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Chapman River Estuary Reserve Action Plan 2022 - 2025

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Abbreviations

CGG - City of Greater Geraldton
 CRF - Chapman River Friends
 CRRP - Chapman River Regional Park
 DBCA - Department of Biodiversity, Conservation and Attractions
 DPAW – Department of Parks and Wildlife
 DWER - Department of Water and Environment Regulation
 DPLH - Department of Planning, Lands and Heritage
 IUCN - International Union for Conservation of Nature
 NACC NRM - Northern Agricultural Catchments Council
 NRM - Natural Resource Management
 TEC - Threatened Ecological Community
 YSRC - Yamatji Southern Regional Corporation

We respectfully acknowledge the Southern Yamatji people, who are the Traditional Owners and original natural resource managers of the lands and waters in the City of Greater Geraldton, and pay our respect to their Elders and leaders, past, present and emerging.

This project is supported by funding from the Western Australian Government’s State NRM Program.

1 Introduction

The Chapman River Estuary is a highly valued, heavily used urban space. The estuary reserve area that is the subject of this Action Plan extends from the bridge on Chapman Road west to the river mouth. It is emphasised that the Study Area (Figure 1) encompasses only the section of river considered estuarine (ie has tidal influence) and is a small section of the larger Chapman River Regional Park. It has high intrinsic environmental value, being home to a Threatened Ecological Community (Subtropical and Temperate Coastal Saltmarsh), and high social and cultural value for the community. There are a number of divergent views within the community on how to manage access and use in this area.

The Chapman River Estuary area is composed of a complex set of tenures including Crown land vested with the City, City of Greater Geraldton Freehold property, Vacant Crown Land, and privately owned property extending to the water's edge. A registered Aboriginal heritage site and a Threatened Ecological Community are located in this area, indicative of the concurrent cultural and ecological significance of this area. Walk trails weave through the riparian vegetation - the community has an expectation of continued access to the area and recent closures of walk trails through the Threatened Ecological Community have highlighted the strength of these expectations. While these areas are important for recreation, this must be balanced with all values of the area.

1.1 Scope

The City of Greater Geraldton (hereby referred to as “the City”) has engaged NACC NRM to develop a three-year Chapman River Estuary Reserve Action Plan, informed by values-led community engagement, input, and feedback. The Plan will recommend actions to the City, providing a transparent way forward for management of the area, and clearly define the expectations and responsibilities of the land manager and other local stakeholders.

This Action Plan focuses on the immediate management and conservation of the estuary while including plans to investigate some of these larger scale topics. It is important to note areas of interest that fall outside the scope of this three-year Action Plan, include;

- land tenure,
- catchment scale projects,
- burning regimes,
- coastal erosion plans, and
- anti-social behaviour*.

*“anti-social behaviour” refers to a variety of negative activities occurring in the area including intentional environmental damage, trespassing, littering, violence, and criminal activities. This environmentally-focused project will recommend actions to reduce environmental damage that may have the added benefit of reducing impacts of anti-social behaviours, however, regulation and compliance are outside the scope of this Action Plan.

1.2 Goal

The aim of the Chapman Estuary Reserve Action Plan is to provide a framework, informed by stakeholder and community input, to protect the ecological and cultural values of the site.

1.3 Objectives:

- Increase understanding/awareness of the sites ecological and cultural values.
- Provide a transparent framework to inform decision-making and investment from July 2022 through June 2025.
- Determine specific actions to mitigate threats to ecological and cultural values.

1.4 Study Area

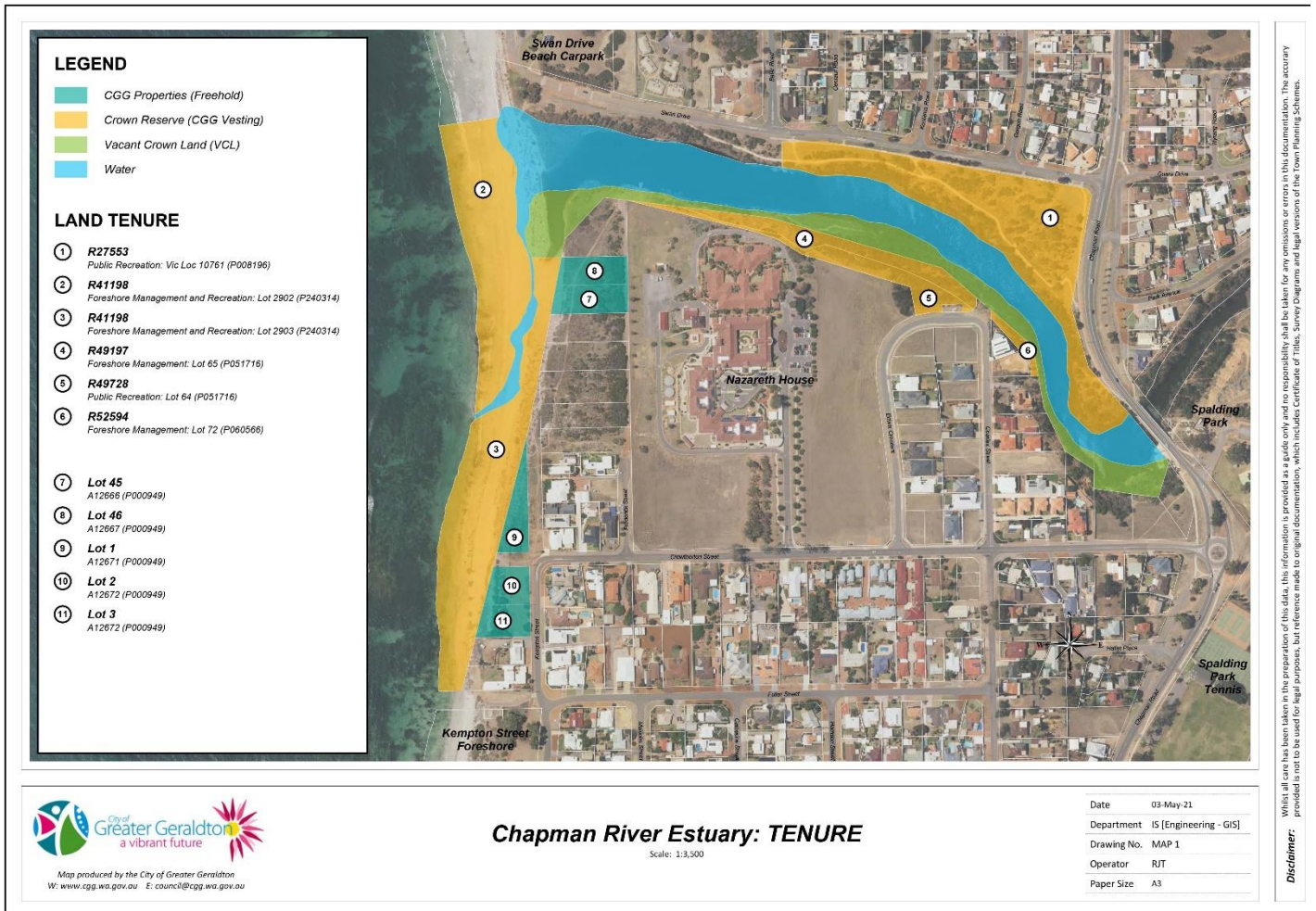


Figure 1. Map of Chapman River Estuary showing the tenure of the project area (Source: CGG).

2 Action Plan

The development of this plan was informed through a thorough and values-led, community and stakeholder engagement process. The following key issues areas were highlighted as priorities for management action. Actions to address each issue are in the following section, with an anticipated timeline presented.

2.1 Actions

Environmental Value			
Number	Action	Responsibility	Anticipated schedule
E1	Rabbit Control	CGG	2023-2025*
<p>Rabbits are a threat to native vegetation through grazing activity, and they outcompete native animals for food and habitat (DBCA 2014). The construction of warrens also poses a safety risk to recreational users.</p> <p>From Workshop 1, rabbits were noted in significant numbers in the area, negatively affecting native flora and fauna, and creating visible warrens along walking trails and exercise areas.</p> <p>Recommended Action: It is recommended the City engage a contractor to undertake rabbit control in affected areas. Appropriate methods of control include warren gassing and destruction as baiting is not suitable in an urban setting. Warren destruction involves ground disturbance, therefore this action should occur pending Heritage Agreement. Refer to Figure 2 for reference of identified areas where rabbit control is required.</p>			
E2	Weed Control	CGG/Community	Ongoing
<p><i>Lycium ferocissimum</i> (African Boxthorn) and <i>Opuntia sp.</i> (Prickly Pear) are common weeds in the Midwest region and are present in the study area. These weeds and others present in the area, including <i>Verbesina encelioides</i> (crownbeard), <i>Cynodon dactylon</i> (couch grass), and <i>Juncus acutus</i> (spiny rush) outcompete native vegetation for ground cover. As a result, these invasive species decrease habitat availability for native fauna, as well as altering sediment movement in the area. Native species have a greater capacity to trap sediment during peak river flow or rainfall events, while the weed species provide little structure to prevent wind and water erosion (Water and Rivers Commission 2001).</p> <p>From the workshops, stakeholder survey, and targeted community engagement, weeds were noted as a significant issue leading to ecosystem loss and imbalance in the area. Community members noted couch grass at the river mouth, and highlighted the impacts of weeds on native vegetation and the abundance of ants showing the imbalance in the natural environment.</p> <p>Recommended Action: The City currently engages contractors to remove <i>Lycium ferocissimum</i> and <i>Opuntia sp.</i> in this area. The City also have a “Boxthorn Blitz” program where community and stakeholders can get involved and help keep the area Boxthorn free. Community members and groups like Chapman River Friends (CRF) can assist with monitoring in this area, and make use of CGG’s ‘SnapSendSolve’ App to report weeds.</p>			
E3	Investigate Storm Water Infrastructure	CGG	2022-2023
<p>Water quality, erosion, and drainage concerns were a main theme throughout the consultation process. Discussions largely focused on water quality decline and significant erosion of riverbanks. It is recognised that multiple contributing factors impact and contribute to water quality, erosion, and</p>			

drainage issues. The cumulative impact of other measures outlined in this plan need to be taken into consideration as contributing to site stability and supporting the intended reduction of hard surface water flow and erosion (including E2, E4, E7, S2). Land management practises and water quality upstream are known contributing factors, these are outside the scope of this Plan. DWER's Chapman River Flood Study informs infrastructure planning within the Project Area. From Workshop 1, suggestions were made to investigate alternative drainage options on the northern side to reduce direct flow of stormwater into the river.

