

Your ref:
Our ref: 12546786

30 June 2021

Mike Dufour
City of Greater Geraldton
PO Box 101
Geraldton WA 6531

Bluff Point Coastal Adaptations, Threatened Ecological Community Impact Assessment (Revised)

Dear Mike

1. Introduction

1.1 Project background

The City of Greater Geraldton are investigating the development of a low crest groyne at the Bluff Point foreshore, located in Geraldton, Western Australia (WA) (the project). The proposed groyne will be located at Bluff Point North, north of the Kempton Street carpark and approximately 30 m south of the Chapman River mouth (Figure 1).

The Geraldton Coastal Hazard Risk Management and Adaptation Plan (CHRMAP; Baird Australia 2018) identified that the shoreline within the Bluff Point Coastal Management Unit is at risk from coastal erosion over the immediate planning timeframe to 2030. This risk arises from the assessed annual shoreline erosion rates of between 0.3 to 0.9 m per year, putting numerous local government and community assets at risk over the 100-year planning time frame. Based on an Adaptation Options Assessment completed by M P Rogers & Associates Pty Ltd (MPR), the City of Greater Geraldton has determined Bluff Point North as a priority area for interim coastal adaptation measures to be implemented, with a Geotextile Sand Containers (GSCs) groyne being the preferred option. The proposed groyne is to be constructed from the foredune at the rear of the beach, westwards into the Indian Ocean, with a proposed excavation depth of around 3 m below ground level.

Desktop information has identified the presence of the Subtropical and Temperate Coastal Saltmarsh (Coastal Saltmarsh) Threatened Ecological Community (TEC) which is listed as Vulnerable under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and as a Priority 3 Ecological Community (PEC) in WA by the Department of Biodiversity, Conservation and Attractions (DBCA). This community is located at the mouth of the Chapman River, which is approximately 30 m north of the proposed groyne location. Given the close proximity of the proposed groyne to the Chapman River, there is potential for the proposed groyne to impact on habitat at the Chapman River mouth, including the Coastal Saltmarsh TEC.

