GLADSTONE REGIONAL COUNCIL

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Gladstone Regional Council

Seventeen Seventy Coastal Adaptation and Resilience Plan

Prepared by Mosaic Insights and Alluvium Consulting

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Alluvium recognises and acknowledges the unique relationship and deep connection to Country shared by Aboriginal and Torres Strait Islander people, as First Peoples and Traditional Owners of Australia. We pay our respects to their Cultures, Country and Elders past and present.

Artwork by Melissa Barton. This piece was commissioned by Alluvium and tells our story of caring for Country, through different forms of waterbodies, from creeklines to coastlines. The artwork depicts people linked by journey lines, sharing stories, understanding and learning to care for country and the waterways within.

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1 Executive Summary

The Seventeen Seventy foreshore faces pressures from coastal hazards such as erosion and inundation – these pressures are expected to increase in the future and place the foreshore area and assets within it at risk. The Coastal Adaptation and Resilience Plan (CARP) has been developed to provide Gladstone Regional Council (GRC) with a pathway to plan for and adapt to coastal hazard impacts to foreshore assets in Seventeen Seventy.

We used an intregrated approach that combined best available coastal science and engineering evidence with in-depth community engagement and social insights. The community values-led approach (Section 3) helped to develop a vision for the future of Seventeen Seventy and key values shared by the community which has informed the recommended management options for key assets.

"**Our vision is for a peaceful, shady Seventeen Seventy where people live in harmony with the natural environment and the movements of the ocean.** We recognise the deep and continuous cultural significance of the place and strive to protect the plants, animals and ecosystems that support our wellbeing. We aim to blend the footprints of modern day living with the natural beauty and ambience of our unique coastal environment."

Community concerns and priorities for adaptation were also identified. Overall, the community place high value on the natural environment, including assets which allow them to experience and connect with natural foreshore features. The community also showed a preference for nature-based and 'blended' adaptation responses.

An asset vulnerability assessment and prioritisation of intervention was also undertaken for key assets in the area (Section 4). Two approaches have been used for the assessment and prioritisation of assets: 1) using a Multi-Criteria Analysis (MCA) for most assets, or 2) using an alternative assessment where there are limitations on the management actions that Council can take to manage the assets. A summary of the intervention levels for each asset resulting from the vulnerability assessment is provided in Table 1 on the next page. Recommended management options vary for each asset, but emphasise nature-based solutions over engineered solutions where feasible. More detail on our methods and outcomes in the context of Seventeen Seventy can be found in Attachment A: Community Engagement Report and Attachment B: Engineering Assumptions and Methodologies Report.

While this project focussed on planning for assets located on the Seventeen Seventy foreshore, this approach can be applied elsewhere in the region in a similar manner. This report captures the lessons learned from the CARP project, including what worked well and what could be done better next time for Council to consider when implementing a similar project in future.

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Table 1. Summary of asset intervention levels

Key assets	Intervention levels
Assets within Endeavour Park	Medium
Boardwalk between Endeavour Park and Air Sea Rescue Park	Immediate
Footpath at the foot of Captain Cook Drive	Medium
Kayaks/crafts are stored along the foreshore	Future
Boardwalk with rock armour revetment	Future
Park assets within Air Sea Rescue Park	Medium
Toilet block and parking lots	No implementation required
Pocket beach next to VMR	Medium
Sewer gravity main, stormwater pipe and stormwater pits (north of camping ground)	Future
1770 camping ground	Medium
Stormwater outlets/discharge on the beach	Medium
Sewer rising mains and stormwater culvert	Future
Boat ramp carpark	Medium

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2 Introduction

The Seventeen Seventy foreshore, with its unique shoreline and geography, faces pressures from coastal hazards such as erosion and inundation and these pressures are going to increase in the future. The Coastal Adaptation and Resilience Plan (CARP) has been developed to provide Gladstone Regional Council (Council) with a pathway to plan for and adapt to pressures such as erosion and inundation of coastal areas, environment, and foreshore assets along the Seventeen Seventy shoreline.

2.1 What is coastal adaptation and resilience?

Coastlines are dynamic, continuously changing with each tide and storm event. These events can cause erosion, long-term (permanent) tidal inundation in low-lying areas due to sea level rise and storm tide inundation which shape our coast. These processes are referred to as coastal hazards when they impact on how we use and enjoy the coast.

Coastal hazards have impacted the Seventeen Seventy coastline for some time. Studies of coastal processes undertaken as part of the *Our Coast Our Future* Coastal Hazard Adaptation Strategy (CHAS) (GRC 2021) and Shoreline Erosion Management Plan (SEMP) (GRC 2020), were used to provide the foundation for the assessment of risk along the Seventeen Seventy foreshore area. The program has identified that the Seventeen Seventy foreshore area is increasingly prone to emerging coastal hazards from present day to 2100 and recommended more localised planning for future impacts to Seventeen Seventy. Both the CHAS and the CARP were co-funded under the QCoast$_{2100}$ program.

Resilience refers to the ability to respond or reorganise in ways that maintain the essential function, identity, and values of a region, while also being able to proactively adapt to change. We can improve our resilience by avoiding, mitigating, or managing impacts through adaptation planning and intervention.

2.2 The purpose of this report

The purpose of the CARP report is to provide guidance for Council asset managers on the future management of assets along the Seventeen Seventy foreshore. This includes:

- Intervention levels for key assets (priority for intervention) in order to protect them and/or manage the impacts from coastal hazards.
- Recommended management actions for key assets and timeframes for implementation.
- A framework that asset managers can apply to the management of these and other assets in the region beyond this project.

2.3 Our approach

We used an intregrated approach that combined best available coastal science and engineering evidence with in-depth community engagement and social insights. In overview, our approach involved:

- An in-person site inspection of the study area undertaken by Council and Alluvium representatives.

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- Development of a Draft Assumptions and Methodologies Report, developed in collaboration with Council's Project Team and Steering Group, including:
    - Data availability and gap analysis
    - Proposed approach for an asset vulnerability assessment (multi-criteria analysis)
- A series of community engagement activities.
- Development of a Community Engagement Report (Attachment A).
- Development of the Final Engineering Assuptions and Methodologies Report (Attachment B).

These activities have contributed to the development of the CARP Final Report (this document), which contains:

- Our approach for community engagement, overview of the Community *Vision and Values*, and other engagement outcomes (Section 3).
- Our approach for the asset vulnerability assessment (Section 4).
- Assets, intervention levels, and management options (Section 0).
- Summary of criteria scorings and interventions levels (Section 6).
- Economic value of Seventeen Seventy's Sandy Beaches (Attachment C).

This report is not designed to replace or represent Council's asset growth plans for assets in this area, but rather it is intended to be a document to guide development of new (and review of existing) asset growth plans and investment decisions for each of the key assets along the Seventeen Seventy foreshore.

Seventeen Seventy Lookout

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2.4 Study area

Seventeen Seventy is located on the western, sheltered side of the headland, near the mouth of Round Hill Creek. Tides and currents have shaped and changed the Seventeen Seventy coastline and sandy beach ridges form barrier features across the estuary/delta zone. For the purpose of this report, the study area refers to an approximately 1.7 km stretch of foreshore area from north of the 1770 camping ground to south of Seventeen Seventy Marina (Figure 1). Historically, this stretch of the shoreline has been observed to naturally erode and accrete in response to the prevailing coastal processes.

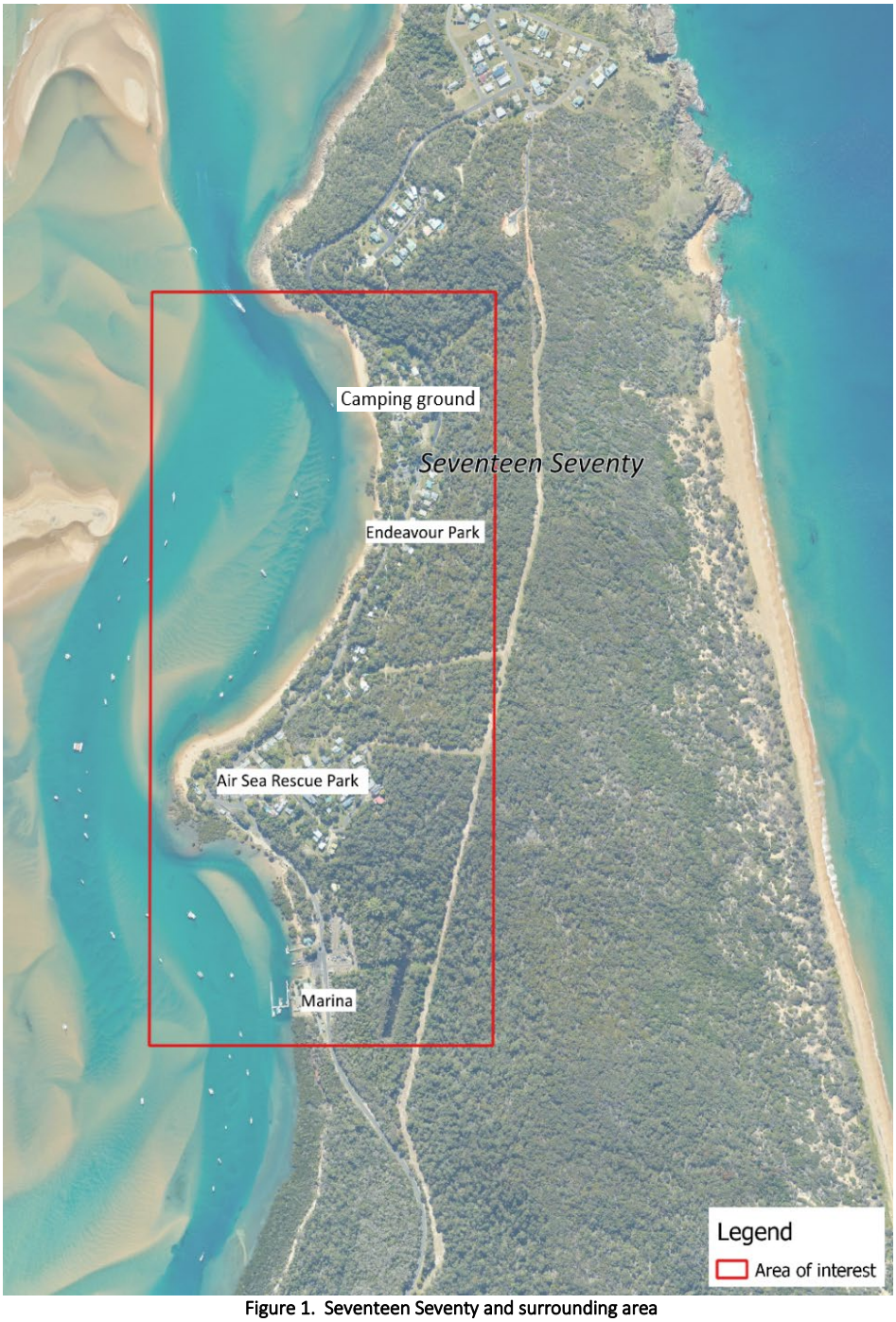

Figure 1. Seventeen Seventy and surrounding area

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Demographics

The population of Seventeen Seventy has experienced notable growth in the last decade, with the number of residents increasing from 69 in 2016 to approximately 125 as per the latest census conducted in 2021. Please note that due to this community's small population size, small changes can appear as relatively large proportional changes.

The Seventeen Seventy community is characterised by a relatively older population compared to both Gladstone and the wider state of Queensland (median age of 54 years, compared to 37 years for Queensland and 35 years for Gladstone). The age structure within the population has seen a substantial rise in individuals between the ages of 60 and 69, indicating a larger population of retirees or individuals approaching retirement in the town. Additionally, the age group between 30 and 39 years old has witnessed a notable increase, reflecting a growing segment of young professionals and families settling in the area. Interestingly, other age groups have emerged that were previously absent in the 2016 census, particularly those between 10 and 29 years old. These shifts in the age structure suggest a diversifying population composition, influenced by various factors such as lifestyle choices, economic opportunities, increasingly flexible working arrangements, and potentially the impact of the COVID-19 pandemic.

Inward migration

The transformation observed in the growing population of Seventeen Seventy is not solely reflected in changes in age dynamics but also to the origin of newcomers, but particularly of newcomers originating from other locations in Australia than previous migration patterns have shown (Attachment C). These evolving demographics indicate the increasing allure of Seventeen Seventy as an appealing destination for newcomers from various backgrounds and geographical locations and reflect the trend during the COVID-19 pandemic of city-dwellers relocating to regional areas.

Economy

Identifying the key industries that drive local employment is vital for gaining economic understanding of growth in Seventeen Seventy. There is greater representation of Accommodation and Food Services, as well as the Real Estate sector since the last census. This aligns with the growing tourism industry and the increasing population, both residents and visitors, which is likely to generate a higher demand for these services. A notable addition in the 2021 census is the presence of the Professional, Scientific and Technical Services, which likely reflects professionals taking advantage of the rising flexibility in work arrangements, such as remote work.

Despite the growing working population, there has been an absence of associated growth in construction within Seventeen Seventy (likely a result of the lack of additional land available for new housing). While the number of houses has remained relatively unchanged between the 2016 and 2021 census, the proportion of unoccupied dwellings in the area has significantly decreased from 32.8% in 2016, which was above the average for the neighbouring Agnes Water area and the State as a whole, to just 16% in 2021, which is considerably lower than the State average and Agnes Water. It is possible that the decrease in unoccupied dwellings is due to an increase in permanent residency (e.g., from an influx of retirees), rather than properties being used for tourism purposes.

More information on demographic data, economic drivers and economic values can be found in Attachment C: Economic value of Seventeen Seventy's sandy beaches.

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3 Community values-led approach

This program of engagement was designed to provide a community-centred lens through which to plan for the protection of specific assets in the Seventeen Seventy foreshore area (Figure 2) from coastal hazard impacts. The activities also sought to establish a community 'vision' for the future management of the foreshore more generally, and to confirm the values, concerns, and aspirations held by the community. We also sought to understand the community's priorities for intervention/management of key assets. In addition, these activities sought to strengthen the relationships between Council, the community, and key stakeholders and establish trust towards the process.

Throughout the engagement, we consulted with community on adaptation options for eight assets (Figure 2) which were identified as at risk or requiring intervention, and for which Council wished to hear community perspectives:

1. Endeavour Park
2. Boardwalk between Endeavour Park and Air Sea Rescue Park
3. Footpath at the foot of Captain Cook Drive
4. Kayaks/crafts stored along the foreshore
5. Boardwalk with rock armour revetment
6. Air Sea Rescue Park
7. Toilet block and parking lots at Air Sea Rescue Park
8. Pocket beach next to VMR

Engagement was largely positive and constructive, with participants actively contributing to the activities and discussion. The community is passionate about the issues facing their region, driven by coastal hazards and otherwise, as well as being a part of shaping the future of Seventeen Seventy. An overview of engagement findings can be found in Section 3; please refer to the full Engagement Report (Attachment A) for more detail on the findings from each engagement activity.

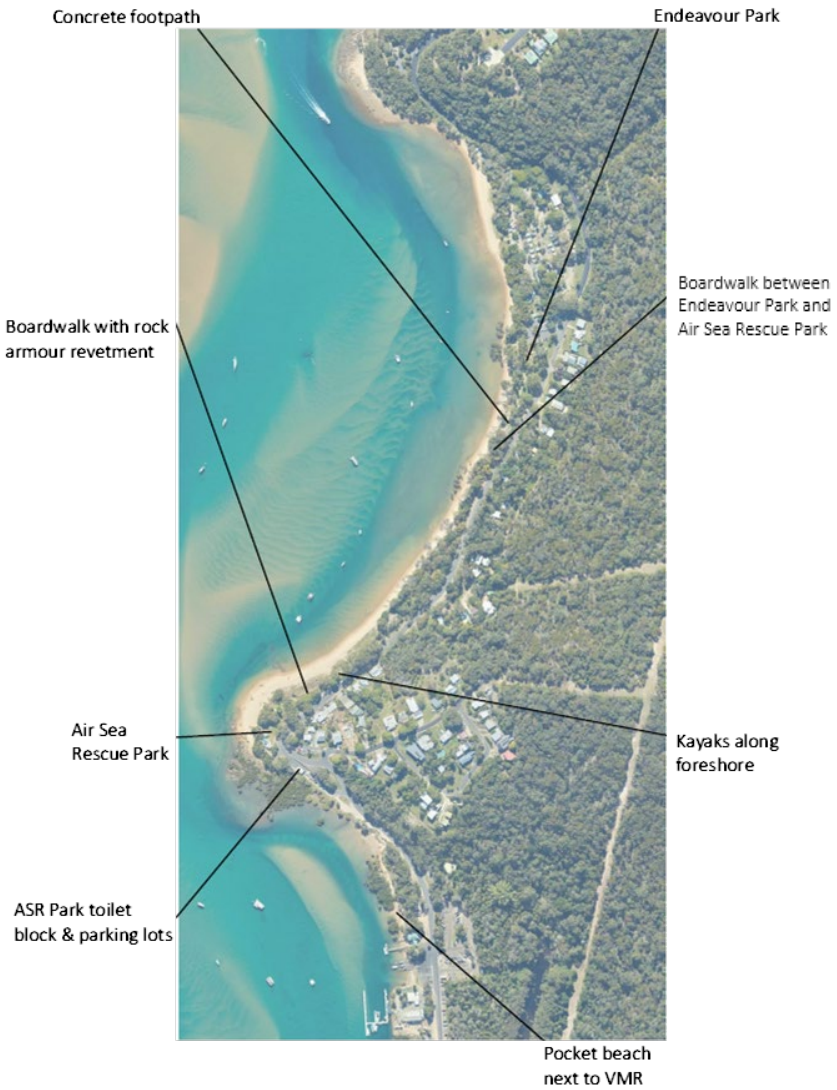

Figure 2. Project area and location of assets in Seventeen Seventy featured during engagement activities

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Table 2. Summary of engagement activities for the CARP project

Activity	Date	Method	Outcomes	Participation
Online project website	February to June	Online via Gladstone Regional Council's Conversations website	Sharing information about the project, hosting the survey (see below), and providing an avenue for questions and formal submissions.	17 questions / submissions via contact form
Community survey	15 February to 16 April	Online via Gladstone Regional Council's Conversations website Paper copies at Agnes Water Library	Understanding and validating community values, popular areas and aspects of the foreshore	104 responses
Community Workshop	22 February 6pm-8pm	Evening workshop with key community and agency stakeholders, invitation only	Validating and expanding on community values, concerns, and aspirations for the foreshore	6 participants
Listening Post	23 February 6am-8am	Drop-in session on the Seventeen Seventy foreshore		15 participants
Meeting with PCCC	16 March	Online meeting	Introducing the project, developing the relationship between GRC and PCCC	1 representative
Drop-in session	23 March 1pm-7pm	6hr drop-in session at Agnes Water Community Centre	Seeking feedback on the draft vision and values and identifying potential adaptation options	10 participants
Pop-up stall	16 April 8am-12pm	Market stall at Discovery Coast Rotary Markets	Promoting the project and the final workshop, demonstrating a GRC presence in the community	20 visitors (7 approx.) that spoke with stall attendants
Community Workshop	20 April 8pm-8pm	Evening workshop at Agnes Water Community Centre	Identifying community priorities for adaptation	13 participants 1 Councillor
			TOTAL	**186 interactions**

This series of engagement provides GRC with an indication of the community priorities and aspirations for their region, as well as a plan for how to adapt the foreshore in a changing climate. This information sets GRC up plan for these initiatives and the growth of these assets in a way that aligns with the community's vision.

