ecological communities (TECs) which are assigned one of four categories: critically endangered (CR); endangered (EN); vulnerable (VU) and presumed totally destroyed (PD).

DBCA also maintains a non-statutory list of priority ecological communities (PECs) which do not meet survey criteria or are not adequately defined. PECs are assigned one of five priority categories, P1 (highest) – P4 (Lowest), based on knowledge or concern. P5 are PECs that are not threatened but are subject to specific conservation programs.

Appendix B – Stakeholder Engagement Report

DRAFT

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

CITY OF KARRATHA

CLEAVERVILLE FORESHORE MANAGEMENT PLAN

STAKEHOLDER ENGAGEMENT REPORT

July 2018

Prepared for GHD

vicki long & associates
Living in the Pilbara
PO Box 713, Karratha WA 6714
0428 854 852
ABN: 96 009304 634

CITY OF KARRATHA

CLEAVERVILLE FORESHORE MANAGEMENT PLAN

STAKEHOLDER ENGAGEMENT REPORT

Prepared for: GHD

Job No: VLA043

Reference No: VLA043rv01-RevA

Revision Status

Rev	Date	Description	Author(s)	Reviewer
A	24/06/2018	Draft Issued for Internal Review	L Timmins	V. Long
B	19/07/2018	Draft Issued for Client	L Timmins	T Hibberd

©Copyright 2015 Vicki Long & Associates. All rights reserved.
This document and information contained in it has been prepared by VLA under the terms and conditions of its contract with its client. This report is for the clients use only and may not be used, exploited, copied, duplicated or reproduced in any form or medium whatsoever without the prior written permission of VLA or its client.

EXECUTIVE SUMMARY

The City of Karratha (City) is developing a foreshore management plan (FMP) for the Cleaverville Foreshore (Cleaverville) that will guide the use and management of the area in a manner that ensures the long-term preservation of ecological, cultural and social values. To develop an effective FMP, it was paramount the City used a stakeholder engagement strategy to consult with local residents, Traditional Owners, Government and non-Government stakeholders to ensure their needs are considered.

The stakeholder engagement strategy was executed, and the strategies used included an online survey; community and agency stakeholder workshops; and interviews with seasonal travellers. 83 community members completed the online survey, two public and one agency consultation workshops were provided, and 25 seasonal campers were interviewed.

The results of these strategies provide insights into what the community values about the area, what they perceive to be the threatening the area, and what strategies could be implemented to protect and enhance the experience of the area. The results were grouped into key themes to help understand the breadth of the issues, which included:

- Cultural considerations
- Environmental issues
- Access to the area
- Camping processes
- Infrastructure provided
- Information provided

This engagement strategy has resulted in a greater understanding of the values and needs of the community including those that travelled to the region from other areas of Australia. These insights have been compiled for consideration by the City of Karratha and will be used in the development of managements strategies as part of the FMP. The results are also a valuable source of potential management ideas and provide evidence of community support for specific management strategies when the FMP is developed and ultimately implemented.

TABLE OF CONTENTS

EXECUTIVE SUMMARY iii
TABLE OF CONTENTS iv
List of Figures v
List of Tables v
List of Plates v
1. INTRODUCTION 6
2. METHODS 6
3. RESULTS 7
3.1 Online Stakeholder Survey 7
3.2 Community and Agency Stakeholder Workshops 10
3.3 Interviews with seasonal campers 14
4. DISCUSSION 16
5. CONCLUSIONS 17
6. REFERENCES 17
7. APPENDICES 18
Appendix A – Community and Agency Stakeholders 18
Appendix B – Stakeholder engagement promotion strategies 19
Appendix C – Cleaverville Foreshore Management Plan – Community Consultation Survey 20
Appendix D – Cleaverville Stakeholder Engagement Workshop Presentation 22
Appendix E – Community Consultation Online Survey Results 24

List of Figures

List of Tables

Table 1 *Damage or key threats to Cleaverville as identified in the online community consultation survey* 7

Table 2 *Suggestions from the online community consultation survey on how to make Cleaverville a better place to visit* 8

Table 3 *Suggestions made in the online community consultation survey on ways the City of Karratha can enhance Cleaverville* .. 9

Table 4 *Current and potential uses of Cleaverville as identified in the stakeholder workshops* 12

Table 5 *Damage and key threatening processes at Cleaverville* ....., ... 13

Table 6 *Suggestions from the stakeholder workshops on future improvement and management of Cleaverville* 14

Table 7 *Suggestions from interviewing seasonal campers on ways to make Cleaverville a better place to visit* 15

Table 8 *Summary of the results under key themes from the Cleaverville stakeholder consultation strategy* 17

List of Plates

Plates 1 - 4 *Participants at the Cleaverville FMP agency stakeholder workshop* 11

Plates 5 - 6 *Samples of annotated aerial photographs produced at the Cleaverville FMP stakeholder workshops.* 12

Plates 7 - 8 *Participants at the Cleaverville FMP Community stakeholder workshop* 12

1. INTRODUCTION

The City of Karratha (City) is developing a foreshore management plan (FMP) for the Cleaverville Foreshore (Cleaverville) that will guide the use and management of the foreshore in a manner that ensures the long-term preservation of ecological, cultural and social values. Cleaverville is a much-loved nature-based camping area and is used by local residents and seasonal campers over winter. To develop this FMP, it is paramount the City uses a stakeholder engagement strategy to consult with local residents, Traditional Owners, Government and non-Government stakeholders to ensure their needs are considered.

2. METHODS

The stakeholder engagement strategy was developed in consultation with the City of Karratha to be compliant with the City's Community Engagement Policy (CE-09) and the International Association for Public Participation's public participation spectrum. Stakeholders were determined in consultation with the City's Community Engagement and Partnerships team. Stakeholders are listed in Appendix A and included Government and non-Government agencies, traditional owner groups, major local industries, sporting and recreation groups, and the general community. Strategies used to consult with stakeholders included:

1. **Online stakeholder survey**
2. **Community and agency stakeholder workshops**
3. **Interviews with seasonal travellers.**

Multiple strategies listed in Appendix B were used to promote the online survey and stakeholder workshops. Some of these included:

- Listings on the City of Karratha website and Facebook page
- Promotion on numerous social media pages
- On-air interview between City of Karratha Ranger Services Coordinator and the ABC North West WA Radio.
- Sending letters, emails and direct phone calls to target stakeholder groups, inviting their contribution to the project

The online survey included in Appendix C, was provided via the City of Karratha Website. This survey structure was also used when interviewing seasonal travellers at Cleaverville.

Stakeholder workshops were offered to the general community, Aboriginal corporations and local industries and agencies. The workshop presentation provided in Appendix D, was developed to identify the current uses for the area, the current and future opportunities and threats, and suggestions for improving and managing the area. High definition aerial photographs of the Cleaverville area were used and participants were asked to annotate the photographs with comments and coloured labels. The results for each strategy are listed below and are collated in the discussion section.

3. RESULTS

3.1 Online Stakeholder Survey

The online survey was available for 12 weeks, during which time 83 community members responded. Appendix C, lists the full results and the free-text responses to each question. A brief summary of the results are:

- The number of survey respondents was consistent with other non-sponsored City surveys. Residents from all townships, age groups and duration of residency were represented.
- The demographic data indicated that 87.9% of survey respondents lived in one of the towns within the City of Karratha and 55.4% stated they were rate payers. 86.75% identified as non-Aboriginal, with 6% identifying as being of Aboriginal or Torres Strait Islander decent and 7.2% preferring not to say.
- The age of the respondents varied with the highest group being 41-50 years (31.3%), followed by 31-40 years (28.9%) and then 51-60 years (20.5%).
- Survey respondents visited Cleaverville throughout the year with the most popular season being winter with 87.9% of respondents visiting and the lowest season is Summer with 44.5% visiting.
- 59% of survey respondents visiting Cleaverville stayed for a day trip only followed by 26.5% visiting for two days (overnight). Visitors who stayed 1 or more nights, most frequently stayed on the ground in swags or tents, followed by camper trailers.
- The five highest recreational activities reported were camping, shore-based fishing, family picnics and gatherings, water-based recreation and beach walking. The next highest activity was boat-based activities, 4-wheel driving and cultural activities. Other activities listed under the free text option included scuba diving, reef walking and visiting memorial sites.

Respondents were asked to list the main threats to Cleaverville and the five highest threats listed were littering and illegal dumping, pressure from increasing visitors, increasing number of tracks, the spread of weeds, and the erosion of dunes. The other threats listed under the free text option included 4-wheel driving on the beach, disturbance to nesting turtles, snakes and fire risk from the dense grass around camp sites and the potential disruption from a potential new port at Point Anketell. Table 1 below lists the main threats Cleaverville which have been grouped under themes.

Table 1. Damage or key threats to Cleaverville as identified in the online community consultation survey

	Damage or key threatening processes at Cleaverville
Environmental issues	Littering and illegal dumping
	Weeds
	Feral animals (dogs, cats, foxes)
	Overfishing
	Overgrown grass near camping encouraging snakes and fire. Needs to be slashed
	Burn some of the bushland to remove snake risk and minimise fire danger to campers
	There needs to be closer scrutiny on what the campers take out of Cleaverville
Access issues	4WD on the beach during turtle nesting and hatching season
	Erosion of dunes
	Increasing number of tracks
	Pressure from increasing number of visitors
	Too many people if the City promotes it as a tourist area
	Long term campers in winter

	Damage or key threatening processes at Cleaverville
Camping issues	Unable to access favourite camping areas due to high numbers of seasonal campers. Cannot access the best beaches as campers have taken all the best locations
Infrastructure issues	Development of Anketell Port causing dust and noise and will detract from the quiet ambience of the area

Respondents were asked for suggestions for ways to improve the experience at Cleaverville. A list of eight suggestions was provided to select from as well as the option to write ideas as free text. The five most frequently lasted ways to improve Cleaverville were campsites allocated for use by residents, more shade structures, rubbish bins, and more toilets. Table 2 below lists all the responses and the free text comments categorised under themes.

Table 2. Suggestions from the online community consultation survey on how to make Cleaverville a better place to visit

	Suggestions to make Cleaverville a better place to visit
Cultural considerations	Cultural tours
	Guided walking tours of the area
	Interpretive signage about Aboriginal history in the area
	Indigenous rangers
Environmental	Close duplicated tracks and rehabilitate
	Prevent destruction of vegetation and intrusion of weeds
	Manage erosion
	Underwater surveys and cleanups
	Better litter management, particularly on the eastern side near the creek
Access	Close off unnecessary tracks
	Stop off road driving on the beach
	Manage trespassing on closed tracks
	Provide more directional signage and a good map of the area
Camping processes	Allocate some campsites for use by locals
	Establish campsite boundaries to preserve the dunes and provide easier access
	No camping fees for locals
	Delineate camp-fire and no-fire (i.e day trip) sites
	Limit how long people can stay
Provision of Infrastructure	Put log fencing around camping areas to protect intrusion into the vegetation
	More shade structures
	Provide gas BBQs
	Provide fire rings
	More toilets
	More rubbish bins
	Fishing, swimming and diving platforms
Information availability	More interpretive signage
	Provide a good map of the area at entrance points
	Name some of the areas to simplify getting to areas
	Provide information on the plants and animals and other environmental attributes. Note importance and the dangers to its preservation (weeds, off-track vehicles, erosion and fire)
	More information about the area
	More signage regarding penalties for dumping of rubbish
Other	Have rangers regularly inspect the area and issue fines for dumping and off-roading

Respondents were asked for suggestions to help the City of Karratha enhance the area. In the Table 3 below, responses are listed under key themes. Where there were multiple comments of a similar topic, the number of mentions were listed.

Table 3. Suggestions made in the online community consultation survey on ways the City of Karratha can enhance Cleaverville

Theme	Suggestions	Number of mentions
Cultural enhancement	Indigenous rangers	1
	Cultural interpretive signage	1
	Consult with traditional owners about the significance of the area	1
Environmental enhancement	Conserve some areas	1
	Departments of Parks and Wildlife need to increase their presence there	1
	Do rubbish cleanups	1
Access improvement	Close beach to cars and patrol compliance	4
	Seal the road in	3
	Don't seal the road in – leave it graded / grade more often	2
	Close the beach and tracks to cars. Have designated car areas, then walking from there onwards.	1
	Close duplicate tracks	1
	Directional signage	1
	Better tracks and access for dinghies	1
	Better access to the beach for cars	1
Camping process improvement	Local residents exempt from camping fees	6
	Separate areas for grey nomads and locals	2
	Limit number of long-term campers. Too much pressure from long-termers	3
	Provide a communal fire ring for social gatherings	1
	Better planning on the location of campsites, using degraded areas to prevent more tracks being made and the bush being flattened	1
	Allocate camping areas for short-term stays so locals have a chance to camp. It's unfair the prime spots are taken by long -term campers in our winter camping season	1
	Appoint a caretaker / manager	1
	Have some designated areas for camping that provide shade, toilets and fire rings and still have beach access	1
	Locals could buy a local camping pass to assist with upkeep than have unlimited camping	1
	Reduce fees and allow people to stay longer	1
	More camping bays for tourists	1
Infrastructure enhancement	More shade structures	9
	Boat ramp	6
	More toilets	4
	More bins and litter management	4
	Invest in campsite establishment to preserve dunes and provide easier access	3
	BBQs	1
	Burning and slashing the grass/bush areas to reduce snakes and fire risk	1
	Fishing platform	1
	Fish cleaning area	1
	Fresh water	1
Information availability	Interpretive signage and including what Cleaverville has to offer	2
	More signs	2

Theme	Suggestions	Number of mentions
	Information on the need to protect and conserve the environment	1
	More day use shaded areas to have lunch under	1
	Develop a plan for the area	1
Other	None / don't change anything	8
	Less sandflies / midge management	4
	Greater Ranger Presence	2
	Don't over legislate this gorgeous area	1
	Fisheries need to include Cleaverville on their rounds to stop over fishing	1
	Create a snorkel or dive trail	1
	Run community clean-ups	1
	Increase pay for ranger/caretaker and/or provide in kind support (e.g. food and fuel vouchers)	1

3.2 Community and Agency Stakeholder Workshops

Three stakeholder workshops were conducted as part of the engagement process. These included:

- Two workshops, open to any resident, offered at the Leisureplex and the Wickham Community Hall.
- One workshop, for agency and industry stakeholders, which included Traditional Owners, Government and Non-Government organisations and local industries.

During the workshops, participants were provided with high definition aerial photographs of Cleaverville and were asked to discuss some key questions which included:

- What are the main activities of people visiting the area and how has this changed over time?
- How do you see this changing in the future?
- What are the main threats to the area?
- What damage do you see occurring?
- What can the City of Karratha implement to prevent this from occurring?
- What would make Cleaverville a better place to visit?
- What strategies could the City of Karratha use to make this happen?

Participants were asked to annotate, shade and apply colour-coded labels or symbols to the aerial photographs, when answering the questions, see plates 3 and 4 below.



Plate 1 – Stakeholder workshop



Plate 2 – Stakeholder workshop



Plate 3 Stakeholder Workshop



Plate 4 – Stakeholder Workshop

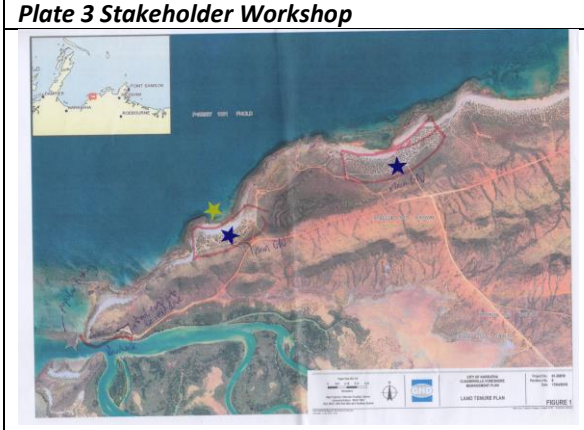


Plate 5 – Sample of annotated aerial photography

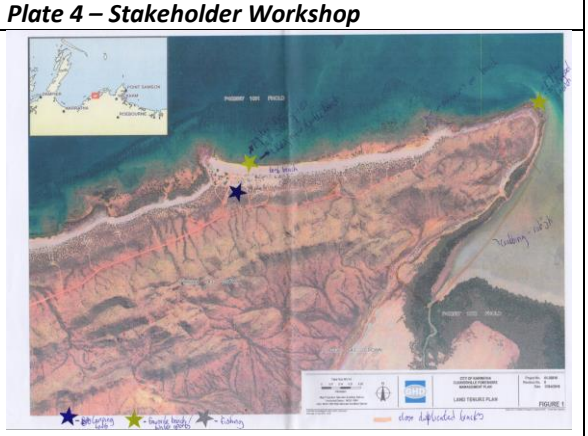


Plate 6 – Sample of annotated aerial photography



Plate 7 – Community consultation workshop

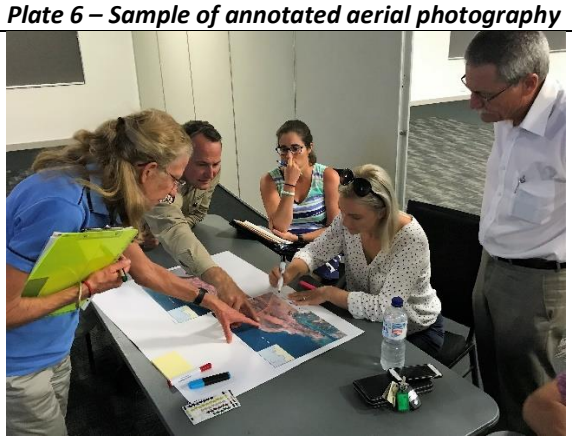


Plate 8 – Community consultation workshop

The results from the workshops are qualitative and discussed in a group setting. Responses were grouped into like themes to assist with the discussion and are listed below in Tables 4, 5 & 6.

