

THE WATERFRONT
ROSS CREEK MARINE PLANT
MANAGEMENT GUIDELINE
VERSION 1



This is a technical document for Townsville City Council purposes.

DOCUMENT CHANGE HISTORY

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THE WATERFRONT

Contents

Table of Contents	3
Introduction	4
Aims	5
Section 1	6
Background	6
Guideline details	11
References	14
Section 2	15
Objectives	15
Categories of Marine Plant Management	16
Precinct Management Strategies	17
Precinct 1 – City Waterfront Gateway	17
Precinct 2 and 3	21
Precinct 4 – Hanran Park	25
Precinct 5 – Central	30
Precinct 6 – Tomlins and Wickham	34
Precinct 7 – Maritime Mixed Use	38
Appendix 1 Photo reference points	41
Appendix 2 List of properties in the guideline area	65
Appendix 3 Summary of all stormwater outfalls in guideline area	66

Introduction

This guideline provides the basis for management of mangroves and other marine plants on a section of the Ross Creek in Townsville that is within the Townsville Waterfront Priority Development Area (PDA). It has been developed in recognition of the important environmental values of Marine plant areas protected under State legislation and the need to actively manage this public area.

Marine Plants in most of the PDA area were cleared historically to allow ease of access to the creek for industrial uses and have re-established since the cessation of these uses.

Marine plants play an integral role in maintaining the health and biodiversity of estuarine and offshore marine environments. They offer a wide range of ecosystem services including improving water quality through the filtering of sediments, assimilation of nutrients, providing in stream and riparian habitat, bank stability, fauna corridors and community benefits in terms of amenity and recreational values. Areas of marine plants which have been identified as having very high or high biodiversity values will be retained. However operational works are proposed in order to create an interpretive boardwalk through the very high biodiversity area, to maintain connectivity through the PDA, to allow public surveillance and allow for future construction of water access areas along the creek. Marine plants to be retained will continue to function as marine habitat, contribute to natural scenic amenity and play an important role in maintaining bank stability and erosion control. The Marine Plant Management Guideline is a key component of management in this area and will contribute to community benefit by increasing sustainable public use of the creek area.

Within the offset areas existing marine plants will remain relatively undisturbed. They are located within and adjacent to Council managed land. 3 Marine plant areas will be rehabilitated and protected for further marine plant community development.

Management of marine plants adjacent to existing Council infrastructure such as bridges and drains and the removal marine plants in key areas to ensure site lines and allow casual surveillance is documented in the guideline. The Guideline is intended to fulfil the requirements of the Planning Act 2009, the Fisheries Act 1994 and the Codes for self-assessable development of minor impact works and maintenance works that involve removal, destruction or damage to marine plants.

The Guideline shall be both internally audited by a nominated council representative and reviewed in conjunction with local Fisheries Queensland officers on an agreed basis to ensure currency and best practice.



Aims

1. To foster a shared understanding of the importance of vegetated marine fish habitats for fisheries production; and to the social, economic and environmental values of the local community.
2. To identify, endorse and document key marine plant communities that will be protected from future development and/or will be restored.
3. To provide a consistent strategic framework for Townsville's Local Government planning and undertaking public infrastructure maintenance and development works within and adjacent to sensitive tidal fish habitats.
4. To support innovative operational management techniques within agreed sections of marine plant communities to achieve long-term protection of tidal fish habitats and meet community requirements for passive recreation and access.
5. To reduce costs of administration (to both LG and DAF) associated with the integrated development assessment process and fisheries development approvals.
6. To identify offset areas to be enhanced or restored to offset damage to marine plants for maintenance and infrastructure.

Section 1

BACKGROUND

The Department of Agriculture and Fisheries Queensland is responsible for implementing the provisions of the Fisheries Act 1994 (Fisheries Act). This guideline is a joint project between Townsville City Council and Fisheries Queensland and is intended to fulfil requirements under the Fisheries Act and the Planning Act 2016. The guideline has been developed with the aim of meeting the policy target of Fish Habitat Management Operational Policy FHMOP 001 to:

Maintain the relative distribution of each of the components of the marine plant community state-wide to 90% or greater of the distribution levels that existed in 1990.

Maintain the extent of marine plant distribution within local government areas at 80% or greater of the level that existed in 1990 for all natural areas and to 50% or greater of 1990 levels for constructed areas.

Marine plant communities have an important role as fisheries habitat through structural complexity, shelter for food organisms and for juvenile and forage fishes at high tide and feeding opportunities for fish, crabs and molluscs (Couchman et al., 2006). Along Ross Creek the mangroves also provide a rookery for migratory bird species and provide habitat for native mammals. Marine plants also have other values, they assist with improved water quality by supporting nutrient uptake and assist with erosion control by stabilising creek banks (Bell 2013). The main guideline area stretches from the mouth of the Ross Creek to the new railway station. This area is within the Central Business District and is part of the Townsville City Waterfront PDA. The vision for the PDA is to transform Townsville's city heart into a lively urban destination where the city and nature come together through an interconnected series of vibrant and active experiences anchored by a focus on the water's edge. It will provide an exciting mix of recreation, culture, tourism, eco-tourism and urban lifestyle choices along with residential, commercial and business uses.

Ross Creek was originally an overflow channel of Ross River formed by coastal processes and flood events. The creek originally had a large meander in it where the Civic Theatre, Reed Park and the Townsville High School are now located. The construction of Boundary Street in the early 1960's cut off this meander creating a much straighter channel. The largest change to the morphology of the creek, however, also occurred in the 1960's with the Queen's Road levee which was built to provide flood protection from the overflow of Ross River into Ross Creek. This levee was constructed across Bicentennial Park to Rooney's Bridge and permanently cut Ross Creek from Ross River. The creek was further altered with the construction of Lake 1 in the late 80's and Lake 2 in the mid 90's. These two constructed lakes receive urban storm water runoff from a catchment that extends to Aitkenvale and drain into Ross Creek.

The creek bank area adjacent to the CBD has been the focus of commercial and industrial activity since 1864 when John Melton Black identified Townsville as an appropriate harbour from which to ship pastoral products from the Burdekin and gold fields in the west. Most of the creek was cleared of marine plants and rock or concrete walls were established to allow shipping and industrial activities to operate from the banks of the creek.

In 1926, to further solidify the creek as being an industrial location, an Order in Council decreed that all land within 100 chain of a creek or river was to be developed as industrial land. Whilst many of the historical buildings remain as architectural assets to both Queensland and the local government, industrial uses started to decline around the 1970's in favour of more commercial and tourist uses. However, there are still large sections of the creek which are used for industrial purposes today. Marine Plant communities were largely excluded from the Ross Creek until mid-1980 when they began to recolonise in some locations. Even now, most of the lower reaches towards the mouth of the creek are clear of mangrove and marine vegetation along the banks.





The PDA is the most comprehensive economic development effort in Townsville and one of the largest urban renewal projects currently underway in Northern Australia. The PDA is a catalyst project for the revitalization of the Townsville City Centre, which will take shape over the next 15 to 20 years. The motivation for the project was drawn from the 'Townsville City Plan' and 'Townsville CBD Masterplan', which emphasized the need for the city to reconnect with its waterfront, the Ross Creek. The evolution of Townsville's City Centre through The Waterfront project will deliver strong economic benefits to the region by activating prime inner-city land for development, creating significant investment opportunities and local jobs for Townsville.

The importance of marine plant communities along the banks of Ross Creek is now recognised, as is the need to protect and maintain them. Four Marine Habitat/Mangrove Regional Ecosystem types are defined by the Vegetation Management Act 1999 (Table 1). Three of these are located along the banks of Ross Creek in the PDA area. Small areas of samphire and salt pans may be classed as regional ecosystems (RE) 11.1.2 or as part of RE 11.1.1 while the mangrove areas would be defined as RE 11.1.4. Whilst it has been identified that there are regions of very high and high environmental value along Ross creek (Figure 1), none of the three ecosystem types found in the PDA area 'Of Concern' (Table 1).

Whilst their importance is recognised, in some areas mangroves impede visual connection, pedestrian access and pose impediments to Crime Prevention through Environmental Design (CPTED). CPTED principles were developed by the Queensland Government to guide local Councils in the design and maintenance of built environments in ways that lessen or prevent the incidence of crime and promote public safety. Two key aspects of CPTED identified within the PDA Development Scheme are casual surveillance and sight lines, both of which are impeded by mangroves in certain key areas. By maintaining casual surveillance and sight lines people in adjoining areas are able to see what is happening and know where they are going, encouraging people to enter and use the area, which in turn will make the area safer.

Table 1 – Marine Habitat/Mangrove Regional Ecosystems

RE and Description	VM Status
<p>11.1.1 <i>Sporobolus virginicus</i> grassland on Quaternary estuarine deposits. <i>Sporobolus</i> spp. usually dominates pure stands although a wide range of other species may be present as scattered individuals including <i>Fimbristylis ferruginea</i>, <i>Cyperus victoriensis</i>, <i>C. scariosus</i>, and sometimes <i>Eleocharis spiralis</i>, <i>Mnesithea rottboellioides</i>, <i>Marsilea mutica</i>, <i>Cynanchum carnosum</i>, <i>Ischaemum australe</i>, <i>Cyperus polystachyos</i>, <i>Ceratopteris thalictroides</i> and <i>Diplachne fusca</i>. Occasional emergent stunted mangroves, usually <i>Avicennia marina</i> or <i>Ceriops tagal</i>, may occur as isolated individuals or along small channels. There may also be a minor presence of salt-tolerant forbs such as <i>Suaeda australis</i>, <i>S. arbusculoides</i>, <i>Sarcocornia quinqueflora</i> subsp. <i>quinqueflora</i> or <i>Tecticornia australasica</i>. Occurs on supratidal flats which are often only inundated by highest spring tides. Often occurs on the landward side of intertidal flats; seaward margins irregularly inundated with tidal waters and dissected by small tidal channels. Formed from Quaternary estuarine sediments with deep grey or black and grey saline cracking clays with occasional mottling, minor gilgai occasionally present. (BVG1M: 35b)</p>	Least Concern
<p>11.1.2 Samphire forbland or bare mud-flats on Quaternary estuarine deposits. Mainly salt pans and mudflats with clumps of saltbush including one or several of the following species; <i>Tecticornia</i> spp. (e.g. <i>Tecticornia indica</i> subsp. <i>julacea</i>, <i>Tecticornia indica</i> subsp. <i>leiostachya</i>), <i>Sesuvium portulacastrum</i>, <i>Sarcocornia quinqueflora</i> subsp. <i>quinqueflora</i>, <i>Suaeda australis</i>, <i>S. arbusculoides</i>, <i>Tecticornia australasica</i>, <i>Salsola australis</i>, algal crusts and the grass <i>Sporobolus virginicus</i>. Sedges are also common. Occurs on supratidal flats with deep saline clay soils and formed from Quaternary estuarine sediments. Occurs along the landward edge of the intertidal zone in a hypersaline environment that is only inundated by the highest spring tides. Soils are grey mottled clays with a crusting surface, and are highly saline. (BVG1M: 35b)</p>	Least Concern
<p>11.1.3 Sedgeland to grasslands on Quaternary estuarine deposits. Sedgeland dominated by a range of sedges and grasses which include <i>Eleocharis philippinensis</i>, <i>Cyperus alopecuroides</i>, <i>C. scariosus</i> and <i>C. iria</i> and the grasses <i>Sporobolus virginicus</i> and <i>Paspalum vaginatum</i>. Other typical species in shallower margins include <i>Fimbristylis ferruginea</i>, <i>Phyla nodiflora</i> and <i>Cyperus polystachyos</i> var. <i>polystachyos</i>. Occasional twiners such as <i>Cynanchum carnosum</i> may be present. Occurs in depressions on Quaternary estuarine deposits which are brackish to saline. These are may be seasonally inundate with fresh water, but dry out completely before the next season's rain. (BVG1M: 34c)</p>	Of Concern
<p>11.1.4 Mangrove low forest on Quaternary estuarine deposits. Low open shrubland to closed forest of mangrove species forming a variety of associations, depending on position in relation to salt water inundation. <i>Avicennia marina</i> is the most common dominant but also other trees such as <i>Aegiceras corniculatum</i>, <i>Rhizophora</i> spp. and <i>Ceriops tagal</i> dominate often in pure stands. There is often a shrub layer consisting of juvenile plants of the above species. Other species such as <i>Excoecaria agallocha</i>, <i>Bruguiera</i> spp., <i>Lumnitzera racemosa</i> and <i>Alchornea ilicifolia</i> may also occur. Occurs on intertidal flats which are often dissected by tidal streams. Soils are usually deep saline clays. (BVG1M: 35a)</p>	Of Concern

Note: Descriptions are derived from the Regional Ecosystem Description Database (REDD) maintained by the Queensland Herbarium. Figure 1 Natural Assets Map showing areas of very high and high environmental value.