In regard to water quality, risk of disease is a State Government responsibility. However, the City's Environmental Health team undertakes monthly water quality testing throughout the summer months, monitoring for various levels of bacteria and the presence of amoeba, particularly *Naegleria fowleri*. Generally, there are no findings, however, a reading of *Naegleria amoeba* (not the *fowleri* sp.) earlier this year suggests the environment's capacity for hosting *Naegleria fowleri*.

Recommended Action: the City to maintain testing and install signage at the popular swimming sites.

The current stormwater infrastructure, particularly the northern discharge point, has potential to cause significant environmental damage by draining vehicle wastes and other pollutants directly into the river. The area at the corner of Swan Dr and Chapman Rd has been revegetated without installation of a Bio-filter or similar.

Recommended Action: Further investigation into practical and efficient stormwater discharge solutions, including the efficacy of the existing drainage sump on the southern bank, is considered a priority. It is also recommended the City commission a study to look into stormwater management options, such as biofiltering.

E4	Fencing	CGG	2023-2024*
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The use of fences to protect threatened, damaged, or recovering ecosystems is a widely used conservation technique, providing protection from natural and anthropogenic activities that limit rehabilitation (DPAW 2007). Many of the fences in the study area, particularly on the northern side, have been renewed in recent years. See inventory map (Figure 4) for current fencing infrastructure.

Community and stakeholder reports acknowledge the high ecological and aesthetic value of the area, and make further comment on the damage caused by prohibited motor vehicle and recreational access.

Recommended Action:

The recommended approach is to implement fencing or physical barriers, with appropriate authorisation, to restrict vehicle access as well as foot traffic in order to provide protection to threatened vegetation. Installation of new fencing is recommended on the southern side of the river, particularly to control access on the dune system west of Nazareth house and along the walk trail following the southern side of the river. This action is subject to heritage agreement due to ground disturbance. Refer to the Action Plan map (Figure 2) for spatial representation of proposed fencing.

Effective implementation of infrastructure, such as fencing and signage, may help restrict access to vulnerable or private areas, reducing the impacts of antisocial behaviours and damage to the flora (particularly the Threatened Ecological Community).

E5	Monitoring of Threatened Ecological Community	Community	Yearly
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The Chapman River mouth is home to a Subtropical and Temperate Coastal Saltmarsh ecological community, which is nationally listed as a 'Vulnerable' Threatened Ecological Community (TEC). At the river mouth, this saltmarsh fills vital ecological roles such as providing a rich, biodiverse habitat, supporting intricate food webs; filtration of riverine water prior to entering the ocean (thereby preventing algal blooms and eutrophication), carbon sequestration, enhanced riverbank stability,

greater coastal productivity, and protection of the coastal zone from storms and wave surge (DPAW 2007).

Throughout the community and stakeholder engagement process, primary concern focused on protecting the Project Area for the ecological values. Declining riparian vegetation and the resulting loss of habitat for wildlife were identified as primary concerns that reflect the state of the TEC.

Recommended Action:

This action would largely rely on community groups and members, in consultation with the City, the Department of Biodiversity, Conservation and Attractions (DBCA), and NACC NRM, to implement and continue long-term monitoring providing reliable insight into the health and required management of the ecosystem. It is recommended the City take the lead role in ensuring community groups are engaged in this project and assist in creating the monitoring strategy specific to the Chapman Estuary. Further protections may be applied based on, and informed by, improved monitoring.

E6	Managing Recommended Fishing Spots	CGG/Community	Ongoing
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Recreational fishing along the river and at the river mouth has led to the accumulation of discarded fishing materials, largely fishing line, which poses a known choking, strangulation, or entanglement threat to wildlife.

Many concerns identified around litter are relating to recreational fishing materials. Incidents of bird entanglement in fishing line were noted. Suggestions for managing these issues included installing fishing line bins, ongoing education and awareness, and pruning of overhanging branches at popular fishing spots.

Recommended Action:

From community feedback, the primary action recommended is to use signage and marketing to recommend ‘fishing locations’. These locations can be promoted for fishing, with the installation of ‘Reel It In’ Bins, signage and pruning of overhanging branches. Encouraging recreational fishers to use managed areas, while deterring fishing in fenced areas, targets the issues of fishing litter. Refer to the Action Plan map (Figure 2) for the proposed locations of the recommended fishing areas.

The intent is for the City to install the signage, undertake pruning of branches and establish the bin program in consultation with the community. To be successful, on-going bin management will need to be undertaken by the local community. This community initiative is proposed to generate and increase education and social responsibility.

DBCA have implemented a similar “Reel It In” program elsewhere. Supporting the concept of volunteer monitored bins dedicated to removing fishing waste. “Reel It In” bins are present at many popular beaches and rivers throughout Perth and Peel as well as becoming adopted more regionally. Through relationship building and management with local community groups and potentially schools, the City will support these groups by providing the bins and assisting to empty as necessary.

E7	Opportunities for Rehabilitation	CGG	2023-2025*
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Native vegetation is adapted to the areas unique composition and effectively provide a myriad of ecosystem services including soil stability through intricate and deep root systems, filtration for improved water quality and habitat for native fauna (Water and Rivers Commission 2001).

Community appreciation and concern for native vegetation and the ecosystem services it provides was largely acknowledged throughout the engagement process.

Recommended Action:

There are several areas that provide opportunities for revegetation. Previously fenced and revegetated areas on the north side have some bare areas with potential for infill revegetation.

Investigation into strategic planting on the south side between Charles St and Chapman Rd may encourage rehabilitation in this heavily impacted area. Investigation into the most appropriate rehabilitation techniques is required, there may be potential for brushing, riverbank stability, and erosion control.

Further City support for the suppression and potential eradication of existing weeds will also assist with native species regeneration.

Social, Cultural and Recreation Value

Number	Action	Responsibility	Timing
S1	Develop Heritage Agreement	CGG/YSRC	2022-2023

The Yamatji Nation Claim consent determination and Indigenous Land Use Agreement was signed on 7 February 2020. This Agreement between the State of Western Australia and the Yamatji Southern Nation supports Aboriginal empowerment and recognition and includes a diverse range of benefits. The recent conclusion of the determination process, development of a representative corporation, and attainment of culturally appropriate processes has laid the foundation for the City to develop a Heritage Agreement with the Yamatji Southern Regional Corporation (YSRC).

Targeted engagement with members of the YSRC Cultural Committee further highlighted the area's cultural heritage and significance. Current Aboriginal heritage and knowledge is often poorly reflected in existing records.

Recommended Action:

The recommendation is for the City to develop a site assessment plan and conduct a review of Aboriginal heritage surveys (i.e. archaeological, anthropological, ethnographic), in collaboration with the YSRC Cultural Committee. This process will support the collection of accurate and current knowledge. Any constructed signage that is informing community on Aboriginal heritage (or in further site reports) should be completed in collaboration with the YSRC Cultural Committee to ensure accurate and complete representation. Interpretive signage with Aboriginal names for local animals, plants, and heritage will demonstrate equal respect and add culturally appropriate information and value to the area.

The City has made a commitment to develop a Cultural Heritage Management Plan, including an Aboriginal Engagement Strategy, in order to ensure ongoing collaboration with the Cultural Committee and to ensure appropriate communication channels are followed. This process sits with the City's Community Development Team.

S2	Trail renewal & closure	CGG	2023-2024*
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Access should be managed to provide a balance between ecological values and recreation. There are two intentional trails in the area, running along each side of the river, connecting on the Chapman Rd bridge and on the beach in front of the river mouth, creating a circular route. Due to impacts from cyclone Seroja, and access through private property, the walking trail on the southern side of the river is now partially closed (from Chapman Rd to Charles St). The stairs to the East of Nazareth house, on the southern trail, require renewal for public safety. The trail on the northern side of the river is well maintained and mostly concrete or limestone, and lined by fencing. There is currently an undesignated walk trail along the river mouth, impacting both primary coastal dune flora and wetland communities including *Tecticornia sp* (samphire).