Table 4. Current and potential uses of Cleaverville as identified in the stakeholder workshops

Current and potential future uses of the area – Key insights
Shore-based fishing, crabbing and boat-based fishing from small vessels such as dinghies and kayaks
Some areas are more popular than others for shore-based fishing such as at the creek mouth, rocky spits and the south east facing shoreline
Camping in the dunes and on the rocky pavement on the north-eastern point (both long-term and short-term campers)
Visitor use the area during the day including the sandy beaches and to reach the popular fishing points
4WD and quad bike traffic along sandy beaches
Increasing boat access at the boat ramp and in the creek mouth
The current low level of infrastructure has the benefits of limiting the use to people who are relatively self-sufficient, which limits the impact on the area
Visitation of the numerous memorial sites at Cleaverville
Scuba diving
Searching for GeoCaches on the hill tops
Increasing drone use in the area

Table 5. Damage and key threatening processes at Cleaverville

	Damage and/or key threatening processes at Cleaverville
Cultural considerations	Aboriginal people have reported concern if access is restricted and have been told in the past that they can't light fires and have to pay camping fees. Note: Current practice is to not charge camping fees to Aboriginal people
	Potential source of conflict between Aboriginal Native Title rights to light fires for cultural reasons, DBCA/CofK fire management and the *Bushfires Act 1954 (WA)*
Environmental issues	Proliferation of weeds (particularly Buffel and Kapok) in the dunes and along tracks
	Increasing amount of litter, particularly on the rocky pavement along the south eastern shoreline
	Depleting fish and mud crab numbers by overfishing
Access issues	Proliferation and duplication of tracks
	Erosion of dunes from vehicle traffic
	Concerns that too many tracks will be closed reducing access to favourite fishing areas
	Vehicle traffic along sandy beaches is frequently observed particularly where turtles are known to nest. This practice should be prohibited during the turtle nesting season.
	Visitation and pressure on the area is anticipated to increase with the increasing population, particularly if Port Anketell progresses allowing easier access to the area using 2WD
Camping process issues	Campsites are not numbered which has led to the creation of unauthorised campsites or existing campsites are widened to suit camper needs
	Campers taking native vegetation for firewood from surrounding bushland reduces habitat for fauna
Infrastructure issues	Concerns about the impact of noise, dust and impacts on the aesthetics of the area from the development of the proposed Port Anketell

Table 6. Suggestions from the stakeholder workshops on future improvement and management of Cleaverville

	Suggestions for future improvement and management of Cleaverville
Cultural enhancement	Develop an Indigenous ranger program and cultural tourism opportunities
	Expand the cultural interpretive signage
	Provide an area for use by Aboriginals for cultural activities where they are not disturbed, allowing the building of fires (SE shoreline area suggested). Sell firewood in this area
Environmental enhancement	Protect areas with unique ecology (e.g. ephemeral wetland) or areas in pristine condition
	Protect the ephemeral wetland by managing track duplication and weed management
	Fund/support a turtle rookery, migratory and nesting shorebird monitoring program
Access improvement	Reduce access points to the beach to 2 or 3 areas only
	Close duplicated or unnecessary tracks and redirect traffic to existing tracks and roads
	Prohibit driving on the beaches during turtle nesting and hatchling season
	Improve access information and signage
Camping process improvement	Stratify camping areas to long, medium and short-term. It was reported that the long-term campers damage the dune environment more than short-term campers. Restrict long-term to the most degraded areas
	Number the sites with an overflow area
	In peak camping season, it's difficult for locals to find a particular type of campsite. Consider segregating some sites for locals and/or rate payers
	Eliminate camping fees for locals or rate payers
	Continue the current practice of not charging camping fees to Aboriginal people
	Improve the information available on the City of Karratha Website about how to book a campsite. Suggested an on-line booking system like the Ningaloo area
	Consider the need for camping on the rocky pavement as this promotes driving through the dunes and along the beaches
Provision of Infrastructure	Current toilets in the Day Use Area and the camping areas near the Caretaker are well maintained. There are minimal toilet facilities elsewhere for campers, which encourage people to find their own spot, fouling the environment, leaving excrement and paper waste, and disturbing the soil.
	Construct a boardwalk and with the occasional bench seating around the western headland near the creek mouth to reduce the risk of falling when walking over the uneven rock pavement. This is also a popular shore-based fishing location
	Provide more low-impact shade structures within easy access of the beach, particularly near any beaches where tracks are closed. This may discourage people driving onto the beach to take their vehicle-mounted shade awnings with them.
	Provide fixed fire rings at designated campsites and provide firewood that can be purchased
	Improve the boat ramp facilities
Information availability	Improve directional, camping and interpretative signage and a basic map to find facilities and features of the area
	Increase environmental interpretative information particularly about the turtle nesting and hatching season, not driving on the beaches, nesting shorebirds, conservation, coastal risks and tidal information. This may encourage better conformation by improving awareness.
Other	Establish volunteer programs to help collect environmental data, promote awareness and contribute to conservation effort.
	The Caretaker model generates income for the City, however the Caretaker is not paid. Consider a more equitable monetary or non-monetary payment
	Restrict or prohibit recreational drones being used around camping areas

3.3 Interviews with seasonal campers

The Caretaker reported that the arrival of seasonal campers at Cleaverville seemed to be later than in previous years and as such, the numbers present during the survey was less than expected. 25 campers were interviewed at Cleaverville using similar questions used in the online community survey. There were many more people camping at Cleaverville on the day of the interviews, however most had driven into Karratha and were not in their caravans.

Of the 25 campers, 17 had travelled from elsewhere in Western Australia and the remaining eight had travelled from other states in Australia. None of the campers lived in the City of Karratha or were rate payers. All 25 campers normally visited during winter and 18 had camped at Cleaverville before. One camper identified as being of Aboriginal decent from the Banjima group which are from the inland Pilbara near Karijini National Park. The most common age of the campers was between 61 and 70 years of age with 13 people in this range. This was followed by four campers aged between 41 and 50 years, then three campers aged between 71 and 80 years, three between 51 and 60 years, and two children aged around 10 years of age.

Of the 25 campers, 13 planned to stay for two weeks, eight planned to stay for one week, and four planned to stay for four weeks. 14 campers were staying in caravans, 10 in camper trailers and one in a roof-top tent. Of the 25 campers interviewed, 21 intended on fishing from the shore, two planned on fishing from a boat, seven intended on going on long walks and six were planning family gatherings. Seven campers were about to engage in gold prospecting when they left Cleaverville and two were qualified school teachers and were looking for paid work in Karratha.

Campers were asked what they felt were the main threats to Cleaverville. Of the 25 campers, nine felt there were no threats, seven listed littering and illegal dumping, seven listed backpackers because of the perceived mess they leave and six listed the duplication of tracks.

Campers were asked what would make Cleaverville a better place to visit and Table 7 below lists the responses and the number of people who offered the suggestion. Responses have been grouped into like themes to assist with the discussion.

Table 7. Suggestions from interviewing seasonal campers on was to make Cleaverville a better place to visit

	Suggestions to make Cleaverville a better place to visit	Number of mentions
Access enhancement	Reduce the track duplication and close some tracks to the beach	3
	Install speed signs along the Cleaverville Road and along the tracks	2
	Surface Cleaverville road from the highway with asphalt	2
Camping process improvement	Have cut firewood available for purchase	4
	Don't raise the camping fees	3
	No backpackers! If BBQs and water are provided, then backpackers will arrive and make a mess	2
	Lengthen the maximum number of days permitted to stay	1
Provision of Infrastructure	Install more toilets for campers	9
	Install a solar powered sea water pump near the sullage points. That way campers can sluice portable toilets without wasting potable water	7
	Provide a shower cubicle where campers can hang their own solar showers, like the cubical at Coronation Beach WA	4

	Suggestions to make Cleaverville a better place to visit	Number of mentions
	Don't install more infrastructure, as it's perfect the way it is	2
	Install communal seating area for happy hour	2
	Install more shade structures	2
	Provide gas BBQs	2
	Provide non-potable fresh water	2
	Use one large skip bin rather than multiple wheelie bins. It looks untidy.	2
	Install a simple jetty in the Cleaverville Creek	1
Information availability	Increase interpretive signage to include safety and risk management (e.g. management of Irukandji and other marine stingers, stonefish, and tides)	2
	Provide better signage including a map of the area	2
	Provide signs on fishing information including common table species	2

4. DISCUSSION

Cleaverville is a highly valued coastal region and nature-based camping area important to Traditional Owners, residents and seasonal campers from other regions of Australia. The City of Karratha is developing a FMP to preserve the area and is being developed using multiple sources of information, particularly the needs, values and opinions of stakeholders. A stakeholder consultation strategy was implemented that included a wide range of stakeholders and the community. Multiple consultation strategies were used including an online survey, workshops and in-person interviews. This consultation strategy has been successfully used in the development of other FMPs in the region including Gnoorea, Hearson Cove and the Wickham Back Beach.

The number and demography of people and organisations that contributed to the stakeholder consultation process confirms the effectiveness of the reach and the strategy. This provides confidence in the validity of the findings and confirms the community does value the area and are motivated to contribute to the development of a long-term management plan. The summary of stakeholder suggestions from the online survey, workshops and the interviews are presented in Table 8 and have grouped into key themes.

Table 8. Summary of the results under key themes from the Cleaverville FMP stakeholder consultation strategy

Key theme	Summary of suggestions
Cultural considerations	Cultural tourism and walks; cultural interpretive information; Indigenous Rangers; more consultation about significance of the area; and consider an area for Aboriginal cultural gatherings
Environmental issues	Close duplicated tracks and rehabilitate eroded areas; delineate campsites to prevent clearing of vegetation; manage weeds; designate some sensitive areas for conservation (e.g. ephemeral wetland); establish environmental monitoring programs; provide more information about fishing rules; establish community-run environmental programs and rubbish clean-up days; and provide more information about responsible fishing and inspections by Fisheries Department
Access to the area	Close off duplicated tracks; reduce car access to beaches; manage unauthorised access to closed tracks; stop or limit driving on beach; install speed signs on entry tracks; improve directional signage; provide site map; and improve boat access
Camping processes	Allocate areas for long-term and short-term camping to ensure fair access to desirable sites; plan location and size of sites to protect sensitive areas; utilize degraded areas for long-term camping; allocate numbers to campsites; set up overflow area; stop camping on coastal rocky pavement area; provide fee camping for Aboriginals and local residents or provide a camping pass with council rates; provide campsite fire-rings; communal fire pit; provide cut firewood for purchase; delineate areas where campfires are permitted; appoint a caretaker and remunerate (money or in-kind)
Provision of Infrastructure	Clearly delineate boundaries (e.g. logs, stones); provide increased shade structures, bins, campsite fire-rings, communal firepit and seating; provide more toilets in camping areas and gas BBQs; establish a boat ramp and jetty, board walk and bench seating around western headland; provide a fish cleaning station; solar-powered pump to provide salt water at sullage points; provide non-potable fresh water; build a communal solar shower cubical
Information availability	Provide more interpretive signage on a range of environmental issues, Indigenous culture and risk management; provide a site map at all nodes; and directional signage
Other	Establish a greater ranger presence, dive/snorkel trail, volunteer programs; restrict drone use near camping areas

The potential limitations to the stakeholder engagement process is with the number of seasonal campers interviewed, due to their unexplained late arrival to the area. With this limitation, there were still 25 campers interviewed which represented more than a quarter of the total people surveyed.

Another potential limitation is with the number of Traditional Owners contributing to the consultation strategy. According to the Australian Bureau of Statistics 2016 census, 13% of the population of the City of Karratha identified as being of Aboriginal or Torres Strait Islander decent. Representatives from the Ngarluma Aboriginal Corporation participated in the stakeholder workshops, however only 6% of survey respondents identified as being of Aboriginal decent and 7.2% preferred not to say, which is a lower percentage than represented in the general population. There are many potential reasons, however it may reflect the ease of access to computers, or the effectiveness of using online surveys as an engagement strategy. An unexpected finding was from people who did not identify as being of Aboriginal decent. Many people in this group suggested an increase in cultural interpretive information, increased cultural tourism and an Indigenous Ranger program. Another unexpected finding is the suggestion to leave the area as it is or to limit the amount of infrastructure provided. It appears that the community value the nature-based and relatively minimalist camping experience available encouraging campers to self-sufficient.

The results from the consultation strategy and the grouped key themes are important. These help to understand of the complexity of each theme and represent what the community and stakeholders value.

5. CONCLUSIONS

The City of Karratha are developing a FMP for Cleaverville which will ensure the environmental, social and cultural values of the much-loved coastal region are preserved and enhanced. A critical component of a FMP has been to engage with all key stakeholders including local residents, Traditional Owners, Government and non-Government stakeholders to ensure their needs are considered.

This engagement strategy has resulted in a greater understanding of the values and needs of the community including those that travelled to the region from other areas of Australia. These insights have been compiled for consideration by the City of Karratha and will be used in the development of managements strategies as part of the FMP. The results are also a valuable source of potential management ideas and provide evidence of community support for specific management strategies when the FMP is developed. The results will also be valuable when prioritising the implementation of these strategies by the City of Karratha.

6. REFERENCES

Australian Bureau of Statistics, 2017, *2016 Census Community Profiles,* viewed 20 October 2017, http://www.censusdata.abs.gov.au/census_services/getproduct/census/2016/communityprofile/POA6714?opendocument

7. APPENDICES

Appendix A – Community and Agency Stakeholders

Community and agency stakeholders
Burrup Mountain Bike Club
City of Karratha Employees
Dampier Community Association
Dampier residents
Department of Biodiversity, Conservation and Attractions
Department of Environment Regulation
Department of Mines & Petroleum
Department of Primary Industries and Regional Development
Greening Australia
Karratha Community Association
Karratha residents
Main Roads Department
Murujuga Aboriginal Corporation
Ngarluma Aboriginal Corporation
Pilbara Mesquite Management Committee
Pilbara Ports Authority
Point Samson Community Association
Point Samson residents
Rangelands NRM
Red Dog 4WD Club
RioTinto
Roebourne residents
Water Corporation
Wickham Community Association
Wickham residents
Wickham Tidy Towns
Woodside Energy Ltd.
Yaburara and Coastal Marthudunera Aboriginal Corporation
Yara Pilbara
Yindjibarndi Aboriginal Corporation

Appendix B – Stakeholder engagement promotion strategies

Stakeholder engagement and promotion strategies
Media
ABC Local Radio
Pilbara News
Websites
City of Karratha
Karratha Visitor Centre
Social Media Sites (Facebook and Forums)
City of Karratha
Dampier Community Association
Everything Karratha
Greening Australia - Pilbara
Grey Nomads Australia
Karratha Community Association
Karratha Enviro Group
Roebourne Town
The Grey Nomads Forum
What's going on Karratha
Wickham and surrounds FYI
Wickham Community Association
Wickham Notice Board
Wickham Residents Association
Wickham, Roebourne and Point Samson Events
Wickham Tidy Towns

Appendix C – Cleaverville Foreshore Management Plan – Community Consultation Survey

Introduction

The City of Karratha has secured funds from Coastwest (a State Government initiative), to develop a plan for the long-term management of the Cleaverville foreshore area. Cleaverville is approximately 20km from Karratha and has a nature-based campground which is managed by the City.

This 10-minute survey is designed to help the City understand who visits the area and why and what the local community values. Feedback will be used when considering management strategies to further enhance the area. Thank you for participating.

Question 1 – Which season(s) do you visit Cleaverville MOST often? (Tick up to three)

☐ Summer (December, January, February)	☐ Autumn (March, April, May)
☐ Winter (June, July, August)	☐ Spring (September, October, November)
☐ All seasons	

Question 2 – When you visit Cleaverville, how long do you usually stay? (Tick one)

☐ Day trip	☐ 2 days (Overnight)
☐ 3-5 days	☐ 6 – 7 days
☐ More than a week	

Question 3 – If you stay for 1 or more nights, how do you usually stay? (Tick one)

☐ On the ground (Swag, mat)	☐ Caravan, pop-top, fifth-wheeler
☐ Tent trailer or camper trailer	☐ Campervan, motorhome
☐ In your car or roof top tent	

Question 4 – When you visit, what are your main activities? (Tick up to three)

☐ Cultural activities
☐ Camping
☐ Boat-based fishing (line, spearfishing, drop nets)
☐ Shore-based fishing (line, spearfishing, hand collection)
☐ Water-based recreation (Swimming, snorkelling, kayaking, paddle-boarding)
☐ Powered Off-roading (2-wheeled motorbike, 4-wheeled motorbike, 4-wheeled driving vehicle)
☐ Mountain biking
☐ Walking (beach, hiking, geocaching)
☐ Family picnics and gatherings
☐ Other (Describe below):

Question 5 – What do you believe are the main threats to Cleaverville? (Tick up to three)

☐ Litter & illegal dumping	☐ Overfishing
☐ Erosion of dunes	☐ Pressure from increasing number of visitors
☐ Increasing number of tracks	☐ All the above
☐ Weeds	☐ None of the above
☐ Feral animals (dogs, cats, foxes)	☐ Other (Describe below)

Question 6 – What do you think would make Cleaverville a better place to visit? (Click as many as you like)

☐ More shade structures	☐ More interpretive signage
☐ Gas BBQs	☐ More information about the area
☐ Fire rings	☐ Campsites allocated for local use
☐ More toilets	☐ More rubbish bins
☐ Other (describe below)	

Question 7 – What suggestions do you have to help the City of Karratha to enhance the area?