Figure 1 - Natural Assets Map showing areas of very high and high environmental value

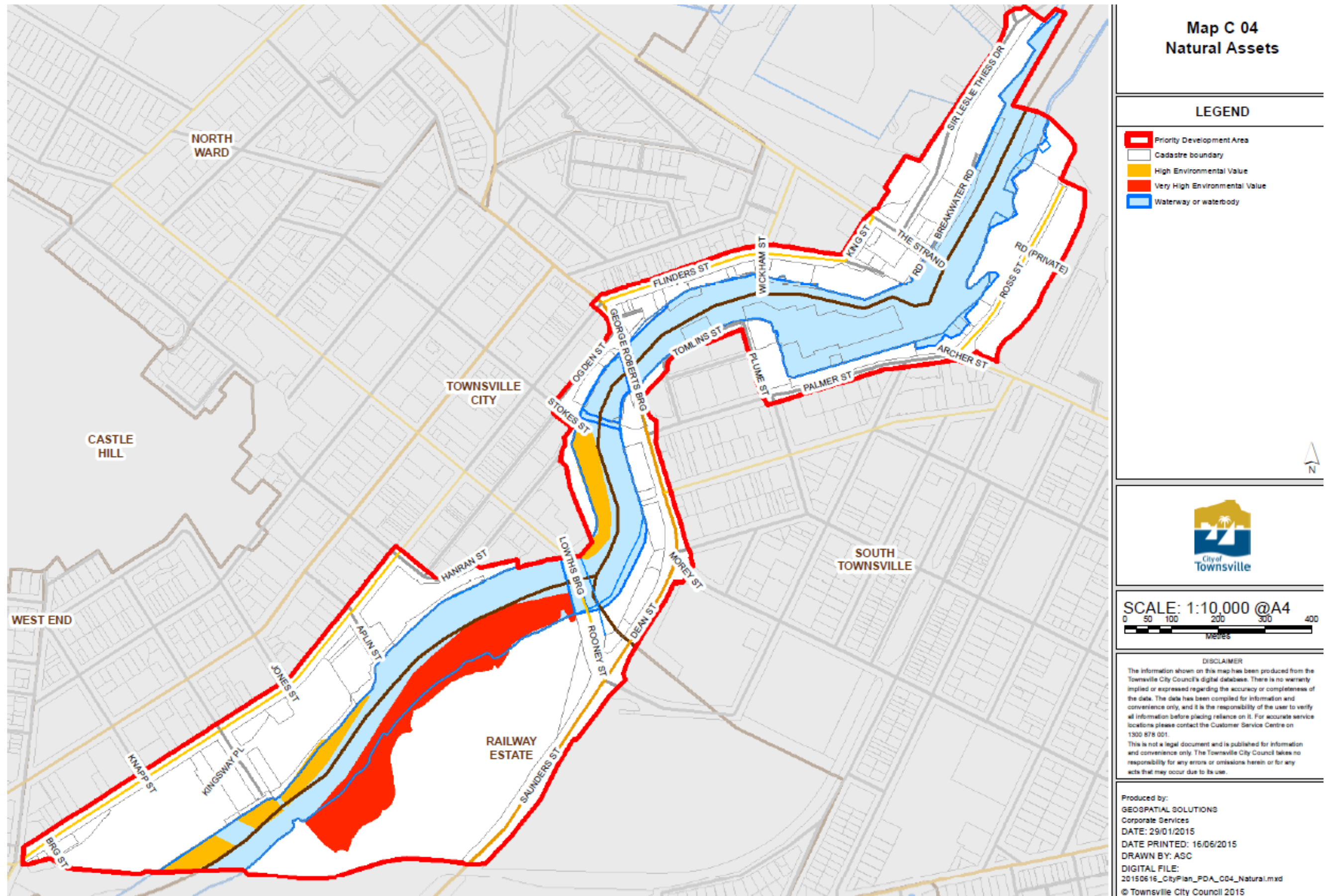


Figure 2 - Blacksmith Shop on the bank of Ross Creek (Image sourced from Townsville CitiLibraries. This image is free of copyright restrictions)



GUIDELINE DETAILS

The aim of this guideline is to specify how marine vegetation will be managed in the PDA while retaining the natural environment for amenity, educational purposes and fisheries habitat values. The guideline area includes all land adjacent to the Ross Creek. One intention of the PDA is to provide safe and secure public access along both sides of the creek which enhances areas of natural assets and improves the viability and attractiveness of the active transport network within the PDA area.

Key areas of marine plant communities within the guideline area are designated for retention to ensure that marine habitat and natural scenic amenity are maintained. Other marine plant areas will be managed to provide for and maintain public infrastructure such as stormwater outfalls, water access points, pathways and boardwalks. It is also proposed to remove or modify mangroves in key areas in order to meet CPTED principles of casual surveillance and site lines to encourage passive recreation, safe river access and active transport within the PDA. New facilities impacting on marine plants will be limited to those designated areas during the life of this guideline.

Once endorsed the guideline will guide operational work on marine plants in the guideline area. Agreed actions will be undertaken as self-assessable works. This document will be subject to regular review to incorporate new issues as they arise.

Existing infrastructure within the guideline area includes retaining walls, 55 stormwater drain outlets (Appendix 3) two decommissioned railway bridges, Lowths Bridge, Victoria Bridge and George Roberts Bridge. Of the 55 stormwater drain outlets, 19 are located in areas heavily populated by marine plants.

Access to and across the water will be enhanced through the construction of new infrastructure which includes two new pedestrian bridges, boardwalks, pedestrian pathways, and more than 20 water access points for use by tourists, sightseers and recreations fishers. Water access points are planned to be located in areas where they can provide dual functionality by providing access to the water as well as providing line of site to increase opportunities for casual surveillance. Boardwalks will be built in areas of high biodiversity to minimise impact on marine plant connectivity and to allow for educational opportunities. Many of these structures are proposed to be built in areas of marine plant growth, and disturbance is required in order to fulfil CPTED requirements. It will be minimised

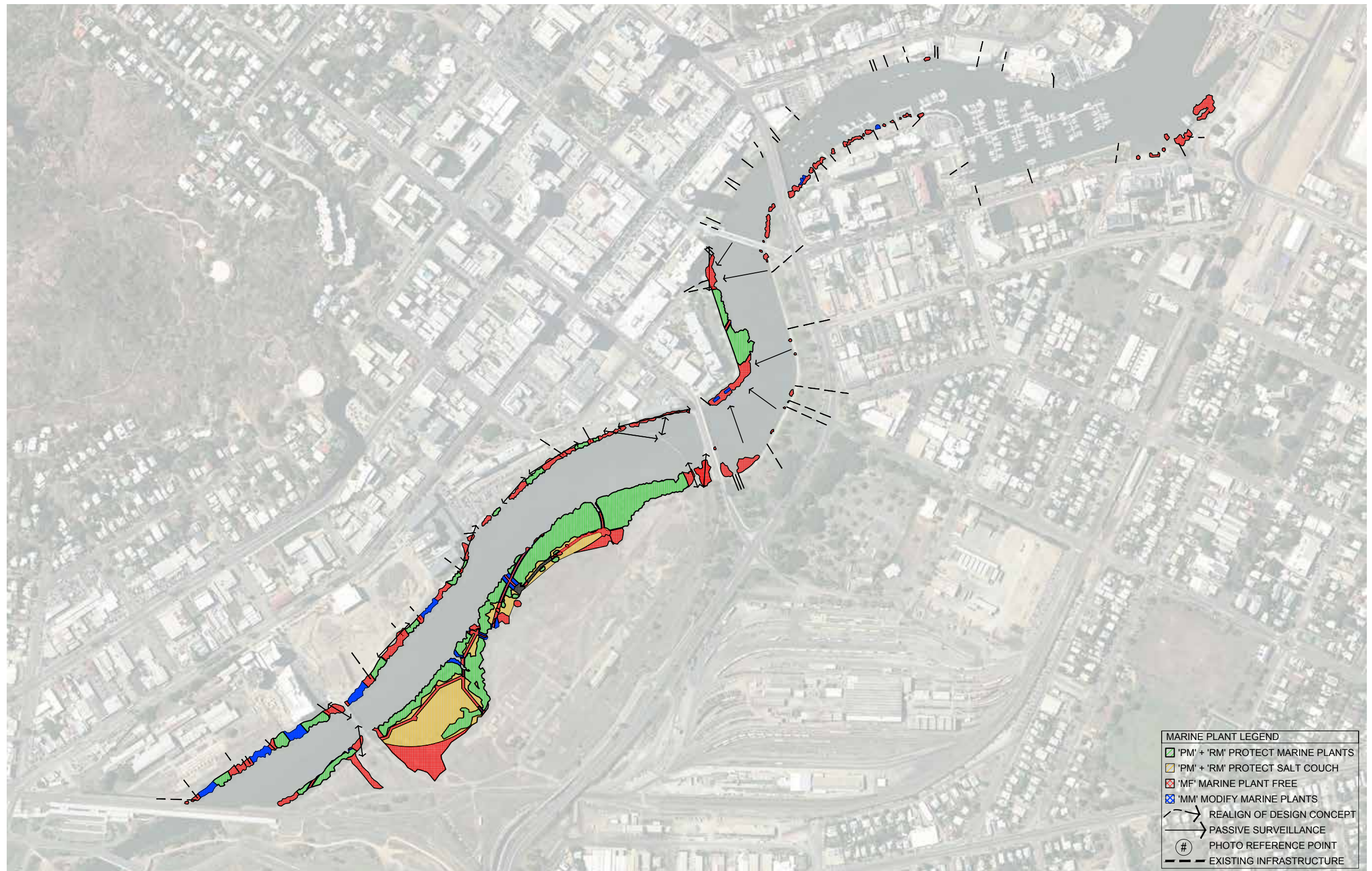
as much as possible in order to protect marine plants in these areas into the future. It is proposed to control the growth and encroachment of mangroves in these particular areas and maintain present gaps so that the construction of infrastructure in the future will require minimal disturbance to mangroves. All new infrastructure on the river bank will be subject to an assessment process with approvals obtained to ensure compliance with the PDA Development Scheme and the Marine Plant Management Guideline. Existing marine plants will not be disturbed until such approvals have been obtained.

Four main mangrove species are present in the guideline area. These are *Avicenia marina* (grey mangrove), *Lumnitzera* sp. (White-flowered black mangrove), *Rhizophora stylosa* (red mangrove) and *Bruguiera parviflora* (small-leaved orange mangrove). With *Avicenia marina* (grey mangrove) being the most commonly observed species. Due to past modification and historical uses the width of mangrove habitat varies through the guideline area and is often very narrow. The mangrove and salt marsh community within precincts 2 and 3 are the only areas which were not completely cleared historically and consequently are the areas with the widest range and highest biodiversity.

Photo reference points have been established for each precinct and an initial series of photographs are saved in Council records (Appendix 1). These will be used as part of the monitoring and evaluation process where photos taken every 12 months will be compared with those taken previously and assessed against the objectives for each precinct. This guideline has been formulated in recognition of the fact that bank and marine plant conditions may change from time to time. This may require a re-evaluation of marine plant management actions which could take the form of a major review of the guideline to be negotiated between the Council and Queensland Department of Agriculture and Fisheries. Minor changes may be dealt with by agreement between the two parties in an addendum to be added to the existing guideline. It is intended that the guideline itself will be reviewed every three years.