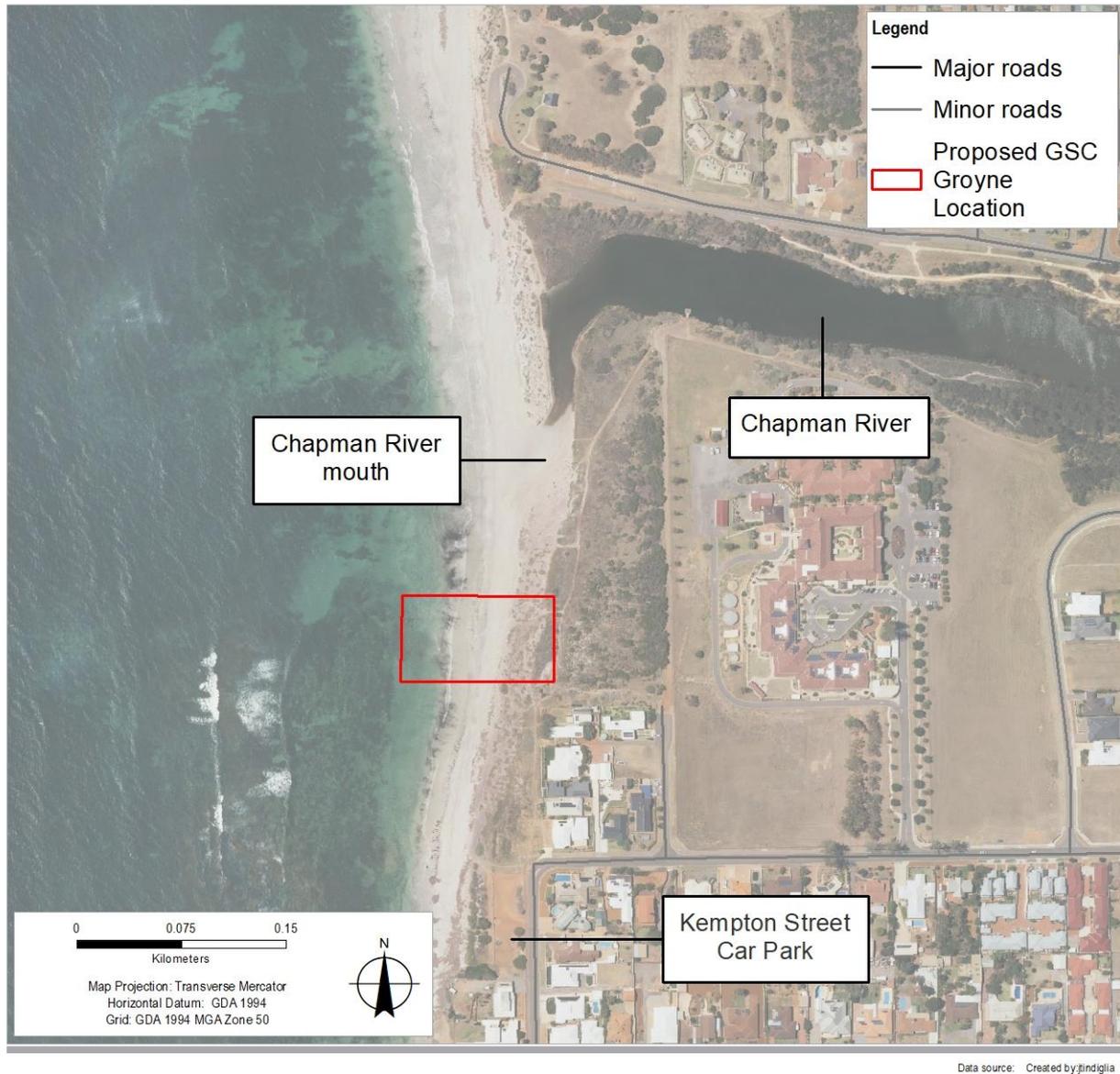


Figure 1 Project Location

1.2 Scope of works and purpose of this letter

The City of Greater Geraldton have engaged GHD Pty Ltd (GHD) to undertake environmental investigations for the project, including a terrestrial vegetation and flora assessment. Part of this assessment also includes an environmental impact statement of the proposed groyne on the Coastal Saltmarsh TEC and the Estuarine Environment. This letter presents a high-level environmental impact assessment of the proposed groyne on the Coastal Saltmarsh TEC based on available reports and desktop information.

1.3 Limitations and assumptions

This letter has been prepared by GHD for the City of Greater Geraldton and may only be used and relied on by the City of Greater Geraldton for the purpose agreed between GHD and the City of Greater Geraldton as set out in section 1.2 of this letter.

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

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

The opinions, conclusions and any recommendations in this letter are based on conditions encountered and information reviewed at the date of preparation of the letter. Reports provided by the City of Greater Geraldton/available for use in this letter include:

- Bluff Point Coastal Adaptation Options Assessment (MPR 2020a)
- Bluff Point North GSC Groyne Concept Design (MPR 2020b)

GHD has no responsibility or obligation to update this letter to account for events or changes occurring subsequent to the date that the letter was prepared.

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

2. Existing environment

2.1 Estuarine environment (Chapman River)

The Chapman River commences at Yuna approximately 60 km north east of Geraldton and meanders to the mouth located at Sunset Beach, Geraldton. Annual rainfall and groundwater dynamics influence the hydrology of the Chapman River. The estuarine reach of the Chapman River is also subject to the hydrodynamics of tidal exchange. The Chapman River is an intermittently closed estuarine system by the formation of a sand bar at the mouth of the river. Winter flows breach the sand bar separating the River from the ocean allowing tidal exchange of water. It is estimated the estuarine reach of the Chapman River extends approximately 1.5 km upstream from the mouth of the river (Water and Rivers Commission 2001).

2.2 Local sediment dynamics

MPR (2020a) reports that sediment dynamics in the Geraldton region are heavily influenced by the prevailing wind regime. Average annual wind roses from 9 am and 3 pm highlight the prevalence of offshore (easterly) winds in the morning and onshore/alongshore south to south westerly winds in the afternoons. At Bluff Point the net sediment transport pathway is predominately northerly, with contributions to the alongshore transport coming from the erosion of the shoreline further south (MPR 2020a). It is noted that as shorelines to the south are protected the rate of shoreline erosion to the north (such as Bluff Point) will increase (MPR 2020a).

MPR (2020b) reports that the prevailing northerly sediment transport may lead to downdrift erosion on the northern side of proposed GSC groyne. With a sufficient quantity of sand accumulation on the updrift (southern) side of the groyne, downdrift erosion effects can be mitigated by the natural bypassing of sand around the head of the groyne. Initial sand nourishment will facilitate this, however, as the initial sand nourishment material is exhausted, and as the supply of sand from the shorelines to south reduces over time, some downdrift erosion is likely to occur.