Voluntary and confidential demographic information:

Question 8 – Do you identify as being of Aboriginal or Torres Strait descent? (Tick one)

☐ Yes	☐ No	☐ Prefer not to say

Question 9 – What is your age? (Tick one)

☐ 10-20 years	☐ 61-70 years
☐ 21-30 years	☐ 71-80 years
☐ 31-40 years	☐ Over 80 years
☐ 41-50 years	☐ Prefer not to say
☐ 51–60 years	

Question 10 – Where do you normally live? (Tick one)

☐ City of Karratha (includes all towns)	☐ Elsewhere in the Pilbara
☐ Elsewhere in Western Australia	☐ Elsewhere in Australia
☐ Prefer not to say	

Question 11 – Are you a City of Karratha rate payer? (Tick one)

☐ Yes	☐ No	☐ Prefer not to say

Thank you for your input.

Appendix D – Cleaverville Stakeholder Engagement Workshop Presentation

City of Karratha Cleaverville Foreshore Management Plan

Community Consultation



Presented by: Vicki Long & Associates
Date: 17th April 2018

1

Cleaverville Foreshore Management Plan
Community Consultation

- Welcome
- Acknowledge the Traditional Owners and that we stand upon the land of the Ngarluma People
- Housekeeping



2

Cleaverville Foreshore Management Plan
Community Consultation

- Introduction
- State Government mandate to ensure long-term sustainability of the WA coastline with the State Coastal Planning Policy.
- Pilbara Regional Council's Coastal Access policy
- City of Karratha's foreshore management plans and coastal improvement projects
  - Point Samson foreshore works
  - Wickham Boat Beach FMP
  - Gnoorea FMP
  - Karratha Coastal FMP
  - Hearson Cove FMP
  - Dampier Foreshore Improvement Projects

3

Cleaverville Foreshore Management Plan
Community Consultation

- Current management of the Cleaverville area has been vested to the City of Karratha by the State Government for the purposes of camping and recreation.
- Coastwest grant funding and objectives:
  - Assist in the identification, protection and maintenance of environmental values, aesthetic qualities, biodiversity and water quality.
  - Foster sustainable recreation and tourist use
  - Support coastal management actions that reduce exposure to coastal hazards and risks to preserve the beaches and foreshores.

4

Cleaverville Foreshore Management Plan
Community Consultation

- City of Karratha Foreshore Management Plan.
- Needs and interests of Traditional Owners, the community and other stakeholders are considered.
- Objectives of a Foreshore Management Plan



5

Cleaverville Foreshore Management Plan
Community Consultation

- Workshop Objectives
- Workshop outline



6

Discussion questions

- Cleaverville is accessed by Traditional Owners, the local Community and seasonal visitors to the area. What comments (positive and negative) do you have about the current level of access and visitation?



- Image source: iCampfire

7

Discussion questions

1. What are the main activities of people accessing the area? How has this changed over time?
2. How do you think this may change in the future?





8

Discussion questions

3. What are the main threats to Cleaverville?

4. What sort of damage do you think is occurring? Using the aerial photos, illustrate particular areas of concern.



9

Discussion

5. What can the City of Karratha implement to prevent this occurring?

6. What would make Cleaverville a better place to visit? How can the City of Karratha enhance the area?



10

Discussion

7. What would be your wish-list of things to change or implement to make Cleaverville a better place to visit?

8. What strategies could the City of Karratha consider including in the FMP to make this happen?



11

Where to from here?

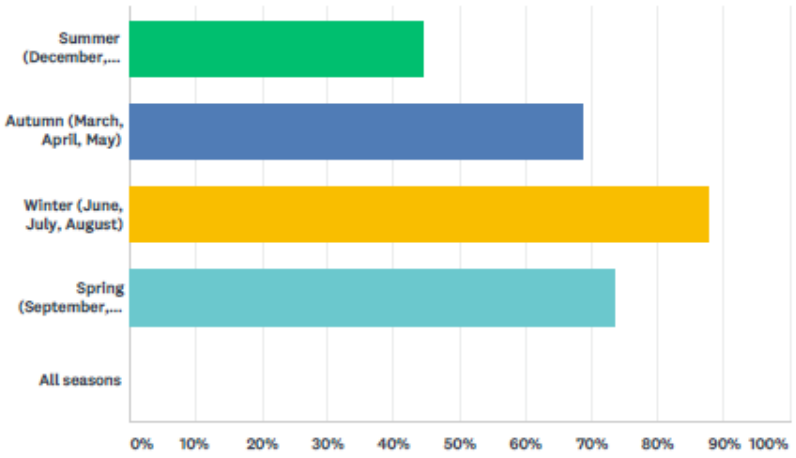
- Online survey remains open for comment
- Consultation summary report which includes community feedback will be available at the completion of the project
- Baseline documentation of tracks, weeds, erosion will be performed
- Development of the Foreshore Management Plan which includes recommendations for the City of Karratha to consider
- Further suggestions?

12

Appendix E – Community Consultation Online Survey Results

Q1 Which season(s) do you visit Cleaverville MOST often? (Tick all that apply)

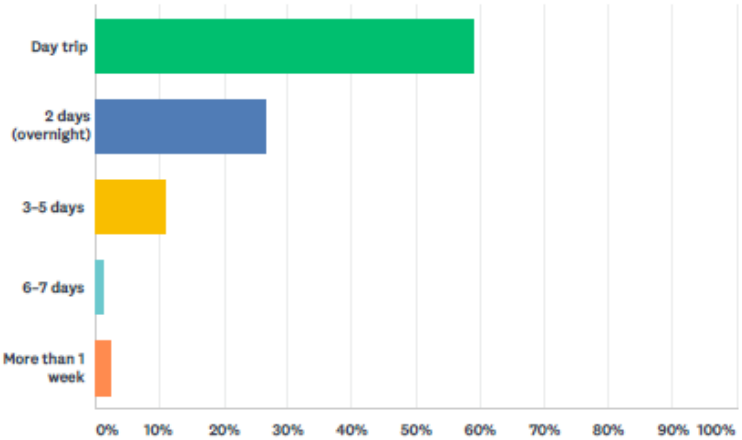
Answered: 83 Skipped: 0



ANSWER CHOICES	RESPONSES	
Summer (December, January, February)	44.58%	37
Autumn (March, April, May)	68.67%	57
Winter (June, July, August)	87.95%	73
Spring (September, October, November)	73.49%	61
All seasons	0.00%	0
Total Respondents: 83		

Q2 When visiting Cleaverville, how long do you usually stay? (Tick 1)

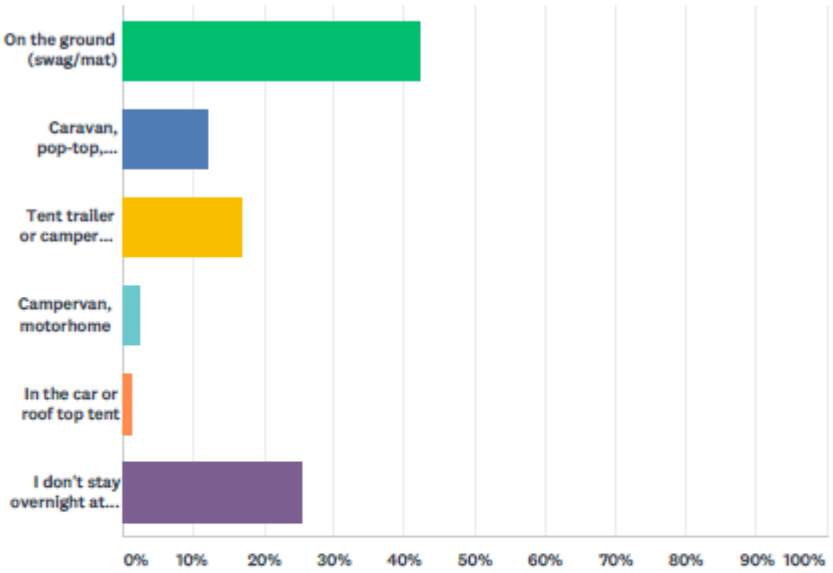
Answered: 83 Skipped: 0



ANSWER CHOICES	RESPONSES	
Day trip	59.04%	49
2 days (overnight)	26.51%	22
3–5 days	10.84%	9
6–7 days	1.20%	1
More than 1 week	2.41%	2
Total Respondents: 83		

Q3 If you stay for 1 or more nights, how do you usually stay? (Tick 1)

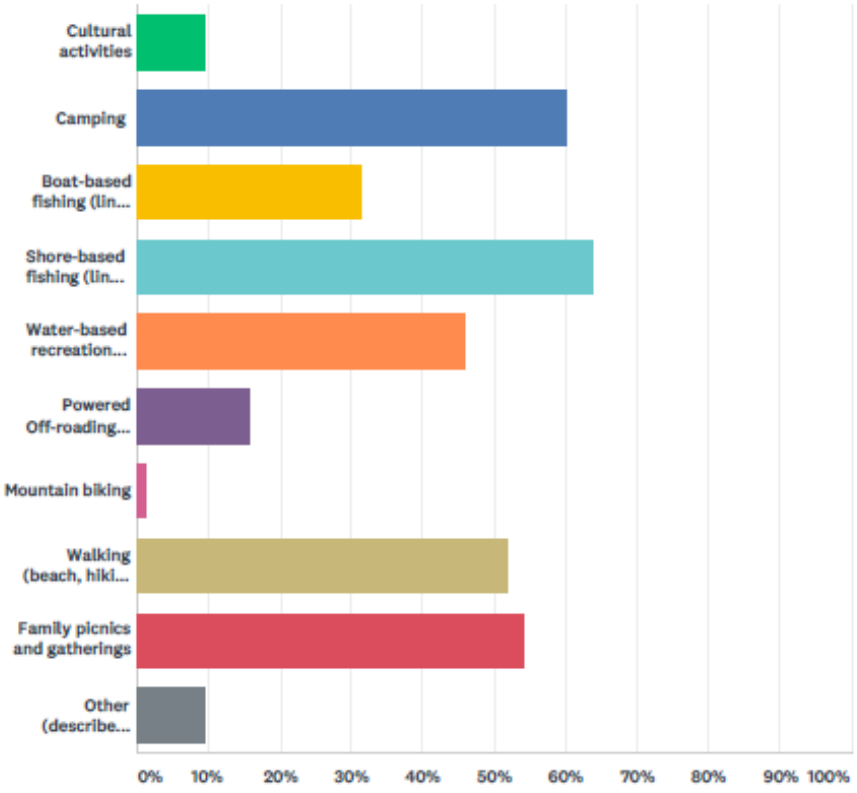
Answered: 83 Skipped: 0



ANSWER CHOICES	RESPONSES	
On the ground (swag/mat)	42.17%	35
Caravan, pop-top, fifth-wheeler	12.05%	10
Tent trailer or camper trailer	16.87%	14
Campervan, motorhome	2.41%	2
In the car or roof top tent	1.20%	1
I don't stay overnight at Cleaverville	25.30%	21
Total Respondents: 83		

Q4 When you visit, what are your main activities? (Tick all that apply)

Answered: 83 Skipped: 0

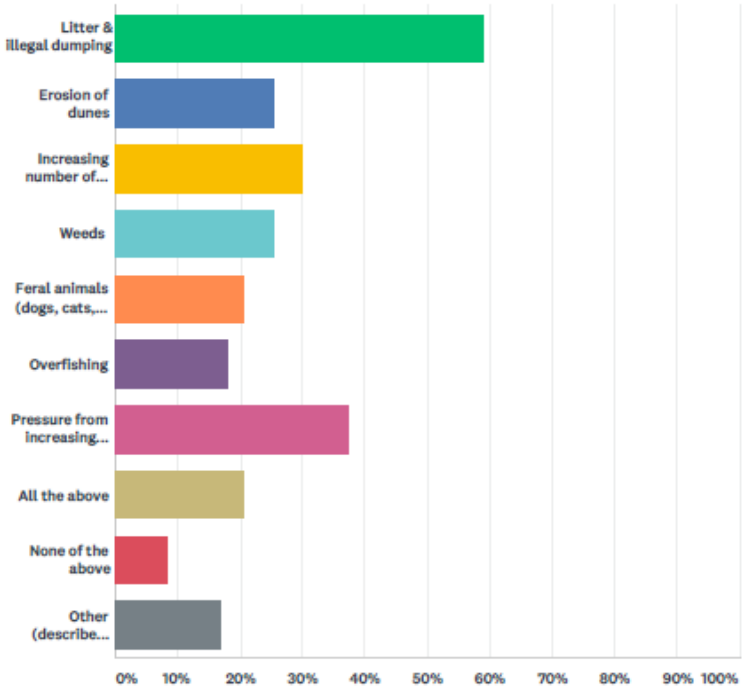


ANSWER CHOICES	RESPONSES	
Cultural activities	9.64%	8
Camping	60.24%	50
Boat-based fishing (line, spearfishing, drop nets)	31.33%	26
Shore-based fishing (line, spearfishing, hand collection)	63.86%	53
Water-based recreation (swimming, snorkelling, kayaking, paddle-boarding)	45.78%	38
Powered Off-roading (2-wheeled motorbike, 4-wheeled motorbike, 4-wheeled driving vehicle)	15.66%	13
Mountain biking	1.20%	1
Walking (beach, hiking, geocaching)	51.81%	43
Family picnics and gatherings	54.22%	45
Other (describe below):	9.64%	8
Total Respondents: 83		

#	OTHER (DESCRIBE BELOW):	DATE
1	Generally relaxing in a beautiful and peaceful environment	4/19/2018 11:53 AM
2	Main Roads WA involvement is to undertake RAV Assessments or other inspections on request from the City of Karratha	4/15/2018 3:28 PM
3	Scuba diving	4/9/2018 9:02 AM
4	Reef walking at low tide	4/2/2018 5:12 PM
5	Diving	3/30/2018 7:41 AM
6	Exploring the river inlet area	3/30/2018 7:11 AM
7	there is a memorial seat and plaque for my brother who was a crab fisherman who was lost at sea in September 2018. Cleaverville was the place he loved most in the world.	3/30/2018 6:22 AM
8	Beach party	3/29/2018 4:35 PM

Q5 What do you believe are the main threats to Cleaverville? (Tick all that apply)

Answered: 83 Skipped: 0

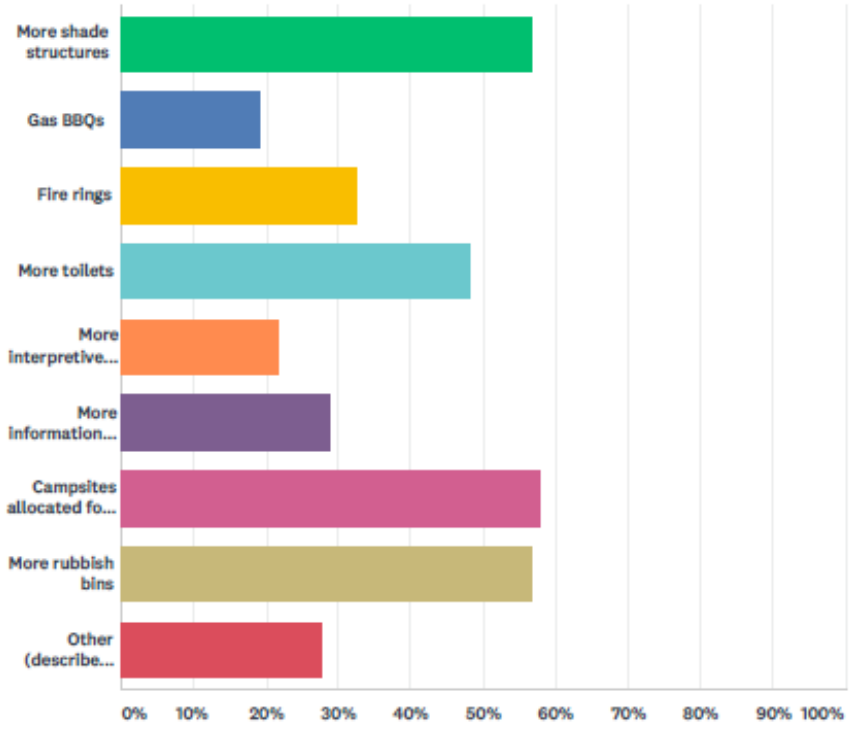


ANSWER CHOICES	RESPONSES	
Litter & illegal dumping	59.04%	49
Erosion of dunes	25.30%	21
Increasing number of tracks	30.12%	25
Weeds	25.30%	21
Feral animals (dogs, cats, foxes)	20.48%	17
Overfishing	18.07%	15
Pressure from increasing number of visitors	37.35%	31
All the above	20.48%	17
None of the above	8.43%	7
Other (describe below)	16.87%	14
Total Respondents: 83		

#	OTHER (DESCRIBE BELOW)	DATE
1	4WD ON THE BEACH	4/20/2018 12:10 PM
2	Off road four wheel-driving and mountain biking	4/20/2018 9:42 AM
3	Anketel Port tracks, rail, noise and dust will detract from the quiet ambience of the area.	4/18/2018 7:16 AM
4	There is some potential increase in maintenance costs to the road if it is added to the RAV Network and an operator sees need to utilise any section of that road	4/15/2018 3:28 PM
5	grass areas near camping areas - had snakes come near camping area last year. Need to consider slashing to minimise fire and to keep snakes in the bush	4/13/2018 11:04 AM
6	It is disappointing to see vehicles driving along the beach during turtle nesting season	4/9/2018 9:02 AM
7	Need to burn some of it off removes snake risk and minimise fire danger to campers	4/5/2018 11:21 PM
8	Amount of ricks in water, can only swim at high tides and you can't get to better parts of beach to swim because of all the travellers staying. Haven't been able to stay at our favourite part of beach for years	4/5/2018 5:45 PM
9	The Nomads need closer scrutiny on what they take out of the Cleaverville area	4/5/2018 4:23 PM
10	The council going in to make it a tourist site	4/3/2018 9:10 PM
11	Long term campers during winter	3/30/2018 7:37 PM
12	People driving in the beach where turtles have later their eggs. I have seen it numerous times	3/30/2018 7:41 AM
13	Naive tourists to the value of the area	3/30/2018 7:11 AM
14	Theres nothing wrong with it. Just hope to have access to it in future years	3/29/2018 5:59 PM