It is anticipated that marine plant management will commence in areas of existing infrastructure upon acceptance of this guideline. Marine Plants outside areas of existing infrastructure will be maintained until funding for future infrastructure becomes available. As funding is sourced to proceed with each phase of The Townsville Waterfront PDA, marine plants in those areas will be managed as per this guideline.

Figure 3 - Map of whole guideline area





REFERENCES

Queensland Primary Industries and Fisheries. Strategic marine plant management in Queensland: A partnership approach. Fact Sheet.

The State of Queensland. 2007. CPTED Guidelines for Queensland: Brisbane. <http://www.police.qld.gov.au/programs/crimeprevention/>

The State of Queensland, Department of Employment, Economic Development and Innovation. 2009. Code for self-assessable development,

Maintenance works on existing lawful structures (other than powerlines and on-farm drains) in a declared fish habitat area or involving the removal, destruction or damage of marine plants. Code number: MP02 April 2013.

The State of Queensland, Department of Employment, Economic Development and Innovation. 2009. Code for self-assessable development,

Minor impact works in a declared fish habitat area or involving the removal, destruction or damage of marine plants. Code number: MP06 July 2013.

Townsville City Council. 2015. Draft Townsville City Waterfront Priority Development Area.

Section 2

OBJECTIVES

Objective 1 – Monitor extent and height of marine plant growth to record baseline data to: determine if remedial actions are required to address threatening processes; protected areas are being maintained or enhanced; and to determine if marine plants in multiple use zones will need modification i.e. will impede infrastructure or passive surveillance within the following 12 months.

- 1.1 Take photos from photo reference points every 12 months prior to planning of works in marine areas.
- 1.2 Undertake GIS analysis as aerial photography is updated to determine changes in extent of marine plant areas and remap marine plant areas if required to improve accuracy of mapping layer records.

Objective 2 – Preserve identified areas of marine plants to ensure no net loss through protection and enhancement of designated marine plant areas in order to offset losses due to modification and maintenance of passive surveillance and riverbank amenities.

- 2.1 Identify areas of natural marine plant growth to be retained.
- 2.2 Aim for nil net loss of marine plants, from 1990 conditions, through promotion of growth in natural areas to offset losses due to maintenance, public safety and amenities.

Objective 3 – Maintain passive surveillance sightlines of the river from key areas of the riverbank to maintain passive surveillance to increase public safety as identified in the PDA.

The river and its natural features were noted as a key environmental attraction. A balance will be established between the need to retain marine plant features in their natural form and to provide opportunities for the public to safely enjoy all of the natural amenity features of the creek.

- 3.1 To undertake strategic marine plant management to create sightlines in key areas of marine plants for public safety.
- 3.2 A map of works is included for each precinct. All works to be carried out according to these plans to ensure compliance with the 2009 Codes for self-assessable development (MP02 and MP06).

Objective 4 – Provide access to river for recreational uses at strategic locations to ensure liveability and provide economic and social prosperity. This includes access to the river for recreational fishing, tourist visitation and passive recreation.

- 4.1 Undertake marine plant management to as create areas for future viewing and fishing platforms.
- 4.2 Undertake marine plant management when required to allow for construction and maintenance of an extended walkway and boardwalk.
- 4.3 All works to be carried out according to these plans to ensure compliance with the 2009 Codes for self-assessable development (MP02 and MP06).
- 4.4 Install educational signage in high use areas where marine plants are retained and managed in order to inform recreational users of mangrove distribution, values and management arrangements. The aim is to highlight the presence of marine plants as a positive and necessary component of a natural and attractive experience of the Ross Creek bank.
- 4.5 Provide for surveillance from the river bank to ensure compliance with Crime Prevention Through Environmental Design (CPTED) principles.

Objective 5 – Protect Council assets and provide access to these assets by maintaining clear areas around existing and future approved assets including jetties, pontoons, stormwater drain outlets, boardwalk and walkways.

- 5.1 The area subject to works in this guideline is not within a declared Fish Habitat Area however works will involve the removal, damage or destruction of marine plants.
- 5.2 All maintenance works to be carried out in compliance with Code for self-assessable development maintenance works on existing lawful structures (other than powerlines and on-farm drains) in a declared fish habitat area or involving the removal, destruction or damage of marine plants (MP02).

CATEGORIES OF MARINE PLANT MANAGEMENT

Protect Marine Plants – Management Code ‘PM’

The objective of ‘Protect Marine Plants’ is to retain the existing marine plant community distribution and diversity and to allow natural processes of further colonisation and marine plant community development to occur. Ideally these areas would benefit from being linked to terrestrial vegetated buffers to provide long-term protection.

Restore Marine Plants – Management Code ‘RM’

The objective of ‘Restore Marine Plants’ is to enhance degraded marine plant communities by removing or reducing threatening processes such as exotic weeds and facilitating natural colonisation by allowing passive regeneration. Areas where there are opportunities to enhance existing marine plant communities through active restoration will also be considered.

Marine Plant Free – Management Code ‘MF’

The objective of ‘Marine Plant Free’ is to maintain the existing situation where areas are kept free of marine plants through maintenance activities and there is no encouragement of

marine plant colonisation. This may be a result of bank engineering design, reduced hydraulic capacity, treatment or maintenance not specifically allowing for marine plant establishment i.e. concrete lined drain. Where areas are kept marine plant free, maintenance activities may include the strategic removal of marine plant propagates for restoration purposes, prior to maintenance works being conducted.

Modify Marine Plants – Management Code ‘MM’

The objective of ‘Modify Marine Plants’ is to minimise impacts to marine plant communities while continuing to meet maintenance or public use requirements. Marine plant modification techniques include trimming via boat, hedging to a height of 1.5m, selective species removal, thinning, crown lifting or replacement of taller varieties with low growing forms. The MPM guideline aims to identify innovative marine plant treatment techniques that support the retention of marine plants but allow necessary maintenance works to be conducted for public use or to provide flood immunity. For example, marine plants could be trimmed to allow access to the waterway for maintenance purposes i.e. dredging or for rubbish removal.

Precinct Management Strategies

PRECINCT 1 – CITY WATERFRONT GATEWAY

Description

This precinct will form a southern gateway to the CBD. Mangroves have re-established along the banks of the creek for most of this precinct. Modifications in this area will allow for greater access to the creek and views across to the mangrove and riparian habitat on the other side. Dominant marine plants here are *Avicennia marina* (grey mangrove).

Approximate area of marine plants – 10,331.4m ²		
Marine Plant	Area	Percentage
Mangroves Enhanced/Retained	4,922	47.64
Mangrove Modify	63.2	0.61
Mangroves Removed	5,346.2	51.75

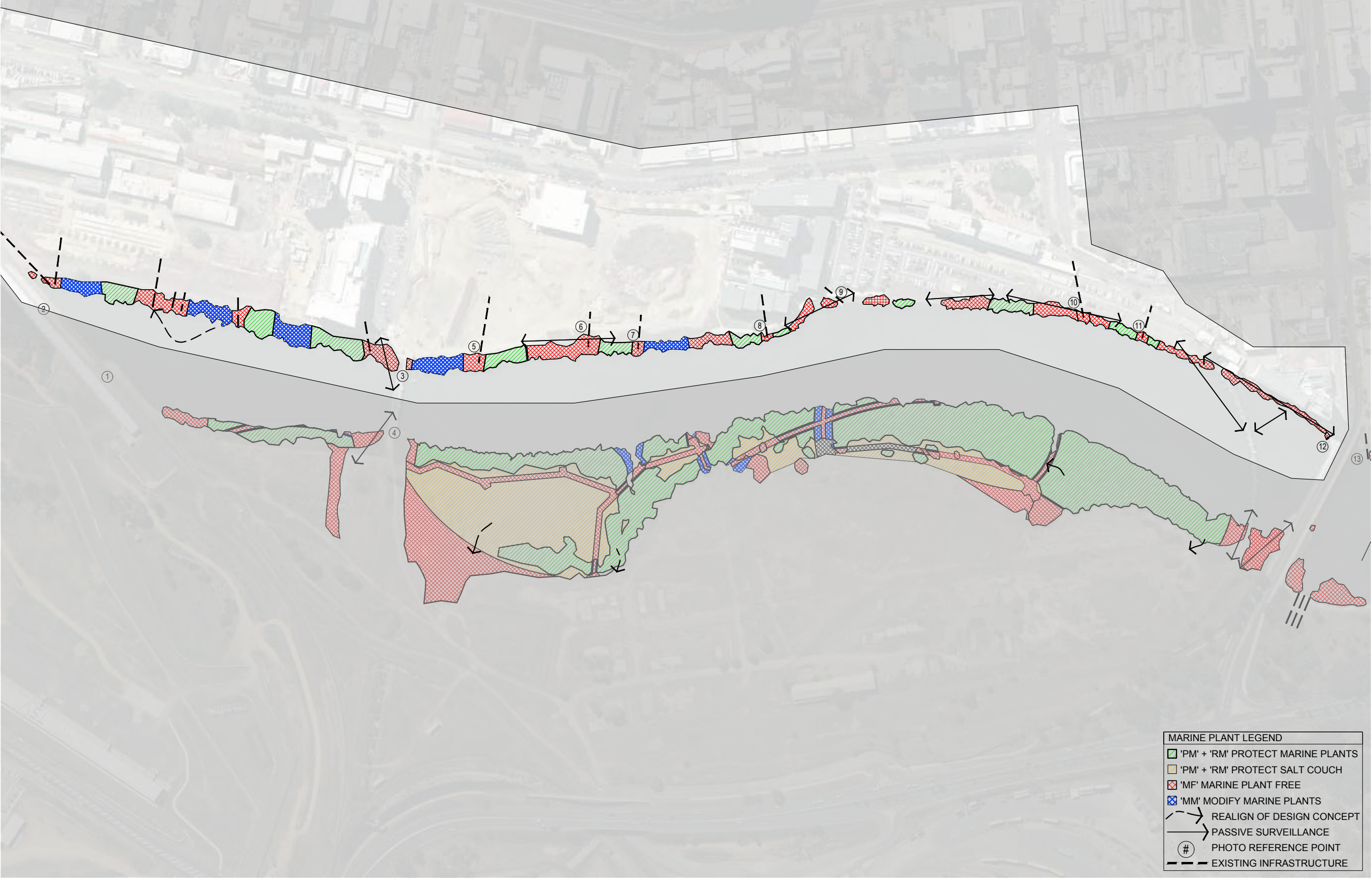
Summary of Proposed Marine Plant Management (% of total area) Mangroves removed 52.36% Mangroves maintained 47.64%.