Throughout the engagement process, the high recreational value of the area was noted, with many enjoying the circular walking trail, which was previously available along the river. The investigation of the feasibility of a boardwalk or sections of boardwalk was encouraged, allowing protection of the riparian vegetation and sediments beneath, with potential to maintain circular access and further appreciation on the river from suitable vantage points.

Recommended Action:

It is recognised that community opinion has remained conflicted throughout the consultation process, and consensus was not reached in relation to the closed section of trail. It is recommended that the closure of the southern trail between Charles St and Chapman Rd be formalised, as this section of trail runs through private property, and is no longer appropriate to remain a public walkway. Irrespective of this action, private property owners are permitted to fence their property along their boundary, which if undertaken on particular properties this would in effect close the trail. Closing the larger section from Charles St to Chapman will give greater protection to the riparian vegetation, and wildlife using the area.

S3	Signage – plan/review signage and install/remove as required	CGG	2022-2024*
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Signage in the area is limited and at times inconsistent. There is a “No Fishing” sign on the north side of the river, while there is a Department of Fisheries “Species Identification Guide” sign on the south side. There are also “Dogs on Leads” guidelines on the larger site signs, however, from observations and anecdotal reports, dogs are generally off leads throughout the area. The ad hoc pathways across the river mouth and through the dune system west of Nazareth house are not clearly marked or sign posted, hence vegetation is adversely impacted.

Workshop reports and community feedback noted the inconsistent messaging and ineffectiveness of the signage in the area. Despite the “Trail Closed” signage on the southern side (from Charles St to Chapman Rd), the trails is frequently in use.

Recommended Action:

The development of a signage plan will ensure consistent messaging and education, leading to better compliance. In Year 1 the signage plan will be developed; identifying which new signs are required and which existing signs need updating to reflect user information, key messages and collaboration with YSRC to acknowledge the significance of the area and include cultural and heritage information. Year 2 and 3 of the signage plan (pending heritage agreement) will direct creation, installation and renewal of signs.

S4	Develop communication plan	CGG	2022-2023
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Developing broad community awareness of the environmental values of the area is important to encourage social responsibility and instil respect for the area. Antisocial behaviour has occurred throughout the Chapman River estuary area, with vandalism of adjacent residential properties, intrusively loud trail bikes, and intentional destruction of City property being particularly problematic (Firth 2009).

Throughout the community and stakeholder engagement processes, the passion and appreciation for the area was evident. There is stakeholder and community interest to create a “community of care”, encouraging further education and social responsibility, as well as ideas for art projects and events to further enjoy the area.

Recommended Action:

Through the development of a two-way communication plan, the City can support the community with clear information. This is intended to support weed control, native revegetation (specifically for local residents on their private property), supporting collaborative regeneration of ecological function and value), community education, and all other engagement activities.

The City is committed to creating media releases about the environmental values of the area, and the work that is being done. A communication plan will support clear and consistent messaging and provide a platform for the City to promote key values and for community to convey information back to the City. The City recognises the efforts of CRF and the work they do to promote the values of the Chapman Estuary and Chapman River Regional Park, it is recommended the City

support and enhance the communication activities of such community groups through the communications plan.

S5	Install/renew seating	CGG	2023-2024*
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There are eight benches and one picnic table within the project area. There are only two benches on the southern side of the river, one of which (nearest to the steps) requires renewing. Refer to the current infrastructure map (Figure 4) for locations.

Community input called for more seating on the southern side, reinforcing appropriate areas of use for the public.

Recommended Action:

It is recommended the City renew the bench near the steps and install a seat in an appropriate area near the pontoon, both on the southern trail (Figure 2). This action is subject to heritage agreement due to ground disturbance. This action, in culmination with others will assist the City in refining appropriate areas of recreational use within the site.

Planning & Tenure			
Number	Action	Responsibility	Timing
P1	Investigate Reserve Status/ creation of 'Regional Park'	CGG	2022-2023

There are two main actions relating to tenure and planning that came out of the consultation process.

- 1) Investigate the formalisation of the Chapman River Regional Park, with opportunity to rename to better align with conservation purposes. The Chapman River Estuary is informally referred to as being part of the Chapman River Regional Park, from the Chapman River Management Plan developed in the 1980's. However, the formalisation of a regional park status never occurred. Recommendation from the Geraldton Local Biodiversity Strategy (2013), recommends the 'Creation of Regional Park joining Chapman River Reserves, Foreshore Reserves and Cutubury Nature Reserve'.
Community members discussed how the name of the area influences public behaviour. For example, "Chapman River Park" implies it is an area for play and recreation, while "Chapman River Reserve" installs the importance of nature preservation for the area. The majority of participants agreed a change in the name may help increase appropriate use of the area, with suggestions including "Chapman Wildlife Reserve" and "Chapman River Nature Reserve". Formalisation of the Regional Park may provide opportunity for a name change.
- 2) Apply for the parcel of Unallocated Crown Land to be vested with the City for Management. This will consolidate the management of the area with the City and increase the City's capacity to maintain consistent management and messaging practices throughout the Estuary area.

* Timeline indicative, pending progress of Heritage Agreement.

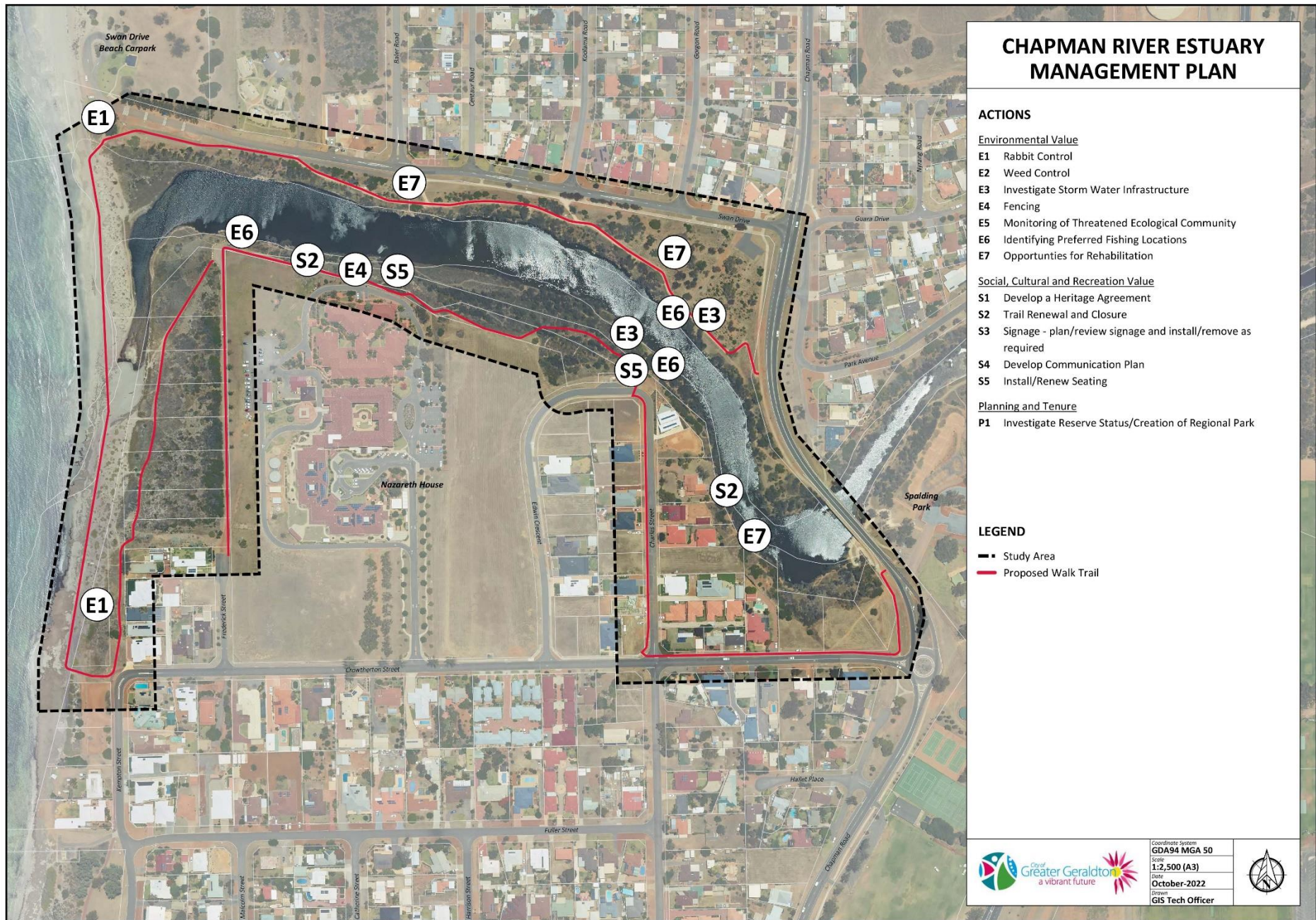


Figure 2. Chapman Estuary Reserve Action Plan (Source: CGG).