Q6 What do you think would make Cleaverville a better place to visit? (Tick all that apply)

Answered: 83 Skipped: 0



ANSWER CHOICES	RESPONSES	
More shade structures	56.63%	47
Gas BBQs	19.28%	16
Fire rings	32.53%	27
More toilets	48.19%	40
More interpretive signage	21.69%	18
More information about the area	28.92%	24
Campsites allocated for local use	57.83%	48
More rubbish bins	56.63%	47
Other (describe below)	27.71%	23
Total Respondents: 83		

#	OTHER (DESCRIBE BELOW)	DATE
1	Additional investment in campsite establishment to preserve dunes and provide easier access	4/22/2018 8:02 PM
2	GUIDED WALKING TOURS OF THE AREA, STICKING TO TRACKS	4/20/2018 12:10 PM
3	More signs regarding penalties for dumping of rubbish and off-road driving. Rangers who regularly inspect the area and make fines	4/20/2018 9:42 AM
4	Cut off and rehabilitate duplicated tracks, put some log fence boundaries around camping and other high use areas to prevent intrusion into the bush, name a few of the locations to simplify getting there, gravel some of the dune access tracks to minimise erosion, get rid of the weeds, perhaps delineate camp-fire and no-fire (ie day trip) sites, prevent vehicles on beach. Retain the isolated character of the place but manage trespass off tracks, erosion, destruction of vegetation and weed intruson. On entrance signs, provide a good map, list the pinats and animals and other environmental attributes, note the importance of the place, list the dangers to its preservation (weeds, off-track vehicles, erosion, fire etc) and generally indicate that this is a special place and please preserve it for others.	4/19/2018 5:55 PM
5	Need to add a few more ammenities such as interpretative and information, directional signs, and a couple more shade structures but NOT detract from the natural "bush camp" environment	4/19/2018 11:53 AM

5	Need to add a few more ammenities such as interpretative and information, directional signs, and a couple more shade structures but NOT detract from the natural "bush camp" environment	4/19/2018 11:53 AM
6	Indigenous Rangers providing cultural tours, greetings and interpretive signage.	4/18/2018 7:16 AM
7	Leave it as it is	4/9/2018 2:59 PM
8	Underwater surveys and clean ups	4/9/2018 9:02 AM
9	Fishing/ swiming/ Diving Platforms	4/6/2018 6:14 AM
10	Abo historical info	4/5/2018 8:43 PM
11	Nothing, leave it alone	4/5/2018 7:41 PM
12	No fees for ratepayers	4/5/2018 4:23 PM
13	Nothing leave it natural	4/4/2018 2:35 PM
14	?	4/4/2018 6:59 AM
15	Nothing it is like for the way it is	4/3/2018 9:10 PM
16	close down all the informal adhoc tracks. Make people more accountable. The area near the creek on the north east side is absolutley disgusting. I am not by any means racist but this is just feral and only used by local indigenous persons.	4/3/2018 9:05 PM
17	Free camping for local ratepayers	4/2/2018 5:12 PM
18	Limit stays for long term campers	3/30/2018 7:37 PM
19	No fees for locals that use it all year.	3/30/2018 6:00 PM
20	Cultural tours	3/30/2018 7:11 AM
21	Nothing its perfect the way it is. Thats why we go there its simple and thats why we go there	3/29/2018 5:59 PM
22	Less sandflies.	3/29/2018 4:35 PM
23	Less bugs ha ha :-)	3/24/2018 9:58 AM

Q7 What suggestions do you have to help the City of Karratha to enhance the area?

Answered: 83 Skipped: 0

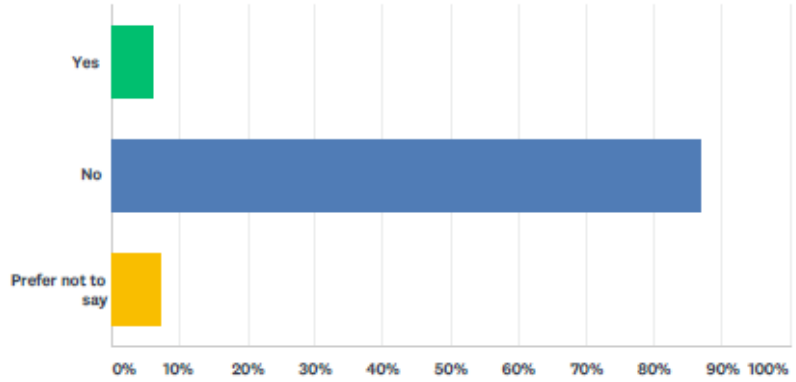
#	RESPONSES	DATE
1	None at the moment	5/15/2018 6:49 PM
2	Additional investment in campsite establishment to preserve dunes and provide easier access	4/22/2018 8:02 PM
3	GREATER RANGER PRESENCE. CLOSE THE BEACH AND TRACKS TO CARS - DESIGNATED AREAS, THEN WALKING ONLY	4/20/2018 12:10 PM
4	Increase pay for rangers/caretakers and/or provide in-kind support eg. food vouchers, fuel vouchers etc.	4/20/2018 9:42 AM
5	See my comments to question 6	4/19/2018 5:55 PM
6	Make dune camp sites more defined, directional signs to camp sites, toilets, boat ramp etc; interpretative signs which include some information on the need to protect dunes; one more shade structure; local campsite area delineated	4/19/2018 11:53 AM
7	More shaded areas to have lunch under	4/18/2018 8:48 AM
8	Do a community clean up in the area every now and then	4/18/2018 7:55 AM
9	Make the camping area signage better. Indigenous Rangers, interpretive signage, communal fire ring/conversation areas, more bins, manage access to the beach during turtle nesting season.	4/18/2018 7:16 AM
10	Restricting access to some areas and particularly the beaches (by car) during turtle egg laying/hatching - reduce the number of tracks to protect areas from erosion and plant death	4/17/2018 11:30 AM
11	Having more bbqs and more toilets maybe	4/16/2018 2:33 PM
12	Seal the road in	4/16/2018 2:33 PM
13	Develop a plan outlining the overall intent of the area	4/15/2018 3:28 PM
14	As above	4/14/2018 9:58 AM
15	Signage and information but most importantly more bins would be great at Cleaverville	4/13/2018 12:29 PM
16	burning or slashing like previous comments. also block off some of the tracks that seem to be multiplying in the area	4/13/2018 11:04 AM
17	None	4/11/2018 10:06 PM

18	Shade and toilets for day trips	4/10/2018 1:25 PM
19	development of the boat ramp/s?	4/10/2018 8:57 AM
20	Local residents should be excempt from fees or very minimal. Happy to pay when visiting other shires	4/9/2018 4:21 PM
21	More structured day use only areas	4/9/2018 3:02 PM
22	Free camping for locals for up to 4 nights at a time.	4/9/2018 2:59 PM
23	Cleaverville has some very nice reef and coral structures that support a wide variety of marine life. I scuba dive in 4 particular spots along the Cleaverville coast regularly and I believe a snorkel and dive trail plus signage of what can be found underwater would be of interest to locals and tourists	4/9/2018 9:02 AM
24	appoint caretakers/managers	4/7/2018 4:14 PM
25	Consult more with local tradional owners of significance of area	4/7/2018 2:58 PM
26	improve boat ramp at the creek	4/7/2018 8:08 AM
27	I think it's lovely already, I think it should be carefully conserved sonas to keep it's natural beauty	4/6/2018 9:38 PM
28	Provide more areas for daily visitots with more shaded seated areas and bbq's.	4/6/2018 5:57 PM
29	having designated areas that still offer beach/forseshore camping with the luxuries of shade areas / toliets and fires	4/6/2018 4:59 PM
30	MORE TOILETS	4/6/2018 3:56 PM
31	Better toilet facilities and shade	4/6/2018 1:02 PM
32	don't change too much	4/6/2018 9:42 AM
33	Leave mainly as is in its natural state. Too many enhancements will spoil the look of the area	4/6/2018 8:17 AM
34	Increase availibility of toilets, Potential Fishing platform	4/6/2018 6:14 AM
35	.	4/6/2018 5:47 AM
36	Day area for locals. Give the grey nomads their place and the locals ours	4/5/2018 11:21 PM
37	Collect rubbish charge less allow longer stays !!!!!!! Bastards! !!!!!!!!	4/5/2018 8:43 PM
38	Seal the road to the BMX club	4/5/2018 7:41 PM
39	Leave as untouched as possible	4/5/2018 6:53 PM
40	I like designated areas for locals, both for camping and day trips	4/5/2018 5:45 PM
41	More shaded areas	4/5/2018 4:23 PM
42	It's generally well looked after now. But I don't believe ratepayers should be paying to camp any where along our coastline	4/5/2018 4:23 PM
43	Maintain access irrespective of Anketell Port	4/5/2018 4:18 PM
44	Better tracks and beach access for dingy and shade structures	4/5/2018 4:08 PM
45	boat ramp at beach	4/5/2018 11:59 AM
46	More camping bays for tourists and a fish cleaning area.	4/5/2018 9:21 AM
47	Allow locals to camp longer than 3 days per month in the off season	4/4/2018 9:22 PM
48	Fresh water	4/4/2018 2:35 PM
49	?	4/4/2018 6:59 AM
50	Litter control	4/4/2018 5:33 AM
51	No	4/3/2018 9:21 PM
52	Lee the rangers active in the area	4/3/2018 9:14 PM
53	You don't need to enhance it, it is loved for what it is, going in and commercialising it will ruin it and why it is loved	4/3/2018 9:10 PM
54	Bitumise the road in.	4/3/2018 9:10 PM
55	Limited the number of camp sites and duration - grey nomads should not be camping for 3 months at a time. I would be happy to pay a small fee to assist with the upkeep. Maybe locals could buy a local annual pass then have unlimited day/camping. Fisheries need to include on tehir rounds to stop overfishing. Stop driving on beaches during turtlee nesting time. Dept Parks and Wildlife also need to increase their presence.	4/3/2018 9:05 PM
56	Better designated camp areas, better beach access	4/3/2018 8:58 PM

56	Better designated camp areas, better beach access	4/3/2018 8:58 PM
57	More info n show wats cleverville has to offer	4/3/2018 8:49 PM
58	Shades	4/3/2018 8:42 PM
59	Keep the road graded	4/3/2018 8:33 PM
60	Make it free for locals. Stop tourists parking up all winter in the prime camps	4/2/2018 5:12 PM
61	Locals should be able to use it free of charge, and no limit to camping	4/1/2018 10:31 PM
62	Leave it as it is.. to many changes will bring to many people in	4/1/2018 7:22 PM
63	Boat ramp access improvement	4/1/2018 8:50 AM
64	Boat ramp	3/31/2018 8:35 PM
65	Allocated area for day recreational use only. Allocated area for short term stays so local people have a chance to camp for short stays during winter. We survive here all year round and it's frustrating that we can't wnjoy our own backyard during the pleasant weather because long term campers from south have secured all camping areas for the duration.	3/30/2018 7:37 PM
66	Leave it alone	3/30/2018 6:00 PM
67	Less long term camping, too much pressure from long term campers.	3/30/2018 9:50 AM
68	The sandflies are really bad which has limited our stay with our small children. Increased awareness and patrolling for ppl driving on the beach where turtles have laid their eggs.	3/30/2018 7:41 AM
69	Seal the road or grade more often	3/30/2018 7:11 AM
70	Clean it	3/30/2018 6:48 AM
71	dont over legislate the use of this gorgeous area.	3/30/2018 6:22 AM
72	-	3/30/2018 12:02 AM
73	Midgee management	3/29/2018 9:55 PM
74	Bins and signs	3/29/2018 8:10 PM
75	Make it more friendly for local use	3/29/2018 6:52 PM
76	Just leave it alone	3/29/2018 5:59 PM
77	Keep it free n keep it open to our community	3/29/2018 4:57 PM
78	Most take of the sand fly problem. They are out of control and impossible to handle at times.	3/29/2018 4:35 PM
79	Bring me back! I miss that place.	3/29/2018 4:34 PM
80	Don't make it more attractive to tourist leave it alone	3/29/2018 4:30 PM
81	More planning as to where camp sites can be but utilising existing degraded areas, to prevent more tracks being made and discouraging bush being flattened to make new campsites.	3/29/2018 1:32 PM
82	Have more shade for day trips	3/27/2018 9:37 PM
83	Some more shaded area's	3/24/2018 9:58 AM

Q8 Voluntary and confidential demographic information: Do you identify as being of Aboriginal or Torres Strait descent? (Tick 1)

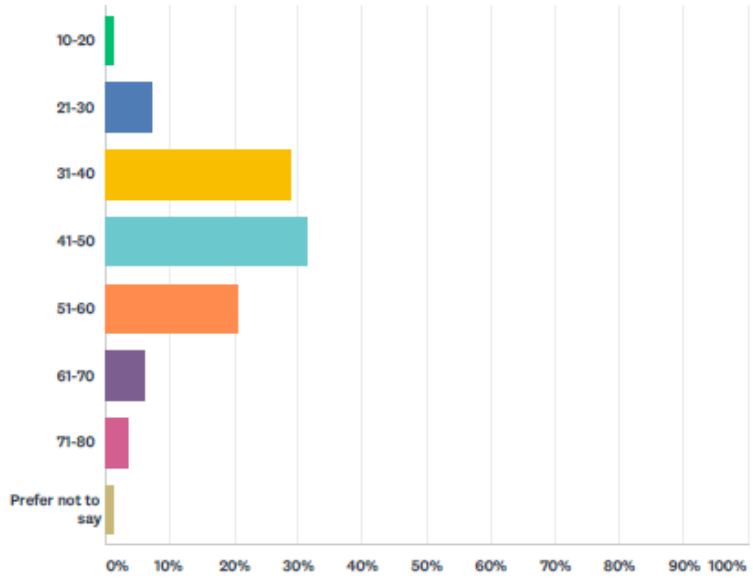
Answered: 83 Skipped: 0



ANSWER CHOICES	RESPONSES	
Yes	6.02%	5
No	86.75%	72
Prefer not to say	7.23%	6
Total Respondents: 83		

Q9 Voluntary and confidential demographic information: What is your age? (Tick 1)

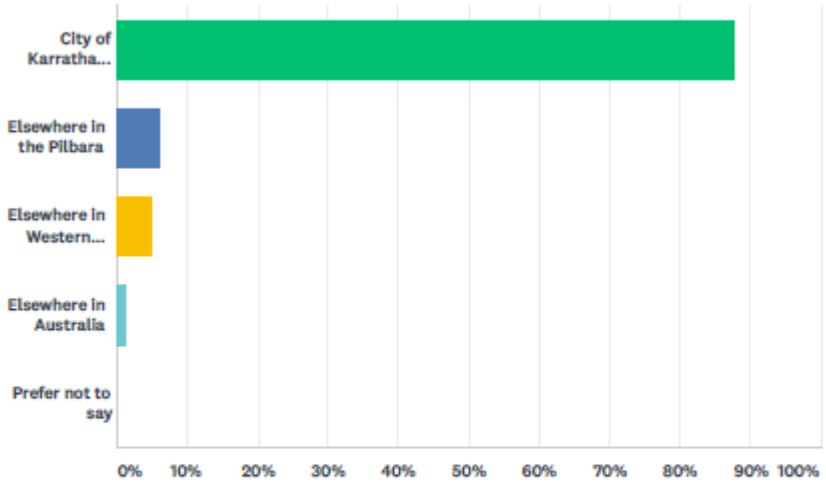
Answered: 83 Skipped: 0



ANSWER CHOICES	RESPONSES	
10-20	1.20%	1
21-30	7.23%	6
31-40	28.92%	24
41-50	31.33%	26
51-60	20.48%	17
61-70	6.02%	5
71-80	3.61%	3
Prefer not to say	1.20%	1
Total Respondents: 83		

Q10 Voluntary and confidential demographic information: Where do you normally live? (Tick 1)

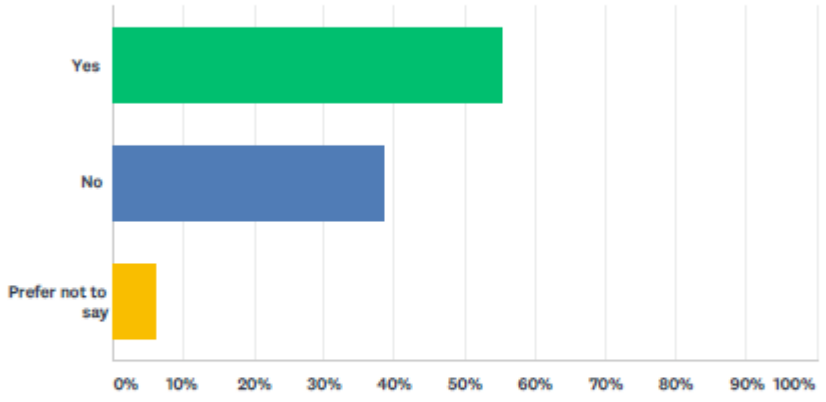
Answered: 83 Skipped: 0



ANSWER CHOICES	RESPONSES	
City of Karratha (includes all towns)	87.95%	73
Elsewhere in the Pilbara	6.02%	5
Elsewhere in Western Australia	4.82%	4
Elsewhere in Australia	1.20%	1
Prefer not to say	0.00%	0
TOTAL		83

Q11 Are you a City of Karratha rate payer? (Tick 1)

Answered: 83 Skipped: 0



ANSWER CHOICES	RESPONSES	
Yes	55.42%	46
No	38.55%	32
Prefer not to say	6.02%	5
Total Respondents: 83		

Appendix C – Vegetation Condition Assessment Report

DRAFT

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

CITY OF KARRATHA

CLEAVERVILLE FORESHORE MANAGEMENT PLAN

VEGETATION CONDITION REPORT

JUNE 2018

Prepared for GHD

DRAFT

vicki long & associates
Living in the Pilbara
PO Box 713, Karratha WA 6714
0428 854 852
ABN: 96 009304 634

CITY OF KARRATHA CLEAVERVILLE FORESHORE MANAGEMENT PLAN VEGETATION CONDITION REPORT

Prepared for:
GHD

Job No: VLA043

Reference No: VLA043rv02-RevB

Revision Status

Rev	Date	Description	Author(s)	Reviewer
A	18/06/2018	Draft Issued for Internal Review	V. Long	P. Aylmore
B	26/06/2018	Draft Issued for Client Review	V. Long	

DRAFT

vla

©Copyright 2015 Vicki Long & Associates. All rights reserved.
This document and information contained in it has been prepared by VLA under the terms and conditions of its contract with its client. This report is for the clients use only and may not be used, exploited, copied, duplicated or reproduced in any form or medium whatsoever without the prior written permission of VLA or its client.