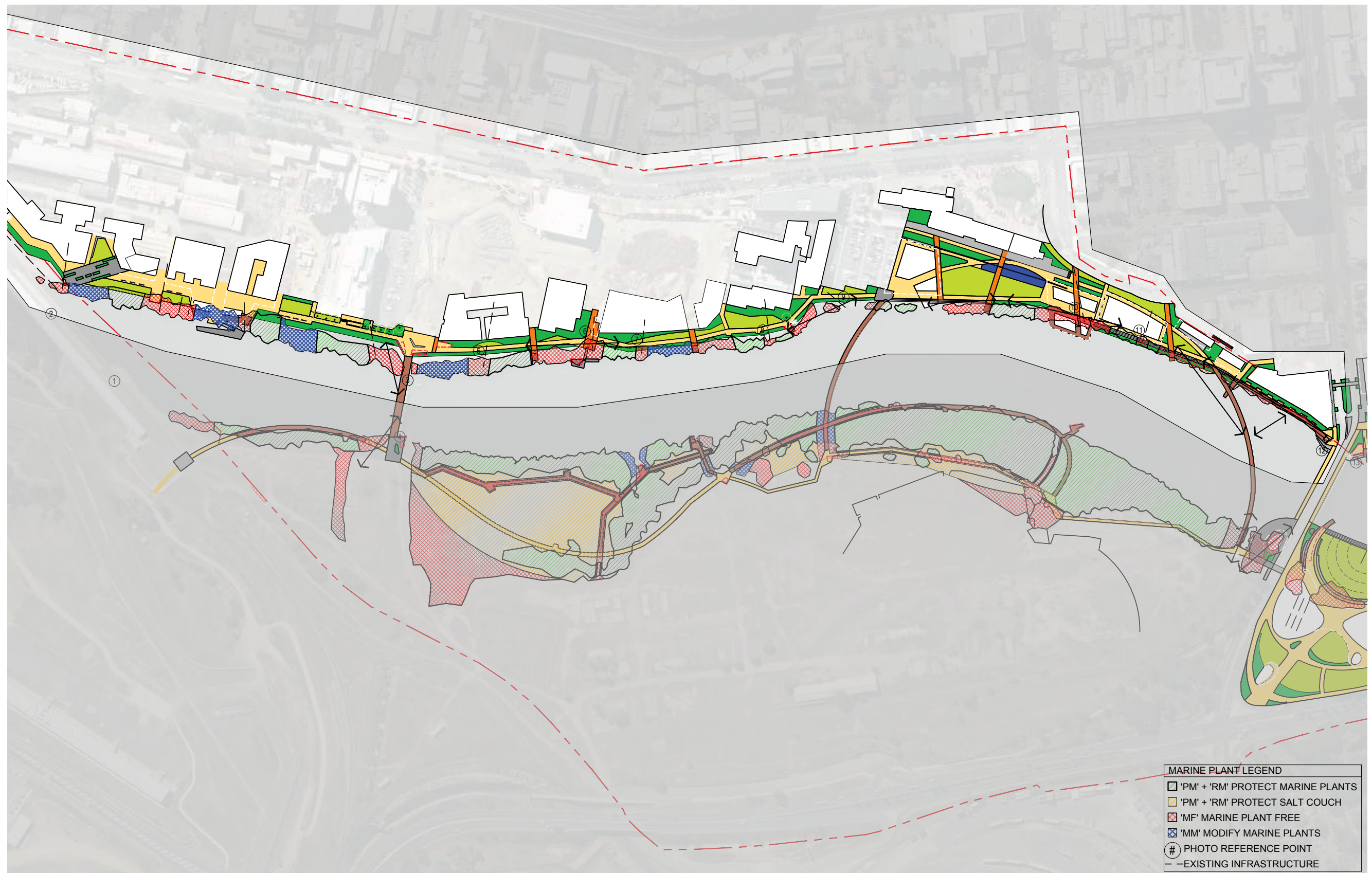
Photo reference point locations

- 1 Precinct 1 from Railway Platform
- 2 Precinct 1 from Railway Platform
- 3 Utilities bridge in Honeycombes
- 4 Utilities bridge in Honeycombes
- 5 - 12 Taken from bank adjacent to Central Development

Site Management

Guideline Objectives Relevant to this Precinct	Management Action	Management Code	Priority
Monitor extent and height of marine plant growth	Monitor extent and height of marine plant growth and record baseline data, to determine if remedial actions are required to address threatening processes, protected areas are being maintained or enhanced and to determine if marine plants in multiple use zones will need modification i.e. impede infrastructure or passive surveillance within the following 12 months	Monitor	
Create public water access points	Provide access to river for recreational uses at strategic locations to ensure liveability and provide economic and social prosperity. This includes access to the river for recreational fishing, tourist visitation and passive recreation.	MF	
Protect Council assets and provide access to these assets	Protect Council assets and provide access to these assets by maintaining clear areas around existing and future approved assets including jetties, pontoons, stormwater drain outlets, boardwalk and walkways.	MF	
Ensure passive surveillance from key areas to increase public safety.	Maintain passive surveillance sightlines of the river from key areas of the riverbank to maintain passive surveillance to increase public safety as identified in the PDA. The river and its natural features were noted as a key environmental attraction. A balance will be established between the need to retain marine plant features in their natural form and to provide opportunities for the public to safely enjoy all of the natural amenity features of the creek.	MM	
Retain identified areas of Marine Plants	Preserve identified areas of marine plants to ensure no net loss through protection and enhancement of designated marine plant areas in order to offset losses due to modification and maintenance of passive surveillance and riverbank amenities.	PM	





PRECINCT 2 AND 3

Description

The waterfront interface in these precincts aims to maintain the area’s riparian character. This will be reflected in the enhancement of natural areas with a focus on the protection and enjoyment of the site’s natural habitat and views. A mangrove boardwalk extending through this site will provide opportunity for an interpretive walk with an aim at education regarding how important mangroves are to the creek and its biodiversity.

Marine Plants in this area have been relatively undisturbed. This area has the highest ecological values along the creek. It functions as a nursery for both terrestrial and aquatic juvenile species. Dominant marine plants here are *Avicennia marina* (grey mangrove) with *Lumnitzera* sp. (black mangrove) and samphire also present.

Approximate area of marine plants – 38,061m ²		
Marine Plant	Area	Percentage
Mangroves Enhanced/Retained	14,995.1 m ²	39.40
Mangrove Maintenance	205.6 m ²	0.54
Mangroves Removed	2,838 m ²	7.46
Salt couch Enhanced/Retained	17,742.5 m ²	46.62
Salt couch Remove	2,279.8 m ²	5.99

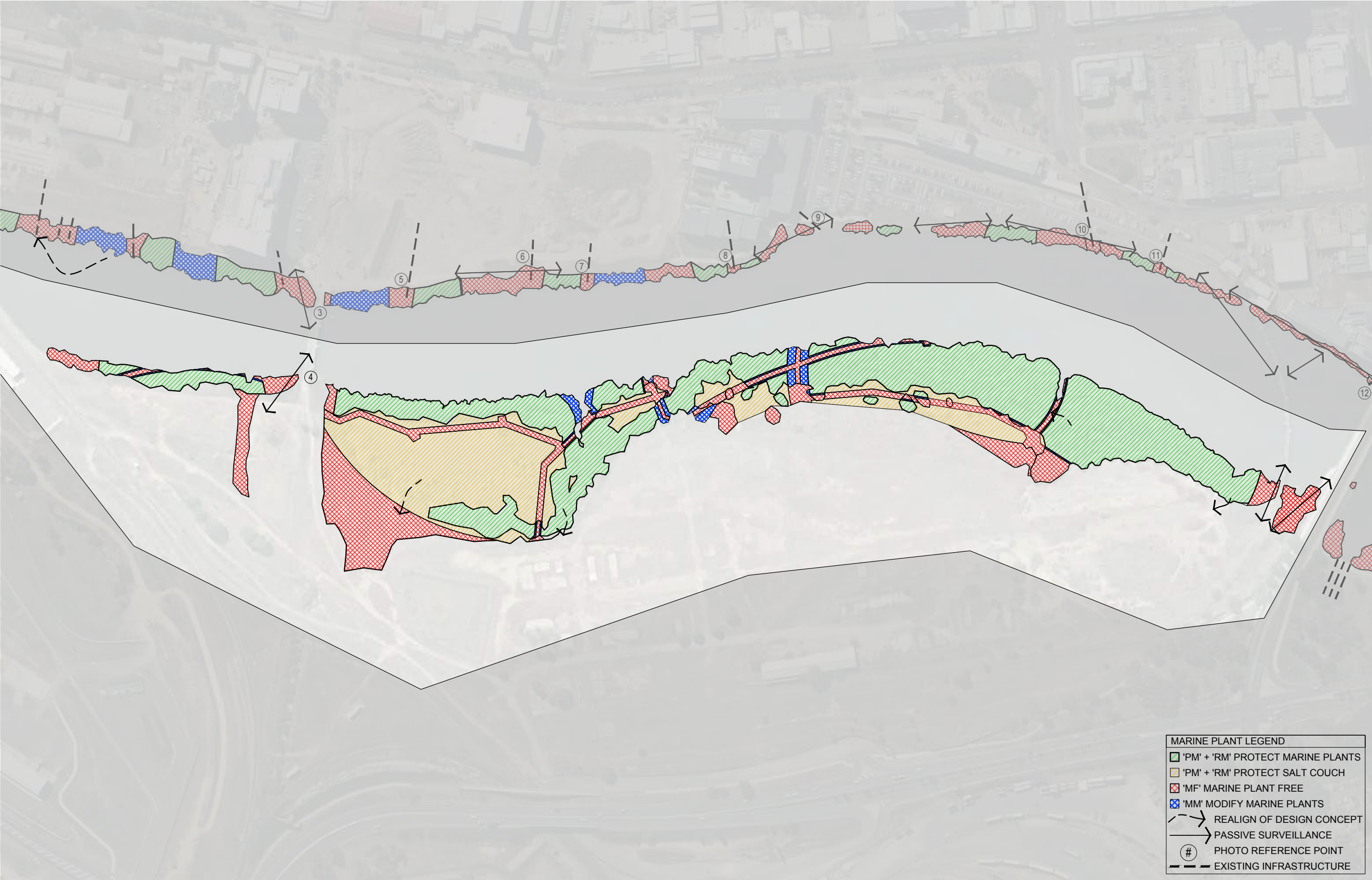
Summary of Proposed Marine Plant Management (% of total area) Marine plants removed 13.98% Marine plants maintained 86.02%

Photo reference point locations

- 1 Precinct 1 from Railway Platform
- 3 Utilities bridge in Honeycombes
- 4 Utilities bridge in Honeycombes
- 9 and 12 Taken from bank adjacent to Central Development

Site Management

Guideline Objectives Relevant to this Precinct	Management Action	Management Code	Priority
Monitor extent and height of marine plant growth	Monitor extent and height of marine plant growth and record baseline data, to determine if remedial actions are required to address threatening processes, protected areas are being maintained or enhanced and to determine if marine plants in multiple use zones will need modification i.e. impede infrastructure or passive surveillance within the following 12 months	Monitor	
Create public water access points	Provide access to river for recreational uses at strategic locations to ensure liveability and provide economic and social prosperity. This includes access to the river for recreational fishing, tourist visitation and passive recreation.	MF	
Protect Council assets and provide access to these assets	Protect Council assets and provide access to these assets by maintaining clear areas around existing and future approved assets including jetties, pontoons, stormwater drain outlets, boardwalk and walkways.	MF	
Ensure passive surveillance from key areas to increase public safety.	Maintain passive surveillance sightlines of the river from key areas of the riverbank to maintain passive surveillance to increase public safety as identified in the PDA. The river and its natural features were noted as a key environmental attraction. A balance will be established between the need to retain marine plant features in their natural form and to provide opportunities for the public to safely enjoy all of the natural amenity features of the creek.	MM	
Retain identified areas of Marine Plants	Preserve identified areas of marine plants to ensure no net loss through protection and enhancement of designated marine plant areas in order to offset losses due to modification and maintenance of passive surveillance and riverbank amenities.	PM	





THE WATERFRONT



PRECINCT 4 – HANRAN PARK

Description

Hanran Park celebrates the area’s historic role as the city’s port. Mangroves in this area were cleared historically but have recolonised since the late 1980’s.

Mangroves in this area are important for habitat connectivity of estuarine species as it is the only area of marine plant growth in this reach of the Ross Creek. Marine plant species here are *Avicennia marina* (gray mangrove), *Lumnitzera* sp. (White-flowered black Mangrove), *Rhizophora stylosa* (red mangrove) and *Bruguiera parviflora* (small-leafed orange mangrove). Although the dominant species is *Avicennia marina* (gray mangrove).

Approximate area of marine plants – 4,676.3m ²		
Marine Plant	Area	Percentage
Mangroves Enhanced/Retained	2,232.8	47.75
Mangrove Maintenance	48.9	1.05
Mangroves Removed	2,394	51.21

Summary of Proposed Marine Plant Management (% of total Area) Mangroves removed 52.25% Mangroves maintained 47.75%

Photo reference point locations

- 13 Taken within Hanran Park
- 14 Taken within Hanran Park
- 15 Taken within Hanran Park

Site Management

Guideline Objectives Relevant to this Precinct	Management Action	Management Code	Priority
Monitor extent and height of marine plant growth	Monitor extent and height of marine plant growth and record baseline data, to determine if remedial actions are required to address threatening processes, protected areas are being maintained or enhanced and to determine if marine plants in multiple use zones will need modification i.e. impede infrastructure or passive surveillance within the following 12 months	Monitor	
Create public water access points	Provide access to river for recreational uses at strategic locations to ensure liveability and provide economic and social prosperity. This includes access to the river for recreational fishing, tourist visitation and passive recreation.	MF	
Protect Council assets and provide access to these assets	Protect Council assets and provide access to these assets by maintaining clear areas around existing and future approved assets including jetties, pontoons, stormwater drain outlets, boardwalk and walkways.	MF	
Ensure passive surveillance from key areas to increase public safety.	Maintain passive surveillance sightlines of the river from key areas of the riverbank to maintain passive surveillance to increase public safety as identified in the PDA. The river and its natural features were noted as a key environmental attraction. A balance will be established between the need to retain marine plant features in their natural form and to provide opportunities for the public to safely enjoy all of the natural amenity features of the creek.	MM	
Retain identified areas of Marine Plants	Preserve identified areas of marine plants to ensure no net loss through protection and enhancement of designated marine plant areas in order to offset losses due to modification and maintenance of passive surveillance and riverbank amenities.	PM	

It should be noted that in this area council will be trialling canopy lifting and selective mangrove trimming as an interim measure. If these modifications are able to ameliorate some of the safety issues and allow for clear view lines into and out of the park, the amount of area identified as marine plant free will be re-evaluated.