3.1 Community insights

Vision and Values

The comments and discussions from all engagement activities have contributed to the summary of the community's *Vision and Values* for the Seventeen Seventy foreshore (Figure 3). The community places a strong emphasis on the natural environment, including the aesthetic and personal benefits that nature provides for their enjoyment of the foreshore (e.g., for rest and relaxation, feeling connected to nature). The foreshore is also an important area for them to socialise with others and take part in recreational and physical activities. Cultural values were also mentioned, including acknowledgement of First Nations Australians' connections to the area, as well as the colonial history. Feedback from the community also suggests that economic activities are a critical part of people's lives here, however there is a lot of concern that any future development and expansion of commercial activities is done in a minimal, environmentally sustainable way.

A common theme expressed by the community is their love of the natural, peaceful, and relaxed feel of the area. These lifestyle attributes have likely contributed to the influx of newcomers migrating to Seventeen Seventy from elsewhere in Australia (Attachment C). The community cares deeply about preserving and, in some areas, restoring the natural

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features of the foreshore and surrounding areas, and are keen to see the Seventeen Seventy foreshore managed well with sustainability in mind, while preventing development and commercialisation that would change the character of the place. There is also a desire among many for the community to have greater input into decision-making processes.

These values were consistently expressed by community members through each engagement activity. For the CARP, and particularly for decisions about adaptation options, GRC will need to keep in mind the community's strong desire for environmental protection and preference for natural aesthetics. For example, nature-based solutions should be prioritised over hard engineering solutions wherever possible. Nature-based solutions in this context refer to the use of vegetation, reefs, or other natural structures to reduce the impact of coastal hazards. These can be used in isolation or in conjunction with engineered structures as a 'blended' or 'hybrid' solution. A comparison of natural versus artificial (engineered) adaptation is presented in Attachment C. Any hard engineering solutions should be designed in a way that is sympathetic and complimentary to the natural surroundings where possible. Through their frequent use of the foreshore, the community regularly observe the conditions and patterns of change in the area and can provide valuable insights into the issues occurring in the coastal environment and infrastructure. Working with the community on the CARP, as they have been through this series of engagement activities, Council can tap into the considerable local knowledge to help them make decisions about appropriate adaptation solutions for the foreshore.

Please refer to the Engagement Report (Attachment A) for more information on methodology and findings from each engagement activity.

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SHARED VISION AND VALUES

Figure 3. Shared vision and values for the foreshore held by the Seventeen Seventy community

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Traditional Owner values

Traditional Owner values were captured predominantly through direct engagement with a representative of Port Curtis Coral Coast Trust (PCCC). The purpose of this engagement was to start conversations about how GRC can collaborate with the Traditional Owners and the wider First Nations community to make Seventeen Seventy more resilient to increasing impacts of coastal hazards.

The whole of Agnes Water and Seventeen Seventy is of high cultural significance. Captured below are the high-level values and perspectives held by Traditional Owners and First Nations Peoples. It is important to note that Traditional Owner values here should not be seen as separate or conflicting with the broader community's *Vision and Values*. In fact, there is high alignment between Traditional Owner values and the broader community's *Vision and Values*, in particular the values of '**respect**' (working with Traditional Owners to recognise and protect Aboriginal culture and natural heritage), '**protection**' (protecting the plants, wildlife, and ecosystems through ecological restoration and stormwater management), and '**engagement and collaboration**' (working closely with the local community). Traditional Owners also share similar concerns with the broader community about overdevelopment and development that is not environmentally sensitive.

The following were discussed as places of particular cultural significance in and around Seventeen Seventy, although many fall outside of the CARP project area:

- **Round Hill Headland** – cultural significance with symbols around birth, life, death, and spirit moving on as well as an important vantage point to the northeast.
- **Eurimbula National Park** – aspiration for co-management arrangement with QPWS, works commencing over next 18 months to integrate cultural values, with values established for the park which QPWS then uses for health checks. There is a need for a whole-of-system, values-based management framework.
- **Logger head turtles** – there are important logger head turtle nesting sites along Agnes Water and Seventeen Seventy. The sea turtle is an important totem animal for some First Nations peoples.
- **Reedy Creek and nature reserve** – managed by Bush Heritage Australia, PCCC are currently working in partnership to explore opportunities for bush burning.
- **Laguna development to west of Rocky Point** – the wetland in this area (SE corner) is important for frog dreaming.
- **Scar trees** – more work is needed to engage with Traditional Owners to understand and map the location of these sites and values (recorded as polygons rather than points to respect cultural sensitivities and intellectual property).

Values and aspirations specific to Traditional Owners were identified as:

- Better mapping of the location of cultural sites and values (e.g., scar trees) in a way which respects cultural sensitivities and intellectual property.
- Access and cultural rights of Traditional Owners and First Nations peoples to foreshore, waters, land (e.g., for cultural fishing, traditional hunting, ceremonies).
- Culturally appropriate naming and signage.
- Ongoing engagement with GRC through the Elders Council and Prescribed Body Corporate, with the aim to proactively protect values as opposed to engaging on the back of development.

Rather than considering Traditional Owner values separately from the broader community, GRC should be mindful of the importance that the *whole* community places on the protection of cultural and natural values, as noted in the community *Vision and Values* summary (Figure 3) above. GRC has been building relationships and collaborations with Traditional Owners to address the way the area is used and managed. There are good opportunities for GRC to further develop this relationship and work collaboratively with PCCC through GRC's fire management planning. By maintaining a strong relationship and building in a *Caring for Country* approach to the way issues are handled, the GRC and Traditional Owners will be able to ensure this area is protected, cared for, and managed well into the future.

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3.2 Aspirations and priorities for adaptation responses

The final Community Workshop asked the community to prioritise the adaptation option for the foreshore (refer to Attachment A for methodology and detailed findings). The workshop was designed to acknowledge there would not be perfect agreement among community members about which particular assets are the priority. Rather, in recognition that consensus is unlikely, information was collected to reflect their aspirations and concerns for these assets (Table 3).

Table 3. Community aspirations and concerns for identified assets and their proposed adaptation options

Asset	Aspirations and concerns
Park assets within Endeavour Park	• Highly popular park • Subject to flooding • Toilet capacity issues here are more important than those at Air Sea Rescue Park • Parking management is needed (though not addressed as an intervention option) • Desire to add a pathway between Endeavour Park/camping ground and the Captain Cook Monument to improve connectivity and address safety issues • Parking overflow from camping ground into Endeavour Park a major issue
Boardwalk between Endeavour Park and Air Sea Rescue Park	• Highly used and valued asset, including seating along pathways • This asset scored highly for some participants and low for others • Those scoring highly were most concerned about the sewage pipe and sewage system as a whole which requires attention • Others scored lower as they had been provided information from GRC that works were in progress to address this issue
Footpath at the foot of Captain Cook Drive	• Highly used and valued asset, including seating along pathways • Aligns with the desire to maintain (and improve) connectivity • Support for upgrades to raised boardwalk to protect sections at risk, preference for rocks over sandbags for revetments and armouring • Path is impacted by runoff and drainage
Kayaks/crafts are stored along the foreshore	• This was not a high priority for the community, but many see it as a quick fix • There was a range of support, from allowing the kayaks to remain in some capacity, to a "tidying up" of damaged and unused crafts, to some enforcement to limit abuse of this privilege • Any regulation may be a "can of worms", storage fees are not a preferred system of management • Strong support for removal/limitation of larger boats mooring onshore/close to shore which impact views and swimmers
Boardwalk with rock armour revetment	• Highly used and valued asset, including seating along pathways • Strong support for nature-based solutions (i.e. revegetation) to provide additional protection • Support for extension of the boardwalk to other sections (including to a potential new section between Air Sea Rescue Park and the marina)
Park assets within Air Sea Rescue Park	• Support for improvements to stormwater drainage • Aware that this park is not currently at great risk from coastal hazards
Air Sea Rescue Park toilet block and parking lots	• This was not a high priority for community, as this area is not currently at great risk from coastal hazards • However, capacity is an issue, as is the need for some regulation of visitors and traffic (which may need to be addressed as part of a broader visitor/traffic management strategy)
Pocket beach next to VMR	• Strong support for the option of constructing a pathway through this section to connect the marina and Air Sea Rescue Park • High commercial and recreational activity in this area (i.e. the marina, businesses, kayaks, dragon boats and other boaters using as an informal boat ramp) • Erosion noted which may impact large old growth trees

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Asset	Aspirations and concerns
Other priorities not directly linked to one asset	**Vegetation** • Strong support for protection and enhancement of existing vegetation everywhere, including revegetation • Keeping locals informed of vegetation clearing and management activities **Sewage system** • Low pressure sewage system unsafe and unreliable • Major concerns of pollution from perceived sewage outflows **Beaches** • Formalised access points to beaches are needed • More bins at beach access points

3.3 Implications for the CARP

The engagement activities have provided a great insight into what the community values about their foreshore, future management of the assets within it, and management of the region more broadly. It is important to note that the community's *Vision and Values* have strong alignment with Traditional Owner values and that strong relationships and collaboration with all facets of the community will contribute to a holistic view of community values and priorities.

Community values have been incorporated into the multi-criteria analysis (MCA) process (Section 4.1 / Attachment B) to help identify the preferences and priorities of the community. By including community value in the MCA, the decision-making process can be more inclusive and reflective of the community's needs and concerns.

In addition to improving the alignment of management and resilience measures with community values, incorporating community values into the MCA may also help to build community support and engagement for the implementation of the CARP.

3.4 Out-of-scope broader community concerns and 'big ideas'

Though the scope of this project was limited to a select area of the Seventeen Seventy foreshore (and select assets within this), throughout the engagement activities we heard many concerns, 'big ideas' and perspectives on broader issues in the area. Despite not being necessarily within scope, we found these insights to be often interconnected with the issues identified with specific assets. We consider these insights important to be captured here, as they may influence future decisions on the assets within and around the project area, and future projects that may occur in this region. The community suggestions were categorised into themes, presented below.

Tourism

The community is well-aware that visitation rates are increasing rapidly since 2020, making holiday periods especially challenging for locals to move around. The community emphasises a desire for no additional tourism promotion for their Seventeen Seventy/Agnes Water until existing visitation is managed in some way (potentially linked to traffic management, see below). There is a strong desire for 'sustainable tourism' to guide the management of existing visitation. There were some suggestions of a ballot system to manage visitors, similar to how National Parks are managed elsewhere (e.g., Parks Victoria operates a ballot system for peak season).

Despite these concerns, the community is conscious of the importance of tourism for the region. The economic value of tourism to Seventeen Seventy is discussed further in Attachment C: '*Economic value of Seventeen Seventy's Sandy Beaches*'. A visitor management strategy, perhaps incorporating some other issues identified below, may be appropriate to plan for the future of Seventeen Seventy on issues beyond the scope of this project.

Parking and traffic management

There are parking concerns across the whole Seventeen Seventy area, not just the areas within scope for this project. Specifically:

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- Parking overflow from camping ground into Endeavour Park (especially campers with multiple vehicles, campervans, and boat trailers).
- Limited parking available at Air Sea Rescue Park and around The Tree Restaurant.
- Parking at the marina cannot currently service all users, especially in peak periods, both from boat ramp users and additional pressure resulting from new businesses operating out of the marina precinct.
- Related to the above, some boaters are parking trailers long term (e.g., 2-4 days) which limits capacity for daily users.
- Illegal parking along both sides of Captain Cook Drive (between marina and SES Grounds) during peak periods.
- Large vehicles (i.e., campervans, caravans) block traffic along Captain Cook Drive when parking or turning.

The community have suggested ideas to better manage parking and traffic (which in turn may help to manage visitation impacts). Please note that parking options were not an explicit topic of engagement activities, so the opinions below may not reflect all views. These include:

- Bollards between the marina and SES Grounds to limit illegal parking (bollards could also provide a canvas as an opportunity to showcase local artists and artwork of the region).
- Alternatively, provide some formalised angled parking between the marina and SES Grounds to improve safety and accommodate users that already park illegally.
- The community expressed negative views around the expansion of the existing marina carpark into Conservation Park land. Other suggestions included:
    - Limit parking at the marina for daily or short-term (1-2 day) use and provide long-term parking elsewhere.
    - Paid parking at the marina, preferably with a permit system that exempts local residents.
- Implement a public electric scooter service to facilitate quick and car-free transport around the foreshore (although Council has noted that an e-scooter trial has already been approved for Agnes Water and Seventeen Seventy). This would ideally be implemented in conjunction with:
    - Connecting all footpaths along the foreshore (e.g., marina to Air Sea Rescue Park), and
    - Encouraging scooters to use the upper footpath along Captain Cook Drive instead of the lower concrete path (which is better suited to walkers and slower travel).
- Many locals also suggested implementing a free shuttle service (or some form of public transport) that regularly travels between Agnes Water and/or SES Grounds and Seventeen Seventy to limit vehicles entering the foreshore areas. This would also require consideration of:
    - Where people will be parking to get onto the shuttle bus
    - Frequency of services (e.g., only during holiday periods)

Given that parking concerns are most significantly impacted by tourism and visitation rates, addressing some or all these concerns as part of a larger visitor management plan may provide the best long-term solutions.

Planning and development

As Seventeen Seventy gets busier, the community aspire for environmentally sensitive development, and development which aligns with the 'laidback lifestyle' which they have cultivated. The community hold a strong sense of identity linked to their region and wish to retain this by leaning into the unique qualities that sets them apart from other coastal towns and cities (i.e., Airlie Beach, Hervey Bay, Noosa, Sunshine Coast, Gold Coast).

Some more specific comments include:

- Preventing overdevelopment and development that is "purely for financial gain".
- Managing/regulating stormwater runoff and erosion on private land, and silt that runs down the hillside and impacts the foreshore and beach areas.
- The community is already struggling to access health and other essential services with current population increases.

These comments should feed into GRC's next planning scheme review.

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Round Hill Creek and boating

Many people live in/around and visit Seventeen Seventy to enjoy the beaches for walking, swimming, fishing, and to access Round Hill Creek for boating activities. There are many community concerns around the health of the creek, including:

- Impacts of pollutants from anti-fouling chemicals, sewage effluent, and stormwater on marine life and vegetation.
- Impacts of increased commercial activity along the creek and waterways.
- Concerns about the potential disposal of grey- and black-water from liveaboard vessels into Round Hill Creek, as the only facilities nearby are onshore at GRC's waste facility and with its safe anchorage, this creek is a frequent stopover for these vessels.
- Regulation of large-scale, commercial fishing.

Other comments refer more to boat users themselves:

- Improvements to the existing boat ramp facility.
- More boating facilities, such as a potential parking, washdown and/or boat storage precinct at the SES Grounds.
- Better mapping and marking of Round Hill Creek channel and routes, the channel is now wide and shallow when it was once narrow and deep.

A number of these suggestions are not entirely within GRC's control, but Council may be able to play an advocatory role for the community to Maritime Safety Queensland, and/or collaborate with other organisations/businesses (e.g., VMR) to address them.

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4 Asset vulnerability assessment

Asset vulnerability assessment is an important process for identifying potential risks and threats to assets and determining the necessary measures to mitigate or eliminate them. Two approaches have been used for conducting asset vulnerability assessment and prioritisation of assets: 1) using a Multi-Criteria Analysis (MCA) (Section 4.1) for most assets, or 2) using an alternative assessment (non-MCA) (Section 4.2) where there are limitations on the management actions that Council can take to manage the assets.

Coastal approvals guidance

Prior to assessment of options and committing to any works within the coastal zone, it is important to have an understanding of the approval restrictions associated with each individual asset. It is important to consider whether the MCA assessment approach outlined in Section 4.1 is appropriate, particularly in cases where the infrastructure is critical or where the viable options are limited. In such situations, it may be more suitable to use the alternative assessment (non-MCA) approach detailed in Section 4.2. This ensures that the assessment approach aligns with the specific circumstances and constraints associated with each specific asset.

Undertaking works within the Coastal Management District (CMD) has additional State Government requirements that can restrict options and make approvals more complex and time consuming. This can mean no matter what the preferred option may be from key stakeholders, it may not be possible to get many options approved. Generally, within the coastal zone new hard protection structures can now only typically be constructed to protect existing approved high value infrastructure that is not easily relocatable or replaceable. Protection structures should not be more than the value of the assets they are protection, and they must not adversely impact natural coastal processes.

Operational Works Approval – Tidal Works

To undertake new works within the CMD, works typically require an Operational Works Approval (OPW) – Tidal Works. These can be very complex and time-consuming approvals as they need to be referred to numerous state agencies throughout the process and can take many months to gain approval. For any projects at the tidal interface that extend below the high tide mark, landowners' consent for the unallocated tidal land must first be sought from the Department of Resources (DoR): Part B LA08 Application for owners consent to development applications (www.qld.gov.au). This can take approximately two months and is required prior to being able to lodge the OPW – Tidal Works.

When an OPW – Tidal Works is lodged, at a minimum it is required to meet the requirements of State code 8: Coastal development and tidal works which will see it referred to the Department of Environment and Science (DES) to ensure it complies with all the requirements of this code. If, as part of the works, marine plants are likely to be damaged, it will be referred to the Department of Agriculture and Fisheries (DAF) who will assess for compliance against State code 11: Removal, destruction or damage of marine plants. If works extend into the water, it is also likely to be referred to Marine Safety Queensland (MSQ) to assess against State code 7: Maritime safety. Given the complexity of tidal works approvals, the approval alone can often take six months or more to complete. Factoring in design and Council budget cycles, realistically 2 years is reasonable minimum timeframe to implement and totally commence new works.

However, for Councils there are some circumstances where works implemented within the CMD can occur in much faster timeframes if necessary, and without the need for a full tidal works approval.

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Emergency Works

Should coastal hazards such as erosion, cause a risk to;

- People's safety or health,
- An approved building's structural safety, or
- Operation or safety of approved infrastructure;

Works can immediately be undertaken under the approval/supervision of a registered professional engineer under the Emergency Works Code: ESR/2016/2045 Necessary operational work that is tidal works (des.qld.gov.au). However, these works will still need to gain tidal works approval at a later date, unless they are temporary only, in which case they must be removed at a later date.

Maintenance Works

Maintenance works on approved structures can be undertaken by Council utilising the Excluded Works Code: Excluded Work (Coastal) - Guideline for coastal development (EPP/2016/2081) (www.qld.gov.au). This means that works will not require a new approval when the works comply with the requirements of the code.

Minor Works for Public Benefit

Council can also undertake other minor works using the self-assessable code: EPP/2017/3930 Code for accepted development - For tidal works, or work completely or partly in a coastal management district - August 2017 (des.qld.gov.au), to undertake minor works such as;

- Minor public marine development,
- Stormwater infrastructure,
- Certain work involving boardwalks, beach access and viewing structures, netted swimming enclosures and pedestrian/bikeway bridges,
- Beach re-profiling and beach nourishment,
- Demolition of structures seaward of high-water mark,
- Management of a natural waterway mouth across a beach,
- Reconstruction of a functional seawall or revetment,
- Reconstruction or maintenance of a road, carpark or path, and addition of a footpath to a road.

Works must comply with the requirements of this code and Council must notify DES prior to and on completion of the works.

4.1 Multi-criteria analysis

The Multi-Criteria Analysis (MCA) approach is adopted to assess vulnerability and prioritisation of non-critical and public assets to determine the required levels of intervention. The MCA evaluates each asset against a defined set of decision criteria that represent the objectives of the Seventeen Seventy Foreshore Area. The MCA criteria has been developed through a collaborative process with Council.