No information is available on the local sediment dynamics at the Chapman River mouth.

2.3 Coastal Saltmarsh ecological community

The Coastal Saltmarsh ecological community occurs within a relatively narrow margin of the Australian coastline, within the subtropical and temperate climatic zones of Australia. The physical environment for the ecological community is coastal areas under regular or intermittent tidal influence. This includes along estuaries and coastal embayments and on low wave energy coasts in places with at least some tidal connection, including rarely-inundated supratidal areas, intermittently opened or closed lagoons, and groundwater tidal influences. The Coastal Saltmarsh ecological community occurs on sandy or muddy substrate and may include coastal clay pans and similar habitats. Although tides are highly predictable, the interactions between tides, weather, groundwater influences and vegetation result in complex patterns of

environmental variation for the Coastal Saltmarsh (Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) 2013).

The Coastal Saltmarsh ecological community consists mainly of salt-tolerant vegetation (halophytes) including grasses, herbs, sedges, rushes and shrubs. Succulent herbs, shrubs and grasses generally dominate and vegetation is generally of less than 0.5 m height (with the exception of some reeds and sedges). While the Coastal Saltmarsh vascular flora can be diverse, it is generally dominated by a few families such as Chenopodiaceae and Poaceae. Many species of non-vascular plants are also found in saltmarsh, including epiphytic algae, diatoms and cyanobacterial mats (DSEWPaC 2013).

The Coastal Saltmarsh ecological communities are limited to areas and patches of coastal saltmarsh that meet the key diagnostic characteristics and condition thresholds. Although significantly degraded or modified patches may not be protected as the ecological community listed under the EPBC Act, it is recognised that patches that do not meet the condition thresholds may still retain important natural values (DSEWPaC 2013).

DSEWPaC (2013) reports key threats to the Coastal Saltmarsh ecological community including clearing and fragmentation, land-claim or infilling, altered hydrology/tidal restriction, invasive species, climate change, mangrove encroachment, recreation, pollution/litter, eutrophication, acid sulfate soils (ASS), grazing, insect control, evaporative salt production and other mining, and inappropriate fire regimes.

At the mouth of the Chapman River, the DBCA TEC and PEC database indicates three occurrences of the Coastal Saltmarsh ecological community (Figure 2). These occurrences are buffered by approximately 500 m, and therefore are expected to be limited in size and collectively cover approximately 1.4 ha.

A terrestrial flora and vegetation surveyed scheduled for spring 2021 will confirm the locations and extents of the Coastal Saltmarsh ecological community at the mouth of the Chapman River.