Table of Contents

1. INTRODUCTION 1
2. SCOPE 1
3. METHODS 1
3.1 Field Methods 1
3.2 Survey Personnel and Timing 2
3.3 Taxonomy and Nomenclature 2
4 LIMITATIONS 2
5 RESULTS 2
5.1 Weed Species Recorded 2
5.2 Cover, Abundance and Life Stage. 3
5.3 Changes in Weed Cover from 2000 to 2018 4
5.4 Vegetation Condition 8
5.5 Priority Species 8
5.6 Significant Vegetation Type for Coastal Location 8
6 DISCUSSION AND RECOMMENDATIONS 9
7 REFERENCES 11

List of Tables

Table 1. Attributes recorded at weed location points 1

Table 2. Inventory of introduced and weed species recorded within the Cleaverville Foreshore study area and weed classifications (Department of Parks and Wildlife 2016; Department of Agriculture and Food Western Australia 2016) 3

Table 3. Abundance and life stage of weed species in the study area. 4

Table 4. Comparison of weed abundance and cover between the 2000 and 2018 surveys 6

List of Figures

Figure 1. Cleaverville Foreshore Management Plan Area

Figure 2. Cleaverville Vegetation Condition (i)

Figure 3. Cleaverville Vegetation Condition (ii)

Figure 4. Cleaverville Vegetation Condition (iii)

DRAFT

Figure 5. Cleaverville Vegetation Condition (iv)

Figure 6. Cleaverville Vegetation Condition (v)

Figure 7. Cleaverville Vegetation Condition (vi)

Figure 8. Cleaverville Vegetation Condition (vii)

List of Appendices

Appendix A. Vegetation Condition Scale as adapted from Trudgen (1977)

Appendix B Weed Classifications

Appendix C Categories and Definitions of Threatened and Priority Flora

DRAFT

1. INTRODUCTION

The City of Karratha has commissioned GHD to assist in the preparation of a foreshore management plan (FMP) for the Cleaverville Foreshore area (Figure 1). The FMP will provide guidance for future use and development of the area ensuring the long-term preservation of environmental, cultural and social values. Previous studies at Cleaverville have been completed (Astron 2000; Astron 2011) which detail the existing vegetation types, but an update of current vegetation condition was considered necessary to help achieve the scope for this current project.

VLA was sub-contracted by GHD to conduct the vegetation condition survey.

2. SCOPE

A vegetation condition assessment for the Cleaverville foreshore area (study area), will be achieved utilising the *Vegetation Condition Scale for the Eremaean and Northern Botanical Provinces* (Adapted from Trudgen 1988). In addition, any Declared Pests (*BAM Act 2007*) or Weeds of National Significance (WONS) (Australian Government) that were encountered will be recorded. Areas of pristine vegetation (not weed infested) will be indicated on the vegetation map to help inform management decisions.

3. METHODS

3.1 Field Methods

Previous vegetation surveys (Astron 2000; Astron 2011) were reviewed and aerial imagery was used to determine vegetation types, disturbance features and areas with the highest potential for weeds.

In the field, the entire length and width of the study area was traversed by vehicle and foot. Beginning at the westernmost end, each new vegetation type was walked over in order to assess weeds present, cover and disturbances. Within each vegetation type, information was collected from releves, approximately 20 m x 20 m in size or an equivalent area was used for narrow, linear road verges and foreshore dune type vegetation. The number of releves sampled depended on the overall size of the vegetation type. Within each quadrat, the attributes, as described in Table 1, were recorded.

Table 1. Attributes recorded at weed location points

Attribute	Description
Weed Species name	Current taxonomic species name of all weed species (excluding *Cenchrus ciliaris)*[1]
Collection ID	A unique identifying code was assigned if a specimen was collected
Location	Coordinates of the weed point location (GDA94)
Recorder and date	Personnel involved in sampling at location and survey date
Cover (within a stated area)	An estimate of foliar cover as a percent value (1; 5; 10; 20; 30; 40; 50; 60; 70; 80; 90 and 100)
Life Stage	Non-flowering; Flowering; Set Seed; Seeding
Other disturbances	Other disturbances which may have contributed to the vegetation condition were recorded including tracks, litter and vegetation damage.

The vegetation condition score was based on the *Vegetation Condition Scale for the Eremaean and Northern Botanical Provinces* (Adapted from Trudgen 1988) (Appendix A). This is the condition scale currently approved for the Pilbara by the EPA Technical Guidance (2016). Vegetation boundaries

were marked on hard copy aerial photographs in the field, together with the vegetation condition score. Any Declared Pests or WONS species, along with any Priority flora species (FloraBase 2018) were recorded with a hand held GPS.

During the vegetation condition field survey, access tracks not considered necessary were identified for closure. The camp caretaker was also consulted in regard to this and he also identified makeshift camp sites within the dunes, he would like to see closed.

3.2 Survey Personnel and Timing

The field survey was conducted on April 23rd 2018 by Vicki Long, a botanist/ecologist with over 33 years of experience in the Pilbara. Vicki has been involved in numerous weed surveys in the Pilbara region, particularly coastal Pilbara and is well qualified to detect new weed incursions and assess current infestations. The survey was conducted under Department of Biodiversity, Conservation and Attractions Licence Number SLO12112 and DRF Permit No 190-1617.

3.3 Taxonomy and Nomenclature

All species were able to be identified in the field. One Priority species was collected for confirmation of identification back in the office.

4 LIMITATIONS

The survey was conducted in April 2018. In the six month period prior to the survey being undertaken, a total of 74mm of rainfall had been recorded for the Karratha area (BoM 2018). This rainfall is below average for that period. The Cleaverville area may have received slightly more rainfall than that recorded at Karratha Aero Station, but the results of the field survey confirmed relatively low rainfall. The weed species present were generally dormant but identifiable, but estimation of their real abundance and full foliar cover was somewhat compromised. Potentially other weed species may be present but could not be easily detected due to the dry conditions.

There were no other limitations to the survey.

5 RESULTS

5.1 Weed Species Recorded

Eight introduced plants were recorded in the study area. Six of these are classified as Environmental Weeds (FloraBase), one as a Declared Pest and WONS species and one garden plant, which is not a native to Australia, has been planted at a small memorial. The weeds identified and their classifications are presented in Table 2.

DRAFT

Table 2. Inventory of introduced and weed species recorded within the Cleaverville Foreshore study area and weed classifications (Department of Parks and Wildlife 2016; Department of Agriculture and Food Western Australia 2016)

Species and Common Name	Classification and Ranking[1]	Ecological Impact	Invasiveness
Adenium sp. (Desert rose)	Deliberate planting but not native to Pilbara		
Aloe vera (Aloe)	Environmental weed; (further assessment required) Likely planted (camp area)	TBA	TBA
Aerva javanica (Kapok)	Environmental weed	High	Rapid
Cenchrus ciliaris (Buffel grass)	Environmental weed	High	Rapid
Cenchrus setiger (Birdwood grass)	Environmental weed	High	Rapid
Malvastrum americanum (Spiked malvastrum)	Environmental weed	High	Unknown
Tamarix aphylla (Athel pine, Tamarisk)	Declared Pest and WONS species: s22(2),		
Tribulus terrestris (Caltrop)	Environmental weed	Unknown	Moderate

1. Weed Classifications are given in Appendix B.

5.2 Cover, Abundance and Life Stage.

Weed cover is incorporated into the vegetation condition overall assessment (see Figures 2-8). **Cenchrus ciliaris* (buffel grass), **Cenchrus setiger,* (birdwood grass) and **Aerva javanica* (kapok) were the most common and abundant weeds recorded within the study area. Generally, these three species were present along the edges of all tracks, within all vegetation types. Their cover and abundance varied, being sparse along a narrow, linear corridor parallel to the track in stony areas and dense in wider, linear corridors in sandy areas. All three were abundant, with the buffel and birdwood grasses, dense on the leeward side of the beach dunes and on the coastal plain immediately adjacent to the dune. Buffel and birdwood grass had in most cases dropped seed, but some were still seeding. Kapok was generally in flower. Spiked malvastrum was only recorded in one vegetation type associated with the ephemeral wetland. All plants were senesced. Caltrop was recorded in the vicinity of the main camping area, however it was generally in poor condition, with some plants exhibiting occasional flowers and some green spiny seed capsules. Desert rose (a garden plant, native to Africa and Arabia) was recorded as having been planted at two memorial sites, and two aloe plants were recorded in and on the edge of the main camp site. Large Athel pine trees occur at the main camp site. None of the latter planted species were flowering at the time of the survey. Table 3 provides a summary of the abundance and life stage of each of the weed species present within the study area.

DRAFT

Table 3. Abundance and life stage of weed species in the study area.

Species and Common Name	Cover and Abundance	Life Stage[1]
Adenium sp. (Desert rose)	Only two plants recorded, both at memorial sites. (Plate 11)	NF
Aloe vera (Aloe)	Two small populations totaling approximately 8 plants were recorded at the main camp site. (Plate 8)	NF
Aerva javanica (Kapok)[2]	2-5 % cover along less disturbed areas. Up to 30 % cover and relatively dense in patches on the leeward side of coastal dunes and up to 50% very dense along the edges of tracks on coastal dunes[2].	Some F Majority SD
Cenchrus ciliaris (Buffel grass)[3]	Both buffel and birdwood grasses were present along the edges of all tracks, to a width of 1-2 m away from the track. On stony slopes, abundances were lower and cover 10-25%, but on dune track verges cover was 40-60%. On the leeward side of the dunes, especially where disturbed due to camping, these weed species provide up 80-90% of the grass cover. Along the coastal plain adjacent to the dune, cover varies depending on whether the soil is silty or loamy.	
Cenchrus setiger (Birdwood grass)[3]		
Malvastrum americanum (Spiked malvastrum)[4]	Isolated plants totaling <1% were found in the deeper channels in the ephemeral wetland area.	Senesced
Tamarix aphylla (Athel pine, Tamarisk)		NF
Tribulus terrestris (Caltrop)		F & SS

1. NF = Non flowering, F = Flowering, SS = Set seed, SD = Seeded
2. Difficult to assess cover and abundance of kapok due to plants being dormant: full cover would be best assessed in the last quarter of the year.
3. Difficult to assess cover of buffel and birdwood, due to both being dormant and in most cases only rootstock present. Assume higher percentage cover following rain.
4. May be more prevalent than was actually apparent in this survey.

5.3 Changes in Weed Cover from 2000 to 2018

Vegetation associations were mapped by Astron (2000) but vegetation condition was not mapped or recorded. However, utilising the vegetation descriptions provided in the report, it is apparent that buffel grass (**Cenchrus ciliiaris)* and birdwood grass (*Cenchrus setiger)* dominated six vegetation associations and kapok (**Aerva javanica*) was the dominant, low shrub cover along with other species, in three associations.

In 2018, buffel grass and birdwood grass were recorded in ten (as compared to 6) of the 14 vegetation associations. They had increased in abundance and cover in areas where they were previously recorded as being co-dominant with other native grasses. Native grasses in these vegetation associations are now only scattered or patchy. In two associations, buffel grass and birdwood grass were only found within 1 m of the road verge and they were found to be scattered in rockpile vegetation, where they had not previously been recorded.

Kapok was recorded in seven (compared to 3) vegetation associations. It had increased in abundance in the three areas where it had previously been recorded, associated with a decline in abundance of other low shrubs. It has become more dominant in two hind dune vegetation associations and was also present as scattered or patchy in rockpiles, where it had not previously been recorded.

Spiked malvastrum (*Malvastrum americanum*) was only found to be scattered in the channels of the ephemeral wetland. It was not recorded on the leeward side of the dune where it was recorded in 2000, however it is most probable it is still present there and dormant because of the dry conditions.

Athel pine (*Tamarix aphylla*) trees remain in similar numbers to those recorded in 2000 and do not appear to have spread beyond their immediate location at the main camp. As they provide the only shade in the area, it is recommended they are monitored, but not removed.

The two aloe plants in the main camp area were not recorded in 2000 and should be removed. Both plants were reproducing from root nodes.

It is doubtful that the desert rose plants at the memorial sites will spread. They should be monitored and if they do begin to spread, they should be replaced with a local native species. They were not present in the survey undertaken in 2000.

Table 4 summarises the changes in presence and abundance of weeds in the mapped vegetation associations between the 2000 survey (Astron 2000) and the current survey. The vegetation descriptions given in the Astron (2000) report are based on Muir (1977).

DRAFT

Table 4. Comparison of weed abundance and cover between the 2000 and 2018 surveys

Vegetation Associations 2000	Changes 2018
1. Low Mangrove Forest B dominated by *Avicennia marina* subsp. *marina* with *Ceriops tagal* and *Rhizophora stylosa* along tidal creeks	Remains the same – no weeds present
2. Dwarf Scrub D of *Tecticornia halocnemoides* subsp. *tenuis* with Very Sparse Open Grassland of *Sporobolus virginicus*	Remains the same no weeds present
3. Very Open Dwarf Scrub D of *Scaevola crassifolia* and *Salsola australis* with Open Grassland of *Spinifex longifolius*. There is also Very Open Herbs of *Euphorbia* spp. with very occasional *Sporobolus virginicus*	Remains the same – no weeds present
4. Low Heath B or *Acacia coriacea* and *A. bivenosa* with Dwarf Scrub C of **Aerva javanica, Scaevola crassifolia* and *Adriana tomentosa*, over Mixed Tussock Grass of S*pinifex longifolius, *Cenchrus ciliaris, Whiteochloia airoides* and occasional *Eulalia aurea* and *Triodia epactia*	Buffel grass now dominates grass cover. Native grasses are only patchy. Kapok continues to dominate the low shrub cover. Native species *Scaevola crassifolia* and *Adriana tomentosa* are only very occasional.
5. Heath B of *Acacia coriacea, A bivenosa, Ehretia saligna, Rhagodia eremaea, R. preissii, Dichrostachys spicata, Capparis spinosa,* with *Tinospora smilicina* creeping over, and with a mixed grassland of **Cenchrus ciliaris, Triodia epactia* and *Whiteochloia airoides.*	Buffel grass now dominates the grass cover. Native grasses are only patchy. Kapok is now a dominant low shrub. Medium shrub cover remains similar with some areas of shrub removal for camping bays.
6. Very Open Low Scrub B of *Acacia bivenosa, A inaequilatera, A transluscens*, over Open Dwarf Scrub C of *Trianthema turgidifolia* and *Tephrosia rosea*. There is also a Mixed Low Grassland of *dense *Cenchrus ciliaris* with *Triodia epactia* and *T. angusta*	Buffel grass has become very dense here. Native grasses are patchy. Tall shrubs remain the same but low shrubs are now only scattered and kapok has increased.
7. Mixed Heath B of *Acacia bivenosa*, *A. inaequilatera* and *A. coriacea*, over Mid-Dense Grassland of **Cenchrus ciliaris* with occasional *Triodia epactia* and *T. angusta*	Buffel grass is now dense.
8. Low Heath C of *Aerva javanica* with Open Herbs of **Malvastrum americanum, Pterocaulon sphaeranthoides, Ptilotus gomphrenoides and Indigofera* sp. There is also a Mid-Dense Grassland of **Cenchrus ciliaris* with occasional *Setaria dielsii* and *Eragrostis eriopoda*	Kapok and buffel grass both remain dense. The weed *Malvastrum americanum* was not recorded in this vegetation type in 2018 but conditions were dry. It will be present following rain.
9. Low Open Scrub of *Acacia inaequilatera, A. bivenosa, A. coriacea and Dichrostachys spicata*, with a Mid-Dense Hummock Grassland or *Triodia epactia* and *T. wiseana*	Remains the same. Buffel only occurs within 1 m of road verges.
10. Very sparse Open Dwarf Scrub C of *A. bivenosa, Scaevola spinescens* and *Indigofera monophylla*, with an Open Herbland of *Euphorbia myrtoides*. There is also a Mid-Dense Hummock Grassland of *T. epactia* and *T. wiseana*	Where rocky outcrops occur in this vegetation there are now scattered (<2%) kapok and buffel plants.