The decision criteria are as follows:

1. How at risk is the asset from present day coastal hazards and climate change impacts?
2. What is the criticality of the asset (e.g. essential/critical service, recovery time)?
3. What is the feasibility of asset relocation and intervention (e.g. approvals, costs, capacity)?
4. What is the remaining useful life of the asset?
5. What is the community value of the asset?
6. What is the economic value of the asset?

Each asset is scored out of 5 according to Table 4, and each criterion is weighted based on the importance of each criterion (Figure 4). The decision criteria are presented in Table 4.

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Criteria assessment

Criteria	Definition
Risk	*Potential risk of the asset.* Existing data and assets including coastal hazards and tangible and intangible assets from the *Our Coast Our Future* program database have been compiled and reviewed in the Stage 1 process. The purpose of this is to better understand the level of risk posed to key assets in the near vicinity of the Seventeen Seventy area. The risk outcome from the *Our Coast Our Future* program set the foundation for prioritising key assets and assessing the risk criteria. The site inspection has also been undertaken to validate key assets in order to identify any visual conditions at the site that may pose a higher or lower risk to these assets or any visible deterioration of the assets that may result in future vulnerability to coastal hazards.
Level of service	*Level of service and function of each asset to determine its priority.* Each asset provides a service or function, such as protection, community use and environmental or social value. It is important to assess the consequences of asset failure in the servicing area, as well as its impact on emergency situations. Note: Council has conducted asset criticality assessments for water and sewer networks, which can be used to determine the criticality criteria.
Feasibility	*Likelihood of whether the asset can be easily defended, relocated, implemented and readily approved.* Feasibility considers whether an asset can be defended or relocated under existing and future conditions. The likelihood of successful implementation of each asset as well as any obstacles involved in the approval process should also be considered (i.e. is consistent with current planning policy or legislative requirements).
Asset life	*Remaining useful life of each asset to determine the possibility of asset renewal.* Asset condition data such as its remaining useful life can help a manager assess whether the asset will be able to provide the services required, identify the nature of its risk, and assess its maintenance and renewal needs. Note: This criterion is subject to data availability. Comprehensive information on asset condition has not been provided by Council. Alternative measures will be discussed if data is not available.
Community value	*Community values and vision.* The outcome of the community co-design engagement will contribute to shaping the community value criteria. The workshops allow us to seek community feedback on their values and vision for the Seventeen Seventy area by giving them the opportunity to explore problems and solutions collaboratively.
Economic value	*Impact to local economy.* Disruption or loss of the asset resulting in loss of potential local economy.

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Table 4: MCA assessment criteria scoring

Criteria	1	2	3	4	5
Risk *How at risk is the asset from coastal hazards and climate change impacts?* **Refer to Our Coast Our Future.*	*Extreme – Immediate and/or ongoing action (treatment) is needed to eliminate or reduce risk to acceptable levels.	*High – Short term action (treatment) is needed to eliminate or reduce risk to acceptable levels.	*Medium – Short to longer term action (treatment) is needed to eliminate or reduce risk to acceptable levels.	*Low – Manage the risk as part of current operations, provide for periodic maintenance.	*Very low – Acceptable risk.
	After a large event: High tide mark distance from asset after large events <2m	After a large event: High tide mark distance from asset after large events 2 – 5m	After a large event: High tide mark distance from asset after large events 5 – 10m	After a large event: High tide mark distance from asset after large events 10 -15m	After a large event: High tide mark distance from asset after large events >15m
Level of service *What is the level of service of the asset (e.g. essential service, recovery time)?*	Essential/critical assets (e.g. water, power, sewer, road)			Non-essential/non-critical assets (e.g. park infrastructure, boardwalk, footpath)	
	Asset servicing 1770 and emergency purposes only.	Asset servicing 1770 only but asset can be reinstated.	Alternate options are available.	Asset servicing 1770 only but asset can be reinstated.	Alternate options are available.
Feasibility *What is the feasibility of asset interventions or implementation (e.g. approvals, costs, capacity)?*	Cannot be defended or relocated. OR Is technically viable and easily implementable at the site.	Can be partially defended or relocated. OR Is technically viable with some effort.	Can be relocated only. OR Is likely to be technically viable at the site but would require further investigations to clarify.	Can be defended but not relocated. OR Is only technically viable with substantial engineering (or other) design investigation and capabilities for implementation.	Can be defended and relocated. OR Is not technically viable at the site.
Asset life *What is the remaining useful life of the asset?*	Remaining useful life >50 years. Asset is likely to become at risk from coastal hazard before it needs to be replaced.	Remaining useful life <50 years.	Remaining useful life <25 years.	Remaining useful life <10 years.	Remaining useful life <5 yrs. Council is likely to replace asset before it is likely to become at risk from coastal hazards. Allowing for relocation
Community value *What is the value or priority that the community places on protecting and managing assets?*	The community places a very high value or priority on this asset.	The community places a high value or priority on this asset.	The community places a moderate value or priority on this asset.	The community places a low value or priority on this asset.	The community does not place any value or priority on this asset.
Economic value *What is the asset contribution to local economy (e.g. tourism)?*	Significant contribution to local economy.	N/A	Moderate contribution to local economy.	N/A	No to little contribution to local economy.

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Weightings

The Pairwise matrix (presented in Figure 4) was developed in consultation with Council, and it generates a series of weightings for each criterion (Table 4). It involves comparing and prioritising each of the selected criteria against each other sequentially. The Pairwise ranking provides decision-makers with oversight into the relative degree of importance of each criterion with respect to each other.

Criteria		Risk	Level of service	Feasibility	Asset life	Community value	Economic value	Total	Weighting (%)	Rank
		a	b	c	d	e	f			
Risk	1	1	1	2	2	2	2	10	28.6%	1
Level of service	2	1	1	1	2	2	2	9	25.7%	2
Feasibility	3	0	1	1	1	0	1	4	11.4%	4
Asset life	4	0	0	1	1	0	0	2	5.7%	6
Community value	5	0	0	1	2	1	2	6	17.1%	3
Economic value	6	0	0	1	2	0	1	4	11.4%	4

Figure 4: Pairwise scoring approach

Intervention levels

The total scores and the recommended intervention levels are summarised in Table 5. Intervention levels have been assigned to immediate, medium-term, future or no implementation required. Intervention timeframes in the table below have been developed with consideration of planning and approval timeframes. Planning should begin within the first year listed, with on-ground works to commence within the second year listed. For example, an asset assigned a medium-term intervention level should commence planning for the chosen management option within two years, and on-ground works should commence within four years. Larger projects or capital works may require longer lead times to secure funding and begin planning.

Table 5: Intervention levels and interpretation

Scores	Intervention levels
1 – 2	Immediate – Recommend implementation within 1 to 2 years, unless triggered by emergency works. Commence the design / approvals processes as soon as budget can be secured.
2 – 3	Medium-term – Recommend implementation within 2 to 4 years. Aim to secure budget in 2 years to commence design / approvals processes and complete works within the 4 year timeframe.
3 – 4	Future – Recommend implementation within 5 to 10 years. Aim to secure budget in 5 to 6 years to commence design / approval processes and complete works within the 10 year timeframe.
4 – 5	No implementation required.

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4.2 Alternative assessment (non-MCA)

Assets subject to management restrictions may require a different evaluation approach instead of the MCA assessment. Assets under the following categories that may require an alternative assessment include:

- Critical assets – assets that are critical in the community and cannot be easily relocated;
- Approval restrictions – assets subject to heavy restrictions on management actions due to approval requirements (see more information on this below);
- Privately owned assets – assets where land acquisition is necessary to carry out management actions; and
- Assets that have no viable alternative location to continue to function.

Seventeen Seventy assets that fall under the aforementioned categories are listed in Table 6 below.

Management of these assets should be driven by triggers. Trigger-based intervention relies on identifying events or conditions that could trigger immediate vulnerability or damage to an asset. For example, a trigger could be severe weather conditions that may cause erosion or inundation damage (refer to Table 7). The assessment would focus on identifying the most appropriate intervention measures to address the immediate risks as soon as these triggers occur.

Table 6: Seventeen Seventy Assets requiring alternative assessment

Key assets	Management restrictions	Intervention Type / Trigger
Sewer gravity main, stormwater pipe and stormwater pits (north of caravan park)	Sewer infrastructure is a critical asset for the community and in certain areas, it cannot be easily relocated.	Trigger-based / Event
1770 camping ground	Due to the temporary and mobile nature of camping and caravanning at the 1770 camping ground, any proposed defence measures are unlikely to be approved as the site lacks significant infrastructure to warrant such measures.	Trigger-based / Event
Stormwater outlets/discharge on the beach	There is potential to enhance the management of stormwater discharge points as they are crucial for the proper functioning of the system. Council is currently planning an upgrade to the stormwater infrastructure to further improve overland flow in the area.	Trigger-based / Event
Sewer rising mains and stormwater culvert	Sewer infrastructure is a critical asset for the community and in certain areas, it cannot be easily relocated.	Trigger-based / Event
Boat ramp carpark (management option is dependent on land acquisition negotiation with the State)	Acquisition of additional land is necessary to facilitate any expansion of the boat ramp carpark.	Trigger-based / Land acquisition

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Trigger points

Trigger points could be based on severe conditions or events that signify the need for immediate, medium-term, future, or no implementation of action. Trigger points presented in Table 7 are used to determine the appropriate timing for the implementation of different management actions.

Table 7: Trigger points for trigger-based assets

Trigger points	**Immediate action** Recommended implementation within less than 2 years. Commence the design / approvals processes as soon as budget can be secured.		**Medium-term** Recommended implementation within 2 to 4 years. Aim to secure budget in 2 years to commence design / approvals processes and complete works within the 4 year timeframe.	**Future** Recommended implementation within 5 to 10 years. Aim to secure budget in 5 to 6 years to commence design / approval processes and complete works within the 10 year timeframe.	**No implementation required**
Risk *How at risk is the asset from coastal hazards and climate change impacts?*	After a large event: High tide mark distance from asset after large events <2m	After a large event: High tide mark distance from asset after large events 2 – 5m	After a large event: High tide mark distance from asset after large events 5 – 10m	After a large event: High tide mark distance from asset after large events 10 -15m	After a large event: High tide mark distance from asset after large events >15m

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5 Assets, intervention levels and management options

The key assets are presented in Figure 5.

Figure 5: Key assets in study area

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5.1 Multi-criteria analysis assets

Assets within Endeavour Park

This analysis refers to the assets and infrastructure located within the park, such as park assets (BBQ pits, picnic tables and chairs, picnic shelters), the toilet block, and pump station, but not the land which the park occupies.

Observations	Community insights
• Localised erosion near picnic shelter from stormwater runoff • Lots of park assets – BBQ pits, picnic tables and chairs, picnic shelters • Limited parking lots resulting in illegal parking in surrounding areas and overflow from caravan park • SPS AGN73 (pump station) has issues with capacity. Asset is currently being replaced but long-term solution will need to be considered • Existing protection structures along the foreshore (rock revetment and geotextile sandbags) • Erosion caused by overland flow and can be exacerbated by northerly wind/swell • Existing toilet facility (oldest in the region) is not able to service current demand from both Endeavour Park and caravan park users – reports of perceived overflows and blockages • Council often receives requests to clean up fallen trees along the foreshore	• Highly popular and well-used park • Additional pathways to improve connectivity (Endeavour Park to Capt. Cook Monument) • Parking overflow from camping ground into Endeavour Park is a major issue • Formalised access points to beaches are needed • More bins at beach access points • Need a balance between public use and private/event use of the park • Toilets are unable to keep up with visitation numbers • Some support for designated dog free and dog park areas

Criteria scores

Criteria	Comment	Unweighted score	Weighted scores
Risk	Assets are at high risk, as identified in *Our Coast Our Future*. Some assets situated in the foreshore area are at high to extreme risk, while other assets located further inland are at a lower risk. The overall risk is evaluated as high risk due to some assets at high to extreme risk.	2	0.57
Level of service	Non-critical asset that is servicing 1770 only and asset can be reinstated.	4	1.03
Feasibility	Asset can be defended, which requires engineering design investigation.	2	0.23
Asset life	Assets have <5 years remaining useful life. Council is likely to replace or relocate asset within 5 years.	5	0.29
Community value	The community places a very high value or priority on this asset, Endeavour Park was one of the most popular locations that survey respondents visit on the foreshore. The adaptation options for this asset scored 3rd highest in the prioritisation activity in the community workshop.	2	0.34
Economic value	Significant contribution to local economy.	1	0.11
		Total	**2.57 Medium**

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Recommended management options

Option 1: Implement nature-based solution, including:

- Designated walkways
- Dune stabilisation and protection

Option 2: If triggered by risk criterion, relocate at risk assets as required, or relocate assets when upgrading/replacing

Option 3: If triggered by risk criterion, install buried geotextile seawall

Council should implement a nature-based solution that combines designated walkways with dune stabilisation and protection at Endeavour Park. In the event of a large storm, if the risk criterion is triggered (resulting in a more urgent intervention level), Council should consider relocating or upgrading any assets that are at risk. Alternatively, Council may consider installing a buried geotextile seawall to mitigate erosion risks.

Description

Council should implement a nature-based solution that combines designated walkways with dune stabilisation and protection at Endeavour Park. This solution would involve constructing designated paths that lead to the beach while simultaneously stabilising and protecting the dunes. This approach could help to reduce erosion and damage to the dunes caused by foot traffic, as well as provide a safe and accessible pathway for park and beach users.

If a large storm occurs, posing a potential risk to existing assets in the area and triggering the risk criterion (resulting in a more urgent intervention level), Council should assess the impacts and consider whether it is necessary to relocate or upgrade any at-risk assets. This may include park assets, such as BBQ pits, seating, shelters, or other assets that are at risk of erosion or inundation. Additionally, it is important to consider relocating assets landward when they require replacement or upgrade after exceeding their useful life.

Alternatively, Council could consider installing a buried geotextile seawall along the Endeavour Park foreshore. The buried seawall would act as a last line of defence to prevent shoreline recession.

The toilet block and pump station at Endeavour Park are at their capacity. It is recommended that the Council assess the feasibility of upgrading and/or relocating these facilities in the near future.

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Boardwalk between Endeavour Park and Air Sea Rescue Park

Observations	Community insights
• Boardwalk is impacted by coastal hazards • Boardwalk is currently held up by acrow props as a temporary solution due to past erosion • Boardwalk is in poor condition, project by Council to renew boardwalk (boards only, not whole structure) • The subsurface formation is stratified unit which comprises of Agnes Water Volcanics • Sand has been accreting in this area in recent times • Boardwalk provides all abilities access to foreshore but requires attention	• Maintaining and improving all-ability access to foreshore and beach • Support for raised boardwalk to protect sections at risk • Preference for rocks over sandbags for revetments, armouring • Seating is highly valued

Criteria scores

Criteria	Comment	Unweighted score	Weighted scores
Risk	Asset is at high risk, as identified in *Our Coast Our Future*.	2	0.57
Level of service	Non-critical asset that is servicing 1770 only and asset can be reinstated. However, the sewer main is considered a critical asset.	2	1.29
Feasibility	Asset can be partially defended or relocated.	2	0.23
Asset life	Asset has <25 years remaining useful life.	3	0.17
Community value	The community places a very high value or priority on this asset, boardwalk and walking paths scored highly in the community survey for important foreshore features. The adaptation options for this asset scored 5th highest in the prioritisation activity in the community workshop.	1	0.17
Economic value	Moderate contribution to local economy.	3	0.34
		Total	**2.00 Immediate**

Recommended management options

Option 1: Relocate or upgrade asset at risk as required.
Option 2: If triggered by risk criterion, implement protection for Captain Cook Drive that preserves functionality of the footpath.

Council should consider relocating or upgrading asset at risk, as required. In the event of a large storm, if the risk criterion is triggered (resulting in a more urgent intervention level), it is essential to protect the steep bank in order to protect the stability of Captain Cook Drive.

Description

Due to the changing climate, our coastline is becoming more vulnerable to the risk of erosion. The boardwalk has already undergone emergency works in response to imminent threat of erosion. Council should consider relocating or upgrading assets that are at risk of being damaged by erosion. This may involve moving the footpath further inland or upgrading the asset to withstand coastal hazards. It is important to consider relocating assets landward when they require replacement or upgrade after exceeding their useful life. It is highly recommended that Council commences the design / approvals processes as soon as budget can be secured.

If a large storm occurs, posing a potential risk to the asset and triggering the risk criterion (resulting in a more urgent intervention level), it is critical to protect the steep bank to maintain the stability of Captain Cook Drive. One approach that could be considered is relocating the lower pathway or boardwalk to a toe protection revetment. This would provide protection to the pathway while preserving its functionality. Additionally, the revetment would be concealed, allowing the lower pathway to remain intact and accessible.

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Further assessment is required to assess the feasibility of relocating the lower pathway or boardwalk onto a toe protection revetment and consider the costs and environmental impact of the proposed option.

Footpath at the foot of Captain Cook Drive

Observations	Community insights
• Old trees (acacias and larger eucalypts) have been removed following an arborist safety assessment • Mulching and revegetation project – plans to plant more smaller shrubs to avoid contributing to fallen tree issue • Temporary sewer rising main is running along the footpath, servicing Endeavour Park • Localised erosion caused by overland flow and coastal processes • Ad hoc repairs were conducted in 2021 • Footpath acts as a buffer between the foreshore and steep bank along Captain Cook Drive • Power assets along this section for foreshore lighting	• Maintaining and improving all-ability access to foreshore and beach • Adding pathways to improve connectivity (marina to Air Sea Rescue Park, and Endeavour Park to Capt. Cook Monument) • Support for raised boardwalk to protect sections at risk • Preference for rocks over sandbags for revetments, armouring • Seating is highly valued • Provide seating along any additional pathways

Criteria scores

Criteria	Comment	Unweighted score	Weighted scores
Risk	Asset is at medium risk, as identified in *Our Coast Our Future*.	3	0.86
Level of service	Footpath is considered a non-critical asset and alternate options are available. However, the sewer main is considered a critical asset.	2	0.51
Feasibility	Asset can be partially defended or relocated.	2	0.23
Asset life	Asset has <25 years remaining useful life.	3	0.17
Community value	The community places a very high value or priority on this asset, walking paths scored highly in the community survey for important foreshore features. The adaptation options for this asset scored the highest in the prioritisation activity in the community workshop.	1	0.17
Economic value	Moderate contribution to local economy.	3	0.34
		Total	2.29 Medium

Recommended management options

Option 1: Gravel pathway or elevated boardwalk to replace concrete pathway
Option 2: If triggered by risk criterion, relocate pathway further inland

As coastal hazards continue to threaten the pathway or when they require upgrading, Council should consider replacing existing concrete pathway with gravel or compressed earth surfaces or elevated boardwalk.

Description

As coastal hazards continue to threaten the pathway, Council needs to regularly monitor and assess the condition of existing pathways that are at risk of being impacted by coastal hazards such as erosion or inundation. In cases where the pathway is significantly damaged or requires upgrading, Council should consider replacing the existing concrete pathway with a gravel or compressed earth surface or constructing an elevated boardwalk.

A gravel or compressed earth footpath can be used as an interim measure before constructing elevated boardwalks. Gravel or compressed earth surfaces are more permeable, which allows for better drainage and reduces the impact of stormwater runoff on the surrounding environment. They also have a lower carbon footprint compared to concrete, making them a more environmentally sustainable option. Elevated boardwalks, on the other hand, provide a safer and

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more resilient alternative to traditional pathways by allowing water to flow underneath and minimising the risk of damage from waves or storm surge.