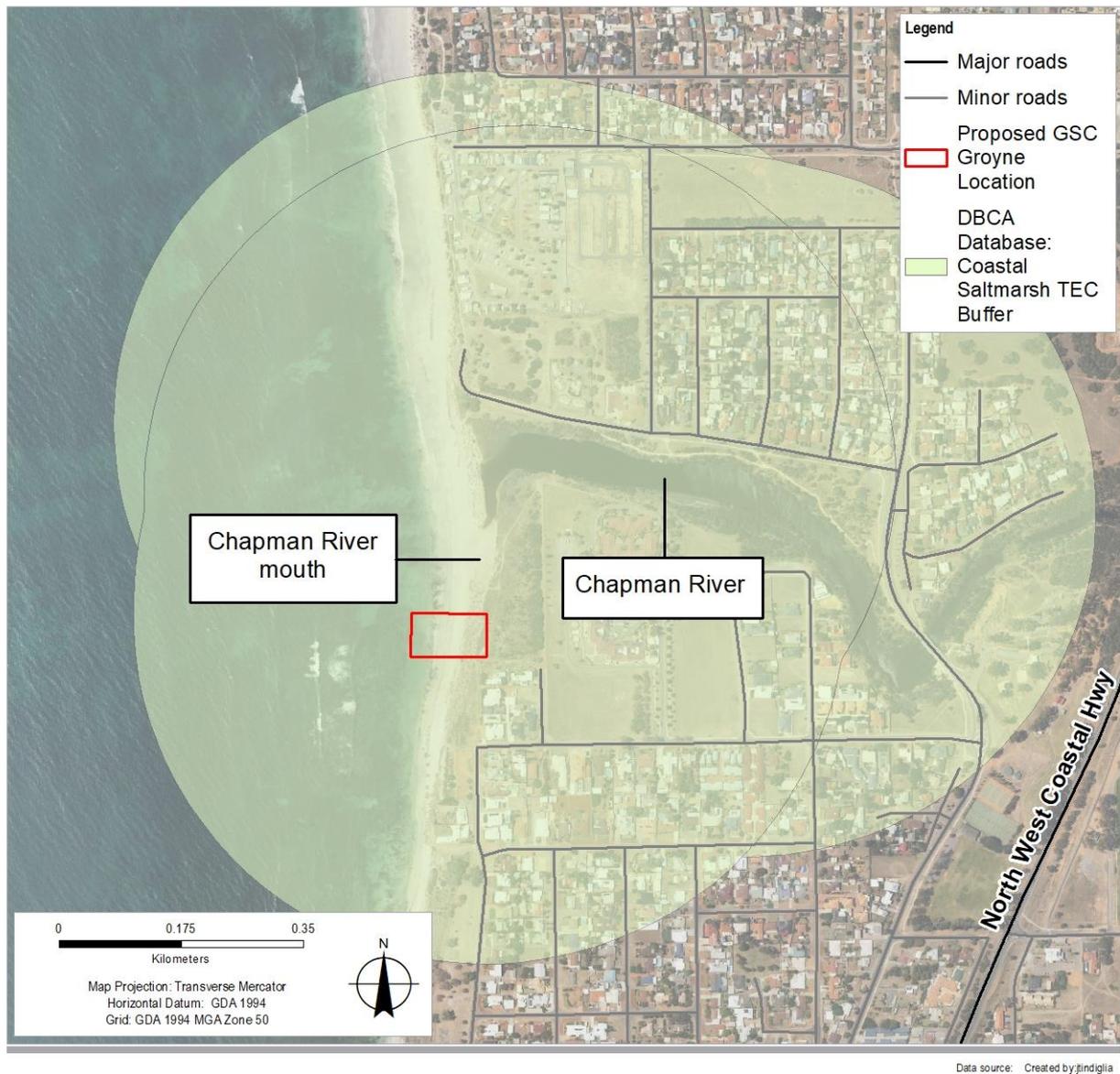


Figure 2 Coastal Saltmarsh TEC buffered locations (Source: DBCA TEC PEC Database, 2021)

3. Assessment of potential impacts

The development of a GSC groyne at Bluff Point North has the potential to impact on the environment. Impacts related to the Coastal Saltmarsh TEC and the estuarine environment (Chapman River) will be limited to indirect impacts. This is because, based on desktop information there are no records of the Coastal Saltmarsh TEC within the proposed groyne footprint and the development is not located at the Chapman River mouth.

A review of key threats to the Coastal Saltmarsh ecological community indicates the development has the potential to alter hydrology/tidal movements leading to habitat loss and decline of the community. The development may also disturb naturally occurring ASS which may reduce habitat quality of the community through acidification.

Altered hydrology/tidal movements

Developments can impact on local microclimates, changing hydrological regimes (freshwater and tidal), which in turns impacts on vegetation and habitats (DSEWPac 2013). The Chapman River is an intermittently closed estuarine system by the formation of a sand bar at the mouth of the river. The Water and Rivers Commission (2001) reports winter flows breach the sand bar separating the River from the ocean allowing tidal exchange of water, however, it is unknown how frequently this occurs. There is no information available on the local sediment dynamics at the Chapman River mouth, both the current baseline condition and with the development of the proposed groyne.

Development of the groyne will not directly impact on the Coastal Saltmarsh ecological community, however, may indirectly impact on the Coastal Saltmarsh ecological community through gradual erosion of the Chapman River mouth sand bar leading to more frequent breaching of the sand bar.

This in turn may lead to increased saline inundation (both frequency and duration), impacting on the vegetation present. Increased inundation can lead to rot and decomposition of species resulting in decline and/or death of the community. Alternatively, the development of the groyne may result in sand accumulation at the Chapman River mouth, leading to less frequent breaching of the sand bar and tidal disconnection. Reduced saline inundation (both frequency and duration), may lead to invasion of other terrestrial species resulting in decline and/or reduction of the community.