2.2 Timeline

			2022					2023					2024					2025																				
#	Action	Who	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J
Environmental Value																																						
E1	Rabbit control*	CGG																																				
E2	Weed Control	CGG/ Community																																				
E3	Investigate storm water infrastructure	CGG																																				
E4	Fencing*	CGG																																				
E5	Monitoring of Threatened Ecological Community	Community																																				
E6	Identifying Preferred Fishing Locations	CGG/Comm unity																																				
E7	Opportunities for Revegetation	CGG																																				
Social, Cultural and Recreation Value																																						
S1	Develop a Heritage Agreement	CGG/YSR C																																				
S2	Trail Renewal & Closure*	CGG																																				
S3	Signage - plan/review signage and install/remove as required*	CGG																																				
S5	Develop a communication plan	CGG																																				
S6	Install/renew seating*	CGG																																				
Planning and Tenure																																						
P1	Investigate reserve status/creation of Regional Park	CGG																																				

* Timeline indicative, pending progress of Heritage Agreement.

3 Context

3.1 Environmental Context

3.1.1 Climate

Geraldton has a Mediterranean climate of cool, wet winters and warm, dry summers while the climate becomes warmer and drier heading east. Over the past 20 years the average rainfall in Geraldton has been around 313mm per year. Year round, the average maximum temperature across Geraldton ranges from 20°C to 30°C (Ecoscape 2021).

3.1.2 Geology and Soils

Starting from the coast the Chapman Estuary contains the Quindalup Central System geology which consists of quartz sand, limestone and eolian shell. Moving east along the river into the catchment area, the geology changes to the Greenough Alluvium System containing red silty and sandy clay soil types (WAPC 2010).

3.1.3 Topography and landform

The City of Greater Geraldton encompasses a broad range of landforms. In the west the landforms consist of coastal dunes, estuary habitats and riparian vegetation. Heading east the landforms start shifting into mesa systems, rocky ranges and sandplains (Ecoscape 2021).

The Chapman Estuary is relatively low lying at the river mouth and becomes steeper along the edges heading east.

3.1.4 Hydrology

The Chapman River meanders 104 kilometres southwest from Yuna through the Chapman Valley to meet the Indian Ocean at Bluff Point, Geraldton in WA's Midwest region (Waters and Rivers Commission 2001). The river mouth, seasonally separated from the ocean by a sand bar, harbours a brackish lagoonal estuary.

There is a drainage sump on the south side of the river (near Edwin Crescent) constructed around 2007. The sump is intended to filter stormwater directed to it before entering the river. On the north side of the river (corner of Swan Dr and Chapman Rd) there is a stormwater pipe that discharges directly into the river. There were initial plans to create a similar 'Stormwater Bio-filter' on the north side of the estuary, which is depicted in the 2009 Management Plan.

The hydrology of the Chapman River Estuary is naturally influenced by annual rainfall, groundwater dynamics and tidal exchange during winter flows and high tides (Water and Rivers Commission 2001). The Chapman River region has been subject to 90% land clearing post settlement, modifying the hydrology of the Chapman River through upstream agricultural practise and localised urban development (Stuart-Street & Clarke 2005). Climate change impacts such as reduced rainfall and more extreme weather events have further impacted the hydrodynamics of the river (WAPC 2010).

In 2020, the Department of Water and Environmental Regulation completed a flood modelling study to better understand the flood risk to Geraldton from major flows in the Chapman River. The catchment has a total area of 1872m² and the river discharges into the estuary after flowing through the northern suburbs of Geraldton (DWER 2020). The Chapman Estuary mouth is regularly closed to the ocean by sand bars however will open after considerable flow events caused by rainfall. In a major flood event the Department of Water and Environmental Regulation modelled that the Chapman River mouth can rise to 3.1m and reach up to 4.44m at the Chapman Road Bridge in the

2020 study. The floodplain across the entire of the Chapman River ranges from 50m to 200m, with a low flow channel ranging from 5m to 15m wide (DWER 2020).

The City’s Environmental Health team conduct regular water sampling during the Summer months of the year, to test the levels of various bacteria and the presence of Amoeba, particularly *Naegleria fowleri*. These tests are historically negative, however in April 2022 a test came back flagging the presence of a species of *Naegleria*. This suggests the environment is capable of hosting *Naegleria fowleri*, resulting in the need for the City to install signage at the popular swimming sites in the estuary. The water quality has been determined as remaining within Department of Health’s guidelines for swimming, however, it is necessary for swimmers to take precautions against allowing water to enter the nose, especially on warm-hot periods.

3.1.5 Vegetation

The Chapman River mouth is home to a Subtropical and Temperate Coastal Saltmarsh ecological community, which is nationally listed as a ‘Vulnerable’ Threatened Ecological Community (TEC) under the EPBC Act 1999 (Figure 3).

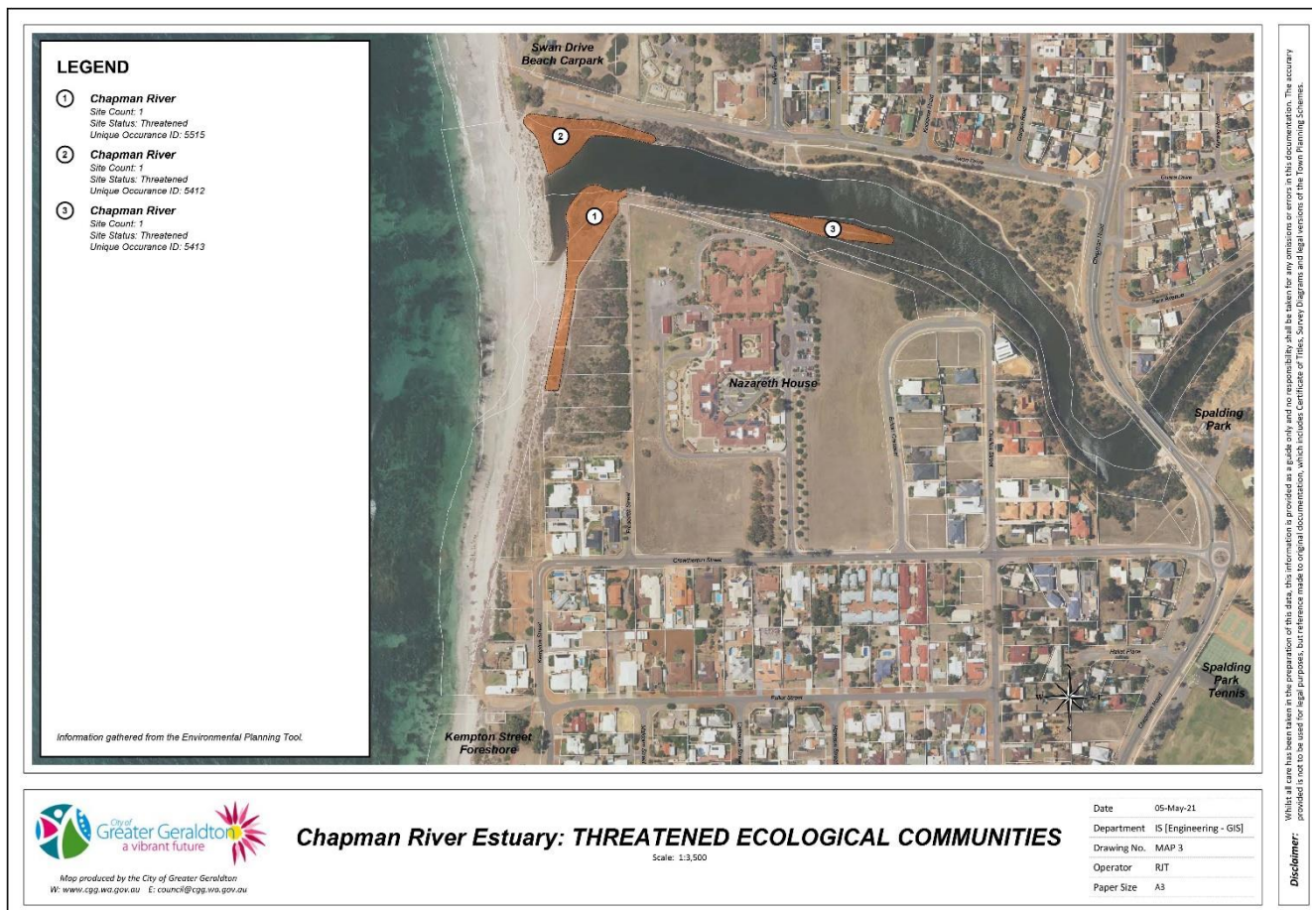


Figure 3. Map of Chapman River Estuary showing the areas recognised as a Threatened Ecological Community (Source: CGG).

The vegetation of the area has been identified into two categories; estuarine and riparian plant communities (WAPC 2010). The estuarine community is identified by wet saline alluvial soil at river mouths and along saline river edges close to the coast. In the reserve area the estuarine community is dominated by *Casuarina obesa*, and *Salicornia sp.* The riparian plant community is found on banks of the river and along drainage lines until merging with the estuarine plant community. The riparian community in the area is dominated by *Eucalyptus camaldulensis subsp obtusa*, *Casuarina obesa* and *Melaleuca raphiophylla* (WAPC 2010).

Vegetation surveys show the area has locally and regionally significant vegetation associations, with one vegetation type (BVA – 359) identified as inadequately reserved and cleared below the threshold which accelerates species loss at the ecosystem level (WAPC 2010). These findings highlight the importance of native vegetation and the need for conservation action in the area.

Large swathes of riparian and terrestrial vegetation have been thinned or cleared for residential, parkland, and transport purposes.