In the event of a large storm, if the risk criterion is triggered (resulting in a more urgent intervention level) and the pathway is at risk of being damaged or destroyed, Council should consider relocating the pathway further inland to a more stable and safer location. This will help to ensure that the pathway remains accessible to the public and provide a safe and functional pathway along Seventeen Seventy.

Kayaks/crafts stored along the foreshore

Observations	Community insights
• Kayaks and small crafts are stored along the foreshore • Yachts/boats/watercrafts are anchored on the beach/foreshore area/to vegetation • Anchored watercrafts are impacting swimming and use of the foreshore • Complaints/contention during peak periods • Kayaks and boats have contributed to dune erosion from stormwater runoff • Kayaks and watercrafts are considered a hazard by some • Community petition in response to Council's notification to remove kayaks along the foreshore	• Continue to allow locals to store kayaks on foreshore, but manage in an environmentally sensitive way • Support for designated kayak storage area • Strong support for removal/limitation of larger boats mooring onshore/close to shore • Support for removal of kayaks was present but less prominent

Criteria scores

Criteria	Comment	Unweighted score	Weighted scores
Risk	Asset is at high risk, as identified in *Our Coast Our Future*.	2	0.57
Level of service	Non-critical asset and alternate options are available.	5	1.29
Feasibility	Can be defended and relocated.	5	0.57
Asset life	Kayaks have been left on the beach for a long time. Asset life is highly variable and not considered as fixed assets.	3	0.17
Community value	The community places a lower value or priority on this asset. The adaptation options for this asset scored 8th highest in the prioritisation activity in the community workshop.	4	0.69
Economic value	Moderate contribution to local economy.	3	0.34
		Total	3.63 Future

Recommended management options

Option 1: Continue to enforce a designated kayak storage area

This option is to help keep kayaks organised and easy to access. It also helps protect the environment by preventing damage to sensitive ecosystems.

Description

The option provides a designated storage area for kayaks and aims to improve the organisation and accessibility of kayaks, which can make them more convenient and efficient to use. This can be particularly beneficial in the foreshore area of Air Sea Rescue Park. The designated area also helps to protect the environment by reducing the potential for damage to sensitive ecosystems that can occur when kayaks are left on the foreshore area. By utilising this option, there will be more foreshore areas for users to enjoy.

Larger motored boats (e.g. tinnies) and sailing boats (e.g. catamarans) that are parked onshore, tied to vegetation, or are

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moored permanently or semi-permanently in very close proximity to the shore appear to be of larger concern to the community. These crafts present greater impacts on vegetation and to swimmers and contribute more so to any erosion issues than kayaks. Council may wish to focus management and enforcement efforts on these types of crafts, by limiting permanent or long-term 'parking' through notices and removal of crafts that are not relocated. This could be combined with some discussion and collaboration between Council, Maritime Safety Queensland, and/or the Department of Transport and Main Roads to determine a potential solution.

Boardwalk with rock armour revetment

Observations	Community insights
• Some sections with no protection • Stormwater outlets along boardwalk • Boardwalk in good condition • Low-lying areas behind dunes build up then break out • Sand has accumulated in front of boardwalk since construction of boardwalk • Rock armour revetment is not an approved structure • Potential Traditional Owners interest in planting in this area • Boardwalk provides all abilities access	• Maintaining and improving all-ability access to foreshore and beach • Support for raised boardwalk to protect sections at risk • Preference for rocks over sandbags for revetments, armouring • Seating is highly valued

Criteria scores

Criteria	Comment	Unweighted score	Weighted scores
Risk	Asset is at medium risk, as identified in *Our Coast Our Future*. However, based on site observations, the presence of the existing rock protection indicates a lower level risk than what was identified in Our Coast Our Future.	4	1.14
Level of service	Non-critical asset and alternate options are available.	5	1.29
Feasibility	Asset can be partially defended or relocated.	2	0.23
Asset life	Asset has <25 years remaining useful life.	3	0.17
Community value	The community places a very high value or priority on this asset, the boardwalk and walking paths scored highly in the community survey for important foreshore features. This asset scored 6th highest in the community workshop.	1	0.17
Economic value	Moderate contribution to local economy.	3	0.34
		Total	3.63 Future

Recommended management options

Option 1: Implement dune revegetation and maintenance
Option 2: If triggered by risk criterion, upgrade or replace rock armour revetment

Council should continue to monitor and implement dune revegetation and maintenance to promote dune stability. If triggered by a large event, Council should consider upgrading or replacing of rock armour revetment if necessary.

Description

The aim of this option is to promote dune stability by regular monitoring and implementing regular maintenance of dune revegetation. This will help to prevent erosion and maintain the integrity of the dune ecosystem.

If a large storm occurs and triggers the risk criterion (resulting in a more urgent intervention level), Council should be prepared to upgrade or replace the rock armour revetment, as necessary, to provide an additional layer of protection in front of the boardwalk and nearby infrastructure. This structure must be appropriately engineered to ensure the design

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(size, height, grade, layers, filters and materials) meet the required standards to provide sufficient protection from the local wave climate.

Park assets within Air Sea Rescue Park

This analysis refers to the hard assets and infrastructure located within the park, such as park assets (BBQ pits, picnic tables and chairs, picnic shelters) and toilet block, but not the land which the park occupies.

Observations	Community insights
• Various recreational assets such as picnic shelters, benches, chairs, BBQ pits and playground • Foreshore is fronted by rocky outcrops to the north and mangroves to the south • Most park bookings in the region for events • 14 bins are always full, limited by no weekend bin collection service • Opportunity to rename the park with a Traditional Owner name • Not an area of concern	• Highly popular and well-used park • Formalised access points to beaches are needed • More bins at beach access points • Need a balance between public use and private/event use of the park • Some support for designated dog free and dog park areas • Preference for natural playgrounds and natural play, but also diverse play options (e.g. sand dumpers)

Criteria scores

Criteria	Comment	Unweighted score	Weighted scores
Risk	Asset is at high risk, as identified in *Our Coast Our Future*.	2	0.57
Level of service	Non-critical asset that is servicing 1770 only and asset can be reinstated.	4	1.03
Feasibility	Asset can be partially defended or relocated.	2	0.23
Asset life	Asset has <5 years remaining useful life. Council is likely to replace or relocate asset within 5 years.	5	0.29
Community value	The community places a very high value or priority on this asset, Air Sea Rescue Park was one of the most popular locations that survey respondents visit on the foreshore. This asset scored 4th highest in the community workshop.	2	0.34
Economic value	Significant contribution to local economy.	1	0.11
		Total	**2.57 Medium**

Recommended management options

Option 1: If triggered, relocate or upgrade asset at risk as required

In the event of a large storm, if the risk criterion is triggered (resulting in a more urgent intervention level), Council should consider relocating or upgrading any assets that are at risk.

Description

This asset is not at immediate risk.

If a large storm occurs, posing a potential risk to the asset and triggering the risk criterion (resulting in a more urgent intervention level), Council should assess the impacts and consider whether it is necessary to relocate or upgrade any at-risk assets. This may include park assets, such as BBQ pits, seating, shelters, or other assets that are at risk of erosion or inundation. Additionally, it is important to consider relocating assets landward when they require replacement or upgrade after exceeding their useful life.

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Toilet block and parking lots

Observations	Community insights
• The area is elevated on higher ground • Less prone to erosion, within presence of scattered rock protection • Fronted by mangroves and vegetation • Stormwater outlet to the northern side of the toilet block • Only toilet block servicing Air Sea Rescue Park, facility is not able to service current demand in peak periods • Capacity issues with parking resulting in illegal parking, not enough parking for Council maintenance works team • Not an area of concern for coastal hazard impacts	• Toilets are inadequate for the high number of visitors

Criteria scores

Criteria	Comment	Unweighted score	Weighted scores
Risk	Asset is at high risk, as identified in *Our Coast Our Future*. However, based on site observations, the presence of vegetation and scattered rock protection indicate a lower level risk than what was identified in *Our Coast Our Future*.	4	1.14
Level of service	Non-critical asset and alternate options are available.	4	1.03
Feasibility	Asset can be defended and relocated.	5	0.57
Asset life	Asset has <25 years remaining useful life.	3	0.17
Community value	The community does not place any value or priority on this asset. This asset scored the lowest in the community workshop. *(Note that this asset still provides some functional value to the community, but it is not a significant reason for why they use and enjoy the foreshore).*	5	0.86
Economic value	Moderate contribution to local economy.	3	0.34
		Total	4.11 No implementation required

Recommended management options

Option 1: Maintain existing assets
Option 2: Relocate or upgrade assets at risk as required

Council should continue to maintain existing assets and provide additional protection or upgrades when necessary. In cases where assets are at risk, Council should be prepared to relocate or upgrade them as required.

Description

Council should continue to maintain existing assets and provide additional protection to ensure the longevity and functionality of the toilet block. Council should also investigate and upgrade the toilet block capacity as this is the only toilet block servicing Air Sea Rescue Park. This should be undertaken concurrently when nearby assets need relocation or in cases where upgrades to stormwater drainage are required to minimise disruption to park users and reduce the overall impact of maintenance activities.

If a large storm event occurs and triggers the risk criterion (resulting in a more urgent intervention level), Council should consider relocating or upgrading these assets away from the hazard area. This could involve identifying alternative sites that are less exposed to coastal hazards or upgrading the assets to improve their resilience to these risks. Relocation of

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assets may require careful consideration and planning, as it could involve significant costs and potential disruption to park users.

Pocket beach next to VMR

Observations	Community insights
• Kayaks/small crafts are stored along the foreshore • Foreshore is fronted by mangroves • Informal boat ramp for small recreational crafts • Offshore anchored vessel users are using this area to store their tenders	• Adding pathways to improve connectivity (marina to Air Sea Rescue Park) • Continue to allow locals to store kayaks on foreshore, but manage in an environmentally sensitive way • Support for designated kayak storage area • Strong support for removal/limitation of larger boats mooring onshore/close to shore • Support for removal of kayaks was present but less prominent

Criteria scores

Criteria	Comment	Unweighted score	Weighted scores
Risk	Asset is at high risk, as identified in *Our Coast Our Future*.	2	0.57
Level of service	Non-critical asset that is servicing 1770 only and asset can be reinstated.	4	1.03
Feasibility	Asset can be partially defended or relocated.	2	0.23
Asset life	Asset has <25 years remaining useful life.	3	0.17
Community value	The community places a high value or priority on this asset, community value the well-established vegetation here and its recreational value. Though the adaptation options for this asset scored the highest in the prioritisation in the community workshop, this was primarily linked to the suggestion to construct a connecting pathway (see 4.3 Additional recommendations for more detail).	2	0.34
Economic value	Significant contribution to local economy.	1	0.11
		Total	2.46 Medium

Recommended management options

Option 1: Continue to enforce a designated kayak storage area

This option is to help keep kayaks organised and easy to access. It also helps protect the environment by preventing damage to sensitive ecosystems.

Description

The option provides a designated storage area for kayaks and aims to improve the organisation and accessibility of kayaks, which can make them more convenient and efficient to use. This can be particularly beneficial in areas where kayaking is a popular activity. The designated area also helps to protect the environment by reducing the potential for damage to sensitive ecosystems that can occur when kayaks are left on the foreshore area. By utilising this option, there will be more foreshore areas for users to enjoy.

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5.2 Alternative assessment assets (non-MCA)

Sewer gravity main, stormwater pipe and stormwater pits (north of camping ground)

Observations	Community insights
• Pinch point for Captain Cook Drive and assets • Foreshore is fronted by rocky outcrops and erosion width may be limited by rock outcrops • The subsurface formation is stratified unit which comprises of Agnes Water Volcanics • Stormwater management in the section is lacking • Stormwater runoff (from hillside) causing washout on the beach • Not an area of concern/no immediate threat due to subsurface formation and rocky outcrop.	[Note: feedback on this asset was not explicitly sought from the community] • Major concerns of pollution from perceived sewage outflows • Better management linked to disaster planning is required

Recommended management options

Option 1: Continue to monitor coastal hazard impacts and maintain asset
Option 2: If triggered by risk criterion, investigate capacity needs and functionality of asset

Continue to monitor and maintain sewer gravity main, stormwater pipe and stormwater pits. In the event of a large storm, if the risk criterion is triggered (resulting in a more urgent intervention level), Council should investigate the asset's capacity needs and functionality. Additional consideration by Council is required before a definitive

Description

The sewer gravity main, stormwater pipe, and stormwater pits are essential components of the infrastructure for Seventeen Seventy. The sewer gravity main provides essential sewer for the community and the stormwater assets manage stormwater runoff to prevent flooding. It is crucial to monitor and maintain these assets regularly to ensure that they remain functional and effective in addressing potential risks and threats.

If a large storm event occurs and triggers the risk criterion (resulting in a more urgent intervention level), Council should investigate the asset's capacity needs and functionality. This investigation would help determine whether the asset is still able to perform its intended function and if any upgrades or repairs are necessary to mitigate risks. It is important to note that the sewer gravity main may require a capacity assessment and possible upgrade to accommodate the increased demand if there are any significant development upstream.

It is also important to note that addressing the risk to these assets requires careful consideration by Council. The selection of a management option to address the risk should be based on a thorough assessment of the asset, including the severity of the risk, the potential consequences of decommissioning, and the available resources. Council should consider all available options and choose the one that is most effective and sustainable in the long term.

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1770 camping ground

Observations	Community insights
• Beachfront row of camp sites and power outlets are at risk of coastal hazards • Stormwater runoff causing washouts at some beach access points and beachfront camp sites • Exposed stormwater pipes observed at a beach access point • Loss of sand from overland flow and poor onsite drainage • Drain functionality limited by blockages from leaves and debris • Emergency works are being undertaken to upgrade powered sites • Camping ground lease is expiring soon – opportunity to revise lease agreement • Carpark and accessibility issues during peak season • Opportunity to re-design caravan park to better utilise space and move at risk sites away from erosion prone area	[Note: feedback on this asset was not explicitly sought from the community] • Improve vegetation around camping ground and surrounding areas •

Recommended management options

Option 1: Remove the power supply from the front row of camping sites and convert to unpowered sites
Option 2: Opportunity to re-design camping ground to better utilise space and move at risk sites away from erosion prone area
Option 3: If triggered by risk criterion, investigate appropriate areas for relocating the camping ground

Council should remove the power supply from the front row of camping sites and convert them to unpowered sites. Council should also review the lease agreement and consider redesigning the caravan park to optimise space and move any at-risk sites away from the erosion prone area. Additionally, improvements should be made, such as designated roads, paths, and kerb and channel, while enhancing and protecting the vegetation. In the event of a large storm, if the risk criterion is triggered (resulting in a more urgent intervention level), Council should investigate appropriate areas for relocation of the camping ground.

Description

In order to reduce the risk of damage from inundation, Council should consider removing the power supply from the front row of camping sites and converting them to unpowered sites. Council could relocate the power supply sites to a more inland location, where they would be less susceptible to the effects of coastal erosion and flooding.

Council should also consider reviewing the lease agreement for 1770 camping ground with leaseholder and use the opportunity to redesign the camping ground layout. This will allow Council to address the issues such as utilisation of space and the placement of at-risk sites. By revising the lease agreement, Council can ensure that the camping ground is laid out in a way that is more efficient and functional for its users.

In addition to revising the lease agreement, Council should also consider making improvements to the layout and drainage of the camping ground. Designated roads, paths, and kerb and channel should be implemented to protect vegetation and reduce potential damages caused by stormwater runoff. Enhancing and protecting the vegetation in the foreshore area will also reduce erosion and stormwater runoff issues.

By making these improvements, Council can ensure that the camping ground is a safe and enjoyable place for visitors to stay. It will also provide a more sustainable long-term solution to the potential risks associated with erosion. The redesign will require careful planning and consultation with stakeholders, but the end result will be a safer and more functional space for all users.

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Stormwater outlets/discharge on the beach

Observations	Community insights
• Stormwater runoff onto beach causing localised erosion • Not an area of concern	[Note: feedback on this asset was not explicitly sought from the community] • Major concerns of pollution from perceived sewage outflows • Better management linked to disaster planning

Recommended management options

Option 1: Continue to monitor and maintain asset

Continue to monitor and maintain stormwater outlets/discharge on the beach at Air Sea Rescue Park. Council is currently planning an upgrade to the stormwater infrastructure to further improve overland flow in the area.

Description

Council should continue to regularly monitor and maintain the stormwater outlets and discharge points along the beach at Air Sea Rescue Park to manage any potential exacerbation to coastal hazard risks.

Council is in the process of planning an upgrade to the stormwater infrastructure in the area to improve roadside drainage and overland flow in the area. The upgrade will ensure the stormwater infrastructure can manage any potential risks posed by climate change and extreme weather events.

Sewer rising mains and stormwater culvert

Observations	Community insights
• Sewer rising mains are running parallel to Captain Cook Drive on the seaward side • Sewer rising main scheduled for relocation in financial year 2023/24 • The subsurface formation is stratified unit which comprises of Agnes Water Volcanics • Erosion is limited in this area • Not an area of concern	[Note: feedback on this asset was not explicitly sought from the community] • Low pressure sewage system is unsafe and unreliable • Major concerns of pollution from perceived sewage outflows • Better management linked to disaster planning

Recommended management options

Option 1: Continue to monitor and maintain asset.
Option 2: If triggered by risk criterion, investigate suitable areas to relocate the asset.

Continue to monitor and maintain sewer rising mains and stormwater culvert between the marina and Air Sea Rescue Park. In the event of a large storm, if the risk criterion is triggered (resulting in a more urgent intervention level), Council should investigate appropriate areas for relocation assets.

Description

Council should continue to monitor and maintain the sewer rising mains and stormwater culverts between the marina and Air Sea Rescue Park to identify any potential issues, such as blockages or damage, that may be caused by inundation or erosion.

If a large storm event occurs and trigger the risk criterion (resulting in a more urgent intervention level), Council should investigate appropriate areas for relocation of the stormwater culverts. This is important to mitigate potential risks and ensure the safety and functionality of the infrastructure. Relocation of infrastructure requires careful consideration and planning by Council. Council should also take into account the current and future needs of the community and other stakeholders in the area.

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Boat ramp carpark

Observations	Community insights
• Identified as a future redevelopment project • Insufficient parking, limited boat trailer parking, smaller vehicles parking in boat trailer parks • Industrial bins at Seventeen Seventy boat ramp are used as dumping of fish scraps • Seventeen Seventy Marina encroaching on adjoining Council-controlled land • Protected plants to the east • Council looking to negotiate land resumption of adjacent State Conservation Park for additional parking • Entrance into Seventeen Seventy is uncontrolled and messy	[Note: feedback on this asset was not explicitly sought from the community] • Additional parking pressure at marina resulting from new businesses • Long-term vs short-term designated parking areas • Shuttle services and/or electric scooters into 1770 to reduce parking pressure • No carpark in the Conservation Park

Recommended management options

Option 1: Council to negotiate with state agencies to expand carpark to adjacent state park

Council should engage in negotiations with state agencies to explore the possibility of expanding the carpark into the adjacent state park.

Description

Council should engage in negotiations with relevant state agencies to explore the possibility of expanding the existing boat ramp carpark to the adjacent state park. This should involve discussions with the Department of Environment and Science (DES) or other relevant agencies, to identify any regulatory or environmental requirements that need to be considered.