PRECINCT 5 – CENTRAL

Description

The Central Precinct is a mixed use area which accommodates residential and short-term accommodation alongside existing tropical, marine and research-based tourism activities.

Marine plants in this area were historically cleared and rock retaining walls built. Very few marine plants are present in this precinct. The existing marine plants are primarily growing from the concrete retaining walls.

Approximate area of marine plants – 1,485.7m ²		
Marine Plant	Area	Percentage
Mangroves Enhanced/Retained		
Mangrove Maintenance	221	
Mangroves Removed	1264.3	

Summary of Proposed Mangrove Management (% of total area): Mangroves removed – 100%

Photo reference point locations
16 Taken from Victoria Bridge

Site Management

Guideline Objectives Relevant to this Precinct	Management Action	Management Code	Priority
Monitor extent and height of marine plant growth	Monitor extent and height of marine plant growth and record baseline data, to determine if remedial actions are required to address threatening processes, protected areas are being maintained or enhanced and to determine if marine plants in multiple use zones will need modification i.e. impede infrastructure or passive surveillance within the following 12 months	Monitor	
Create public water access points	Provide access to river for recreational uses at strategic locations to ensure liveability and provide economic and social prosperity. This includes access to the river for recreational fishing, tourist visitation and passive recreation.	MF	
Protect Council assets and provide access to these assets	Protect Council assets and provide access to these assets by maintaining clear areas around existing and future approved assets including jetties, pontoons, stormwater drain outlets, boardwalk and walkways.	MF	
Retain identified areas of Marine Plants	Preserve identified areas of marine plants to ensure no net loss through protection and enhancement of designated marine plant areas in order to offset losses due to modification and maintenance of passive surveillance and riverbank amenities.	PM	





PRECINCT 6 – TOMLINS AND WICKHAM

Description

This precinct is to provide a significant area for well-designed residential and commercial uses, including a range of supportive service-orientated land uses.

As with precinct 5 this area also was historically cleared of marine plants and rock retaining walls built. Very few marine plants are present in this precinct. The existing marine plants are primarily growing from the concrete retaining walls.

Approximate area of marine plants – 1,232.8m ²		
Marine Plant	Area	Percentage
Mangroves Enhanced/Retained		
Mangrove Maintenance	205.4	
Mangroves Removed	1027.4	

Summary of Proposed Mangrove Management (% of total area): Mangroves removed – 100%

Photo reference point locations

- 18 Taken from Tomlins Street
- 19 Taken from Tomlins Street
- 20 Taken from George Roberts Bridge
- 21 Taken from George Roberts Bridge

Site Management

Guideline Objectives Relevant to this Precinct	Management Action	Management Code	Priority
Monitor extent and height of marine plant growth	Monitor extent and height of marine plant growth and record baseline data, to determine if remedial actions are required to address threatening processes, protected areas are being maintained or enhanced and to determine if marine plants in multiple use zones will need modification i.e. impede infrastructure or passive surveillance within the following 12 months	Monitor	
Create public water access points	Provide access to river for recreational uses at strategic locations to ensure liveability and provide economic and social prosperity. This includes access to the river for recreational fishing, tourist visitation and passive recreation.	MF	
Protect Council assets and provide access to these assets	Protect Council assets and provide access to these assets by maintaining clear areas around existing and future approved assets including jetties, pontoons, stormwater drain outlets, boardwalk and walkways.	MF	
Retain identified areas of Marine Plants	Preserve identified areas of marine plants to ensure no net loss through protection and enhancement of designated marine plant areas in order to offset losses due to modification and maintenance of passive surveillance and riverbank amenities.	PM	





PRECINCT 7 – MARITIME MIXED USE

Description

This precinct accommodates marine transport infrastructure, State maritime infrastructure and marine-based commercial uses.

This area was historically cleared of marine plants and rock retaining walls built in many places. Many of the marine plants present are growing from rock retaining walls however, some mangroves have begun to recolonise in the few areas of undisturbed bank.

Approximate area of marine plants – 1,456.4m ²		
Marine Plant	Area	Percentage
Mangroves Enhanced/Retained		
Mangrove Maintenance		
Mangroves Removed	1,456.4	100%

Summary of Proposed Mangrove Management (% of total area): Mangroves removed – 100%

Photo reference point locations
17 Taken from Palmer Street

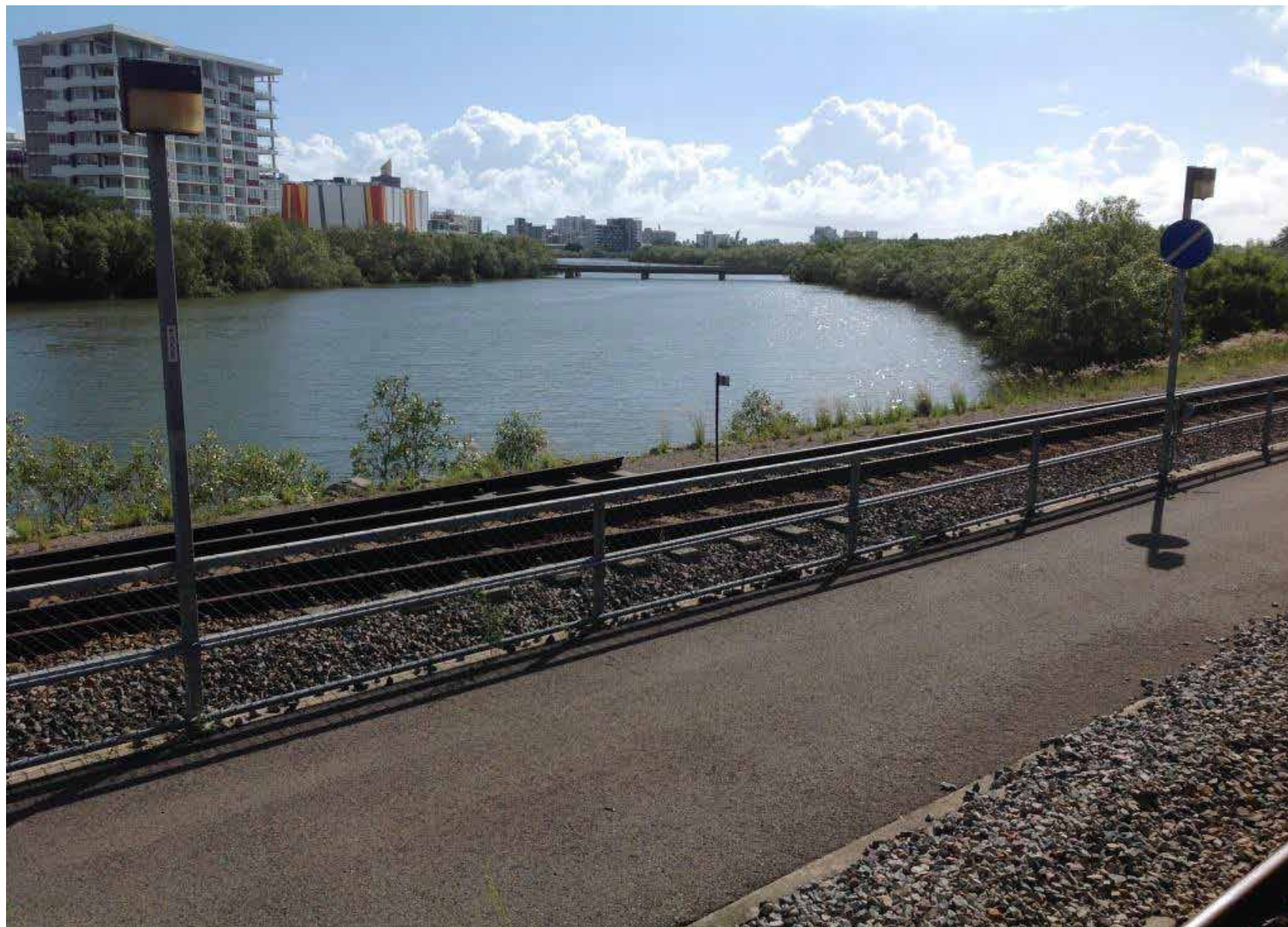
Site Management

Guideline Objectives Relevant to this Precinct	Management Action	Management Code	Priority
Monitor extent and height of marine plant growth	Monitor extent and height of marine plant growth and record baseline data, to determine if remedial actions are required to address threatening processes, protected areas are being maintained or enhanced and to determine if marine plants in multiple use zones will need modification i.e. impede infrastructure or passive surveillance within the following 12 months	Monitor	
Create public water access points	Provide access to river for recreational uses at strategic locations to ensure liveability and provide economic and social prosperity. This includes access to the river for recreational fishing, tourist visitation and passive recreation.	MF	
Protect Council assets and provide access to these assets	Protect Council assets and provide access to these assets by maintaining clear areas around existing and future approved assets including jetties, pontoons, stormwater drain outlets, boardwalk and walkways.	MF	
Retain identified areas of Marine Plants	Preserve identified areas of marine plants to ensure no net loss through protection and enhancement of designated marine plant areas in order to offset losses due to modification and maintenance of passive surveillance and riverbank amenities.	PM	



Appendix 1

PHOTO REFERENCE POINT LOCATIONS



Location 1
Railway platform looking Upstream at both sides of the creek



Railway platform looking Upstream at north creek bank along North Rail Yards



Location 2
Railway platform looking Upstream at north creek bank along North Rail Yards



Location 3
Utilities Bridge in Central looking upstream along north creek bank at North Rail Yards