3.1.6 Fauna

At the river mouth, the saltmarsh fills a vital ecological role providing nursery habitat for prawns and fishes, including commercial fish species. A mixture of estuarine and riverine species occurs in the study area. The sediments, plants and algae support a richness of molluscs, crustaceans and other invertebrates that form the diet of wildlife including shorebirds, micro-bats, ospreys, and fish, such as the endangered Golden Gudgeon (*Hypseleotris aurea*) (Water and Rivers Commission 2001). Birdlife Midwest has recorded 115 species of birds between the river mouth and 1.5km upriver (Appendix B).

3.1.7 Weeds and Pests

Exotic weeds such as *Verbesina enceliodes* (Golden Crownbeard/Dongara Daisy) and *Cynodon dactylon* (Couch grass) have displaced and prevented the establishment of deep-rooted perennial native plants in riparian remnants. Subsequently, riverbank destabilisation, exacerbated erosion, and decreasing water quality have catalysed a decline in ecological condition, consequently cumulating in eutrophication events and acid sulphate soil oxidation (Stuart-Street & Clarke 2005). Pollution from insecticide and herbicide spraying, land claiming, and altered hydrological regimes further compound these issues.

Lycium ferocissimum (African Boxthorn) and *Opuntia sp.* (Prickly Pear) are common weeds in the Midwest region and are present in the study area. The City of Greater Geraldton has previously undertaken control measures for both of these invasive species.

Exotic pest species further threaten the ecological integrity of the Chapman River. The introduction and relative abundance of exotic freshwater species, such as the Eastern mosquitofish, smooth marron, yabbies, swordtails and the noxious IUCN-declared pest Mozambique Tilapia (*Oreochromis mossambicus*) have enabled ecological decline in the Chapman River, resulting in habitat degradation, reduced water quality, and impacting the populations of the 18 species of native freshwater fish (Johnson & Courtney 2017). In response, the Central Regional TAFE's Batavia Coast Marine Institute (BCMI) collaborated with NACC NRM to conduct 179 aquatic surveys in the Chapman River between 2013 and 2017 as part of the Federally funded Noxious Invasive Species Control Project. This project aimed to determine distributions of pest species in Midwest rivers and develop effective and humane control strategies. In addition, the Oblong turtle (*Chelodina colliei*), native to the South West but not the Midwest, persists as an abundant introduced turtle in the Chapman River, and is suspected to be in the process of displacing the native Flat-shell turtle (*Chelodina steindachneri*), which has decreased in abundance and may be hybridizing (Johnson & Courtney 2017).

Rabbits are present in large numbers along the Kempton Foreshore, and on the north side of the river near Baler Road and at the west end of Swan Drive. Rabbits cause significant damage to natural vegetation and create a hazard for people and animals. Feral and domestic cats likely impact significantly on fauna, both native and exotic.

3.2 Social, Cultural and Recreation Context

3.2.1 Current Land Use

Appreciation for the coastline and natural environment is expressed in the large number of people enjoying activities such as walking, fishing, kite surfing, dog-exercising, mountain biking and beach-

going. This has placed pressure on the natural systems beyond regenerative thresholds. Anthropogenic activities and coastal developments have, and continue, to pose numerous disturbances and threats to the estuary and affiliated saltmarsh TEC (Firth 2009).

Natural areas are an integral part of a society's health, wellbeing and cultural continuance (DEWHA 2009). Appropriate access management underpins the preservation of natural assets, landscape processes and ecology for future generations.

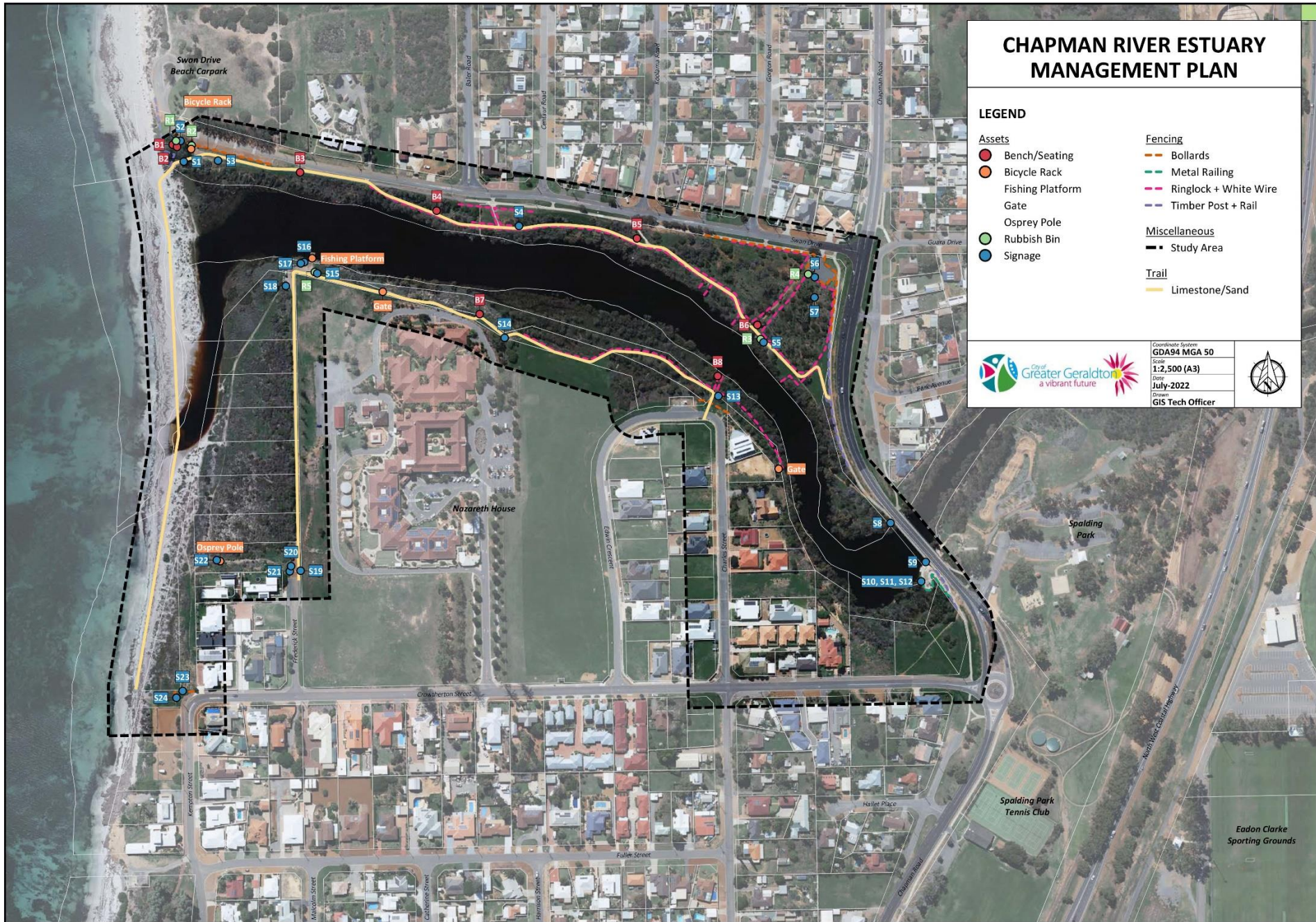
Along the river and at the mouth, recreational walking through remnant vegetation and over the sandbank often leads to foliage trampling and soil compaction, disrupting shorebird nesting activities, whilst accompanying domesticated animals can disturb wildlife.

Litter such as bait bags, fishing line, and tackle discarded within the site pose choking, starvation and entanglement hazards to wildlife. Littering, while being a visual blight, is a threat to fauna, and as it breaks down contributes micro plastics to the ecosystem.

While antisocial behavior is outside the scope of this Reserve Action plan, the issues associated with vandalism of natural and built assets and access by trail bikes are well known. City Rangers regularly patrol the area upon request and list the area as a hotspot.

Shared paths are present along the northern bank and parts of the southern banks. The southeast side (Charles St to Chapman Rd) was closed after Cyclone Seroja in April 2021 due to safety concerns from fallen trees and bank erosion. This part of the trail is still closed pending recommendations from the community consultation process. Various trail plans for the Chapman River Regional Park (CRRP) have been developed over the years including the CRRP Mountain Bike Master Plan (2016).

NACC NRM and the City catalogued all infrastructure in the area (Figure 4). For the full asset inventory, refer to Appendix C.



CHAPMAN RIVER ESTUARY MANAGEMENT PLAN

LEGEND

Assets	Fencing
● Bench/Seating	— Bollards
● Bicycle Rack	— Metal Railing
○ Fishing Platform	— Ringlock + White Wire
○ Gate	— Timber Post + Rail
○ Osprey Pole	Miscellaneous
● Rubbish Bin	— Study Area
● Signage	Trail
	— Limestone/Sand

	Coordinate System GDA94 MGA 50	
	Scale 1:2,500 (A3)	
	Date July-2022	
	Drawn GIS Tech Officer	

Figure 4. Current infrastructure (Source: CGG).