The expansion of the carpark could provide numerous benefits for the community, such as increasing the capacity of the carpark to accommodate more visitors and reducing the overflow of cars parked along Captain Cook Drive during peak times.

During negotiations, Council should ensure that any potential environmental impacts are considered, and any necessary measures are put in place to mitigate these impacts. Council should also seek input from stakeholders to ensure that any concerns or needs are addressed.

It is important to note that utilising the conservation park for the intended purpose may not be endorsed or supported – comments to this effect were received during community engagement activities. Therefore, it is recommended to investigate alternative land parcels, including the directly adjacent state land that is not designated as a conservation park.

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5.3 Additional recommendations

Council should consider constructing a pathway to improve connectivity. While not a coastal management option to protect from coastal hazards, there was strong support from the community to construct a pathway at the pocket beach next to VMR which would connect the marina and the toilet block at Air Sea Rescue Park. Currently, users of this area often walk along the road to move between these areas, which creates significant safety and accessibility concerns. This pathway would fully connect the foreshore pathways in the project area, and potentially reduce vehicle traffic for users that are not already walking along the road instead. This project also aligns with the community's *Vision and Values*, specifically around amenity (i.e., "blended, balanced and sustainable use of natural and built assets", "celebrating the scenic landscapes") and responsible tourism (i.e., "supporting tourism that is gentle on the environment and considerate of local residents"). Future construction of this pathway should still consider the current and projected risk of the land to erosion and other coastal hazards, perhaps including sections of elevated boardwalk where appropriate, which are more resilient to inundation and erosion.

5.4 Region-wide triggers

The proposed eroded distances from an asset after large events to assess the risk criterion (outlined in Table 5 for the MCA and Table 7 for the non-MCA) are considered suitable for adoption along the majority of the Gladstone coastline.

While Seventeen Seventy is protected from offshore swell waves due to the adjacent headland as well as the presence of sediment deposits forming sand bars at the mouth of the river, there are some locations in the region which are more exposed to erosion. If we take Agnes Water as an example, it is primarily influenced by swell waves, which is indicative of the prevailing conditions along the majority of the Gladstone coastline. Despite this contrast, based on *Our Coast Our Future* (CHAS) (GRC 2021), the calculated erosion prone areas (EPA) between Seventeen Seventy and Agnes Water are within relatively similar ranges. For a 1% Annual Exceedance Probability (AEP) event in the present day, the EPA ranges between 19 m to 62 m and it expands to 46 m to 93 m for a 1% AEP event in 2100. Therefore, the eroded distances from an asset after large events proposed in Table 5 for the MCA and Table 7 for the non-MCA are deemed appropriate for adoption across the majority of the region.

However, there are other areas that are more exposed to dynamic characteristics and/or high energy beach environments. Therefore, the following locations may require further consideration:

- Estuarine areas, where the State EPA width is 400 m by 2100:
    - Boyne Island
    - Tannum Sands
    - Bangalee
    - Turkey Beach
    - Port of Baffle Creek
- Open coast beach, where the State EPA width is equal to or larger than 180 m by 2100:
    - Agnes Water
    - Deepwater
    - Rules Beach

Given the dynamic characteristics of the estuarine and high energy beach environments, these areas may require additional and detailed assessments. It is recommended that Council seek expert guidance and advice for the listed areas when conducting a CARP or similar, when there are high value assets situated within the foreshore area.

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6 Summary of criteria scorings and intervention levels

Table 8 presents the overview of criteria scores for each asset against the weighted assessment criteria and the corresponding intervention levels.

Table 8: Criteria scorings and intervention levels

Key assets	Unweighted							Weighted							
	Risk	Level of service	Feasibility	Asset life	Community value	Economic value	Total	Risk	Criticality	Feasibility	Asset life	Community value	Economic value	Total	Intervention levels
								29%	26%	11%	6%	17%	11%		
Assets within Endeavour Park	2	4	2	5	2	1	16	0.57	1.03	0.23	0.29	0.34	0.11	2.57	Medium
Boardwalk between Endeavour Park and Air Sea Rescue Park	2	2	2	3	1	3	13	0.57	0.51	0.23	0.17	0.17	0.34	2.00	Immediate
Footpath at the foot of Captain Cook Drive	3	2	2	3	1	3	14	0.86	0.51	0.23	0.17	0.17	0.34	2.29	Medium
Kayaks/crafts are stored along the foreshore	2	5	5	3	4	3	22	0.57	1.29	0.57	0.17	0.69	0.34	3.63	Future
Boardwalk with rock armour revetment	4	5	2	3	1	3	18	1.14	1.29	0.23	0.17	0.17	0.34	3.34	Future
Park assets within Air Sea Rescue Park	2	4	2	5	2	1	16	0.57	1.03	0.23	0.29	0.34	0.11	2.57	Medium
Toilet block and parking lots	4	4	5	3	5	3	24	1.14	1.03	0.57	0.17	0.86	0.34	4.11	No implementation required
Pocket beach next to VMR	2	4	2	3	2	1	14	0.57	1.03	0.23	0.17	0.34	0.11	2.46	Medium
Sewer gravity main, stormwater pipe and stormwater pits (north of camping ground)	Not applicable														Future
1770 camping ground	Not applicable														Medium
Stormwater outlets/discharge on the beach	Not applicable														Medium
Sewer rising mains and stormwater culvert	Not applicable														Future
Boat ramp carpark	Not applicable														Medium

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7 Conclusions

From the asset vulnerability assessment, the boardwalk between Endeavour Park and Air Sea Rescue Park requires the most urgent intervention. Most other assets have been assigned a medium intervention level, with some assets requiring future or no intervention at this stage.

The community engagement program highlighted that the community places great importance on preserving and respecting the relaxed feel of Seventeen Seventy, as well as the ability to connect with nature and experience the beautiful surrounding natural environment. As such, the recommended management options were chosen with nature-based solutions as the preferred adaptation approach. Further justification and benefits of nature-based solutions over engineered solutions can be found in Attachment C: Economic value of Seventeen Seventy's Sandy Beaches.

While this project focussed on planning for assets located on the Seventeen Seventy foreshore, this approach can be applied elsewhere in the Gladstone region in a similar manner. The section below captures the key insights and lessons learned from undertaking the CARP project, including what worked well and what could be done better next time for Council to consider when implementing a similar project in future.

1.1. Lessons learned from Seventeen Seventy

Community engagement

Overall, the community engagement was successful, with more participants involved than expected given attendance records from past engagement. This was enabled by hosting a variety of event styles (pop-up/drop-in sessions, market stall, focused workshops, and online survey) held at various times. The events which will have the most success will depend on the community being engaged, their preferences, availability, and schedules. Generally, Council should aim to "meet people where they are", such as choosing an accessible and central location, leveraging participation by sharing a space at an existing event (e.g., market stall), or choosing locations which people frequent (and perhaps are related to the project, e.g., the foreshore). Early and frequent communication of upcoming events is also critical, and should include multiple channels – such as project website updates, social media posts, signage in visible areas, QR codes, etc.

Engagement activities should be designed with a specific purpose or objective in mind, as well as ensuring it is clear what questions or specific issues participants are expected to comment on. This was largely achieved in this project, however some technical and asset-specific language used in some activities may not have been the most appropriate way to share information with the community. What the project considered as multiple assets (e.g., concrete path and boardwalk) the community often see as a single asset (e.g., the lower foreshore walk). While it is important for Council to consider the different materials and changing risk to specific parts of assets, this may not translate as well to community when seeking feedback and priorities for action. In addition, technical language such as "revetment" and "toe of the slope" were perhaps not explained enough to be clear to the average community member.

Given the nature of the study area in this project, community members were free to be quite subjective with their ideas, suggestions, and feedback as there were limited private assets at risk. This will likely be different for other areas in Gladstone and may require some careful facilitation when discussing issues that may impact residential property or private assets. Some strategies may be clearly emphasising what is in and out of scope for discussion, what is feasible or within Council's control, while also allowing people to express their views and feel heard.

Another co-benefit of this extensive engagement program was the feedback that community were quite pleased and appreciative that Council was demonstrating a presence in their community, and that expert advice and support was utilised to deliver the project.

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Key insights:

- A variety of event styles and timing allows for maximum participation from a broad range of people.
- "Meet people where they are" – consider event location and leveraging existing events.
- Early and frequent communication of events, using multiple channels.
- Design engagement with a specific purpose or objective for each activity, and clear questions/issues for discussion.
- Review technical language to ensure it is relevant and audience appropriate.
- Navigate engagement carefully if there are private assets at risk.
- Community appreciated seeing Council representatives present in their region for the duration of the project – positive associations with Council.

Engagement with Traditional Owners

Despite our efforts to engage early, only one consultation with Traditional Owners (represented by PCCC) was conducted as part of this project. This demonstrates the need to begin consultation much earlier, ideally prior to project commencement to ensure their perspectives are captured in the process. On this note, establishing and fostering a strong, ongoing relationship with PCCC and/or other Traditional Owners will support more efficient and productive engagement for future projects and opportunities to collaborate. Strong relationships are a cornerstone of working with Aboriginal and Torres Strait Islander communities. This relationship should be built on trust, mutual respect and two-way sharing of stories, information, and priorities. Where possible, Traditional Owners should have agency and self-determination to guide and implement actions that affect them and their cultural values. In the longer term, other mechanisms for working with Traditional Owners and First Nations peoples could be embedded into Council's operations to facilitate ongoing, meaningful engagement, knowledge-sharing, and decision-making.

Key insights:

- Commence engagement efforts with Traditional Owners early.
- Build and maintain a strong, ongoing relationship with key representatives built on trust, mutual respect, and two-way sharing.
- Facilitate agency and self-determination where possible.

Assessing assets

A critical piece of delivering this project was the involvement of Council's asset managers and operational staff as part of the Project Steering Group. Their on-ground expertise with assets and issues in the broader study area, as well as asset history, maintenance requirements, and feedback on potential adaptation was invaluable.

In future projects, a way to streamline the delivery of recommended adaptation options may be to ensure assets are assessed consistently with how they are described in Council's asset databases. This project utilised some asset groupings provided in the data received, though this could be drilled into further if it would prove beneficial when planning for implementation of actions. Further, Council could define what assets or types of actions would fall under capital or major works, and which actions fall under routine maintenance or smaller projects. Capital works require significant lead time and planning before implementation, so having these clearly defined would allow more guidance and to be included regarding which actions to prioritise to ensure planning and decision-making does not delay implementation.

Key insights:

- Asset managers and operational staff provide invaluable insights on assets and issues in the study area.
- Ensure assets are assessed consistently with how they are described in Council's asset database.
- Define assets/actions that fall under capital or major works, and which actions can be implemented through routine maintenance or smaller projects.

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8 References

GRC. 2020. “Agnes Water and Seventeen Seventy Shoreline Erosion Management Plan (SEMP). Prepared by Alluvium for Gladstone Regional Council.”

GRC. 2021. “Our Coast Our Future Strategic Plan. Prepared by Alluvium for Gladstone Regional Council.”

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9 Attachments

Community Engagement Report

A

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ENGAGEMENT REPORT - FINAL

Coastal Adaptation and Resilience Strategy (CARP) for Seventeen Seventy

June 2023

MOSAIC insights

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Mosaic Insights and the Alluvium Group recognises and acknowledges the unique relationship and deep connection to Country shared by Aboriginal and Torres Strait Islander people, as First Peoples and Traditional Owners of Australia. We pay our respects to their Cultures, Country and Elders past and present.

Artwork by Melissa Barton. This piece was commissioned by the Alluvium Group and tells our story of caring for Country, through different forms of waterbodies, from creeklines to coastlines. The artwork depicts people linked by journey lines, sharing stories, understanding and learning to care for Country and the waterways within.

This report has been prepared by Mosaic Insights Pty Ltd for Gladstone Regional Council as part of the Climate Change Adaptation and Resilience Project.

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1 Introduction

1.1 Background and purpose

This program of engagement undertaken in collaboration with the Gladstone Regional Council (Council) project team was designed to provide a community-centred lens through which Council can plan for the protection of specific assets in the Seventeen Seventy foreshore area (Figure 1) from coastal hazard impacts. Please refer to the Coastal Adaptation and Resilience Plan (CARP) Final Report for more detail on coastal hazard risk and impacts to these assets.

These activities also sought to establish a community 'vision' for the future management of the foreshore more generally, and to confirm the values, concerns, and aspirations held by the community. We also sought to understand the community's priorities for intervention/management of key assets. In addition, these activities sought to strengthen the relationships between Council, the community, and key stakeholders and to establish trust towards the process.

Throughout the engagement we consulted with the community on adaptation options for eight assets which were identified as being at risk or requiring intervention, and for which Council wished to hear community perspectives (Figure 1):

1. Concrete footpath
2. Endeavour Park
3. Boardwalk between Endeavour Park and Air Sea Rescue Park
4. Kayaks along foreshore
5. Pocket beach next to VMR
6. ASR Park toilet block and parking lots
7. Air Sea Rescue Park
8. Boardwalk with rock armour revetment

Figure 1. Project area and location of assets in Seventeen Seventy featured during engagement activities

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This series of engagement activities provides Council with the community's priorities and aspirations for their region, as well as a plan for how to adapt the foreshore in a changing climate. This information (alongside the CARP Final Report) positions Council well to seek funding for the implementation of these initiatives and plan for the growth of these assets in a way that aligns with the community's vision.

1.2 Overview of community engagement activities

To capture a range of viewpoints, our approach involved a mixed-method delivery of various styles of engagement. We included both online and face-to-face activities, occurring at various times to provide options for people on different schedules. Engagement was largely positive and constructive, with participants actively contributing to the activities and discussion. The community is passionate about the issues facing their region, driven by coastal hazards and otherwise, as well as being a part of shaping the future of Seventeen Seventy. A summary of the engagement outcomes is provided in Section 0, and detailed findings from each engagement activity are presented in Section .

Table 1. Summary of engagement activities for the CARP project

Activity	Date	Method	Outcomes	Participation
Online project website	February to June	Online via Gladstone Region Council's Conversations website	Sharing information about the project, hosting the survey (further details below), and providing an avenue for questions and formal submissions.	17 questions / submissions via contact form
Community survey	15 February to 16 April	Online via Gladstone Region Council's Conversations website Paper copies at Agnes Water Library	Understanding and validating community values, popular areas and aspects of the foreshore, and future vision.	104 responses
Community Workshop	22 February 6pm-8pm	Evening workshop with key community and agency stakeholders, invitation only	Validating and expanding on community values, concerns, and aspirations for the foreshore	6 participants
Listening Post	23 February 6am-8am	Drop-in session on the Seventeen Seventy foreshore		15 participants
Meeting with PCCC	16 March	Online meeting	Introducing the project, developing the relationship between Council and PCCC	1 representative
Drop-in session	23 March 1pm-7pm	6hr drop-in session at Agnes Water Community Centre	Seeking feedback on the draft vision and values and identifying potential adaptation options.	10 participants
Pop-up stall	16 April 8am-12pm	Market stall at Discovery Coast Rotary Markets	Promoting the project and the final workshop, demonstrating a Council presence in the community.	20 visitors (approx.) who spoke with stall attendants

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Community Workshop	20 April 8pm-8pm	Evening workshop at Agnes Water Community Centre	Identifying community priorities for adaptation.	13 participants 1 Councillor
			TOTAL	186 interactions

2 What we heard

2.1 Vision and Values

The comments and discussions from all engagement activities have contributed to the summary of the community's *Vision and Values* for the Seventeen Seventy foreshore (Figure 2). The community places a strong emphasis on the natural environment, including the aesthetic and personal benefits that nature provides for their enjoyment of the foreshore (e.g., for rest and relaxation, feeling connected to nature). The foreshore is also an important area for them to socialise with others and take part in recreational and physical activities. Cultural values were also mentioned, including acknowledgement of First Nations Australians' connections to the area, as well as the colonial history. Feedback from the community also suggests that economic activities are a critical part of people's lives here, however there is a lot of concern that any future development and expansion of commercial activities is done in a minimal, environmentally sustainable way.

A common theme expressed by the community is their love of the natural, peaceful, and relaxed feel of the area. The community cares deeply about preserving and, in some areas, restoring the natural features of the foreshore and surrounding areas, and are keen to see the Seventeen Seventy foreshore managed well with sustainability in mind, while preventing development and commercialisation that would change the character of the place. There is also a desire among several community members to have greater input into decision-making processes.

The set of values described below (Figure 2) were consistently expressed by community members through each engagement activity. For the CARP, and particularly for decisions about adaptation options, Council will need to keep in mind the community's strong desire for environmental protection and preference for natural aesthetics. For example, nature-based solutions should be prioritised over hard engineering solutions wherever possible. Nature-based solutions in this context refer to the use of vegetation, reefs, or other natural structures to reduce the impact of coastal hazards. These can be used in isolation or in conjunction with engineered structures as a 'blended' or 'hybrid' solution. Any hard engineering needed should be designed in a way that is sympathetic and complimentary to the natural surroundings. Through their frequent use of the foreshore, the community regularly observe the conditions and patterns of change in the area, which means they can provide valuable insights into the issues occurring in the coastal environment and infrastructure. Working with the community on the CARP, as they have been through this series of engagement activities, Council can tap into the considerable local knowledge to help them make decisions about appropriate adaptation solutions for the foreshore.

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Figure 2. Shared vision and values for the foreshore held by the Seventeen Seventy community

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2.2 Aspirations and priorities for adaptation responses

The final Community Workshop asked the community to prioritise the adaptation option for the foreshore (refer to Section 3.2: Community Workshop for methodology and detailed findings). The workshop was designed to acknowledge there would not be perfect agreement among community members about which particular assets are the priority. Rather, in recognition that consensus is unlikely, information was collected to reflect their aspirations and concerns for these assets, in approximate order of priority (Table 2).