DRAFT

Vegetation Associations 2000	Changes 2018
11. Mid-Dense Tussock Grassland of *Eragrostis xerophila, Sporobolus mitchellii* and *Eriachne benthamii.* The area is fringed by an Open Dwarf Scrub D of *Trianthema turgidifolia* with *Triodia wiseana*. The drainage gullies are characterized by dense *Cyperus* sp. with the annual *Sesbania cannabina*	Remains the same. Some spiked malvastrum present but low numbers.
12. Open Low Woodland of *Ficus virens, Pittosporum phylliraeoides* and *Acacia coriacea*, over Mixed Heath B of *Myoporum acuminatum, Rhagodia preissii, Capparis spinosa* and *Stylobasium spathulatum*, over sparse grass, *Cymbopogon ambiguous*, and sedge, *Cyperus cunninghamii*, in rock crevices	Scattered kapok and buffel now in rockpiles.
13. Low Scrub B of *Acacia bivenosa, Senna glutinosa* subsp. *glutinosa, Scaevola spinescens* and *Grevillea pyramidalis*, over Mid-Dense Hummock Grassland and Very Open Herbs	Remains the same apart from buffel along edges of track.
14. Heath B of *Acacia coriacea*, over Dwarf Scrub C of **Aerva javanica* and Dense Grassland of * *Cenchrus ciliaris*	Remains the same with dense buffel and kapok.

DRAFT

5.4 Vegetation Condition

Weed cover and abundance scores were considered along with other impacts, such as tracks, damaged vegetation, erosion (manmade), clearing, frequency of fire and litter, to determine the vegetation condition score. Cumulatively these impacts were correlated to the Trudgen Condition Scale(1988). Vegetation condition within the study area varied from degraded (D) to excellent (E) (Plates 1-8). Numerous new tracks have been created since 2000 and camping nodes in the dunes have expanded. The camp caretaker indicated areas where dune vegetation (in the form of shrubs) had been removed for camp sites. Fire has also occurred along the coastal strip, increasing the density of buffel grass. Areas of poor to degraded condition based on an abundance of weeds, tracks and damaged vegetation, were primarily associated with the leeward side of the beach dunes, where camping activities have occurred over a long period of time. Vegetation condition is indicated in Figures 2 to 8.

5.5 Priority Species

Under the *Wildlife Conservation Act* 1950 (WC Act), the Minister for the Environment produces a gazetted '*Wildlife Conservation (Rare Flora) Notice'* which lists Threatened (or Declared Rare) Flora under two Schedules; extant and presumed extinct. The Department of Biodiversity, Conservation and Attractions (DBCA) also produces a list of Priority Flora that have not been assigned statutory protection under the WC Act, but may be under some degree of threat. The DBCA recognises four Priority Flora levels. The definitions for each category of Threatened and Priority Flora are shown in Appendix C.

One Priority 2 species, *Pentalepis trichodesmoides* subsp *hispida* was found during the survey on the rocky headland towards the western end of the study area (GPS 0497777E 7714606N). A targeted search to obtain an estimate of number of plants present was unable to be undertaken due to time constraints, however it is likely more would be present given the favourable habitat type for this species. The plant was found in stony, hill slope habitat in very good condition (see Figure 8).

5.6 Significant Vegetation Type for Coastal Location

Surrounded by the rocky range to the south, a rocky headland to the north and bordered by coastal dunes and plains to both the east and west is a low-lying alluvial basin. This area has minimal imported sand/shell from the coastal dunes (due to the rocky headland immediately north of it) and acts as a drainage sink for the surrounding hilly areas. Most of the material in the area is a brown, silty clay loam containing numerous medium sized alluvial/colluvial pebbles (generally > 50mm). Although the area is generally flat, it does contain drainage scours up to 1 m deep near the western edge. Localised subsidence during dry periods has also resulted in numerous potholes throughout the centre of the basin (Astron 2000). The location of this alluvial basin in a coastal environment and the vegetation it supports, is considered to be unusual and locally significant. The basin acts as an ephemeral wetland and houses species not generally associated with a coastal environment. It is dominated by tussock grasses; *Eragrostis xerophila, Sporobolus virginicus, Eriachne flaccida, E. benthamii* and the drainage channels within it support relatively dense sedge species, *Cyperus vaginatus* and other *Cyperus sp* which are senesced and sterile, together with a dense ephemeral herbland of *Marsilea hirsuta* (all dead at time of survey). In addition, following summer rainfall, the wetland is a much favoured habitat for migratory bird species (Bret Hogan –caretaker and *pers obs;* V Long *pers obs*). (Figure 6)

Additionally, coastal vegetation is considered "susceptible" and in need of protection. "Susceptible" is defined by Gibson *et al.* (1994) and quoted by Astron (2000) as "a community of concern because there is evidence that it can be modified or destroyed by human acts or would be vulnerable to new threatening processes. "

Vegetation condition, Priority species and the locally significant vegetation type are mapped on Figures 2 to 8.

6 DISCUSSION AND RECOMMENDATIONS

"Vegetation Condition" is poorly defined by the EPA Technical Guidance (2016) which indicates that results will be based on a number of uncertainties, including the experience of the assessor, time of year, knowledge of how vegetation historically looked in the area etc. In fact, vegetation condition is a context-dependent concept and this is not considered by the condition scale. The context will change the assessment. For example economic drivers for pastoralism may classify good vegetation condition as one which has sustainable production capability or alternatively for tourism, one which has good biodiversity and aesthetics. A biodiversity driven context will want to consider factors such as the presence of different plant species, the presence of different vegetation strata and whether it supports fauna habitat. In the context of landform, a weed dominated vegetation may be considered a useful stability tool. Once the context is defined, an assessment of vegetation condition can be more accurately determined, threats can be more easily identified, changes monitored and management implemented.

Mapping and assessment of vegetation in this report are solely based on Trudgen (1988).

Dunal vegetation described and mapped as "Degraded" is based on the Trudgen criteria of being severely impacted by activities such as camping, clearing and beach access, would need intensive management to get it back to "Good" condition, and it has a number of aggressive weed species present. Given that the weed grass species and the kapok shrub are so dominant, it is not recommended any control management is undertaken in the "Degraded" areas. Buffel grass does serve to stabilise the sands on the dune. However, where buffel grass is isolated, for example on rockpiles and road verges on stony areas, it is recommended that weed control is undertaken by the local Indigenous Ranger group to preserve the native vegetation and prevent the spread of these weeds. This would ensure the natural aesthetics of the area are preserved and a good vegetation condition maintained.

Isolated weeds such as the aloe, which is reproducing from nodes, should be removed. The desert roses at the memorial sites should be monitored and if they are noted to be spreading, should be replaced with suitable native species. Athel pine trees should be left *in situ*, however any new populations beyond the main population in the main camp site, should be eradicated. Caltrop in the main camp should be manually removed, as the very sharp spines on the seed capsule are a hazard to bare feet, thongs and bike tyres.

Where buffel grass and birdwood grass are dominant, but less dense on dune areas, some shrub cover remains. However, where these grasses are very dominant and very dense, shrub cover is much reduced. This is caused by the buffel grass which is alleopathic and releases a biochemical, which inhibits the survival of many native plants. The density of buffel grass is also encouraged by

fire. *Acacia coriacea*, the dominant dune shrub at Cleaverville, is unable to tolerate fire. Loss of this shrub from the dunes by fire and from clearing for camp sites, equates to loss of dune stability which will cause erosion and blow-outs. Fire management needs to be carefully considered and knowledge of the species it will encourage and those it will destroy, needs to be taken into account. The destruction of vegetation for individual camp sites can be eliminated by formalising designated camp sites. The caretaker indicated this was the best solution and from his point of view would make his job more effective.

It is recommended that:

1. Buffel grass, birdwood grass and kapok be sprayed (potentially by Indigenous Ranger groups) where they are not dominant (ie edges of all tracks, rockpiles).
2. Aloe plants be removed from the main camp site
3. Desert Rose plants be monitored and replaced with native species, if necessary
4. Athel pine be left *in situ* but any new populations be eradicated.
5. Caltrop at all camp sites should be eradicated.
6. Fire management should be carefully researched as current burns are degrading vegetation condition. Burning of native shrubs and spinifex vegetation should be restricted to areas 20 m x 20 m in size, to prevent monocultures of buffel grass forming.
7. Removal and damage to sand binding shrubs on the dunes and hind dunes should cease immediately through the formalisation of camping areas.
8. Unnecessary access tracks should be closed off and rehabilitated.
9. Firewood should be sold to prevent further damage and taking of local shrub.
10. Driving, if allowed along the beach should not impact beach spinifex in order to prevent weeds spread.

DRAFT

7 REFERENCES

Astron Environmental, 2000. *Cleaverville Beach Existing Environment and Management Issues*. Unpublished report for the Shire of Roebourne.

Astron Environmental, 2011. Cleaverville Beach Tenements M47/359 and M47/464 Vegetation, Flora and Fauna Survey. Unpublished report prepared for Hanson Construction Materials Pty Ltd.

Department of Biodiversity, Conservation and Attractions (DBCA) 2018a, 'Threatened and Priority Flora database', DBCA, Kensington.

Department of Biodiversity, Conservation and Attractions (DBCA) 2018b, 'West Australian Herbarium Database', DBCA, Kensington.

Department of Biodiversity, Conservation and Attractions, 2018: FloraBase (database) Western Australian Herbarium 1998-2018, 'FloraBase – the Western Australian Flora', Department of Parks and Wildlife. http://florabase.dpaw.wa.gov.au.

Department of Environment and Energy (Aus. Gov) 2018 Weeds of National Significance (database)

Department of Environment and Energy 2018, (database) 'Weed species A-Z', Dept. of Environment & Energy, Canberra

Environmental Protection Authority (EPA) 2016, *Technical Guidance: Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia,* Environmental Protection Authority, Perth

Muir B. G. (1977). *Biological survey of the Western Australian Wheatbelt. Part 2: Vegetation and habitat of Bendering Reserve.* Rec. WA Mus, Supp. 3.

Trudgen, M 1988, *A Report of the Flora and Vegetation of the Port Kennedy Area*. Unpublished report to Bowman, Bishaw and Associates.

DRAFT

FIGURES

DRAFT



DRAFT

2557 1001 FHOLD

Priority 2 species

Excellent

Very Good

V. Good P195338 543 CROWN

Very Good

Very poor along edge of entire road (nth side only)

Close this track

Very poor along edge (1m) of entire road (this side only)

Dist no weeds

Very VGood

Track verge (1m) both sides Very poor

Very poor

V.Poor

Carpark

VG

VG

VG Very Good this side

Very Good

VG

Paper Size ISO A3

0 0.015 0.03 0.045 0.06

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

GHD

CITY OF KARRATHA
CLEAVERVILLE FORESHORE
MANAGEMENT PLAN

LAND TENURE PLAN

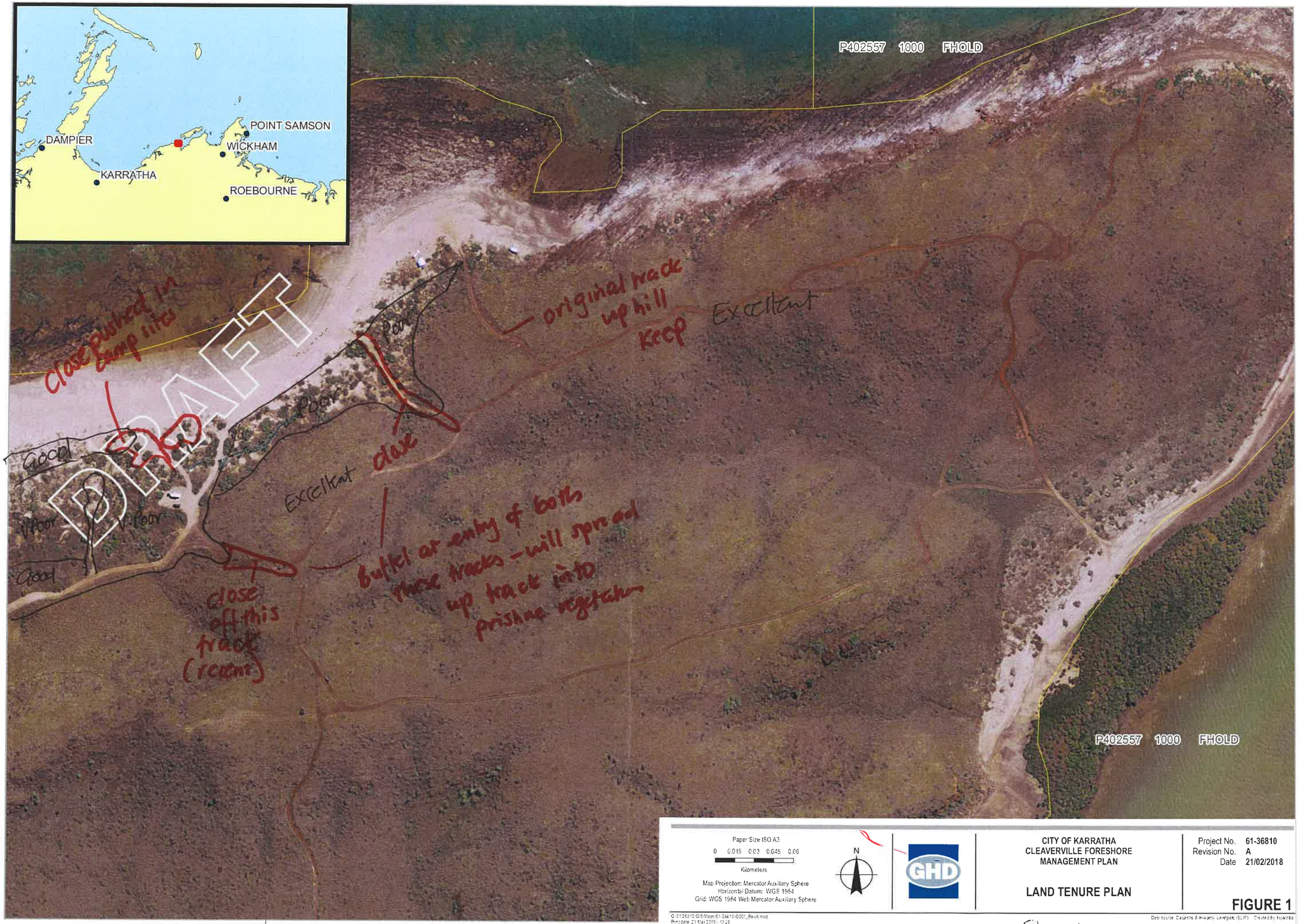
Project No. 61-36810
Revision No. A
Date 21/02/2018

FIGURE 1

G:\61\36810\GIS\Maps\61-36810-G001_RevA.mxd
Print date: 21 Mar 2018 - 13:35

Data source: Cadastre & Imagery: Landgate (SLIP) Created by: kyjacobs

Sheet 8



Paper Size ISO A3

0 0.015 0.03 0.045 0.06

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

GHD

CITY OF KARRATHA
CLEAVERVILLE FORESHORE MANAGEMENT PLAN

LAND TENURE PLAN

Project No. 61-36810
Revision No. A
Date 21/02/2018

FIGURE 1

Data source: Cadastre & Imagery: Landgate (SLIP) Created By: hsanders

Sheet 1



P402557 1001 FHOLD

P195338 543 CROWN

DRAFT

Caretaker stop using edge of quarry as offroad circuit

Caretaker close off new sites pushed into vegetation on dune

close of new sites pushed into veg on dune

Good

Very Poor

Very Poor

Very Poor

Maybe close this

Poor

Poor

Good

Poor

Poor

Good

Poor

Very Poor

Good

Very poor

Very poor

Excellent

Excellent

Good

Paper Size ISO A3

0 0.015 0.03 0.045 0.06

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

GHD

CITY OF KARRATHA
CLEAVERVILLE FORESHORE
MANAGEMENT PLAN

LAND TENURE PLAN

Project No. 61-36810
Revision No. A
Date 21/02/2018

FIGURE 1

G:\61\36810\GIS\Maps\61-36810-G005_RevA.mxd
Print date: 21 Mar 2018 - 13:27

Data source: Cadastre & Imagery: Landgate (SLIP) Created by: mjacobs

Sheet 2



DRAFT

P195338 543 CROWN

Degraded
Degraded
Degraded
Very Poor
Very Poor
Very Poor
Very Poor
Good
Good
Good
Good
Good
Good
Good
Good
Poor
Poor
Poor
Poor
Poor
Poor
Very poor
Very poor
Very poor
Very poor
Very poor
Very poor
Very poor
Very poor
Very poor
Very poor
Excellent
Excellent

Paper Size ISO A3

0 0.015 0.03 0.045 0.06

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

GHD

CITY OF KARRATHA
CLEAVERVILLE FORESHORE
MANAGEMENT PLAN

LAND TENURE PLAN

Project No. 61-36810
Revision No. A
Date 21/02/2018

FIGURE 1

G:\61\36810\GIS\Maps\61-36810-G001_RevA.mxd
Print date: 21 Mar 2018 - 15:29

Data source: Cadastre Imagery Landgate (SLIP) Created by: kaycobb

Sheet 3



Close

Close off reg. by Caretaker

Close off reg. by Caretaker

Close

Very Poor

Very Poor

Good

Good

Good

Very Poor

Poor

Poor

Poor

Poor

Burnt but regrowth is Good at present.