3.2.2 Aboriginal Cultural Value

The Geraldton region is the traditional land of the Southern Yamatji (also spelled Yamaji). The Yamatji Nation Claim consent determination and Indigenous Land Use Agreement was signed on 7 February 2020. This is an agreement between the State of Western Australia and the Yamatji Southern Nation which is comprised of five claimant groups – Hutt River, Southern Yamatji, Yamatji Nation (including descendants of additional ancestors of those who were not included in the original underlying claims), Mullewa Wadjari and Widi Mob.

The Chapman River is a key mythological, historical and birthplace site for the Mullewa Wadjari, Naaguja, and Amangu Aboriginal people of the Southern Yamatji, as it is the landscape embodiment of the Beelarra creation story (Aboriginal Heritage Enquiry System 2022). The river mouth has several Registered Aboriginal sites catalogued, with particular importance on the burial site close to the estuary, and artefacts near the Chapman Rd Bridge (Figure 5). It is important to acknowledge the maintained cultural significance of the area to the Southern Yamatji peoples and the further presence of unregistered sites within the area of this Action Plan.

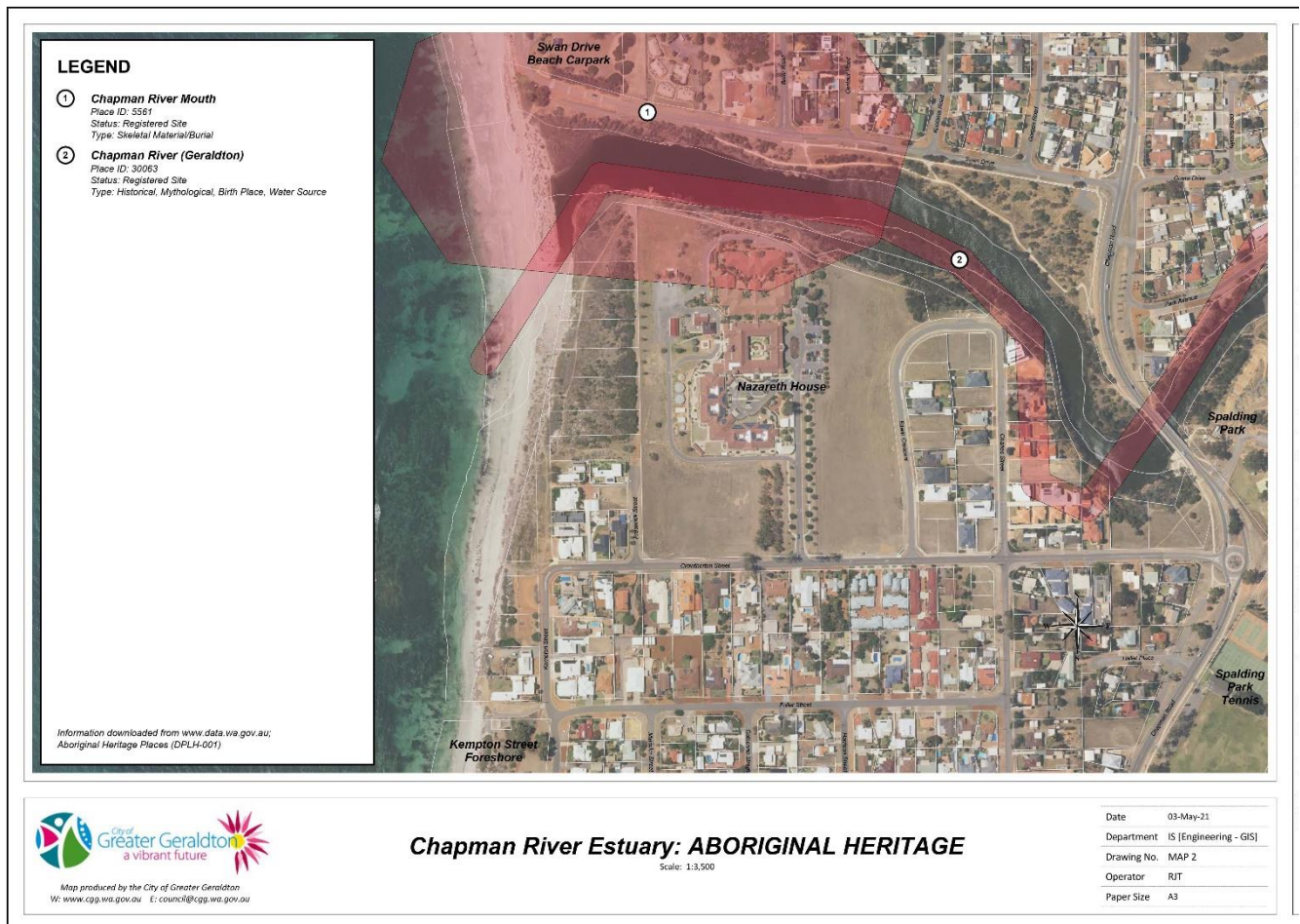


Figure 5. Map of Chapman River Estuary showing the registered areas of Aboriginal Heritage for the project area (Source: CGG).

3.3 Planning Context

3.3.1 Background

This 15ha riparian area of mixed tenure is highly valued for its exceptional ecological, spiritual, cultural, aesthetic, historical, and recreational assets.

Whilst protecting and enhancing the ecological integrity of the TEC remains paramount, public use and appreciation for the area must also be considered for intergenerational protection. The 2021 Natural Areas Strategy prepared for the City of Geraldton recommended that a 3-year Natural Area Action Plan be prepared for four 'Premier' natural areas within the City, naming the Chapman Estuary

as one. This Action Plan will endeavour to protect the ecological, cultural, hydrological, and spiritual assets of the Chapman Estuary through the implementation of restorative activities such as regular environmental monitoring, rehabilitation works, weed and pest control, and access restriction (EcoScape 2021). This will enable low-impact activities to continue to be enjoyed by the public, while conserving and protecting the areas ecological and cultural assets.

3.3.2 Zoning & Tenure

The study area comprises mostly of Crown Land that has been vested with the City for management (Figure 1). Vesting purposes vary from Public Park and Recreation, Public Recreation and Foreshore Management (Appendix A). There are several freehold properties to the West of Nazareth House. The City and Nazareth House are currently in negotiation to have the titles transferred to the City in line with a historical agreement.

The study area is all classified as Foreshore Reserve in the Local Planning Scheme (No.1). The objective for foreshore area is to set aside land for foreshore reserves and provide for conservation and/or public access with a range of active and passive recreational uses. There is a parcel of land on the south side of the river that is Vacant Crown Land. The boundary of one property on the south side of the river extends all the way down to the water. If there are to be walk trails in this area of private property, an agreement will need to be made with the owner for access.

4 Consultation

4.1 Engagement Strategy

- This plan is informed through inclusive community engagement to provide a transparent way forward for effective management of the area ([Stakeholder and Community Engagement Strategy](#)). The engagement strategy was developed in conjunction with the City, and involved a series of workshops and meetings with relevant stakeholders and the broader community. These were advertised through NACC NRM, The City social media channels, media releases, letter box drop and targeted advertising to identified stakeholders. An online survey was made publicly available (advertised via above channels) for stakeholders unavailable to attend the in-person workshops.

The engagement process involved:

- Face to face workshop with community members and invited stakeholders on 31 March 2022. The context was set out, and participants provided input into what they value in the area, their concerns, and proposed solutions to then address these concerns and conserve identified values.
- Targeted engagement with Yamatji Southern Regional Corporation (YSRC) Cultural Committee was facilitated through an on-site meeting at the Estuary with three Cultural Committee members, NACC NRM and representatives from the City.
- At the second face to face workshop on 26 May 2022 with community members and invited stakeholder, NACC NRM provided draft actions based on input from the first workshop for review and further consultation. The minutes of this meeting were sent to YSRC.

Communication goals as described in [Stakeholder and Community Engagement Strategy](#):

- Receive input on community and stakeholder values and uses of the area.
- Collect input from the community into the Chapman River Estuary Reserve Action Plan.
- Promote, and maximise participation and engagement in the development of the Reserve Action Plan.
- Keep community members informed of ongoing progress.
- Create opportunities to receive feedback.
- Raise awareness of the ecological and cultural importance of the Chapman River Estuary.

4.2 Results

The following results are a summary of the input and feedback received from workshops, the online survey and targeted group engagement and represent the community and stakeholders as a whole.

4.2.1 Observations

NACC NRM conducted four separate four hour observations at two viewing locations in the reserve to gain context of how the area is used and valued. This

information provided a snapshot to inform the engagement workshops regarding activities (Figure 6), times of use and primary areas of use ([Workshop 1 Report 2022](#)).

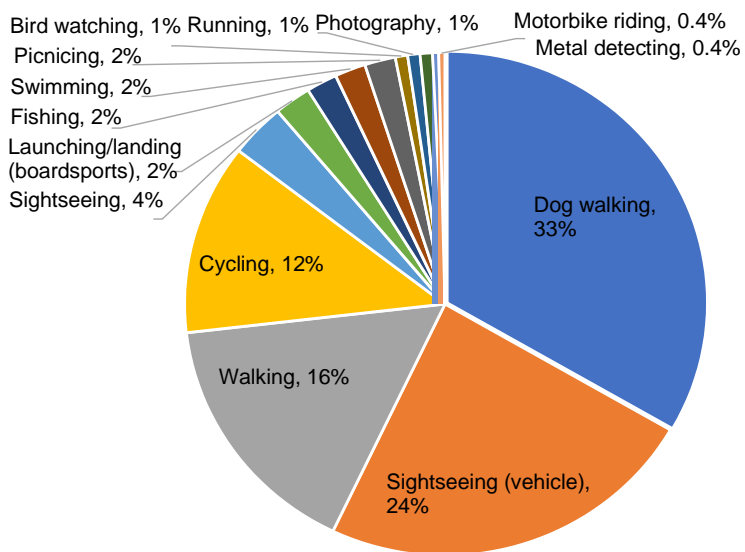


Figure 6. Pie chart representing the frequency of activities observed at the Chapman River Estuary across four 4-hour observation periods.