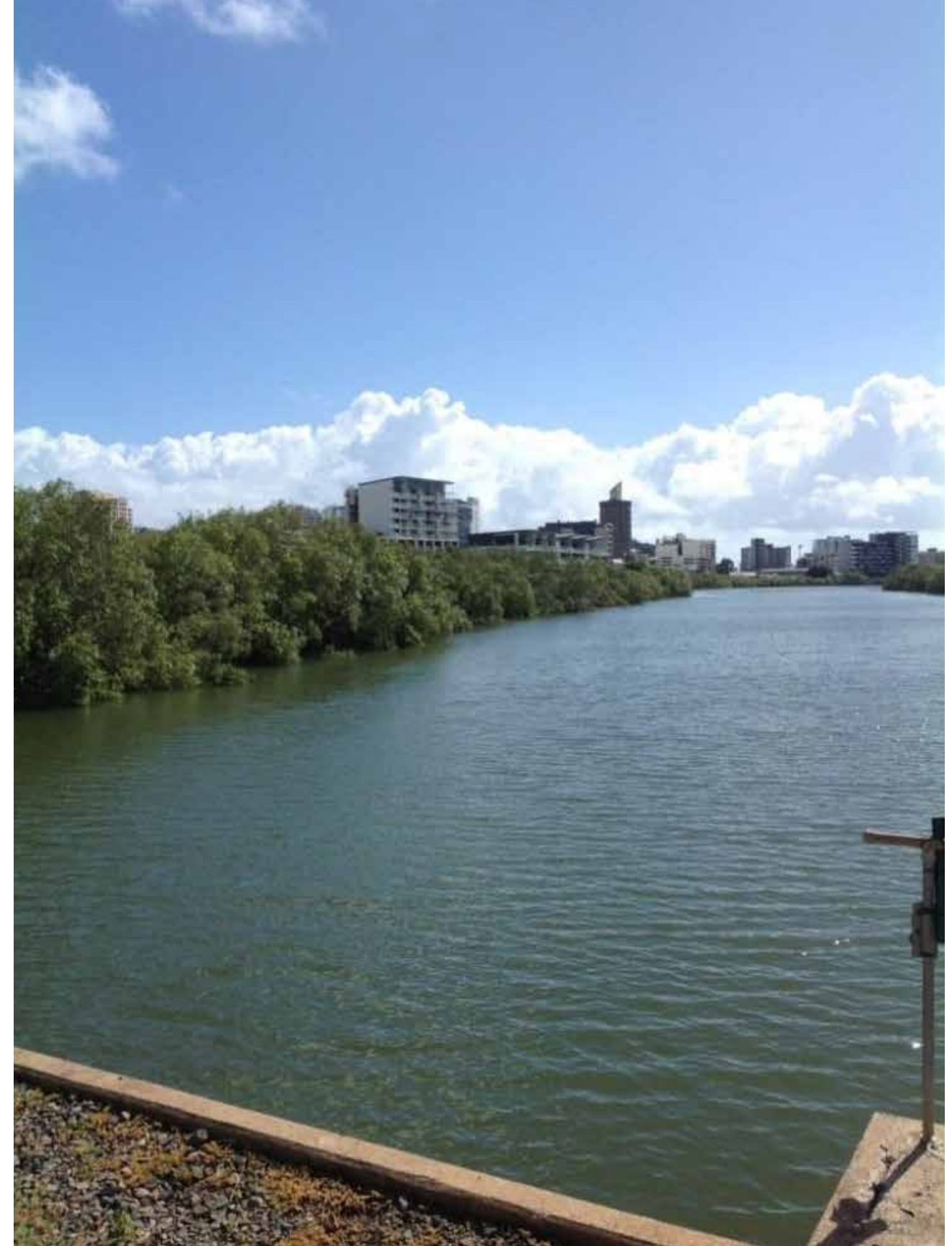
Utilities Bridge in Central looking upstream at south creek bank



Location 4
Utilities Bridge in Central looking upstream at north creek bank at North Rail Yards



Utilities Bridge in Central looking at north creek bank



Utilities Bridge in Central looking downstream at north creek bank along Central



Utilities Bridge in Central looking downstream at north creek



Utilities Bridge in Central looking upstream at south creek bank along South Yards



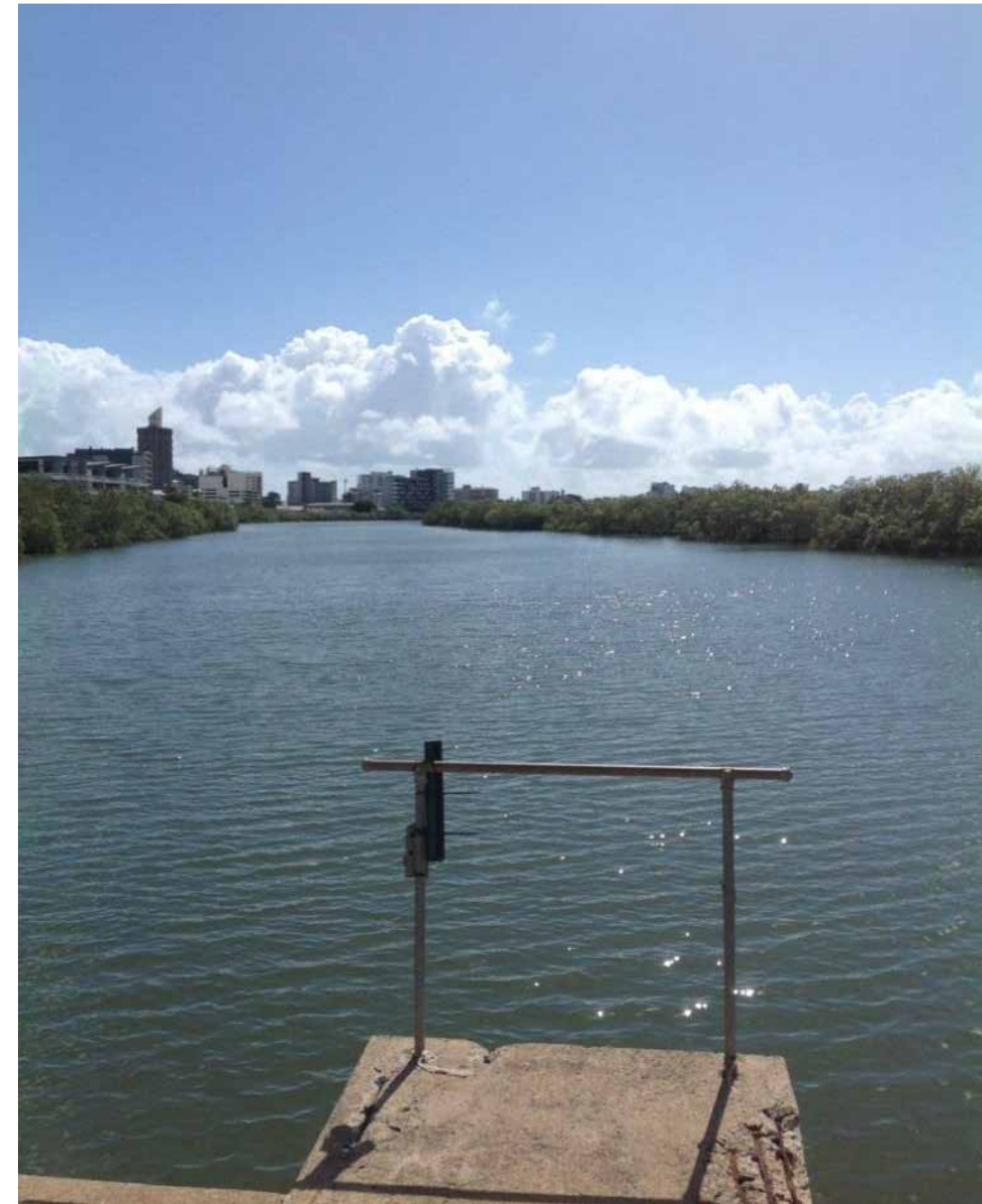
Utilities Bridge in Central looking south creek bank



Utilities Bridge in Central looking downstream at north creek south yards



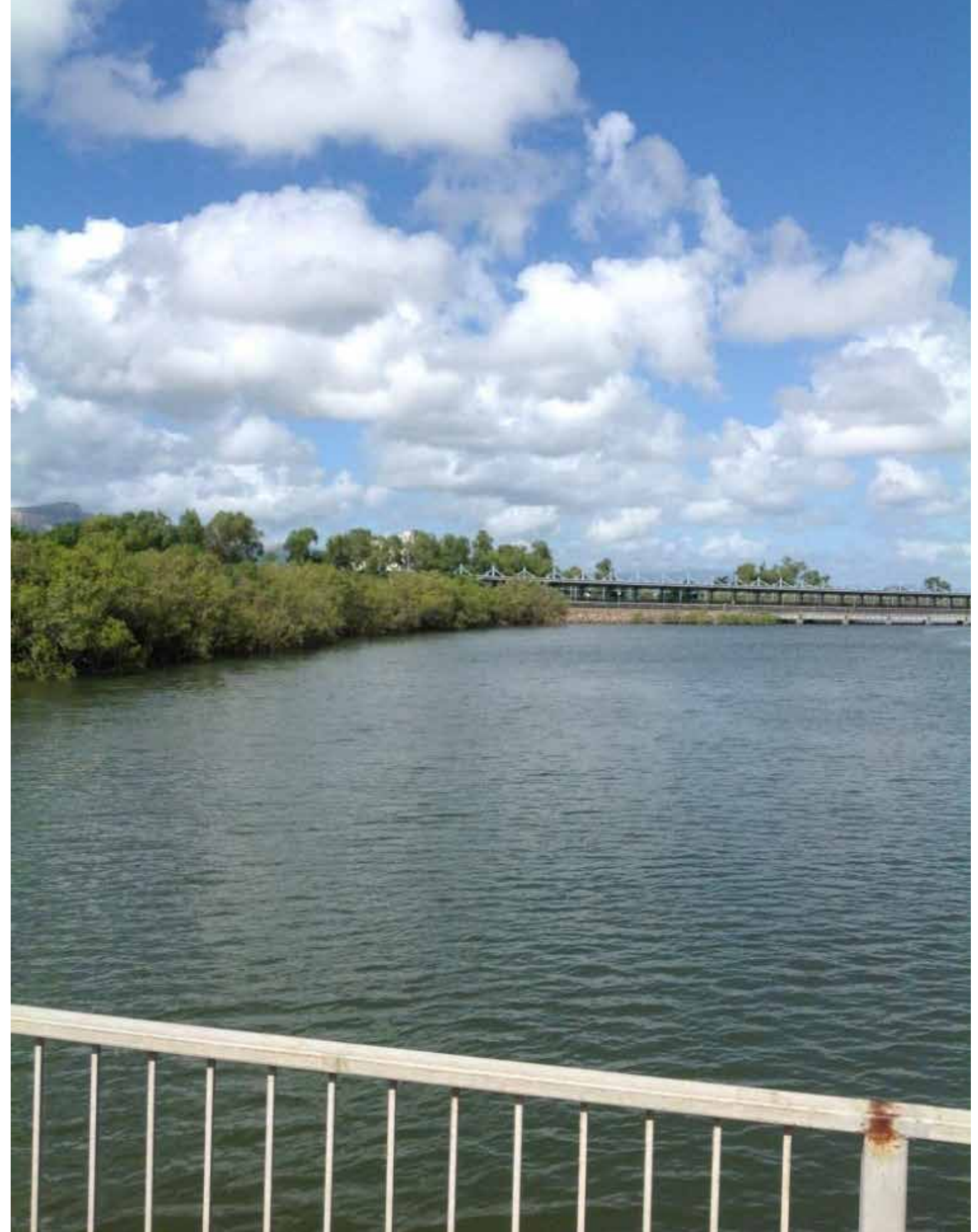
Utilities Bridge in Central looking downstream at south creek along south yards



Utilities Bridge in Central looking downstream at both sides of creek



Utilities Bridge in Central looking upstream at south creek bank of south yards



Utilities Bridge in Central looking upstream along south creek bank of south yards