Table 2. Community aspirations and concerns for identified assets and their proposed adaptation options

Asset	Proposed options	Aspirations and concerns
Pocket beach next to VMR	• Maintain a designated kayak storage area • Install a pathway to allow continuous connection between VMR and ASR Park toilets	• Strong support for the option of constructing a pathway through this section to connect the marina and Air Sea Rescue Park • High commercial and recreational activity in this area (i.e. the marina, businesses, kayaks, dragon boats and other boaters using as an informal boat ramp) • Erosion noted which may impact large old growth trees
Concrete footpath	• Relocating pathway further inland and replacing it with an elevated boardwalk	• Highly used and valued asset, including seating along pathways • Aligns with the desire to maintain (and improve) connectivity • Support for upgrades to raised boardwalk to protect sections at risk, preference for rocks over geobags for revetments and armouring • Path is impacted by runoff and drainage
Endeavour Park	• Relocate or upgrade asset at risk as required • Dune stabilisation and protection • Create formal beach access points to maintain dune health • Buried geobag wall to limit sand loss • Improve stormwater drainage to reduce sand loss and impacts to dunes	• Highly popular park • Subject to flooding • Toilet capacity issues here are more important than those at Air Sea Rescue Park • Parking management is needed (though not addressed as an intervention option) • Desire to add a pathway between Endeavour Park/camping ground and the Captain Cook Monument to improve connectivity and address safety issues • Parking overflow from camping ground into Endeavour Park a major issue
Air Sea Rescue Park	• Relocate or upgrade asset at risk as required • Improve stormwater drainage to reduce sand loss and impacts to dunes	• Support for improvements to stormwater drainage • Aware that this park is not currently at great risk from coastal hazards
Wooden boardwalk & Captain Cook Drive	• Relocate or upgrade asset at risk as required • Relocating pathway onto a toe protection revetment (base of the steep bank)	• Highly used and valued asset, including seating along pathways • This asset scored highly for some participants and low for others • Those scoring highly were most concerned about the sewage pipe and sewage system as a whole which requires attention

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		• Others scored lower as they had been provided information from Council that works were in progress to address this issue
Boardwalk with rock armour revetment	• Implement nature-based solutions (dune revegetation and maintenance) • Engineered solutions (exposed or buried seawall) as secondary options for long-term protection	• Strong support for nature-based solutions (i.e. revegetation) to provide additional protection • Support for extension of the boardwalk to other sections (including to a potential new section between Air Sea Rescue Park and the marina)
Kayaks along foreshore	• Maintain a designated kayak storage area	• This was not a high priority for the community, but many see it as a quick fix • There was a range of support, from allowing the kayaks to remain in some capacity, to a "tidying up" of damaged and unused crafts, to some enforcement to limit abuse of this privilege • Any regulation may be a "can of worms", storage fees are not a preferred system of management • Strong support for removal/limitation of larger boats mooring onshore/close to shore which impact views and swimmers
Air Sea Rescue Park toilet block and parking lots	• Upgrade and improve assets to address capacity issues when feasible	• This was not a high priority for community, as this area is not currently at great risk from coastal hazards • However, capacity is an issue, as is the need for some regulation of visitors and traffic (which may need to be addressed as part of a broader visitor/traffic management strategy)
Other priorities not directly linked to one asset *(Note: not in order of priority)*	**Vegetation** • Strong support for protection and enhancement of existing vegetation everywhere, including revegetation • Keeping locals informed of vegetation clearing and management activities **Sewage system** • Low pressure sewage system unsafe and unreliable • Major concerns of pollution from perceived sewage outflows **Beaches** • Formalised access points to beaches are needed • More bins at beach access points	

2.3 Out-of-scope broader community concerns and 'big ideas'

Though the scope of this project was limited to a select area of the Seventeen Seventy foreshore (and select assets within this), throughout the engagement activities we heard many concerns, 'big ideas' and perspectives on broader issues in the area. Despite not being necessarily within scope, we found these insights to be often interconnected with the issues identified with specific assets. We consider these insights important to be captured here, as they may influence future decisions on the assets within and around the project area, and future projects that may occur in this region. The community suggestions were categorised into themes, presented below.

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Tourism

The community is well-aware that visitation rates are increasing rapidly since 2020, making holiday periods especially challenging for locals to move around. The community emphasises a desire for no additional tourism promotion for their Seventeen Seventy/Agnes Water until existing visitation is managed in some way (potentially linked to traffic management, see below). There is a strong desire for 'sustainable tourism' to guide the management of existing visitation. There were some suggestions of a ballot system to manage visitors, similar to how National Parks are managed elsewhere (e.g. Parks Victoria operates a ballot system for peak season).

Despite these concerns, the community is conscious of the importance of tourism for the region. The economic value of tourism to Seventeen Seventy is discussed further in the CARP Final Report, Attachment C: *Economic value of Seventeen Seventy's Sandy Beaches*. A visitor management strategy, perhaps incorporating some other issues identified below, may be appropriate to plan for the future of Seventeen Seventy on issues beyond the scope of this project.

Parking and traffic management

There are parking concerns across the whole Seventeen Seventy area, not just the areas within scope for this project. Specifically:

- Parking overflow from camping ground into Endeavour Park (esp. campers with multiple vehicles, campervans, boat trailers).
- Limited parking available at Air Sea Rescue Park and around The Tree Restaurant.
- Parking at the marina cannot currently service all users, especially in peak periods, both from boat ramp users and additional pressure resulting from new businesses operating out of the marina precinct.
- Related to the above, some boaters are parking trailers long term (e.g., 2-4 days) which limits capacity for daily users.
- Illegal parking along both sides of Captain Cook Drive (between marina and SES Grounds) during peak periods.
- Large vehicles (i.e., campervans, caravans) block traffic along Captain Cook Drive when parking or turning.

The community have suggested ideas to better manage parking and traffic (which in turn may help to manage visitation impacts). Please note that parking options were not an explicit topic of engagement activities, so the opinions below may not reflect all views. These include:

- Bollards between the marina and SES Grounds to limit illegal parking (bollards could also provide a canvas as an opportunity to showcase local artists and artwork of the region).
- Alternatively, provide some formalised angled parking between the marina and SES Grounds to improve safety and accommodate users that already park illegally.
- The community expressed negative views around the expansion of the existing marina carpark into Conservation Park land. Other suggestions included:
  - Limit parking at the marina for daily or short-term (1-2 day) use, and provide long-term parking elsewhere.
  - Paid parking at the marina, preferably with a permit system that exempts local residents.
- Implement a public electric scooter service to facilitate quick and car-free transport around the foreshore (although Council has noted that an e-scooter trial has already been approved for Agnes Water and Seventeen Seventy). This would ideally be implemented in conjunction with:
  - Connecting all footpaths along the foreshore (e.g., marina to Air Sea Rescue Park), and
  - Encouraging scooters to use the upper footpath along Captain Cook Drive instead of the lower concrete path (which is better suited to walkers and slower travel).
- Many locals also suggested implementing a free shuttle service (or some form of public transport) that regularly travels between Agnes Water and/or SES Grounds and Seventeen Seventy to limit vehicles entering the foreshore areas. This would also require consideration of:

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- Where people will be parking to get onto the shuttle bus
- Frequency of services (only during holiday periods?)

Given that parking concerns are most significantly impacted by tourism and visitation rates, addressing some or all these concerns as part of a larger visitor management plan may provide the best long-term solutions.

Planning and development

As Seventeen Seventy gets busier, the community aspire for environmentally sensitive development, and development which aligns with the 'laidback lifestyle' which they have cultivated. The community hold a strong sense of identity linked to their region and wish to retain this by leaning into the unique qualities that sets them apart from other coastal towns and cities (i.e., Airlie Beach, Hervey Bay, Noosa, Sunshine Coast, Gold Coast).

Some more specific comments include:

- Preventing overdevelopment and development that is "purely for financial gain".
- Managing/regulating stormwater runoff and erosion on private land, and silt that runs down the hillside and impacts the foreshore and beach areas.
- The community is already struggling to access health and other essential services with current population increases.

These comments should feed into Council's next planning scheme review.

Round Hill Creek and boating

Many people live in/around and visit Seventeen Seventy to enjoy the beaches for walking, swimming, fishing, and to access Round Hill Creek for boating activities. There are many community concerns around the health of the creek, including:

- Impacts of pollutants from anti-fouling chemicals, sewage effluent and stormwater on marine life and vegetation.
- Impacts of increased commercial activity along the creek and waterways.
- Concerns about the potential disposal of grey- and black-water from liveaboard vessels into Round Hill Creek, as the only facilities nearby are onshore at Council's waste facility, and with its safe anchorage, this creek is a frequent stopover for these vessels.
- Regulation of large-scale, commercial fishing.

Other comments refer more to boat users themselves:

- Improvements to the existing boat ramp facility.
- More boating facilities, such as a potential parking, washdown and/or boat storage precinct at the SES Grounds.
- Better mapping and marking of Round Hill Creek channel and routes, the channel is now wide and shallow when it was once narrow and deep.

A number of these suggestions are not entirely within Council's control, but Council may be able to play an advocatory role for the community to Maritime Safety Queensland, and/or collaborate with other organisations/businesses (e.g., VMR) to address them.

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3 Detailed findings

3.1 Online survey results

The survey was placed on the Conversations website and was open from 15th February to 17th April 2023. The survey questions can be found in Appendix A of this report. In total, 104 fully completed surveys were received.

Respondent characteristics

Of the 104 respondents, 70% said they live in Agnes Water, 10% live in Seventeen Seventy and the remaining live in either surrounding areas (14%) or come from elsewhere in Australia (6%). In terms of their connection to the area, 61% identify as a local resident, 9% as business owners, 8% as a tourist or visitor, 7% as something else ("other"), and 2% are Traditional Owners. Four respondents identified as Aboriginal, one as Torres Strait Islander, and seven preferred not to say.

Respondents varied across the age groups, with the exception of people aged 16-25 years (there were no respondents in this age group; Figure 3).

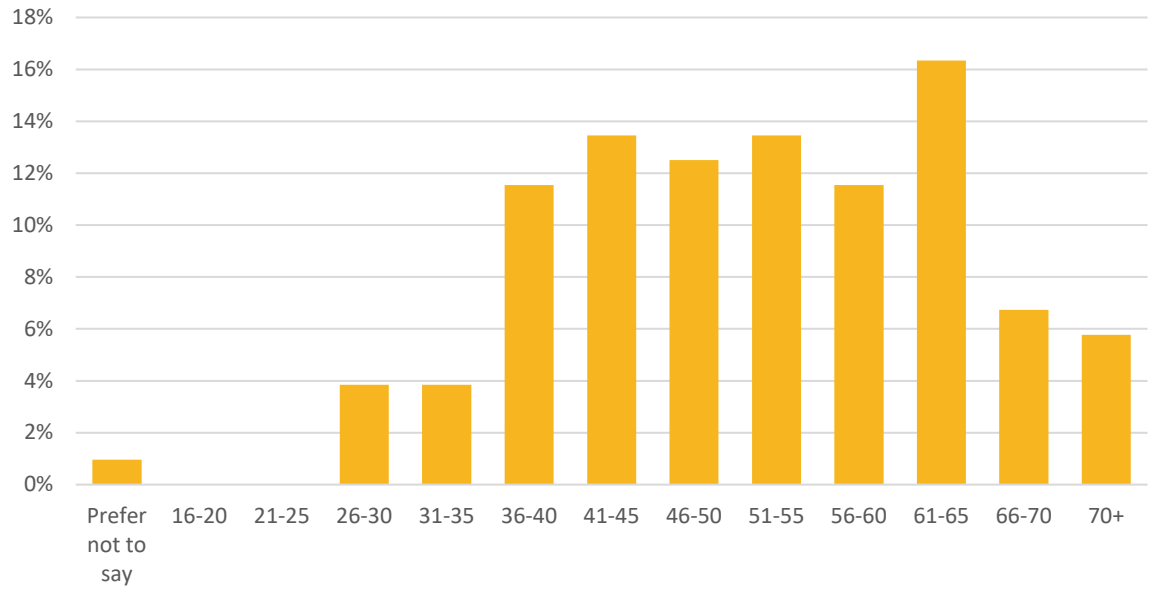

Figure 3. Age group of respondents (years)

How respondents use the foreshore

Respondents are frequent users of the Seventeen Seventy foreshore. 41% said they visit the foreshore daily, and a further 38% visit at least once per week or more. The most popular locations on the foreshore are Air Sea Rescue Park (20% of respondents mentioned this park as the place they spend most of their time), Endeavour Park (20%), "Beach" (20%), Marina (13%).

Only 18 respondents (17%) had been involved in a similar consultation process for coastal hazard protection in the Gladstone region previously.

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Places in the foreshore where they spend the most time

In total, respondents listed 161 names of foreshore places or areas they spend the most time. The responses were open-ended, meaning they typed in the name of the location. Consequently, some place names are more general (e.g., "beach") rather than specific (e.g., "Air Sea Rescue Park"). Of all the responses to this question, 58% mentioned specific place or area names, which were coded into the locations shown in Figure 4. An additional 42% of the locations were non-specific, and these responses were coded separately as 'Other responses' (Figure 4). The most frequently mentioned response was the area around Endeavour Park, which (including the beach area in front of the park) accounted for 15% of all responses. In comparison, Air Sea Rescue Park and beach area in front of the park were mentioned by 10% of respondents. Some respondents noted they spend time in a larger area (e.g., from the camping ground to the Air Sea Rescue Park) rather than specific places. These wider areas are noted as Areas A, B, and C (Figure 4). It is important to keep in mind that some respondents used non-specific location names (e.g., 8% said "beach" or similar), which could refer to any or all beaches in the area. This means the percentages for some locations will be higher than shown in the figure. About 9% of respondents made mention of the walkways, walks, trails, or the boardwalk.

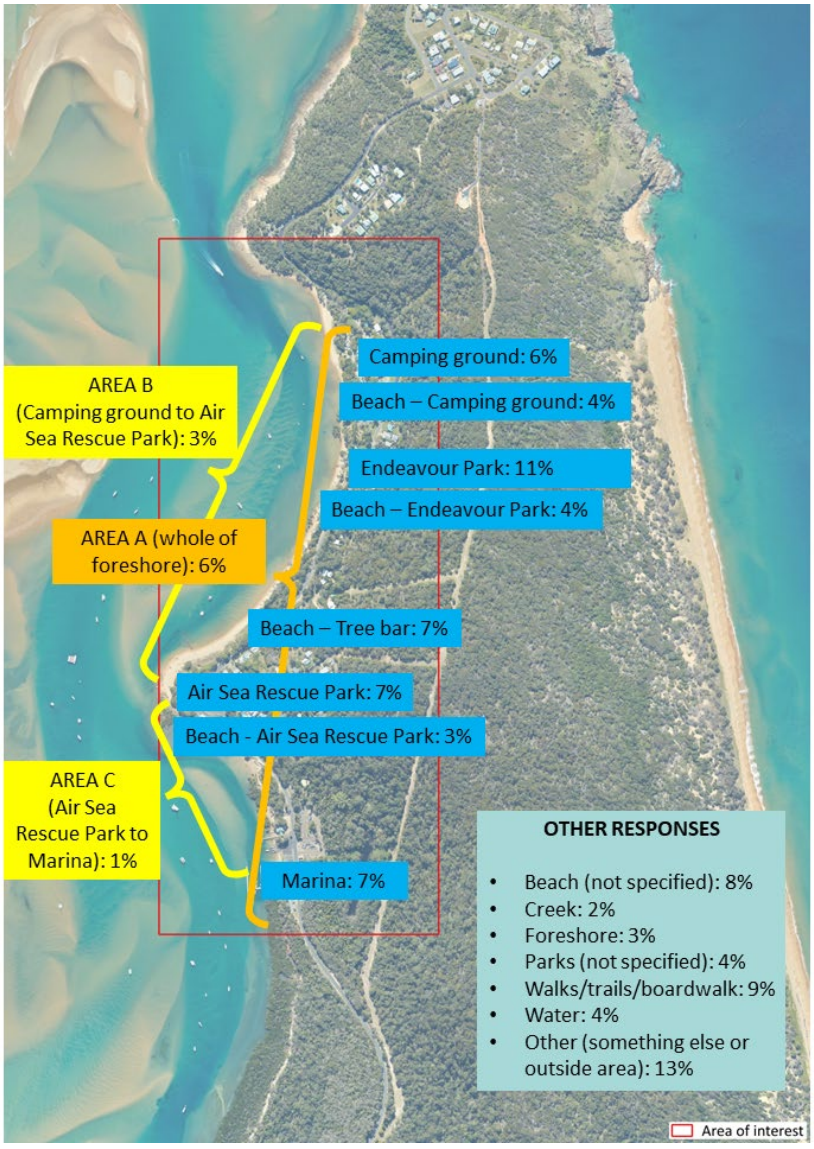

Figure 4. Places in the foreshore where respondents spend the most time

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Main reason for visiting the Seventeen Seventy foreshore

Respondents visit the foreshore for a variety of reasons, most commonly to connect with nature (31%), spend time with others (22%), and for therapeutic reasons (such as rest and relaxation, 21%; Table 3). It is also an important place for some respondents (12%) to engage in physical exercise or walk their dog (7%). Other reasons not listed included "all of the above", "food and refreshment", and "volunteering VMR".

Table 3. Main reasons for visiting the foreshore

Reason	*n*	%
To feel connected to the environment and nature	32	30.8%
To spend time with friends and/or family	23	22.1%
To rest, relax and manage stress	22	21.2%
To maintain/improve my physical health and fitness	12	11.5%
To walk my dog	7	6.7%
To feel connected to my heritage and culture	2	1.9%
To feel connected to my community	1	1.0%
I spend time there as part of my livelihood/business	0	0.0%
Other	5	4.8%
Total	104	100%

Importance of foreshore features

Respondents were asked to indicate the importance of each of 15 features in the foreshore area, including amenities such as barbeque areas and playgrounds, natural features such as beaches, and areas of cultural significance (Table 4). Note, in response to feedback during early engagement activities, the list presented to respondents was expanded after two thirds of the respondents had completed the survey, which explains the difference in the number of respondents. Natural features including the beaches, trees and shade, and native vegetation were ranked the top three (on average) most important in the foreshore. Walking trails and the boardwalk are also of high importance to the respondents, which reflects the specific mentions of walking tracks in the earlier open-ended question about where they spend the most time.

While playgrounds, areas of cultural significance, and barbeque areas are the bottom three features on this list, it is important to note the average scores were 3.4 on a scale of 0 (*not at all important*) to 5 (*very important*) for these features. This score means these features are still important to the community, just less so than the natural features.

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Table 4. Importance of foreshore features

	Number of respondents†	Mean score (average)††	Standard Deviation
Beaches	35	4.71	0.62
Trees and shade	35	4.63	0.65
Native vegetation	35	4.60	0.81
Walking trails	104	4.40	0.99
Boardwalk	104	4.16	1.13
Access points	104	3.97	0.99
Parks	35	3.83	1.07
Open space and recreation places	35	3.66	1.28
Seating	104	3.58	1.18
BBQ areas	104	3.43	1.23
Areas of cultural significance	35	3.40	1.38
Playgrounds	104	3.37	1.41

†The response options were expanded to a longer list after the survey was launched. 35 respondents saw all options.
††Rating scale responses ranged from 0 = *not at all important* to 5 = *very important*

Other foreshore features valued by the community

Respondents were also asked two further questions: (i) to name *other* foreshore features they value in addition to the ones listed in the previous question, and (ii) why they value these other features. Ninety-two people answered at least one of these questions. Since the second question referred to the first, it is important to keep both responses together to understand the context of people's responses. The full list of responses is presented in Appendix B. To summarise, the responses were grouped into themes about *natural features or areas* (39 respondents), *built infrastructure* (33 respondents), *mixed themes* (9 respondents), *access* (5 respondents), *and other topics* (6 respondents). Some of the responses did not answer the question exactly, or they discussed features that were listed in the previous question rather than *other* features which were not on the list (these may have been from respondents who did not see the full list of response options, which were seen by only 35 people). Several other respondents used this question as an opportunity to express their views about problems with the particular feature rather than why they currently value these features.

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Future vision for the foreshore

Respondents were asked three questions in this section:

1. Imagine the Seventeen Seventy foreshore 50 years from now, how would you like it to look and feel?
2. What would stand in the way of this vision – what are your concerns about the future of the Seventeen Seventy foreshore?
3. Do you have any other comments about the future of the Seventeen Seventy foreshore?

For the first question, themes were developed to summarise topics that were discussed by two or more respondents (Table 5). Altogether, there were 269 comments made by the 104 respondents, since many discussed multiple themes. The most common theme mentioned was about *leaving the place the way it is (status quo)*. A similar number of comments related to *maintaining or improving the natural environment*. Respondents also wrote about their desire for *sustainable use and low impact development* along with improvements in much of the *infrastructure*. Specific infrastructure improvements were separated out in the analysis to highlight which assets are a priority to the community. The walkways and trails, including the boardwalk, featured the most prominently in the comments about infrastructure. Additional themes and examples of comments made are provided below (Table 5). The text box below Table 5 captures other comments made by individuals that did not fit into one of the themes (i.e., topics that did not overlap with comments by another respondent).