4.2.2 Values

Understanding how the area is used and valued is critical in designing this action plan.

The engagement process captured what individuals and stakeholders value about the estuary and how they use the area (Figure 7). These results were collected at Workshop 1, targeted engagement and via the online survey.

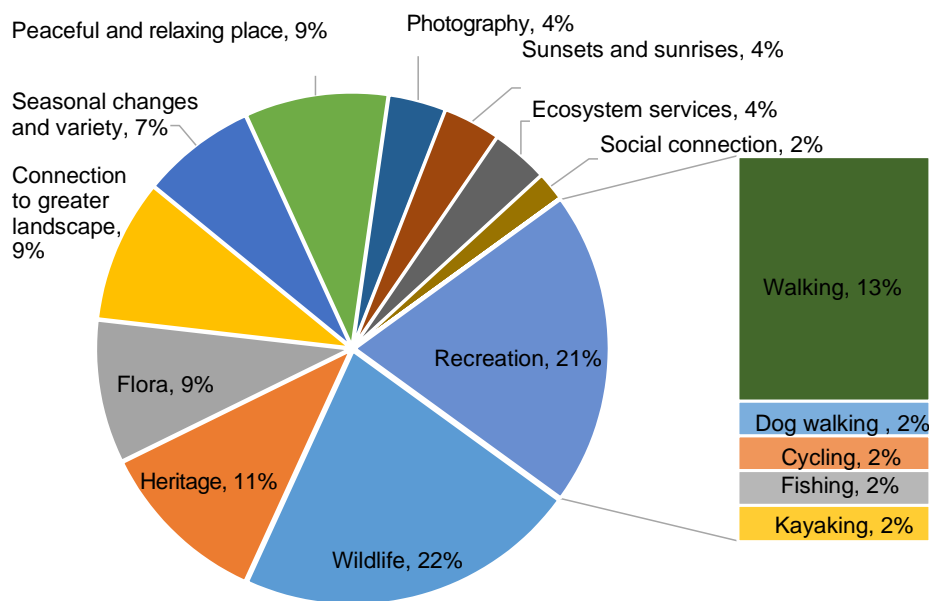


Figure 7. Pie chart representing the main values of community members and stakeholders who contributed during the engagement process.

4.2.3 Concerns

Primary concerns for the area can be grouped in four main categories (Figure 8).

Throughout the engagement process, concerns were captured to understand the main areas for action to protect and conserve the area. Refer to [Workshop 1 Report](#) for detailed concerns for the estuary.

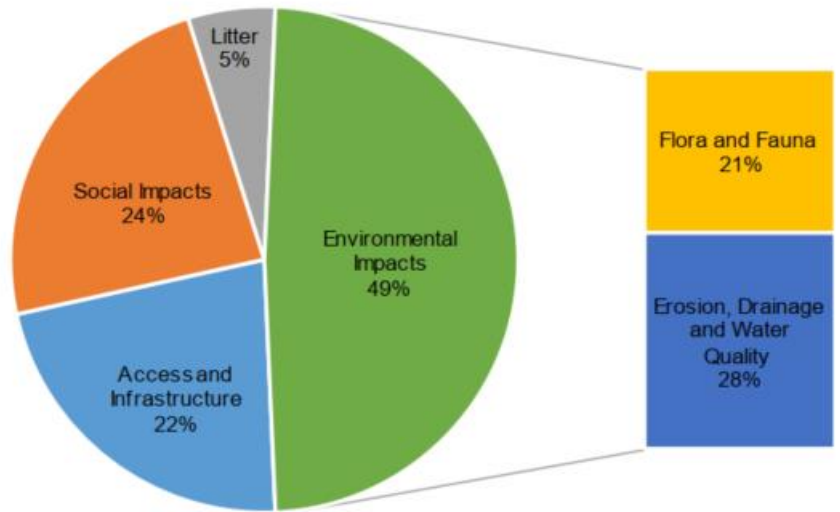


Figure 8. Pie chart representing the primary concerns of community members and stakeholders who contributed during the engagement process. “Flora and Fauna” and “Erosion, Drainage and Water Quality” are a subset of “Environmental Impacts”.

5 References

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6 Appendices

External Links

Community and Stakeholder Engagement Strategy

Available from:

https://www.cgg.wa.gov.au/Profiles/cgg/Assets/ClientData/Documents/Infrastructure/Chapman_Estuary_Reserve_Action_Plan_Asset_Stakeholder_and_Community_Engagement_Strategy.pdf

Workshop Report 1

Available from:

https://www.cgg.wa.gov.au/Profiles/cgg/Assets/ClientData/Documents/Infrastructure/Chapman_River_Estuary_Reserve_Action_Plan_-_Workshop_1_Report.pdf

Workshop Report 2

Available from:

https://www.cgg.wa.gov.au/Profiles/cgg/Assets/ClientData/Documents/Infrastructure/Chapman_River_Estuary_Action_Reserve_Plan_-_Workshop_2_Report.pdf

Appendix A: Zoning and Tenure Table

Lot & Plan Number	Owners/Management	Tenure	Zone
P216832 2873	City of Greater Geraldton	CROWN, R27322	Foreshore
		Road reserve (West side, along Swan Dr)	Road
P008196 10761	City of Greater Geraldton	R27553	Foreshore
W Water		CROWN, R49197	Foreshore
V CROWN LAND			Foreshore
P240314 2902	City of Greater Geraldton	CROWN, R41198	Foreshore
P051716 65	City of Greater Geraldton	FHOLD, R49197	Foreshore
P051716 64	City of Greater Geraldton	FHOLD, R49728	Foreshore
P051716 66	The Trustees of the Sisters of Nazareth	FHOLD	Foreshore
P000949 47	The Trustees of the Sisters of Nazareth	FHOLD	Foreshore
P000949 44	The Trustees of the Sisters of Nazareth	FHOLD	Foreshore
P000949 43	The Trustees of the Sisters of Nazareth	FHOLD	Foreshore
P000949 42	The Trustees of the Sisters of Nazareth	FHOLD	Foreshore
P000949 41	The Trustees of the Sisters of Nazareth	FHOLD	Foreshore
P000949 40	The Trustees of the Sisters of Nazareth	FHOLD	Foreshore
V CROWN LAND			Foreshore
P240314 2903	City of Greater Geraldton	CROWN, R41198	Foreshore
P000949 1	City of Greater Geraldton	FHOLD	Foreshore
P000949 2	City of Greater Geraldton	FHOLD	Foreshore
P000949 3	City of Geraldton	FHOLD	Foreshore

Appendix B: Birdlife Midwest Species List

IUCN Red List Status

Endangered:

Carnaby's Black Cockatoo

Vulnerable:

Fairy Tern

Near Threatened:

Grey Plover

Red-necked Stint

Least Concern:

Pied Stilt

Red-necked Avocet

Banded Stilt

Red-capped Plover

Black-fronted Dotterel

Red-kneed Dotterel

Banded Lapwing

Pied Oystercatcher

Common Sandpiper

Common Greenshank

Sanderling

Caspian Tern

Crested Tern

Roseate Tern

Pacific Gull

Silver Gull

Little Pied Cormorant

Great Cormorant

Little Black Cormorant

Pied Cormorant

Australasian Darter

Australian Pelican

Great Egret

White-faced Heron

Little Egret

Nankeen Night Heron

Australian White Ibis

Straw-necked Ibis

Yellow-billed Spoonbill

Eastern Reef Egret

Black Swan

Musk Duck

Grey Teal

Chestnut Teal

Pacific Black Duck

Hoary-headed Grebe

Australian Grebe

Eurasian Coot

Australian Wood Duck

Hardhead

Australian Shelduck

Crested Pigeon

Stubble Quail

Australasian Pipit

Pallid Cuckoo

Black-eared Cuckoo

Fan-tailed Cuckoo

Red Wattlebird

Western Wattlebird

White-browed Babbler

Eastern Osprey

Black-shouldered Kite

Whistling Kite

Brown Goshawk

Nankeen kestrel

Australian Hobby

Peregrine Falcon

Brown Falcon

Collared Sparrowhawk

White-bellied Sea Eagle

Little Eagle

Australian Owlet Nightjar

Southern Boobook

Barn Owl

Red-tailed Black Cockatoo

Galah

Little Corella

Australian Ringneck spp

Port Lincoln

Western Corella

Striated Pardalote

Rufous Whistler

Mistletoebird

Red-capped Robin

White-breasted Robin

Silvereeye

Weebill

White-browed Scrubwren

White-fronted Chat

Grey Shrike-thrush

Rufous Songlark

Spotted Pardalote

White-winged Fairy Wren

Variiegated Fairy Wren

Splendid Fairy Wren

Grey Fantail

Willie Wagtail

Yellow-rumped Thornbill

Western Gerygone

Zebra Finch

Singing Honeyeater

White-plumed Honeyeater

Brown Honeyeater

White-cheeked Honeyeater

Spiny-cheeked Honeyeater

New Holland Honeyeater

Black-faced Woodswallow

Black-faced Cuckoo Shrike

Rainbow Bee-eater

Grey Butcherbird

Grey Currawong

Pied Butcherbird

Australian Raven

Magpie-lark

Australian Magpie

Sacred Kingfisher

White-backed Swallow

Welcome Swallow

Tree Martin




Yellow-throated Miner


Introduced:

Laughing Dove

Rock Dove


Appendix C: Asset Inventory

Benches/Seating					
#	GPS (S)	GPS (E)	Asset category	Asset description	Photo
B1	28°43.590'	114°37.216'	Bench	Metal	
B2	28°43.591'	114°37.221'	Bench	Metal	
B3	28°43.609'	114°37.290'	Bench	Metal	



B4	28°43.629'	114°37.366'	Bench	On limestone path	
B5	28°43.644'	114°37.477'	Bench	On limestone path	
B6	28°43.687'	114°37.541'	Picnic table and shade	On limestone path	




B7	28°43.678'	114°37.391'	Bench	Wooden, older state than benches on northern side	
B8	28°43.712'	114°37.519'	Bench	Wooden bench, graffiti	
Rubbish Bins					
#	GPS (S)	GPS (E)	Asset category	Asset description	Photo
R1	28°43.595'	114°37.230'	Bin	General waste	




R2	28°43.582'	114°37.213'	Bin	General waste	
R3	28°43.694'	114°37.543'	Bin	General waste	
R4	28°43.663'	114°37.569'	Bin	General waste	

R5	28°43.897'	114°37.210'	Bin	General waste	
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Fencing




#	GPS (S)	GPS (E)	Asset category	Asset description	Photo
	28°43.547' 28°43.605'	114°37.214' 114°37.220'	Fence (start) (end)	Ring lock wire fence, single wire on top, wooden posts (from in-line with start of path to the end at the beach)	
	28°43.595'	114°37.244'	Concrete blocks	2x carpark barriers	




	28°43.598'	114°37.256'	Concrete blocks	2x carpark barriers	
	28°43.605'	114°37.275'	Wood bollards	Lining gravel carpark	
	28°43.615' 28°43.684'	114°37.329' 114°37.527'	Fence (start) (end)	Ring lock wire fence, single wire on top, wooden posts (along north of river, limestone path)	




	28°43.634' 28°43.637'	114°37.386' 114°37.411'	Fence (start) (end)	Ring lock wire fence, single wire on top, wooden posts (between the bitumen and limestone paths, reveg area)	
	28°43.659' 28°43.710'	114°37.508' 114°37.568'	Fence (start) (end)	Wooden posts, 2 wires (road side of limestone path)	
	28°43.713' 28°43.725'	114°37.556' 114°37.570'	Fence (start) (end)	Ring lock wire fence, wooden posts (along north of river, heavily covered in shrubs, needs some maintenance)	


	28°43.770'	114°37.597'	Wood bollards	Barrier along concrete path and vegetation	
	28°43.690' 28°43.664'	114°37.581' 114°37.585'	Green bollards (start) (end)	PVC	
	28°43.664'	114°37.573'	Wooden bollards	Lining carpark at main road end of Swan Drive	




	28°43.653' 28°43.643'	114°37.573' 114°37.512'	Green bollards (start) (end)	Start again along concrete path and vegetation	
	28°43.646'	114°37.526'	Fence	Wooden posts, 2 wires (start/end along concrete path and vegetation)	
	28°43.630' 28°43.622'	114°37.419' 114°37.369'	Fence (start) (end)	Ring lock wire fence, single wire on top, wooden posts (along concrete path and vegetation)	


	28°43.619' 28°43.617'	114°37.349' 114°37.340'	Fence (start) (end)	Ring lock wire fence, single wire on top, wooden posts, claimed by nature (along concrete/bitumen path and vegetation)	
	28°43.652' 28°43.665'	114°37.288' 114°37.258'	Concrete blocks (start) (end)	Road/carpark barrier, (15x blocks, some wood bollards/polls on the ground blocking access)	
	28°43.668'	114°37.335'	Gate/fence	Metal path barrier/fence	



	28°43.692' 28°43.690'	114°37.404' 114°37.409'	Steps and handrail (start) (end)	(15x) Wooden plank and sand steps, wooden posts and metal bar hand rail	
	28°43.690' 28°43.751'	114°37.413' 114°37.551'	Fence (start) (end)	Ring lock wire fence, single wire on top, wooden posts. Blocked intentionally by branches ~5-10m from CGG sign.	
	28°43.799'	114°37.277'	Wooden logs barrier	Road barrier protecting vegetation	




	28°43.795'	114°37.229'	Fence	Star picket and ring lock wire (~10m long, marked mid-point)	
	28°43.809' 28°43.817'	114°37.636' 114°37.642'	Fence (start) (end)	Ring lock, wooden posts	
	28°43.826' 28°43.821'	114°37.647' 114°37.643'	Wooden bollards (start) (end)	Lining path	



	28°43.820' 28°43.809'	114°37.642' 114°37.627'	Metal fence (start) (end)	Lining path	
	28°43.812'	114°37.628'	Post	Metal post blocking trail entry	
	28°43.809'	114°37.627'	Fence	Ring lock, one wooden post at start, broken, goes into river, ~5m long.	




	28°43.809' 28°43.807'	114°37.633' 114°37.635'	Fence (start) (end)	Wooden posts, ring lock ~5m	
	28°43.864'	114°37.215'	Concrete blocks	x3, blocking vehicle access to pathway	
	28°43.860'	114°37.216'	Concrete blocks	x2, protecting vegetation from access	




	28°43.860' 28°43.856'	114°37.214' 114°37.226'	Wooden bollards (start) (end)	Blocking vehicle access to pathway	
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Signage					
#	GPS (S)	GPS (E)	Asset category	Asset description	Photo
S1	28°43.604'	114°37.226'	Sign	Sunset Beach Swan Drive – safety sign (small – near beach entry)	
S2	28°43.595'	114°37.234'	Sign	Sunset Beach Swan Drive – safety sign (large – near carpark)	




S3	28°43.602'	114°37.246'	Sign	Sub-Tropical and Temperate Coastal Saltmarsh	
S4	28°43.637'	114°37.408'	Sign	Wood sign "let it grow", "observe, conserve"	
S5	28°43.694'	114°37.543'	Sign	"Health Warning"	

S6	28°43.664'	114°37.573'	Sign	"Swan Drive Park"(carpark at bridge end of swan drive)	
S7	28°43.675'	114°37.572'	Sign	Nazareth House sign	
S8	28°43.782'	114°37.611'	Sign	"No diving from bridge"	


S9	28°43.809'	114°37.636'	Sign	"No diving from Bridge"	
S10	28°43.814'	114°37.628'	Sign	"Trail closed until further notice"	
S11	28°43.809'	114°37.627'	Sign	"Caution path subject to flooding"	



S12	28°43.809'	114°37.627'	Sign	"Beat the Bite" mosquito sign	
S13	28°43.722'	114°37.518'	Sign	Trail closed until further notice	
S14	28°43.693'	114°37.403'	Sign	Chapman River Estuary Birds (older sign, faded)	




S15	28°43.897'	114°37.210'	Sign	"Pedestrian access only"	
S16	28°43.652'	114°37.289'	Sign	(Fish) Species ID guide	
S17	28°43.652'	114°37.292'	Sign	Sub-Tropical and Temperate Coastal Saltmarsh	

S18	28°43.664'	114°37.283'	Sign	"Slow Shared Zone" (graffiti on one side)	
S19	28°43.802'	114°37.285'	Sign	"End Shared Zone"	
S20	28°43.792'	114°37.281'	Sign	"Bushland conservation area"	



S21	28°43.803'	114°37.279'	Sign	"End Shared Zone"	
S22	28°43.796'	114°37.239'	Sign	Osprey Info	
S23	28°43.858'	114°37.220'	Sign	"Pedestrian Access only"	

S24	28°43.862'	114°37.215'	Sign	Chapman River Regional Park	
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Path/trail					
#	GPS (S)	GPS (E)	Asset category	Asset description	Photo
	28°43.595'	114°37.234'	Path	Bitumen, along north of river to main road	
	28°43.615'	114°37.329'	Pathway	Sand/limestone path along north of river	

	28°43.636'	114°37.400'	Pathway	Entry to limestone path from road (opening in fence (2))	
	28°43.687'	114°37.541'	Pathway	Entry to limestone path from road (opening in fence (3))	
	28°43.897'	114°37.210'	Pathway	Sand/limestone along southern side of river	

	28°43.712'	114°37.519'	Pathway	Fencing stops then restarts to allow river access	
	28°43.829'	114°37.648'	Path	Dirt path through vacant block, car/bike/walking track, unmarked	
	28°43.820'	114°37.642'	Path	Concrete path down to river	

	28°43.864'	114°37.215'	Path	Sand path through dune to ocean.	
	28°43.858'	114°37.220'	Path	Sand/gravel path through to river, between the dunes and properties.	

6.1