Location 5



Location 6



Location 7



Location 8





Location 9







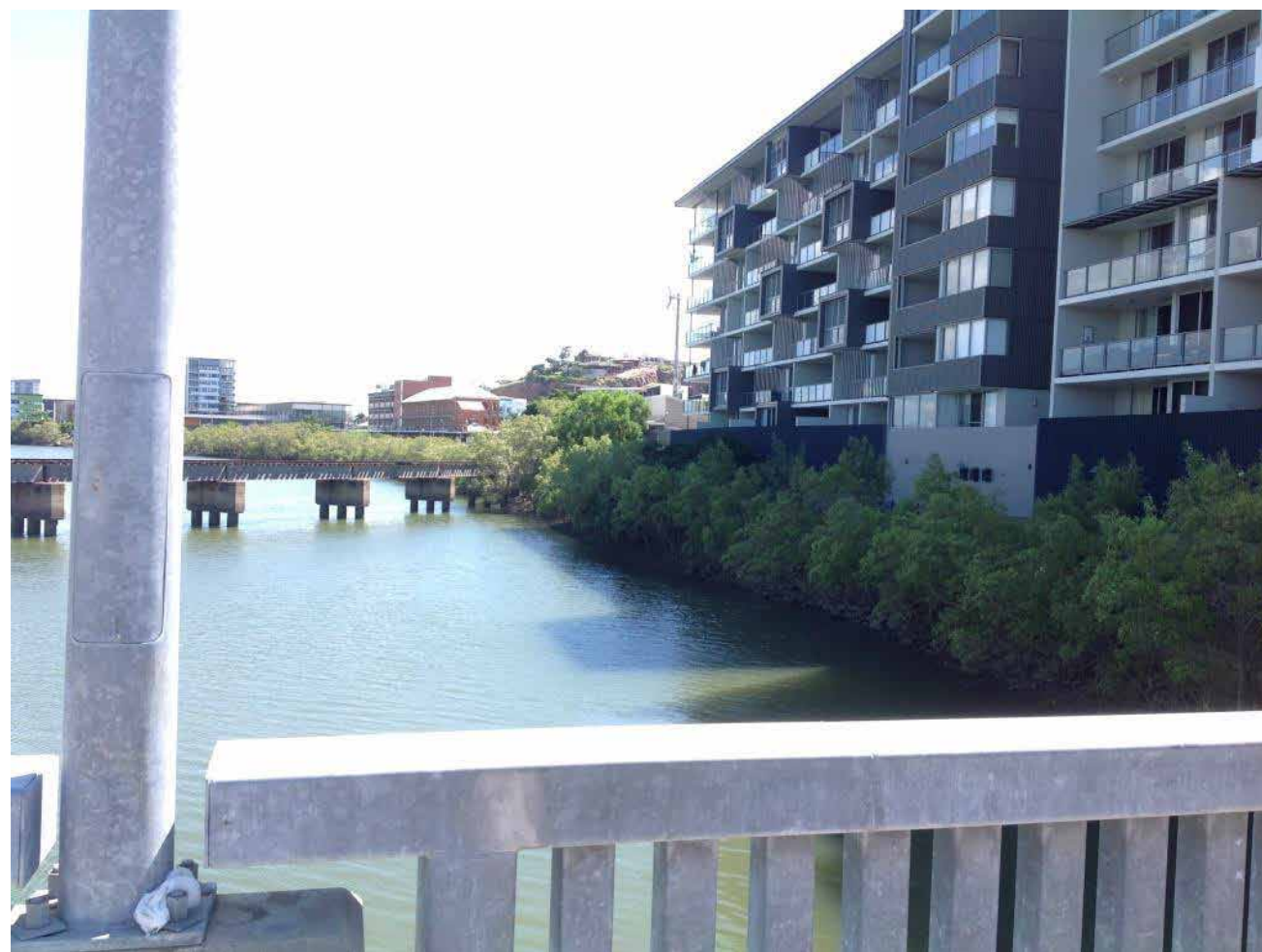
Location 10



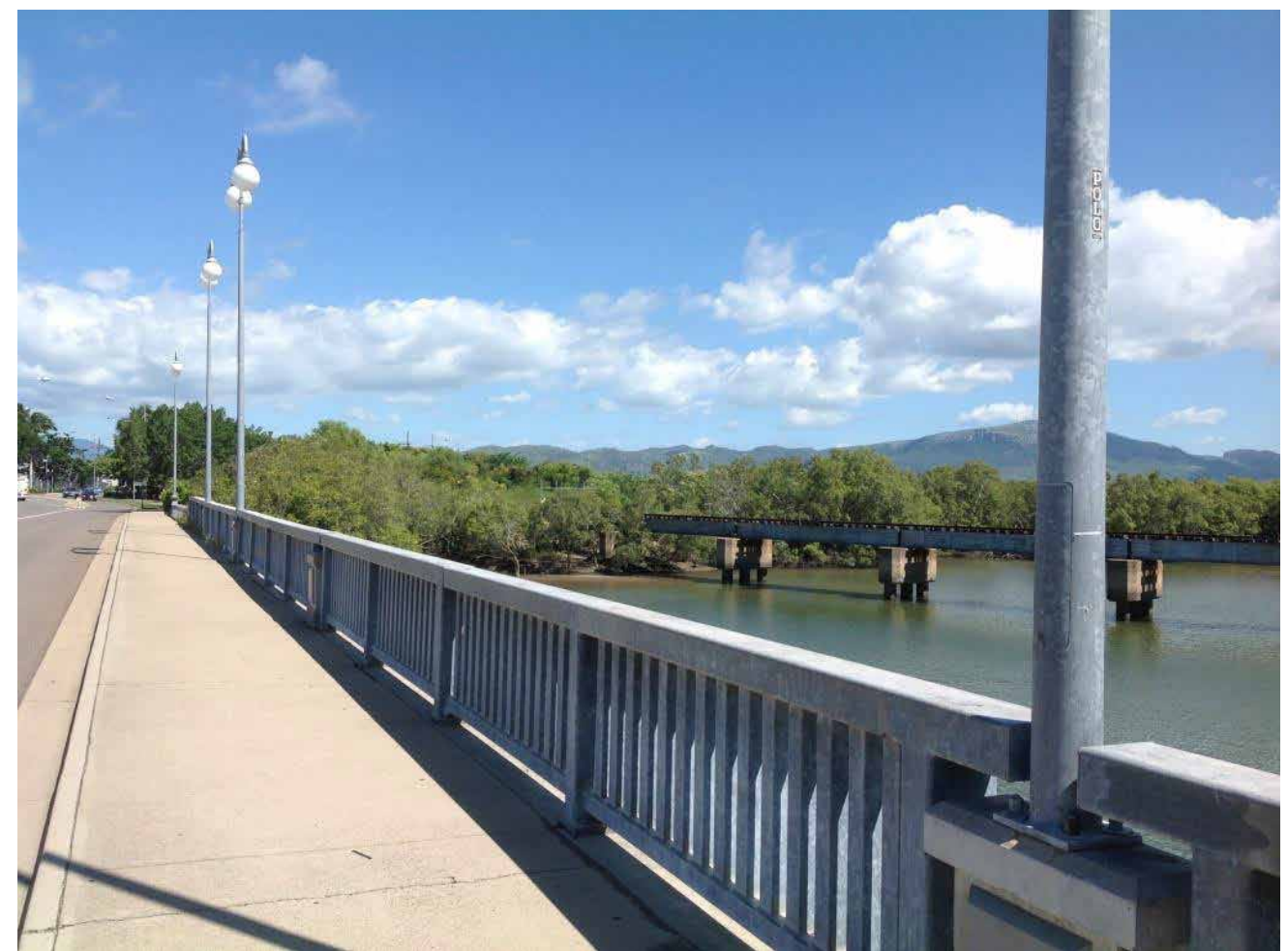


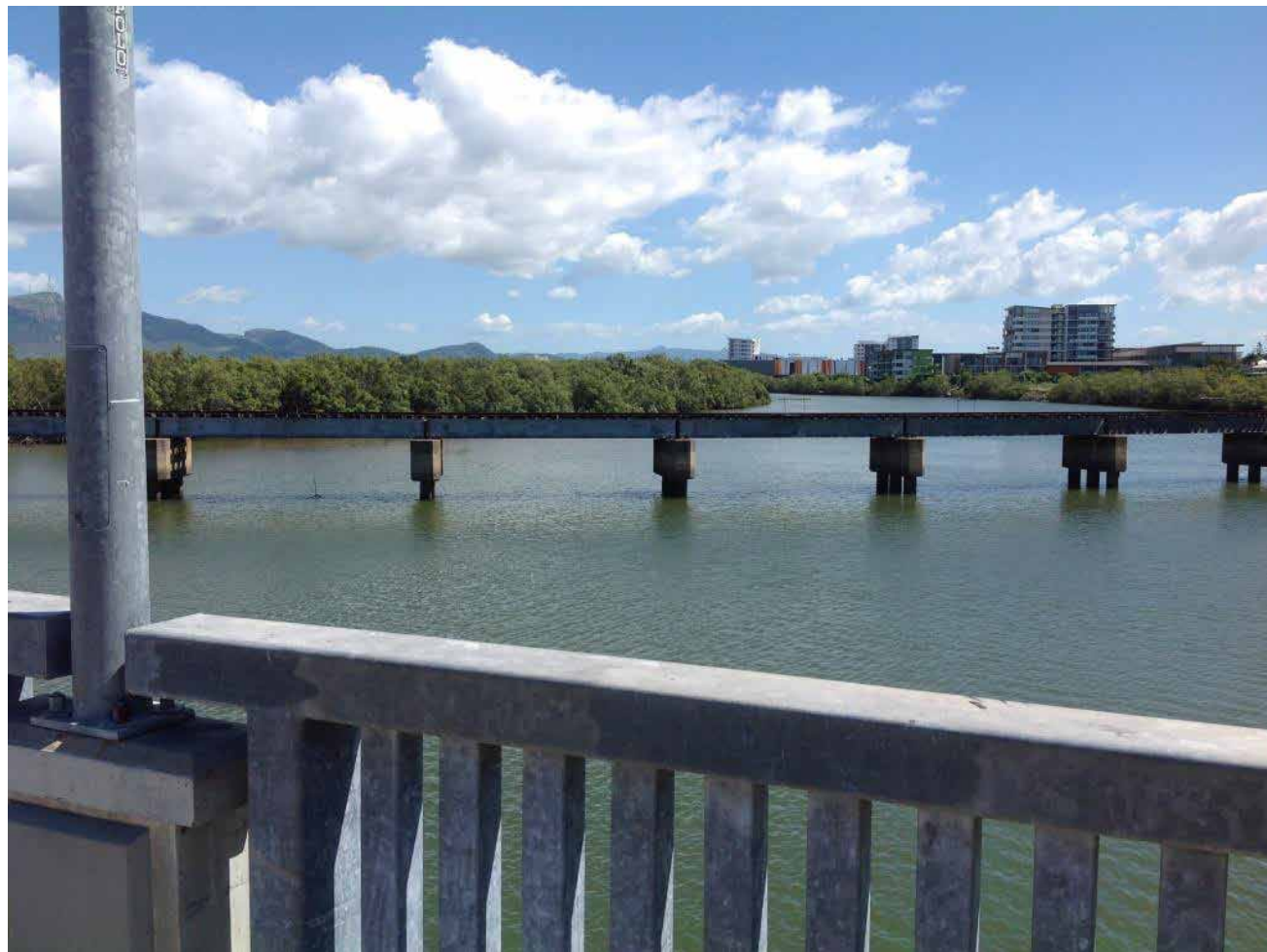
Location 11





Location 12





Location 13

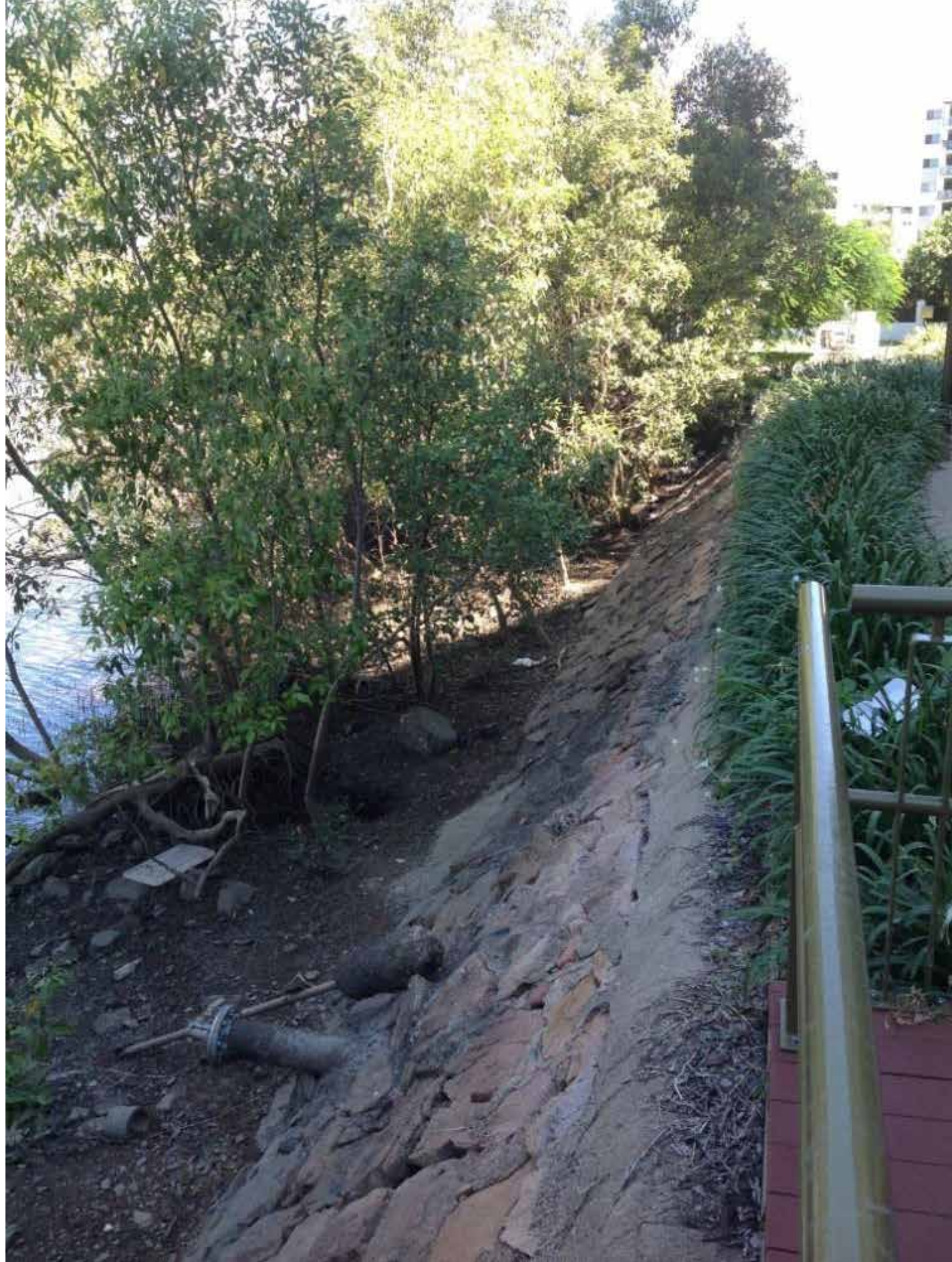




Location 14



Location 15



Location 16





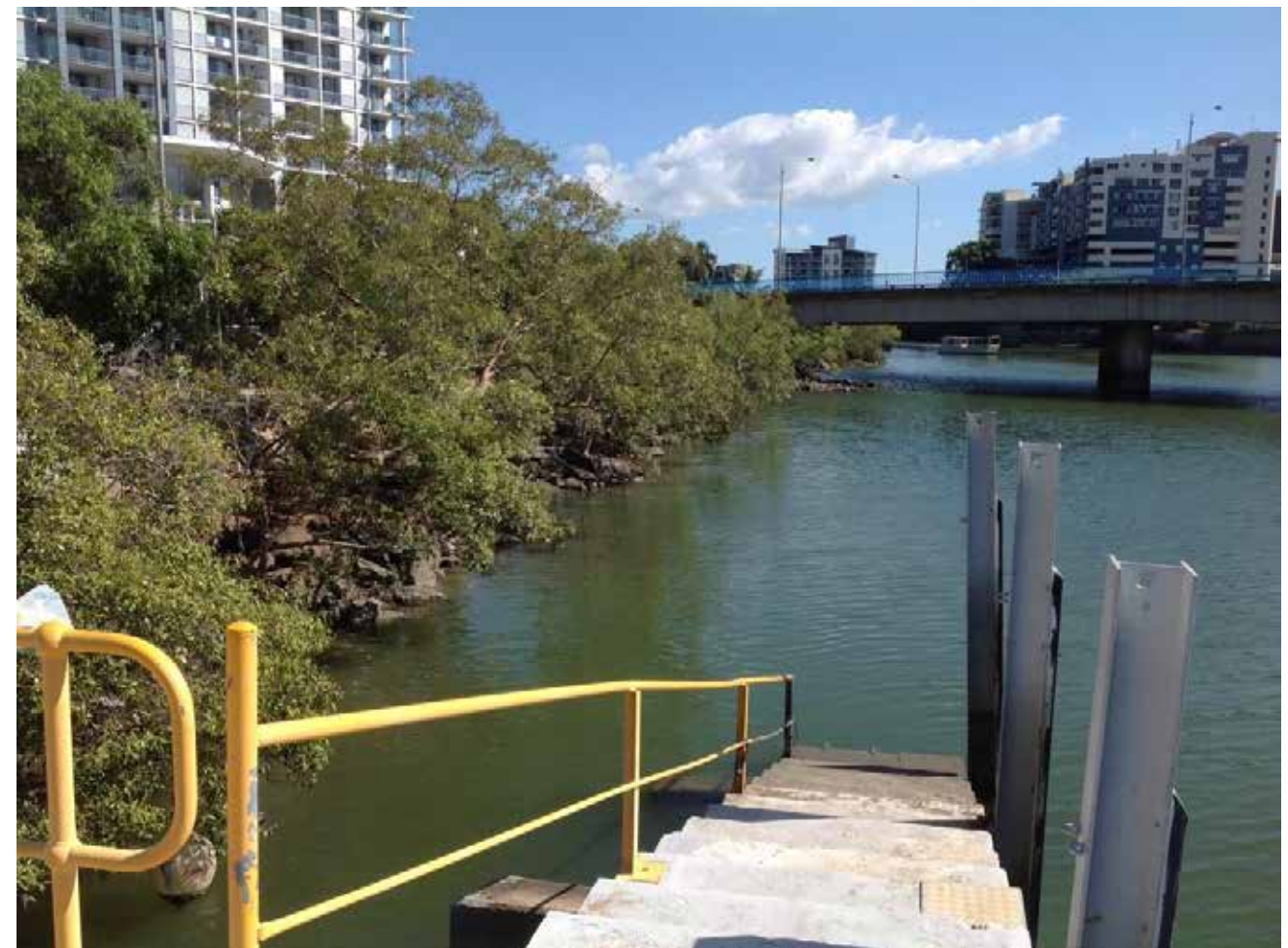
Location 17







Location 18



Location 19



Location 20



Location 21



APPENDIX 2

LIST OF PROPERTIES IN THE GUIDELINE AREA

Watercourse	Ross Creek
2SP155392	Lands Lease North Coast Railway (Townsville to Stuart)
1SP155392	Freehold (old rail yards)
4SP253510	Reserve
13SP253222	Reserve
1SP253506	Public Utilities (old rail yards)
202SP253569	Reserve
12SP117533	Reserve
204SP253509	Reserve
15SP208518	Public Utilities (Queensland Rail)
2RP741419	Public Utilities (Queensland Rail)
101SP187469	Reserve
Road Reserve	Rooney Street/Lowths Bridge/Stanley Street
2SP142955	Reserve (Hanran Park)
15T118347	Reserve (Hanran Park)
Central Park	
3T118640	Reserve (Central Park)
2 T118640	Reserve (Central Park)
1 T118640	Reserve (Central Park)
Road Reserve	Mcllwraith Street
6T118562	Reserve (Central Park)
5T118106	Reserve (Central Park)
4T118106	Reserve (Central Park)
3T118106	Reserve (Central Park)

Watercourse	Ross Creek
2T118106	Reserve (Central Park)
1T118106	Reserve (Central Park)
3SP123544	Reserve
Road Reserve	Palmer Street/Victoria Bridge/Stokes Street
488SP135285	Reserve
11SP267124	Vacant Land
5CP889271	Park Reserve
745EP1548	Park Reserve
Road Reserve	Dean Street/George Roberts Bridge/Denham Street
787EP22272	Vacant Land (Townsville Port Authority)
648EP1980	Restaurant/Fast Food Outlet
692EP2097	Vacant (Crown Land – State)
1EP837709	Professional Offices
1RP744384	Public Utilities (Flinders Street East car park)
2RP744384	Vacant Land
Road Reserve	Wickham Street
Road Reserve	Plume Street
200SP206741	Licensed Club – Non sporting
709SP135285	Public Utilities (Townsville Port Authority)
780SP129549	Vacant Land (Townsville Port Authority)
587SP130947	Public Utilities (Townsville Port Authority)
781SP130971	Vacant Land (Townsville Port Authority)

APPENDIX 3

SUMMARY OF ALL STORMWATER OUTFALLS IN GUIDELINE AREA

Location	Precinct	Description	Mangroves
Townsville Station Car park	1	Stormwater pipe Reference Number – 0206NC	yes
Sturt Street	1	Stormwater pipe Reference Number – 0160A2U	yes
Railway Yards	1	Stormwater pipe Reference Number – 0242C2U	yes
Railway Yards	1	Stormwater pipe Reference Number – 0242D2U	yes
Railway Yards	1	Stormwater pipe Reference Number – 0242E2U	yes
Flinders Street	1	Stormwater pipe Reference Number – 0092A2U	yes
Little Fletcher Street	1	Stormwater pipe Reference Number – 0113A2U	yes
Flinders Street	1	Stormwater pipe Reference Number – 0113AA1U	yes
Flinders Street	1	Stormwater pipe Reference Number – 0242H02U	yes
Flinders Street	1	Stormwater pipe Reference Number – 0242F2U	yes
Flinders Street	1	Stormwater pipe Reference Number – 0242J2U	yes