Table 5. Respondents' vision for the future of the Seventeen Seventy foreshore

Theme (future vision)	Example comments	n	%†
Status quo/ leave as is	*Same as today*	42	15.6%
Natural environment - maintained or improved	*Revegetated with native vegetation*	41	15.2%
Low impact/ sustainable use or development	*NON-COMMERCIALISED. No large industry or commercial presence/feel. Maintaining natural areas over development.*	21	7.8%
Infrastructure - walks/ trails/ walkways/ boardwalk - improve	*A walking trail that is part shaded for a big walk.*	15	5.6%
Access	*More access for people with disabilities.* *A beautiful, naturally pristine space where people can enjoy the space (with full accessibility)*	10	3.7%
Parking - more	*Expansion of carparking availability.*	10	3.7%
Infrastructure - marina - improve	*…the marina offers live music and cafes, restaurants and public meeting places.*	9	3.3%
Visitor management	*Restricted access - endless increasing visitor numbers will spoil it.* *… slow tourism down to manageable levels in future.*	8	3.0%
Infrastructure - hospitality - more	*To have beautiful cafes and shops along the front.*	7	2.6%
Infrastructure - playgrounds - improve	*We need a playground that is not just for toddlers, what about the bigger children.*	6	2.2%
Peaceful	*… a quiet place devoid of loud noise …* *… relaxed, unpretentious …*	6	2.2%
Boating - limited or better managed	*limited long term vessels (live aboard) in creek* *… less derelict boats especially tied to the mangroves …*	5	1.9%
Connection - humans and nature	*You feel part of nature when there.* *A connectivity of nature and human interaction.*	5	1.9%
Infrastructure - boating facilities - improve	*Better boat ramp facility.* *Better boat parking.*	5	1.9%
Infrastructure - public transport	*A shuttle bus ferrying people around the area.* *Public transport in busy periods.*	5	1.9%
Social - family friendly	*Family oriented.*	5	1.9%

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Social – First Nations recognition	*Recognition of Traditional Custodians, their values and continued connection to Country.*	4	1.5%
Well maintained/clean	*Tidy, well maintained.* *Clean.*	4	1.5%
Infrastructure - bike paths - improve	*… well established bike riding tracks …*	3	1.1%
Erosion - manage	*Foreshore that has been stabilised to handle the localised erosion and wave action of the seasons.*	3	1.1%
Green spaces/open space	*Preserved, green & open spaces for the community.*	3	1.1%
Infrastructure - Marina - status quo	*The marina should not increase its size substantially.*	2	0.7%
Infrastructure - roads - improve	*Improved road management.*	2	0.7%
Infrastructure - toilets - more	*Some more toilets.*	2	0.7%
Infrastructure - walks - maintained	*Existing walking tracks maintained.*	2	0.7%
Community participation in decision making	*…far greater local input into the land and waterway uses at 1770.*	2	0.7%
Parking - no more	*No increased carparking at Marina or road.*	2	0.7%
Development - limit	*Cap the development to existing approvals.*	2	0.7%
Other	*See text box below*	37	13.8%

†Percentage is based on all comments received (*n* = 269), not number of participants, to show the proportion of each theme against all comments made.

Other future vision themes mentioned only once

Bike parking - improve
Bins - more
Camping ground - convert to rainforest/ natural parkland
Camping ground – keep so families can have affordable holidays
Coastal protection from sea level rise - improve
Cultural history, esp. Indigenous - more
Development - expand - Crown land
Development - shops - no more
Dogs - better management
Dogs - excluded
Dogs - included/more access
Dredging - minimal
Facilities - no more
Fishing - not overfished
Fishing spots
Fresh water taps at jetty - add
Host community events
Jetties - more
Kayaks and boats on beach - remove
Large trees for shading
Like Noosa foreshore
Litter education
Lookout (vertical) - add
Maintain local character
Management - improved
Picnic areas - improve
Preserve for future generations
Road down coast to Agnes water
Sculptures (natural) - more
Seats - improve
Seats, bins, playground - improved
Things will change with climate
Toilets, BBQs, seats, playground, shade structures - improved
Traffic - better managed
Water sports - more
Waterpark lagoon
Welcoming/friendly

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Barriers to their future vision

All respondents except one commented on barriers to their future vision. There were 173 comments altogether, as respondents often mentioned more than one theme. These comments were summarised in a similar thematic coding process to the previous question. The most common theme of the barriers mentioned was *development*, which attracted a total of 64 comments (Table 6). Of these, the two most frequently mentioned barriers to their future vision were overdevelopment and inappropriate development. Other comments about barriers that development would present included concerns about development decisions that are driven only by financial outcomes with no consideration of environmental and community issues, and a few people mentioned concerns about expansion of the marina area. A small number of people (*n* = 3) said the barrier to their future vision would be people who object to development.

Many respondents (*n* = 31) were also concerned about *environmental degradation*, particularly any damage to, or loss of, vegetation (including mature trees). Several respondents thought that other causes of environmental degradation (for example, development or erosion) would also impact on their future vision. Other perceived barriers included the pressures that increased popularity of the area will bring, and the resulting impacts such as congestion, overuse, traffic problems, and increased vessels on the water. Some respondents made mention of inadequate management and decision-making generally, and more specifically about issues such as infrastructure (roads, parking, and inappropriate coastal mitigation activities) and a lack of community consultation. A further 21 comments were received, which were mentioned by only one person (see text box).

Table 6. Perceived barriers to future vision

Theme (barriers)	Example comments	n	%†
Development - overdevelopment	*I worry that over development will decrease the quality of the foreshore.*	29	16.8%
Development - inappropriate	*Inappropriate development and neglectful environmental policy…*	12	6.9%
Environmental degradation - damage to/loss of vegetation/trees	*Vegetation lost to make way for car parks and facilities.*	11	6.4%
Increased visitors – causing congestion, overuse, traffic	*Increased tourism and congestion.*	11	6.4%
Infrastructure – poor parking or traffic management	*Parking and traffic stands in the way of local enjoyment of the wonderful foreshore.*	9	5.2%
Management - lack of leadership, competence, foresight, poor decision-making	*Not enough foresight from past and present council.*	8	4.6%
Environmental degradation – caused by development	*I am concerned that overdevelopment will leave us with a Gold Coast like development and we lose the precious natural environment that brought us here.*	7	4.0%
Community - lack of input	*Not consulting the community or engaging with Heart of Agnes or DCTC in the planning/development.*	6	3.5%
Development - general	*Development*	6	3.5%
Development - greed, driven by money rather than concern for environment or community	*Developers with loads of money will buy their way in and be allowed to develop with no regard to what the community wants or how it will adversely affect the natural environment.*	6	3.5%
Environmental degradation - erosion	*Erosion to the beach and grass*	5	2.9%
Environmental degradation - general	*Anything to destroy the natural beauty.*	5	2.9%
Infrastructure – other issues	*No footpath access. Poor storm water runoff management.*	5	2.9%

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Vessels – impacts such as increased traffic, anchoring, etc.	*More yachts being allowed to moor in the river will detract from the feeling of space and unspoiled beauty…*	5	2.9%
Coastal mitigation work - inappropriate	*Revetment structures and built environment.*	4	2.3%
Development - commercialisation	*It will no longer be pristine and unsoiled by commercialism.*	4	2.3%
Development - lack of, due to objections	*Small vocal minority groups who don't want any change.*	4	2.3%
Access to public - prevented	*Less beach access. Lack of commitment to designated access points …*	3	1.7%
Development - marina - unplanned, expanding	*Marina over development.*	3	1.7%
Environmental degradation - other	*Planting 'landscape' species where endemic species should be utilised. Threats to the natural environment.*	3	1.7%
Increased population	*Population growth.*	2	1.2%
Infrastructure – lack of/inadequate	*Lack of infrastructure (water, sewage).*	2	1.2%
Overregulation	*Over-regulation.*	2	1.2%
Other	*See text box below.*	21	12.1%

†Percentage is based on all comments received (n = 173), not number of participants, to show the proportion of each theme against all comments made.

Other *barrier* themes mentioned only once

Campers on foreshore
Change
Climate change, sea level rise
Council development plans
Dogs - off leash
Dredging channel for fishing access
Education
EPA rules
GRC - not spending in Agnes/1770 compared to other areas
Interactive centre at Cook's monument (detrimental)
Lack of access points and dune protection
Lack of funding
Litter
Local street owners think that they own the place
Management - campground
Overfishing
Power
Preserving aboriginal heritage
Reluctance to adapt
Small amounts of space, existing infrastructure

Other comments about the future of the Seventeen Seventy foreshore

Of the 104 respondents, 58 made additional comments about the future of the foreshore. Respondents used this question to share their passion for the area, and many of the comments reflect the sentiments expressed in the previous two questions. The full list of comments is provided in Appendix C.

Final reflections on survey findings

The survey findings provide more evidence that the community is eager to maintain the Seventeen Seventy foreshore as a natural place where they can rest and relax, take part in recreation, spend time with others, and enjoy nature. The alignment of the survey results with the findings from the other engagement activities suggests that the majority of the community is supportive of natural or nature-based solutions to coastal adaptation options and are likely to support decisions that reflect these values.

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3.2 Outcomes from the engagement activities

Community Workshop & Listening Post

On the 20th February, we conducted a workshop with select stakeholders from community groups, organisations and volunteers. We also held a 'Listening Post' open to all at the Air Sea Rescue Park the following morning. We presented a poster with values and aspirations for the Seventeen Seventy region sourced from a desktop study of previous engagement with this community from the development of the Our Coast Our Future Coastal Hazard Adaptation Strategy and the Agnes Water & Seventeen Seventy Shoreline Erosion Management Plan. Participants could agree or disagree with the presented information or add their own comments to fill any gaps in information. We also sought input on the key assets along the Seventeen Seventy foreshore, specifically what the community values about these assets, how much they use the asset, and their concerns or aspirations for future management.

"Our beautiful natural environment is our biggest asset."

Value statements relating to the protection of local habitats and remnant vegetation, natural beauty of the region, historical values and abundant wildlife were highly agreed upon. All comments from this exercise have contributed to the shared vision and values for the region (see Section 2.1, Figure 2).

Figure 5. Community members discussing the values and aspirations poster at the Listening Post

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The following assets/issues were most frequently referenced throughout both activities (in approximate order of frequency).

Assets/issues in-scope	Assets/issues not directly in-scope
Footpath and boardwalk • Maintaining and improving all-ability access to foreshore and beach • Adding pathways to improve connectivity (marina to Air Sea Rescue Park, and Endeavour Park to Captain Cook Monument) • Support for raised boardwalk to protect sections at risk • Preference for rocks over geobags for revetments, armouring • Seating is highly valued • Provide seating along any additional pathways	**Parking** • Parking overflow from camping ground into Endeavour Park a major issue • Illegal parking along Capt. Cook Drive during peak periods – bollards to manage this, or formalised angled parking to accommodate? • Additional parking pressure at marina resulting from new businesses • Long term vs daily parking areas at marina to manage boat ramp users? • Shuttle services and/or electric scooters into 1770 to reduce parking pressure? • Paid parking introduced for visitors, but not for residents • No carpark in the Conservation Park
Foreshore and dune vegetation • Protection and enhancement of existing vegetation, including revegetation • Support for species which provide coastal protection – e.g. mangroves, spinifex • Quicker and more effective response by Council to impacted vegetation • Keeping locals informed of clearing and management activities • Improve vegetation in/around camping ground	**Tourism** • Visitor management is essential, no need to promote the region as it gets busier every year • Lean into unique qualities of our region – need to remain different to other coastal towns (e.g. Hervey Bay, Airlie Beach, Sunshine Coast, Gold Coast)
Kayak storage • Continue to allow locals to store kayaks on foreshore, but manage in an environmentally sensitive way • Support for designated kayak storage area • Strong support for removal/limitation of larger boats mooring onshore/close to shore • Support for removal of kayaks was present but less prominent	**Boats and boating management** • Concerns around disposal of grey- and blackwater, only facilities are onshore, none at marina • More boating facilities – parking, washdown, boat storage at SES Grounds? • Better mapping/marking of channel and routes as channel is now wide and shallow – Council to advocate to Maritime Safety Queensland
Endeavour Park & Air Sea Rescue Park • Both highly popular and well-used parks • Need a balance between public use and private/event use of the park • Toilets are unable to keep up with visitation numbers – how will they be expanded?	**Playgrounds** • Preference for natural playgrounds and natural play, but also diverse play options (e.g. sand dumpers) **Roads**

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- Some support for designated dog free and dog park areas

Camping ground

- Improve vegetation in/around camping ground
- Concerns around possible creek that was infilled to build camping ground – drainage/inundation implications

Sewer system and stormwater

- Low pressure sewage system unsafe and unreliable
- Major concerns of pollution from perceived sewage outflows Better management linked to disaster planning

Beaches

- Pristine beaches highly valued – only area in region where you can swim (no pool in area)
- Formalised access points to beaches are needed
- More bins at beach access points
- Better management of dirt roads, limiting sediment runoff
- Better management linked to disaster planning

Foreshore lighting

- Support for turtle-sensitive lighting and 'dark city'

Meeting with PCCC

An online meeting was held with the Mosaic Insights and Gladstone Regional Council project team, Nick MacLean (Cultural Heritage Manager, PCCC), Rebecca Hendry (Research and Conservation Lead, GRC), and Michael Willmot (First Nations Fire Management Officer, GRC).

The purpose of this meeting was to start conversations about how Council can collaborate with the Traditional Owners and wider First Nations community to make Seventeen Seventy more resilient to increasing impacts of coastal hazards. Nick MacLean discussed culturally appropriate processes for engagement as well as highlighting First Nations' perspectives on vision, values, aspirations and concerns for the area. Key insights from this discussion are summarised below.

Cultural Protocols

- Seventeen Seventy is shared Country and an area of high interest to Traditional Owners.
- There is an element of complexity where the outcomes of the 2019 Native Title determination need to be reflected along with the Indigenous Land Use Agreement.
- Native titles of all four groups need to be acknowledged and translated appropriately (e.g., in signage) – the Bailai, the Gurang, the Gooreng Gooreng and the Taribelang Bunda peoples.
- Elders Council membership includes representatives from across PCCC including representatives from outside the native title area. Uncle Shayne Blackman is the chair and coordinator of the Elders Council.
- Council should engage through the Elders Council and Prescribed Body Corporate – seek to proactively protect values as opposed to engaging on the back of development.

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Perspectives on Caring for Country

- The whole of Agnes Water and Seventeen Seventy is of high cultural significance. Traditional Owners hold concerns about increasing development and land clearing that would cause irreversible change to these areas.
- The following were discussed as places of special cultural significance in and around Seventeen Seventy:
    - Round Hill Headland – cultural significance with symbols around birth, life, death, and spirit moving on as well as an important vantage point to the northeast.
    - Eurimbula National Park – aspiration for co-management arrangement with QPWS, works commencing over next 18 months to integrate cultural values, with values established for the park which QPWS then uses for health checks. A need for a whole-of-system, values-based management framework.
    - Logger head turtles – there are important logger head turtle nesting sites along Agnes Water and Seventeen Seventy. The sea turtle is an important totem animal for some First Nations peoples.
    - Reedy Creek and nature reserve – managed by Bush Heritage Australia, PCCC are currently working in partnership to explore opportunities for bush burning.
    - Laguna development to west of Rocky Point – the wetland in this area (SE corner) is important for frog dreaming.
    - Scar trees – more work needed to engage with Traditional Owners to understand and map the location of these sites and values (recorded as polygons rather than points to respect cultural sensitivities and intellectual property).
- Cultural heritage legislation does not properly protect intangible heritage.
- Environmental legislation does not properly recognise Aboriginal cultural heritage from an ecological perspective.

Long term aspirations and ongoing involvement

- Protection of areas of particularly high cultural sensitivity.
- Access and cultural rights of Traditional Owners and First Nations peoples to foreshore, waters, land (e.g., for cultural fishing, traditional hunting, ceremonies).
- Culturally appropriate naming and signage.
- Health of the natural environment, protection of natural assets and values.
- Protection of the Seventeen Seventy area against development.

It is important to note that Traditional Owner values here should not be seen as separate or conflicting with the broader community's *Vision and Values*. In fact, there is high alignment between Traditional Owner values and the broader community's *Vision and Values*. Particularly regarding the values of 'respect' (working with Traditional Owners to recognise and protect Aboriginal culture and natural heritage), 'protection' (protecting the plants, wildlife and ecosystems through ecological restoration and stormwater management), and 'engagement and collaboration' (working closely with the local community). Traditional Owners also share similar concerns with the broader community relating to overdevelopment and development that is not environmentally sensitive.

Rather than considering Traditional Owner values separately from the broader community, Council should be mindful of the importance that the *whole* community places on the protection of cultural values, as noted in the community *Vision and Values* summary (Figure 2) above. Council has been building relationships and collaborations with Traditional Owners to address the way the area is used and managed. There are good opportunities for Council to further develop this relationship and work collaboratively with PCCC through Council's fire management planning. By maintaining a strong relationship and building in a *Caring for Country* approach to the way issues are handled, the Council and Traditional Owners will be able to ensure this area is protected, cared for, and managed well into the future.

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Drop-in session

This activity on the 23rd of March took the format of a 6-hour drop-in session, the purpose of which was to:

- Seek community feedback on the draft vision and values for the Seventeen Seventy area.
- Seek community feedback on identified priority issues and potential adaptation options.
- Build an understanding of adaptation.
- Promote the project and opportunities for ongoing involvement.

Participants were provided with drafted vision statements for which they could vote for their preference, as well as drafted values statements which they could agree, disagree, or provide commentary on (see Appendix D for the full list of drafted statements). Participants had in-depth discussions with the project team, with overall positive sentiments towards the project and Council. Community showed a preference for the vision statement (below), with feedback that the importance of the local economy should also be included in the summary of community values. This has been incorporated into the overarching *Vision and Values* for the community (see Section 2.1, Figure 2).

"**Our vision is for a peaceful, shady Seventeen Seventy where people live in harmony with the natural environment and the movements of the ocean.** We recognise the deep and continuous cultural significance of the place and strive to protect the plants, animals and ecosystems that support our wellbeing. We aim to blend the footprints of modern day living with the natural beauty and ambience of our unique coastal environment."

The community also showed a preference for nature-based and 'blended' adaptation responses.

Pop-up stall

On Sunday 16th April, a representative from the project team and from Council attended a stall at the Discovery Coast Rotary Market at the SES Grounds in Seventeen Seventy. The objectives of this activity were to gain any further high-level feedback from the community on the adaptation options and proposed community *Vision and Values*. This also provided an opportunity to promote the final workshop, and the community survey.

Approximately 20 people stopped to speak with stall attendees, with general positive sentiments about the project including many confirming the perspectives and concerns we have heard through earlier engagement (Figure 6). Many also took this opportunity to speak to Council about other concerns that were not within scope of this particular project. This activity provided a great opportunity for the community to see Council active in their community.

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Comments from 16 April Pop-Up community consultation

Potential adaptation ideas for the assets we value in Seventeen Seventy!

Are there any other ideas that we should consider? Anything we shouldn't consider?