Track verge Very Poor

Poor

Very Poor

V. Poor

Good

Poor

Poor

Poor

Poor

Poor

Poor

V. Poor

Road verge Very Poor both sides

Good

Poor

Poor

Excellent

P195338 543 CROWN

DRAFT

Paper Size ISO A3

0 0.015 0.03 0.045 0.06

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

GHD

CITY OF KARRATHA
CLEAVERVILLE FORESHORE MANAGEMENT PLAN

LAND TENURE PLAN

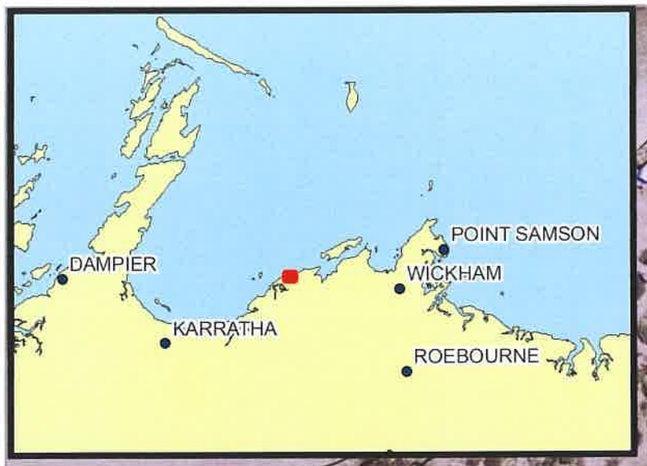
Project No. 61-36810
Revision No. A
Date 21/02/2018

FIGURE 1

Data source: Cadastre & imagery: Landgate (SLIP) Created by: kgscobb

I:\61\36810\GIS\Maps\61-36810-G001_RevA.mxd
Print date: 21 Mar 2018 - 13:33

Sheet 4



DRAFT

P195338 543 CROWN

Good
Very Poor
Close
Very Poor
Vpoor
Very Poor
Poor
Vpoor
Good
Very Poor on road verge
Good
Good
Good (Burnt bur free weedy)
Good
Poor
Poor
Good
Close
Very Poor
V. Poor
Good
Close
Vpoor
Good
Very poor along road 1-2m
Excellent
VPoor
Road verges V. Poor
Excellent

Paper Size ISO A3

0 0.015 0.03 0.045 0.06

Kilometers

Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

GHD

CITY OF KARRATHA
CLEAVERVILLE FORESHORE
MANAGEMENT PLAN

LAND TENURE PLAN

Project No. 61-36810
Revision No. A
Date 21/02/2018

FIGURE 1

G:\61\36810\GIS\Maps\61-36810-G001_RevA.mxd
Printdate: 21 Mar 2018 - 13:24

Data source: Cadastre & Imagery: Landgate (SLIP) Created by: kjacobs

Sheet 5.



This track is less eroded - can use this.

close

Very Good

V. Good

V Poor

Very Poor

Good

close gets boggy nr this end

Very Good

Very poor along road verge

Road verge Very Poor 1-2m

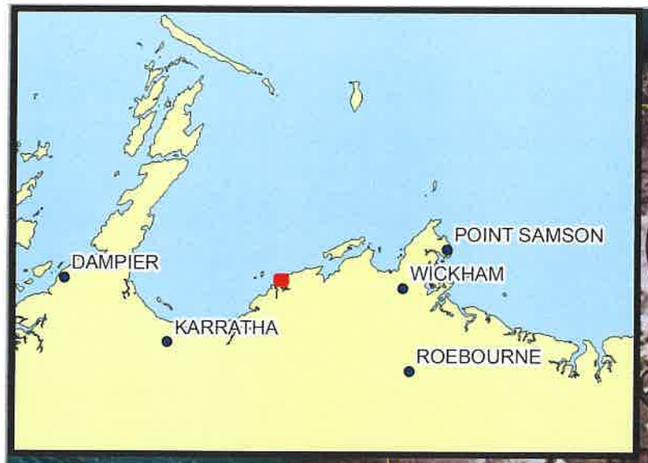
Very Poor

Very Poor

Very Good

Very Good

Very Good



DRAFT

Close off to campers Good native grassland + shrubland here

Good
Poor
V. Poor
Very Poor
Excellent
Very Good
Close
V. Poor Both sides (1m)
Close old tracks
Both sides of track (1m) V. Poor

P195338 543 CROWN

P402557 1001 FHOL

Paper Size ISO A3
0 0.015 0.03 0.045 0.06
Kilometers
Map Projection: Mercator Auxiliary Sphere
Horizontal Datum: WGS 1984
Grid: WGS 1984 Web Mercator Auxiliary Sphere

N

GHD

CITY OF KARRATHA
CLEAVERVILLE FORESHORE MANAGEMENT PLAN

LAND TENURE PLAN

Project No. 61-36810
Revision No. A
Date 21/02/2018

FIGURE 1

Sheet 7

APPENDIX A
VEGETATION CONDITION SCALE

DRAFT

Table A.1. Vegetation Condition Scale as adapted from Trudgen (1988). (Environmental Protection Authority 2016)

Vegetation condition	Condition description
Excellent	Pristine or nearly so, no obvious signs of damage caused by human activities since European settlement.
Very Good	Some relatively slight signs of damage caused by human activities since European settlement. For example, some signs of damage to tree trunks caused by repeated fire, the presence of some relatively non-aggressive weeds, or occasional vehicle tracks.
Good	More obvious signs of damage caused by human activity since European settlement, including some obvious impact on the vegetation structure such as that caused by low levels of grazing or slightly aggressive weeds.
Poor	Still retains basic vegetation structure or ability to regenerate to it after very obvious impacts of human activities since European settlement, such as grazing, partial clearing, frequent fires or aggressive weeds.
Very Poor	Severely impacted by grazing, very frequent fires, clearing or a combination of these activities. Scope for some regeneration but not to a state approaching good condition without intensive management. Usually with a number of weed species present including very aggressive species.
Completely Degraded	Areas that are completely or almost completely without native species in the structure of their vegetation; i.e. areas that are cleared or 'parkland cleared' with their flora comprising weed or crop species with isolated native trees or shrubs.

DRAFT

DRAFT

APPENDIX B
WEED CLASSIFICATIONS

Weeds of National Significance (WONS)

Thirty-two WoNS have been agreed by the Australian State and Territory governments, based on the weed species' invasiveness, potential for spread and environmental, social and economic impacts (Australian Government, 2011). In Western Australia, many WONS are also declared pests under the *Biosecurity and Agriculture Management Act* 2007 (BAM Act).

Declared Pests

The Department of Agriculture and Food Western Australia (DAFWA) regulates weeds under the BAM Act, which supersedes the *Agriculture and Related Resources Protection Act* 1976. Weeds are grouped into four main classifications (Table B.1**Error! Reference source not found.**).

Table B.1: Categorisation of plants under the BAM Act

Category	Description
Permitted organisms under section 11	Organisms that are allowed entry into Western Australia
Prohibited organisms under section 12	Organisms that are prohibited from entry into Western Australia
Unlisted organisms under section 14	If an organism cannot be categorised as either permitted or prohibited the organism will be unlisted
Declared pest under section 22	Pests that may be in the State but are under official containment, control or eradication

Plants that are prevented entry into the State or have control or keeping requirements within the State are declared pests. Declared pests can be assigned to a C1, C2 or C3 category under the BAM Act Regulations 2013. Prohibited organisms can be assigned to a C1 or C2 control category (Table B.2**Error! Reference source not found.**).

Table B.2: Categories of declared pests under the BAM Act regulations.

Category	Description
C1 Exclusion	Plants which should be excluded from part or all of Western Australia.
C2 Eradication	Plants which should be eradicated from part or all of Western Australia.
C3 Management	Plants that should have some form of management applied that will alleviate the harmful impact of the plant, reduce the numbers or distribution of the plant or prevent or contain the spread of the plant.

Landholders, managers and occupiers of land are responsible for the management declared pests on their land. The Western Australian Organisms List contains information on the area(s) in which a pest is declared and the control and keeping categories to which it has be assigned in Western Australia.

Environmental Weeds

The Weed Prioritisation Process for the Department of Parks and Wildlife (Parks and Wildlife) prioritise weeds in each Parks and Wildlife region (not updated since 2014). The process ranks weeds

based on their ecological impact and invasiveness and the priorities for managing weeds is provided in Table B.3 and descriptions for fields used in species based prioritization are presented in Table B.4.

Table.B.3 Priorities for weed management (DPAW 2014)

Priorities
1. Early Detection/Rapid Response: Any new infestations and/or introductions of any weed species in an area, no matter their impact and/or invasiveness, should be eradicated immediately;
2. Eradication of those species which are still in small enough populations for this target to be achieved; and
3. Management of high impact, rapidly-moderately invasive species that are impacting on high value conservation assets.

Table B.4 Extract of descriptions used in the species prioritization process for Parks and Wildlife Regions (@014)

Field	Description	Code	
Ecological Impact	Impact of species within the Region, from low impact (causes minimal disruption to ecological processes or loss of biodiversity) to high (causes acute disruption of ecological processes, dominates and/or significantly alters vegetation structure, composition and function of ecosystems). Examples of impact attributes to consider: - changed fire regime - changed nutrient conditions - changed hydrological patterns - changed soil erosion patterns - changed geomorphological processes - changed biomass distribution - changed light distribution - loss of biodiversity - substantially reduces regeneration opportunities of native plants - allelopathic effects	L M H U	Low Medium High Unknown

DRAFT

DRAFT

APPENDIX C

CATEGORIES AND DEFINITIONS OF THREATENED AND PRIORITY FLORA

Taxa that have not yet been adequately surveyed to be listed under Schedule 1 or 2 are added to the Priority Flora and Priority Fauna Lists under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as Threatened flora or fauna. Taxa that are adequately known, are rare but not threatened, or meet criteria for Near Threatened, or that have been recently removed from the threatened list for other than taxonomic reasons, are placed in Priority 4. These taxa require regular monitoring. Conservation dependent species are placed in Priority 5.

Table C.1: Priority species under *Western Australian Wildlife Conservation Act 1950*

P1: Priority One – Poorly known taxa
Taxa that are known from one or a few collections or sight records (generally less than five), all on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, Shire, Westrail and Main Roads WA road, gravel and soil reserves, and active mineral leases and under threat of habitat destruction or degradation. Taxa may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes.
P2: Priority Two – Poorly known taxa
Taxa that are known from one or a few collections or sight records, some of which are on lands not under imminent threat of habitat destruction or degradation, e.g. national parks, conservation parks, nature reserves, State forest, vacant Crown land, water reserves, etc. Taxa may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes.
P3: Priority Three – Poorly known taxa
Taxa that are known from collections or sight records from several localities not under imminent threat, or from few but widespread localities with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Taxa may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and known threatening processes exist that could affect them.
P4: Priority Four: Rare, near threatened and other taxa in need of monitoring
(a) Rare. Taxa that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These taxa are usually represented on conservation lands. (b) Near Threatened. Taxa that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable. (c) Taxa that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.
P5: Priority Five: Conservation dependent taxa
Taxa that are not threatened but are subject to a specific conservation program, the cessation of which would result in the taxa becoming threatened within five years.

Table C.2: Conservation codes for Western Australian flora under the *Wildlife Conservation Act 1950*.

Code	Conservation category	Definition
S1	Schedule 1 of the Wildlife Conservation (Specially Protected Fauna) Notice and Wildlife Conservation (Rare Flora) Notice under the Wildlife Conservation Act 1950.	Taxa that is rare or likely to become extinct, as critically endangered taxa.

Code	Conservation category	Definition
S2	Schedule 2 of the Wildlife Conservation (Specially Protected Fauna) Notice and Wildlife Conservation (Rare Flora) Notice under the Wildlife Conservation Act 1950.	Taxa that is rare or likely to become extinct, as endangered taxa.
S3	Schedule 3 of the Wildlife Conservation (Specially Protected Fauna) Notice and Wildlife Conservation (Rare Flora) Notice under the Wildlife Conservation Act 1950.	Taxa that is rare or likely to become extinct, as vulnerable taxa.
S4	Schedule 4 of the Wildlife Conservation (Specially Protected Fauna) Notice and Wildlife Conservation (Rare Flora) Notice under the Wildlife Conservation Act 1950.	Taxa that is presumed to be extinct.

DRAFT

APPENDIX D
COLOUR PLATES

DRAFT

Colour Plates



Plate 1: Triodia native grassland on stony soils is weed free even when disturbed. Excellent condition.



Plate 2: Areas of excellent conditon vegetation should not be disturbed or burnt to prevent weed spread.



Plate 3: Native tussock grassland surrounding ephemeral wetland, <2% weeds. Very Good Condition



Plate 4: Native hummock grasslnad with patchy kapok (2-10%). Good Condition



Plate 5: Buffel and kapok (30-50%) on coastal dune with *Acacia coriacea*. Very Poor Condition



Plate 6: Buffel and kapok around camp node with fire pit. Very Poor Condition



Plate 7: Recent fire burned area with abundant kapok and buffel. Weeds 30-50% Very Poor Condition



Plate 8: Aloe vera with kapok in camp ground. Weeds 50-70%. Degraded Condition



Plate 9: Buffel seedlings creeping up track where vegetation is relatively weed free.



Plate 10: Triodia native grassland foreground on stony soil and buffel behind on sand dunes.



Plate 11: Desert rose planted at memorial site.



Plate 12: Closing off unnecessary tracks will help prevent spread on weeds.



Plate 13: Recently made camp node on dunes has destroyed vegetation.



Plate 14: Off road vehicles destroy vegetation on north end of camp site (old quarry)



Plate 15: Beach spinifex is not weed infested. Avoid driving on this vegetation.



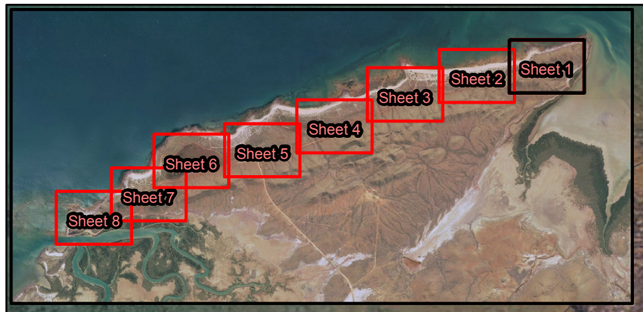
Plate 16: Vehicle tracks on beach.

Appendix D – Management Plans

DRAFT

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

DRAFT



P402557 1000 FHOLD

Legend

- Boat Ramp
- Caretaker
- Information
- Rubbish Bins
- Septic Waste
- Shelter
- Signage
- Toilet
- Closure and Revegetation
- Camping Zone
- Day Use Only
- Boardwalk
- No vehicle access (October to April)
- Cadastre

P402557 1000 FHOLD

Paper Size ISO A3

0 10 20 30 40 50

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

N

GHD

CITY OF KARRATHA
CLEAVERVILLE FORESHORE MANAGEMENT PLAN

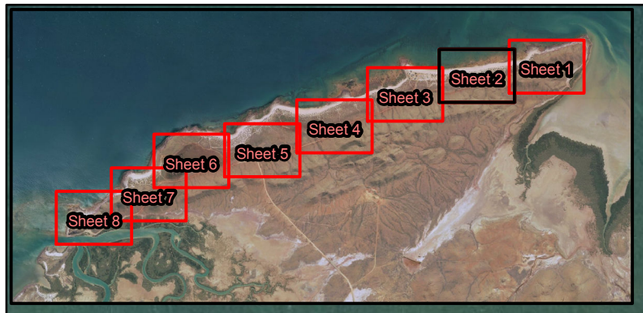
Management Plan

Project No. **61-36810**
Revision No. **A**
Date **31 Jul 2018**

FIGURE 1
Sheet 1

G:\61\36810\GIS\Maps\Working\61-36810_MgmtPlan_RevA.mxd
Print date: 31 Jul 2018 - 13:33

Data source: Cadastre & Imagery: Landgate (SLIP); GHD: Management Recommendation - 20180730. Created by: artermulo



DRAFT

P402557 1001 FHOLD

P195338 543 CROWN

Legend

- Boat Ramp
- Caretaker
- Information
- Rubbish Bins
- Septic Waste
- Shelter
- Signage
- Toilet
- Closure and Revegetation
- Camping Zone
- Day Use Only
- Boardwalk
- No vehicle access (October to April)
- Cadastre

Paper Size ISO A3

0 10 20 30 40 50

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

N

GHD

CITY OF KARRATHA
CLEAVERVILLE FORESHORE MANAGEMENT PLAN

Management Plan

Project No. **61-36810**
Revision No. **A**
Date **31 Jul 2018**

FIGURE 1
Sheet 2

G:\61\36810\GIS\Maps\Working\61-36810_MgmtPlan_RevA.mxd
Print date: 31 Jul 2018 - 13:33

Data source: Cadastre & Imagery: Landgate (SLIP); GHD: Management Recommendation - 20180730. Created by: artermulo