Flinders Street	1	Stormwater pipe Reference Number – 0009A2U	yes
Aplins Street	1	Stormwater pipe Reference Number – 0009AF2U	no
Blackwood Street	1	Stormwater pipe Reference Number – 0026A2U	yes
Hanran Street	1	Stormwater pipe Reference Number – 00026B03U	yes
Stanley Street	4	Stormwater pipe Reference Number – 0270A2U	yes
Hanran Street	4	Stormwater pipe Reference Number – 0270D1U	yes
Hanran Street	4	Stormwater pipe Reference Number – 0270E3U	yes
Stokes Street	4	Stormwater pipe Reference Number – 0272A3U	yes
Ogden Street		Stormwater pipe Reference Number – 0271A3U	no
Ogden Street		Stormwater pipe Reference Number – 0272B1D	no
Flinders Street		Stormwater pipe Reference Number – 0164A3U	no
Ogden Street		Stormwater pipe Reference Number – 0164A01U	no
Ogden Street		Stormwater pipe Reference Number – 0122B4U	no
Ogden Street		Stormwater pipe Reference Number – 0122A2U	no
Denham Street		Stormwater pipe Reference Number – 0078B2U	no
Denham Street		Stormwater pipe Reference Number – 0078A2U	no
Ross Creek		Stormwater pipe Reference Number – 0115F2U	no

Location	Precinct	Description	Mangroves
Flinders Street East		Stormwater pipe Reference Number – 0115A4U	no
Flinders Street East		Stormwater pipe Reference Number – 0115J2U	no
Flinders Street East		Stormwater pipe Reference Number – 0115H2U	no
Flinders Street East		Stormwater pipe Reference Number – 0115B1U	no
Flinders Street East		Stormwater pipe Reference Number – 0115D1D	no
Wickham Street	6	Stormwater pipe Reference Number – 0115E2U	no
Flinders Street East	6	Stormwater pipe Reference Number – 0115G2U	no
Ross Street	7	Stormwater pipe Reference Number – 0132P2U	yes
Ross Street	7	Stormwater pipe Reference Number – 0250A3U	yes
Palmer Street	7	Stormwater pipe Reference Number – 0203A2U	no
Palmer Street		Stormwater pipe Reference Number – 0221A2U	no
Palmer Street		Stormwater pipe Reference Number – 0221B2U	no
Plume Street		Stormwater pipe Reference Number – 0233A2U	no
Tomlins Street	6	Stormwater pipe Reference Number – 0008NC14U	yes
Tomlins Street	6	Stormwater pipe Reference Number – 0008NC12U	yes
Tomlins Street	6	Stormwater pipe Reference Number – 0008NC10U	yes
Tomlins Street	6	Stormwater pipe Reference Number – 0008NC8U	yes
Tomlins Street	6	Stormwater pipe Reference Number – 0008NC6U	yes
Anthony Street	6	Stormwater pipe Reference Number – 0008NC4U	yes
Tomlins Street	6	Stormwater pipe Reference Number – 0008NC2U	yes
Dibbs Street	6	Stormwater pipe Reference Number – 0008A2U	yes
Palmer Street	5	Stormwater pipe Reference Number – 0205E2U	no
Dean Street	5	Stormwater pipe Reference Number – 0205A2U	no
Dean Street	5	Stormwater pipe Reference Number – 0205B2U	no
Dean Street	5	Stormwater pipe Reference Number – 0205C2U	yes
Dean Street	5	Stormwater pipe Reference Number – 0205D1U	yes
Dean Street	5	Stormwater pipe Reference Number – 0249A2U	yes
Rooney Street	5	Stormwater pipe Reference Number – 0242A2U	yes



THE WATERFRONT

13 48 10

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