It is uncertain if the proposed groyne will result in indirect impacts on the Coastal Saltmarsh ecological community from altered hydrology/tidal movements. MPR (2020b) reported that the prevailing northerly sediment transport may lead to downdrift erosion on the northern side of proposed GSC groyne. Therefore indirect impacts on the Coastal Saltmarsh ecological community from altered hydrology/tidal movements are more likely to be a result of gradual erosion of the Chapman River mouth sand bar leading to more frequent breaching of the sand bar. In the absence of information on local sediment dynamics, indirect impacts on the Coastal Saltmarsh ecological community from altered hydrology/tidal movements are unknown.

Acid Sulfate Soils

ASS are naturally occurring soils and sediments that contain iron sulphides. If left undisturbed these soils pose little threat to the environment. However, disturbance of these soils allows for an oxidation process to occur and the consequent production of sulphuric acid which acidifies soil water, ground water, and surface waters (DSEWPac 2013). According to the ASS mapping for the Geraldton region, the Chapman River and proposed groyne location are mapped as high to moderate risk of actual ASS within 3 m of the natural soil profile (GoWA 2021).

GHD completed an ASS investigation within and adjacent to the proposed groyne location in March 2021. Fifteen primary soil samples were collected from five test pits at various depths and analysed for ASS. The investigation concluded that there is no significant risk of ASS (GHD, in prep.). This result is in line with ASS testing undertaken by Blacktop Material Engineering in September 2020. The analytical data provided by the City of Greater Geraldton on behalf of Blacktop Material Engineering indicated that the acid generating potential of the soils sampled in the vicinity of the proposed groyne is considered to be low. Further, the system appears to have a significant amount of acid neutralising capacity to counter acidity inputs generated through the disturbance of ASS.

No direct or indirect impacts on the Coastal Saltmarsh ecological community from ASS from development of the groyne are anticipated due to the low acid generating potential of the soils sampled within and adjacent to the proposed groyne location.

4. Conclusions and recommendations

This assessment has evaluated the potential environmental impacts of a proposed groyne on the Coastal Saltmarsh TEC located at the mouth of the Chapman River at Bluff Point North. Based on a review of key threats to the Coastal Saltmarsh ecological community, this assessment has concluded:

- No direct impacts on the community from altered hydrology/tidal movements and ASS.
- No indirect impacts on the community from ASS are anticipated due to the low acid generating potential of the soils in the area.
- Potential indirect impacts on the community from altered hydrology/tidal movements are unknown due to a lack of information on local sediment dynamics at the Chapman River mouth, both the current conditions and with the development of the proposed groyne.

It is understood a terrestrial flora and vegetation surveyed scheduled for spring 2021 will confirm the locations and extents of the Coastal Saltmarsh ecological community at the mouth of the Chapman River.

In order to elucidate whether development of the groyne will have potential indirect impacts on the Coastal Saltmarsh ecological community, a localised sediment transport/dynamics study should be undertaken. The study should:

- Establish a baseline sediment temporal pattern on the existing situation over a 10 year timeframe
- Model a sediment temporal pattern based on the proposed groyne over the same timeframe
- Compare the two patterns/scenarios to assess the difference in dynamics.

The study should provide information to enable potential indirect impacts from altered hydrology/tidal movements on the Coastal Saltmarsh ecological community to be determined.

Regards



Jordan Tindiglia
Senior Environmental Scientist

+61 8 62228065
jordan.tindiglia@ghd.com

5. References

Baird Australia 2018, Geraldton Coastal Hazard Risk Management and Adaptation Planning Project Part 1: Coastal Hazard and Risk Assessment Report, prepared for the City of Greater Geraldton.

Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) 2013, Conservation Advice for and Temperate Coastal Saltmarsh, Department of Sustainability, Environment, Water, Population and Communities, from <http://www.environment.gov.au/biodiversity/threatened/communities/pubs/118-conservation-advice.pdf>.

Government of Western Australia (GoWA) 2021, DataWA, accessed April 2021, from www.data.wa.gov.au.

M P Rogers & Associates Pty Ltd (MPR) 2020a, Bluff Point Coastal Adaptation Options Assessment, unpublished report prepared for the City of Greater Geraldton.

M P Rogers & Associates Pty Ltd (MPR) 2020b, Bluff Point North GSC Groyne Concept Design, unpublished report prepared for the City of Greater Geraldton.

Water and Rivers Commission 2001, Chapman River Foreshore Assessment. Water and Rivers Commission, Water Resource Management Report WRM 23.