Paper Size ISO A3

0 10 20 30 40 50

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

N

GHD

CITY OF KARRATHA
CLEAVERVILLE FORESHORE
MANAGEMENT PLAN

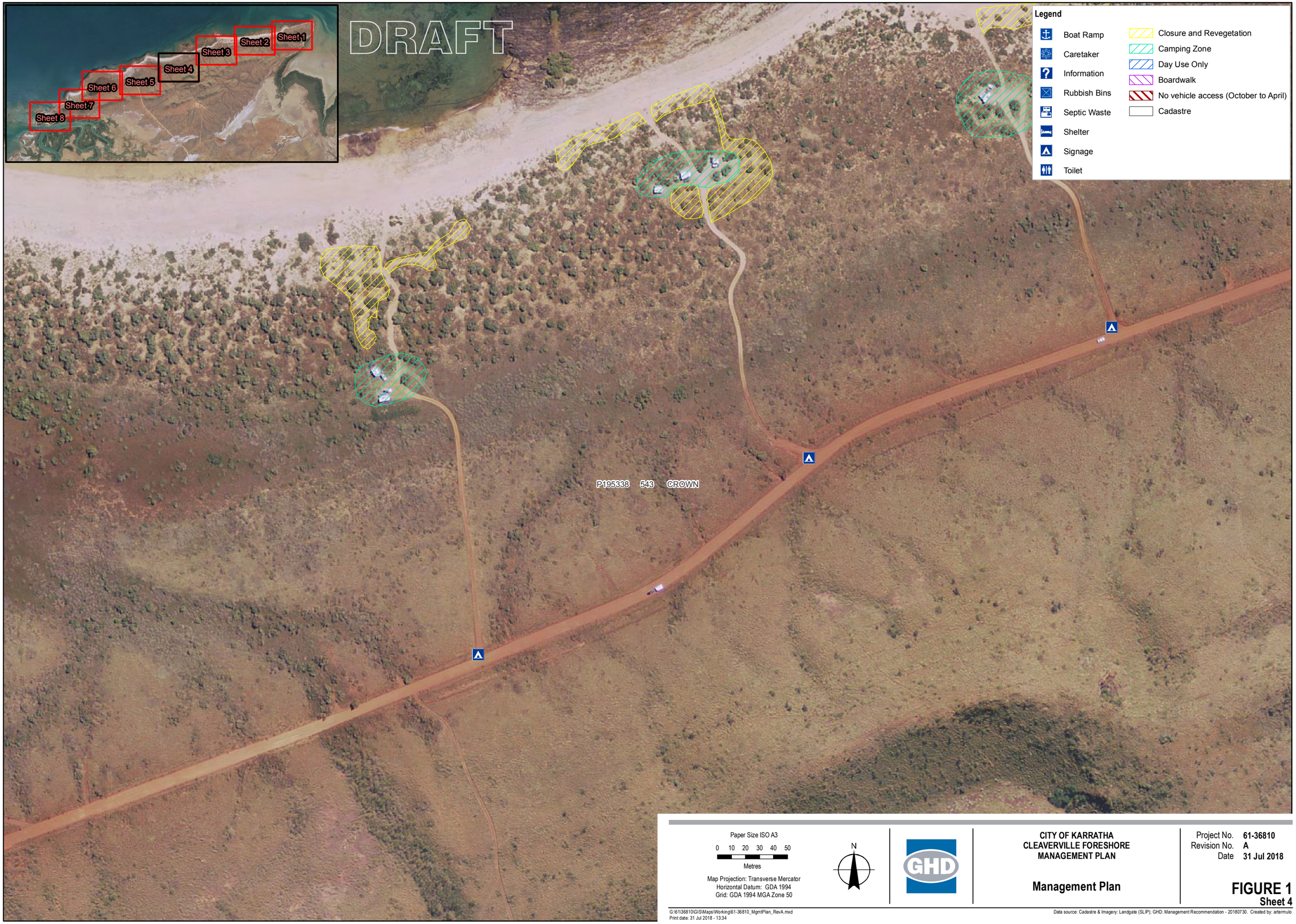
Management Plan

Project No. **61-36810**
Revision No. **A**
Date **31 Jul 2018**

FIGURE 1
Sheet 3

G:\61\36810\GIS\Maps\Working\61-36810_MgmtPlan_RevA.mxd
Print date: 31 Jul 2018 - 13:34

Data source: Cadastre & Imagery: Landgate (SLIP); GHD: Management Recommendation - 20180730. Created by: artermulo



Paper Size ISO A3

0 10 20 30 40 50

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

N

GHD

CITY OF KARRATHA
CLEAVERVILLE FORESHORE MANAGEMENT PLAN

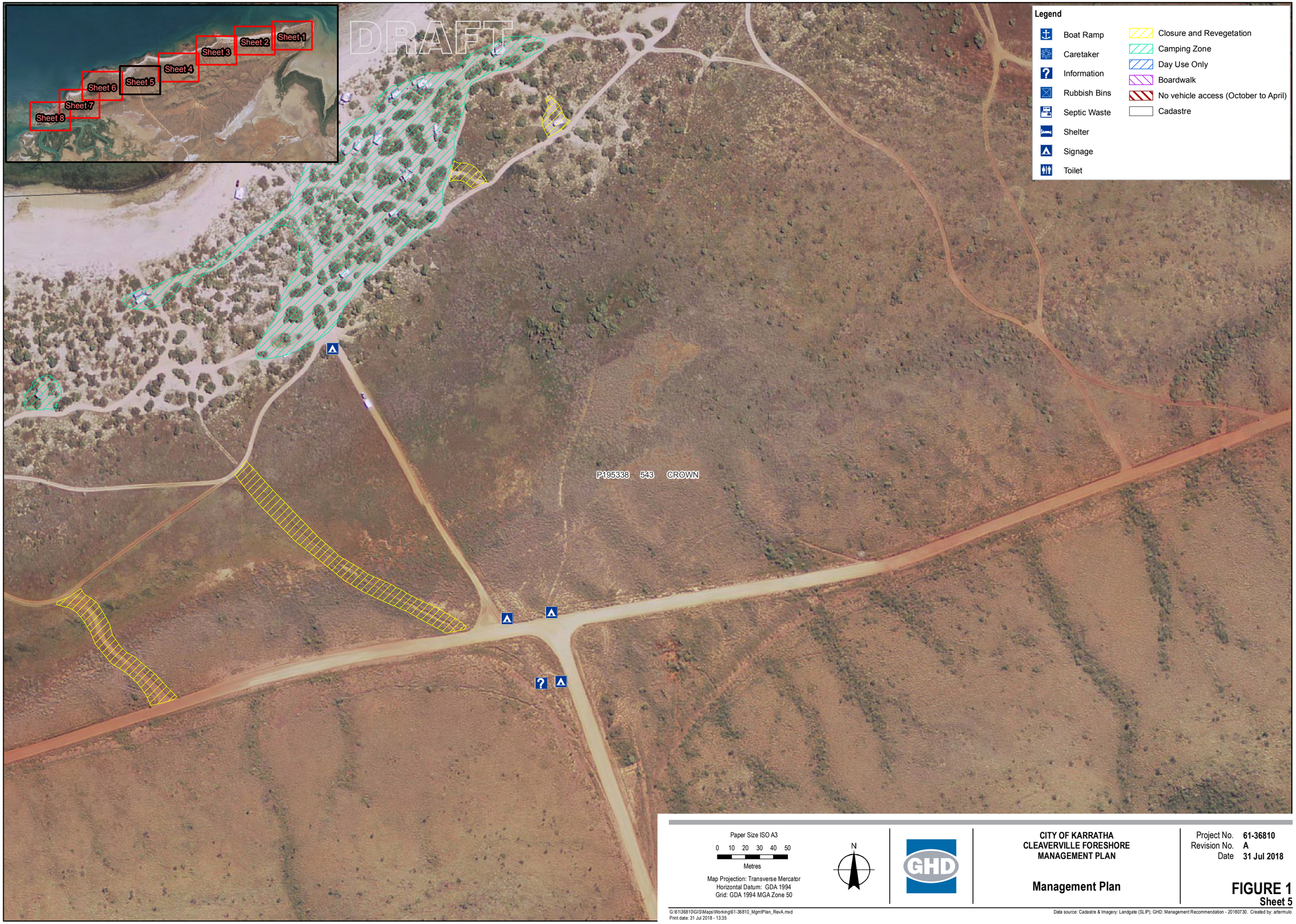
Management Plan

Project No. **61-36810**
Revision No. **A**
Date **31 Jul 2018**

FIGURE 1
Sheet 4

G:\61\36810\GIS\Maps\Working\61-36810_MgmtPlan_RevA.mxd
Print date: 31 Jul 2018 - 13:34

Data source: Cadastre & Imagery: Landgate (SLIP); GHD: Management Recommendation - 20180730. Created by: artermulo



Paper Size ISO A3

0 10 20 30 40 50

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

N

GHD

CITY OF KARRATHA
CLEAVERVILLE FORESHORE MANAGEMENT PLAN

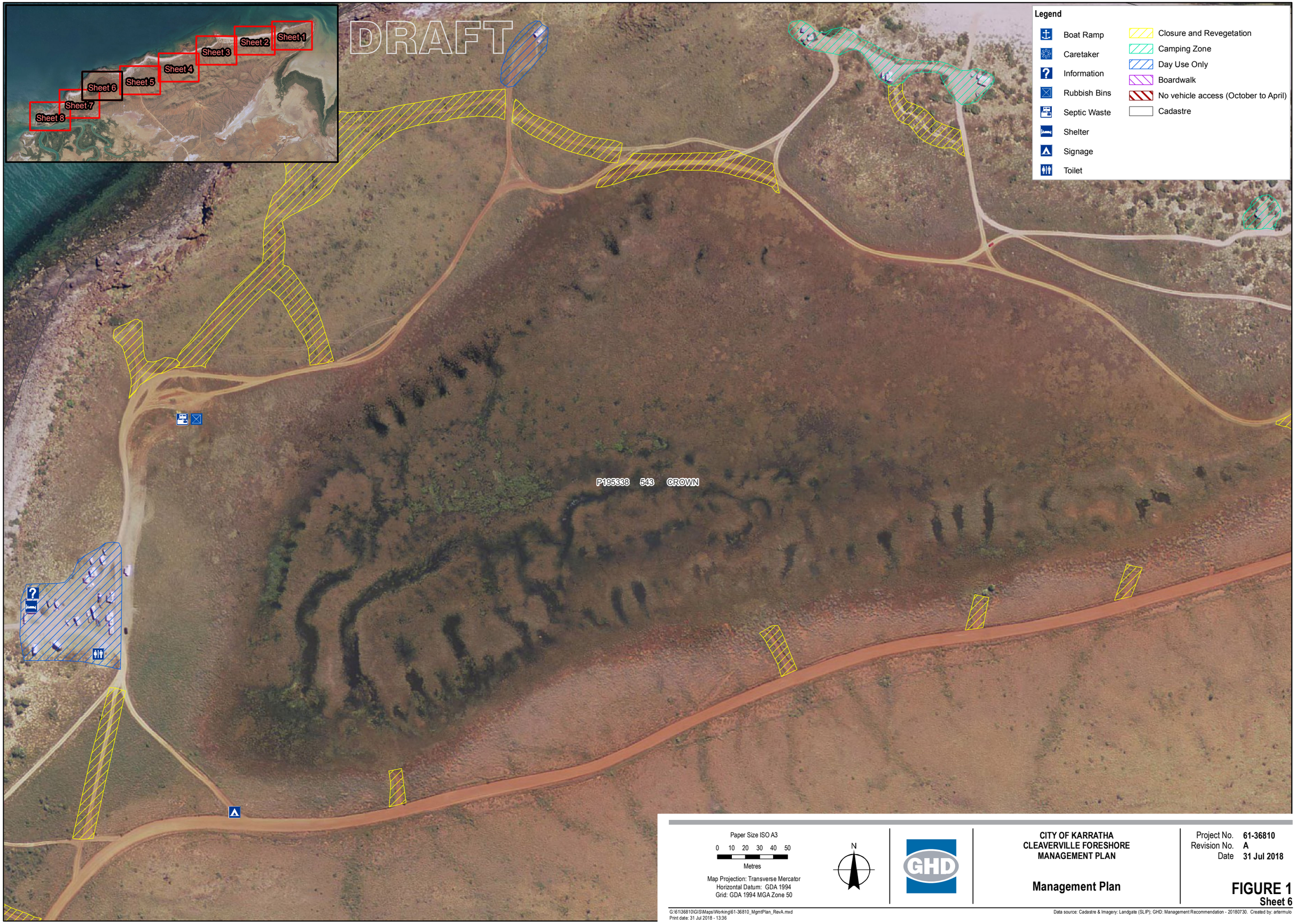
Management Plan

Project No. **61-36810**
Revision No. **A**
Date **31 Jul 2018**

FIGURE 1
Sheet 5

G:\61\36810\GIS\Maps\Working\61-36810_MgmtPlan_RevA.mxd
Print date: 31 Jul 2018 - 13:35

Data source: Cadastre & Imagery: Landgate (SLIP); GHD: Management Recommendation - 20180730. Created by: artermulo



Paper Size ISO A3

0 10 20 30 40 50

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

N

GHD

CITY OF KARRATHA
CLEAVERVILLE FORESHORE MANAGEMENT PLAN

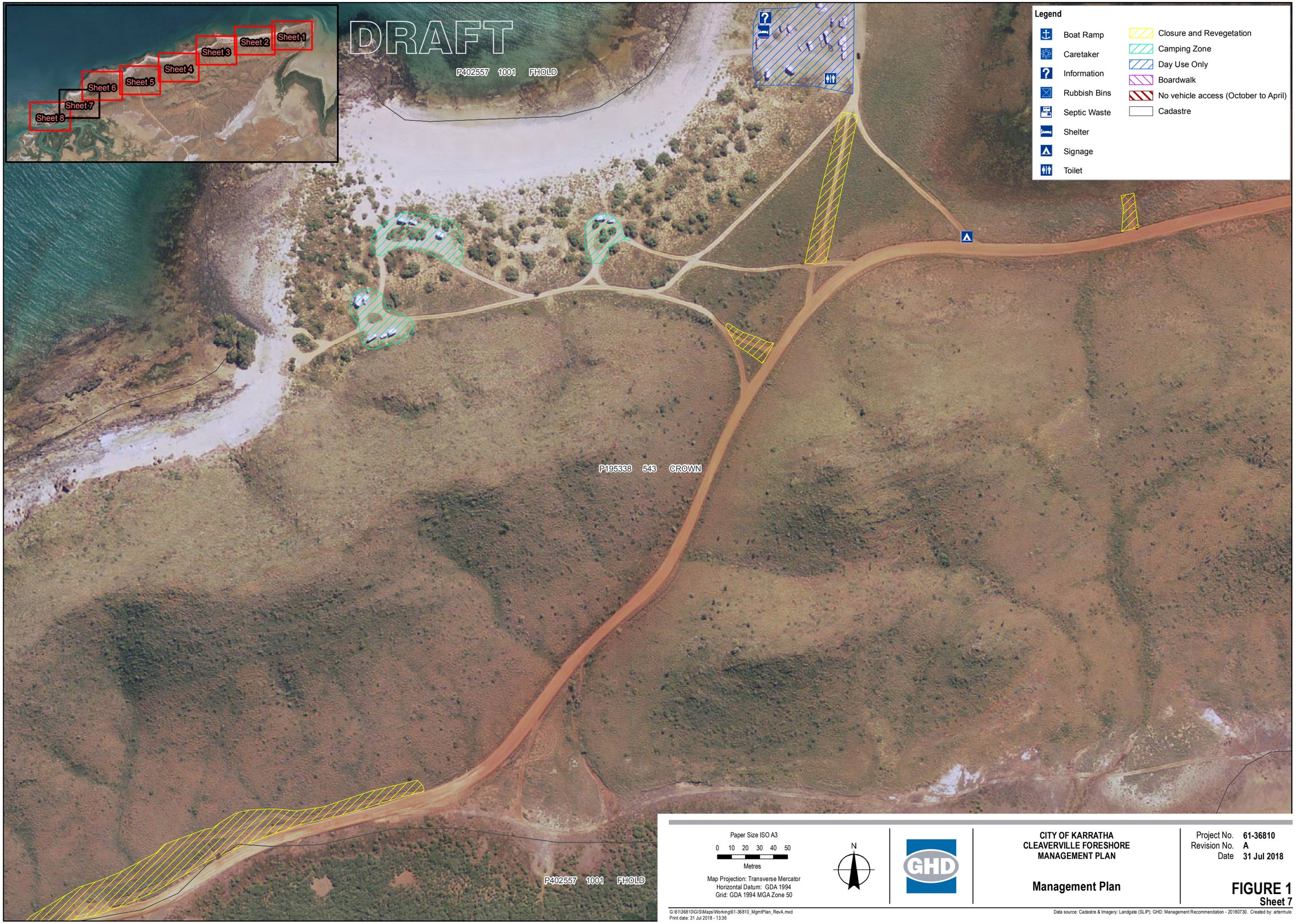
Management Plan

Project No. **61-36810**
Revision No. **A**
Date **31 Jul 2018**

FIGURE 1
Sheet 6

G:\61\36810\GIS\Maps\Working\61-36810_MgmtPlan_RevA.mxd
Print date: 31 Jul 2018 - 13:36

Data source: Cadastre & Imagery: Landgate (SLIP); GHD: Management Recommendation - 20180730. Created by: artermulo



Paper Size ISO A3

0 10 20 30 40 50

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

N

GHD

CITY OF KARRATHA
CLEAVERVILLE FORESHORE MANAGEMENT PLAN

Management Plan

Project No. **61-36810**
Revision No. **A**
Date **31 Jul 2018**

FIGURE 1
Sheet 7

G:\61\36810\GIS\Maps\Working\61-36810_MgmtPlan_RevA.mxd
Print date: 31 Jul 2018 - 13:36

Data source: Cadastre & Imagery: Landgate (SLIP); GHD: Management Recommendation - 20180730. Created by: artermulo



Paper Size ISO A3

0 10 20 30 40 50

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

N

GHD

CITY OF KARRATHA
CLEAVERVILLE FORESHORE MANAGEMENT PLAN

Management Plan

Project No. **61-36810**
Revision No. **A**
Date **31 Jul 2018**

FIGURE 1
Sheet 8

G:\61\36810\GIS\Maps\Working\61-36810_MgmtPlan_RevA.mxd
Print date: 31 Jul 2018 - 13:37

Data source: Cadastre & Imagery: Landgate (SLIP); GHD: Management Recommendation - 20180730. Created by: artermulo

DRAFT

GHD
Unit 186
26 Sharpe Avenue
T: 61 8 9920 9407 F: E: ktamail@ghd.com

© GHD 2018
This document is and shall remain the property of GHD. The document may only be used for the purpose for which it was commissioned and in accordance with the Terms of Engagement for the commission. Unauthorised use of this document in any form whatsoever is prohibited.

6136810-33476/https://projects.ghd.com/oc/WesternAustralia/cleavervilleforeshor/Delivery/Documents/6136810-REP-A_Cleaverville FMP.docx

Document Status

Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
A	K Potts T Hibberd	H O'Keeffe		H O'Keeffe		28/09/18

This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.

www.ghd.com

DRAFT



This document is in draft form. The contents, including any opinions, conclusions or recommendations contained in, or which may be implied from, this draft document must not be relied upon. GHD reserves the right, at any time, without notice, to modify or retract any part or all of the draft document. To the maximum extent permitted by law, GHD disclaims any responsibility or liability arising from or in connection with this draft document.