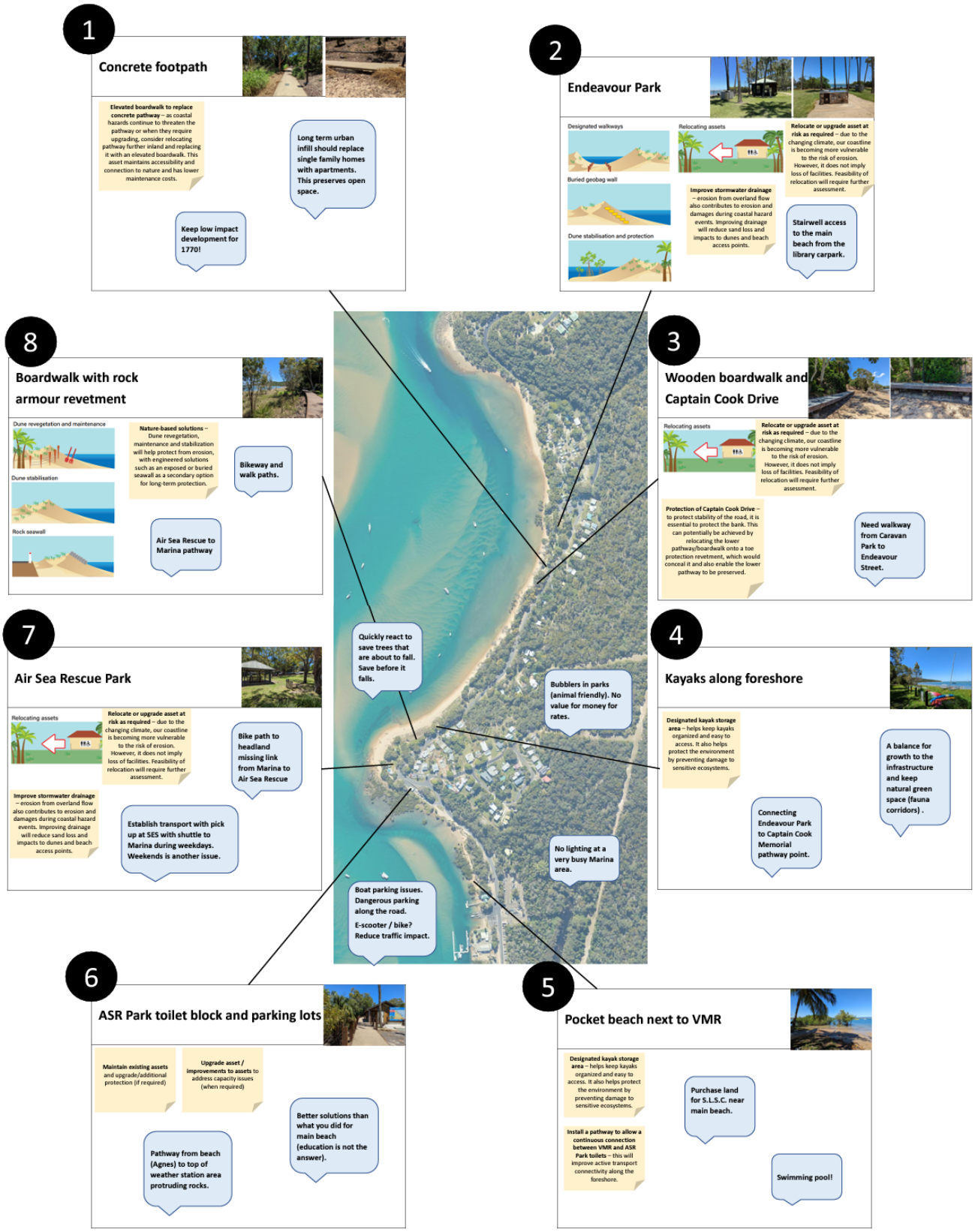

Figure 6. Summary of community comments from the pop-up stall engagement activity

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Community Workshop

On the 20th April, we conducted a community workshop that was open to all, in which we discussed the CARP project as a whole, presented the identified adaptation options (Figure 6), and sought feedback on the pros and cons of each along with the community's priorities for implementing these options. The prioritisation activity asked participants to rank one asset (and its identified adaptation options) as Priority #1, three assets/options as Priority #2, and four assets/options as Priority #3 in a 'bullseye/target' style categorisation activity (Figure 7). Facilitators captured reasoning and discussion for the prioritisation of assets, options, and issues from each group.

Figure 7. Activity handout for the final Community Workshop; participants were asked to place one asset (and its adaptation options) in the centre (priority #1), three assets in the middle ring (priority #2), and four assets in the outer ring (priority #3).

Participants completed the prioritisation activity in three groups, averaging the responses across the three tables, which resulted in the following priorities from the community:

1. Pocket beach next to VMR

Specifically with strong support for the option of constructing a pathway through this section to connect the marina and Air Sea Rescue Park. There is also a lot of commercial and recreational activity in this area (i.e., the marina, kayaks, dragon boats and other boaters using as an informal boat ramp), and the community has noticed erosion which may impact large old growth trees.

2. Concrete footpath

This asset is highly used and aligns with the desire to maintain (and improve) connectivity. The community is aware that the concrete path is impacted by runoff and drainage.

3. Endeavour Park

This park is highly popular, and the community is aware that this park is subject to flooding. Community also state that the toilet capacity issues here are more important than those at Air Sea Rescue Park, and that parking management is needed (though not addressed as an intervention option).

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4. Air Sea Rescue Park

Support for improvements to stormwater drainage, but aware that this park is not currently at great risk from coastal hazards.

5. Wooden boardwalk & Captain Cook Drive

This asset scored highly for some participants and low for others. Those scoring highly were most concerned about the sewage pipe and sewage system as a whole, which requires attention (however others scored this lower as they had been provided with information from Council during the workshop that works were in progress to address this issue).

6. Boardwalk with rock armour revetment

Strong support for nature-based solutions (i.e., revegetation) to provide additional protection, and for extension of the boardwalk to other sections (including to a potential new section between Air Sea Rescue Park and the marina).

7. Kayaks along foreshore

This was not a high priority for the community, but many see it as a quick fix (i.e., it is an easy, relatively inexpensive option that Council could address quickly). There was a range of support, from allowing the kayaks to remain in some capacity, to a "tidying up" of damaged and unused crafts, to some enforcement to limit abuse of this privilege. Some participants mentioned that any regulation is a "can of worms", and that storage fees are not a preferred system of management.

8. Air Sea Rescue Park toilet block and parking lots

This was not a high priority for community, as this area is not currently at great risk from coastal hazards. However, the community are aware that capacity is an issue, as is the need for some regulation of visitors and traffic (which may need to be addressed as part of a broader visitor/traffic management strategy).

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4 Implications for the CARP

The engagement activities have provided a great insight into what the community values about their foreshore, future management of the assets within it, and management of the region more broadly. It is important to note that the community's *Vision and Values* have strong alignment with Traditional Owner values and that strong relationships and collaboration with all facets of the community will contribute to a holistic view of community values and priorities.

Community values have been incorporated into the multi-criteria analysis (MCA) process to help identify the preferences and priorities of the community. Specifically, the multi-criteria assessment includes a score for community value, which was driven by values identified in the survey and in-person engagement outputs, as well as the results of the prioritisation activity in the final Community Workshop. Discussion of each adaptation option has also identified the direct links to the community's *Vision and Values* where possible. By including community value in the MCA, the decision-making process can be more inclusive and reflective of the community's needs and concerns.

In addition to improving the alignment of management and resilience measures with community values, incorporating community values into the MCA may also help to build community support and engagement for the implementation of the CARP.

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Appendix A

Survey questions

Seventeen Seventy Coastal Adaptation and Resilience Plan (CARP) - Survey

We appreciate you taking the time to participate in our survey. Please complete and return to **Agnes Water Library, 71 Springs Road, Agnes Water by Monday, 3 April**.

Section 1: How do you use the foreshore?

1) How often would you normally visit Seventeen Seventy foreshore?
Please only select one answer
☐Daily
☐3 times or more per week
☐1-2 times per week
☐A couple of times a month
☐A couple of times a year
☐On occasion
☐During holidays

2) Where in the foreshore area do you spend most of your time?

3) Typically, what is your main reason for spending time at the Seventeen Seventy foreshore?
Please only select one answer

☐To spend time with friends and/or family
☐To rest, relax and manage stress
☐To maintain/improve my physical health and fitness
☐To walk my dog
☐To feel connected to the environment and nature
☐To feel connected to my heritage and culture
☐To feel connected to my community
☐I spend time there as part of my livelihood/business
☐Other, please specify below:

Section 2: How important are the below to you?
Please rank each of the below by level of importance to you where 0 is 'Not at all important' and 5 is 'Very important'

4) Boardwalk

0 Not at all important	1	2	3	4	5 Very important

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5) Walking trails

0 Not at all important	1	2	3	4	5 Very important

6) Access points

0 Not at all important	1	2	3	4	5 Very important

7) Seating

0 Not at all important	1	2	3	4	5 Very important

8) BBQ areas

0 Not at all important	1	2	3	4	5 Very important

9) Playgrounds

0 Not at all important	1	2	3	4	5 Very important

10) Trees and shade

0 Not at all important	1	2	3	4	5 Very important

11) Open space and recreation places

0 Not at all important	1	2	3	4	5 Very important

12) Parks

0 Not at all important	1	2	3	4	5 Very important

13) Native vegetation

0 Not at all important	1	2	3	4	5 Very important

14) Beaches

0 Not at all important	1	2	3	4	5 Very important

15) Areas of cultural significance

0 Not at all important	1	2	3	4	5 Very important

16) Please name other foreshore features you value:

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17) Please tell us why these features are of value to you?

Section 3: What is your future vision for the foreshore?

18) Imagine the Seventeen Seventy foreshore 50 years from now, how would you like it to look and feel?

19) What would stand in the way of this vision – what are your concerns about the future of the Seventeen Seventy foreshore?

20) Do you have any other comments about the future of the Seventeen Seventy foreshore?

Section 3: Please tell us a little about yourself

21) In which suburb do you live?

22) How would you describe your connection to the area?
Tick all that apply
☐Local resident
☐Tourist/Visitor
☐Business owner
☐Traditional Owner
☐Other, please specify below:

23) Age group
Please circle your answer

16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60	61-65	66-70	70+
Prefer not to say											

24) Do you identify as:

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☐Aboriginal
☐Torres Strait Islander
☐Prefer not to say

25) Please let us know if you have previously been involved in a similar consultation process for coastal hazard protection in the Gladstone Region.
Such as the Coastal Hazard Adaption Strategy (CHAS) or a Shoreline Erosion Management Plan (SEMP)
☐Yes
☐No

You have now completed the survey. Thank you for your contribution.

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Appendix B

Survey responses from end of survey. Respondents were asked to: (i) name other foreshore features they value in addition to the ones listed in the previous question, and (ii) why they value these other features. Note, not all responses were direct answers to these questions. Some discussed features that were presented in the previous list, while others used the opportunity to discuss unrelated matters.

Theme	Other foreshore features valued	Why these features are valued
Access	Able to have personal watercraft along the beach for regular access	Makes it accessible and more likely for our kids to be active
Access	The beach easy access and kyak storage	We van be in water asap from arrival...kyaks also great to launch within 10 min
Access	Access to view clearly the sun going down	It is a place where we I connect with nature and relax fully. The beauty here envelops and nourishes and this reflects all across our local community.
Access	Access to the beach	It's a beach, what else is there?!?!
Access	Easy access to the ocean	I paddle board and surf down there
Built infrastructure	Boardwalk	Ease of access for those with mobility issues
Built infrastructure	Enough parking when tourists are here at peak times. Also need the cafe functioning at 1770 caravan park. Toilets needed at the headland. .	When spending time at 1770 would be good if more available cafes/food vans operated allowing us to stay in that part of area.
Built infrastructure	suitable car parking	no easy to walk far due to physical limitations.
Built infrastructure	Butterfly Walk, Air Sea Rescue Park, 1770 Headland and surrounding beaches, Endeavour Park	Access to coastal areas and their environment with limited impact on that environment.
Built infrastructure	Bbq's and picnic huts, ability to store kayaks and small boats	Due to the parking and traffic issues, I think it is important to have an area where local can leave their kayaks, small catamarans etc.
Built infrastructure	Pontoons and access to boating activities	To attract traveling yachtsman to spend money in the community. Fresh water should be available at the public pontoon and there should be more of them . Yachties spend alot of money here and should be encouraged with more boating inferstructure.
Built infrastructure	Boat ramp	It's such a beautiful special place
Built infrastructure	rescue park	health and fitness also family friendly and community gatherings
Built infrastructure	Enough bins to handle the influx of visitors	They are all important features that allow everyone to enjoy the area. The boat ramp and associated parking is an absolute joke that needs immediate addressing.
Built infrastructure	The trails to walk	To know what's happening in my favourite place as a rates payer of Agnes Water and beable to have a say in it .
Built infrastructure	Parking	There isnt enough

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Built infrastructure	The boat ramp is dangerous. It is only a matter of time before someone gets run over. Ramp on one side of the road boat parking on other side. Really… A child is most likely to be killed by not realizing it is actual a main road.	I have a holiday house at Agnes and enjoy spending time there with family and friends. I have a large boat and use the boat ramp often. Addition to the previous comment:- there is not enough boat trailer parking. Go there when the forecast is good and see the trailers parked on the side of the road all the way back to the community/market grounds.
Built infrastructure		the walk between the two parks is very peaceful and refreshing, but I am concerned about the road falling in the creek do to the tree dying on the slope
Built infrastructure	Being able to have dogs as part of the family and also more carpark for cars and boat trailers and influx of people on holiday periods and some amazing children's playgrounds	Most people who reside in Agnes water/1770 have a dog..... It seems to be, and we like to take them with us to enjoy a walk or a play at the Creek. Parking is becoming very difficult meaning people are parking in unsafe places. There is alot of room adjacent and around the marina to make more parking for cars with boat trailers to make the area far more user friendly and safe. Also the tree bar has wayyy tooo many signs out the front of it which can be distracting and causing blind spots for customers walking into the road and drivers can't see the people, they need to tidy up their roadside.
Built infrastructure	A place for the kayaks	Part of the 1770 culture and a tourist attraction
Built infrastructure	Parking	Cause they is far not enough parking. For tourists and locals.
Built infrastructure	I love the walkways and the overall calmness	They are not offered where we live
Built infrastructure	Parking and safe access to foreshore facilities	Foreshore facilities need to be easily & safely accessible accessible
Built infrastructure	The picnic & BBQ areas	They are well used & popular with most families & visitors.
Built infrastructure	toilet blocks and showers	I spend a lot of time swimming and swimming with my dog on the 1770 foreshore. really helpful to have the showers to use post swimming.
Built infrastructure	Boardwalks and beach access.	Enable safe unfettered access adjacent to the beach and onto the beach. A clean beach free of dead timber.
Built infrastructure	Kayak storage	Recreation
Built infrastructure	shad areas	for community and visitors to sit and enjoy
Built infrastructure	Suitable parking and/or public transport during peak tourist times to reduce parking needs.	Locals like to access our natural resources. During busy times it is almost impossible to access our lovely 1770. Current parking is inadequate and does not cater for larger vehicles that regularly frequent our area eg mobile homes.

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Built infrastructure	Seating where one can view the River or Sea. The BBQ area is always kept clean by the caretaker. Proximity from parkland to water for activities..	They allow time to pause and enjoy/appreciate the natural surrounds which at present are unspoiled by human construction. Nature is beneficial to mental health - if this area was built up it would be detrimental to many people. Allow for as much virgin bush land and foreshore to be retained. Not just for the present generation but for the future also.
Built infrastructure	The parks and grass areas. The Marina.	These are places we spend a lot of time. We would love for more areas to walk along a path and area to be able to take our dog off leash.
Built infrastructure		The foreshore is a great place for families to enjoy open space, a BBQ, and kids and families to enjoy the Park and play equipment.
Built infrastructure	1770 headland, managed walking tracks	safe places to walk with kids in nature.
Built infrastructure	Showers & toilets	It allows you to use the space at anytime before work, during or whenever thus allowing me to unwind whenever I need to.
Built infrastructure	Playgrounds, toilets, taps water access showers	They are basic rights and that we pay for
Built infrastructure	Walking tracks	Getting away from busyness & connecting with nature & going for a fish.
Built infrastructure	Showers for washing off	Safe swimming area for thousands of families. Needs better parking / BBQ shade. people come to our town just for this alone
Built infrastructure	Accessible cafe and food outlets so you can stay all day at the foreshore	Your survey is flawed - I can't tick all that apply for my main reason for attending 1770. I can only select one option. As a mum it's vital we have shaded playgrounds for a variety of ages. The two playgrounds at the foreshore are for young kids and too small. We need a park like they have at Miriam vale. Likewise, a boardwalk or trail so we can safely walk or ride bikes, preferably connected to the bike path which ends at the marina. We also need to keep the trees! Please stop reducing our foliage and instead plant more trees please.
Mixed	Open natural environment with easy access to enjoy the beach	I enjoy relaxing, walking, swimming, kayaking along the 1770 beaches. I am one of the locals who stores their kayak at the beach. Due to limited parking it is often not possible to park and remove kayak from roof racks alone. I understand that the storage area is temporary, perhaps some racks for storage on a more permanent basis, even if there was an annual storage fee might be a solution. Maybe by the VMR / dragon boat access, or where the kayak tours depart would be possible locations
Mixed		We need to maintain the integrity of the natural and cultural environment in this area
Mixed	well maintained grass areas, clean facilities, parking	makes the visit more pleasant

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Mixed	Camping grounds, boat ramp, natural assets	Camping grounds are important as we stay there several times a year with family and friends. We use the boat ramp to launch our boats, car parking is often an issue. Also value the natural features such as the sandy beach for swimming and walking, vegetation and headlands that contribute to the scenic amenity.
Mixed	Established Trees and vegetation, shade from plants along trails and tables to have picnics in shade	
Mixed	views and water. Whilst the playgrounds are not a priority it would be nice to see them improved so all kids can play on them.	Water and being near it is always relaxing it allows people to appreciate nature and its inhabitants.
Mixed	Coconut palms, coffee trailer and good healthy vegan food	They support the growth of my young and are akin to the tropical natural beauty in the local community
Mixed	Kayak storage, being able to walk the dog.	I much prefer to walk my dog at the foreshore over main beach, it has better access, is shorter walk for my elderly dog and is quieter. Locals should be able to leave their kayaks there as it promotes exercise and community.
Mixed	Small craft storage/management (SUPS, kayaks etc). Capacity for EVENTS. More First Nations presence, education and information	
Natural features or areas	Calmness of Bustard Bay	Unique beauty of the area is unparalleled as more headlands and coastal areas are built up. It provides a safe place of our wildlife and mindfulness.
Natural features or areas	Mangroves that provide shade to sit under. The clarity of water. The cleanliness of the beach, the ability to safely park boats in the water	Perfect holiday spot for fishing and relaxing with family
Natural features or areas	to see the natural changes of the sandbanks, over the daily tides, the seasons and the years	it is part of the ever changing nature of the oceans and coastlines
Natural features or areas	Fallen dead trees	They make up usability of the space, providing natural erosion control, cover for local wildlife, part of beauty of area.
Natural features or areas		I enjoy connecting with nature while getting exercise
Natural features or areas	I value the shoreline trees.	Mangroves are vital to healthy shores.
Natural features or areas	Native vegetation and regeneration	Because with sea levels rising this might be the best way to save the area. It stops erosion and looks nice
Natural features or areas	Watching the sunset so need more seats	As above
Natural features or areas	Unchanged vistas to Eurimbula and up the creek, no major development increase at the Marina, clean water with no sewage from boats at anchor or LPSS, lots of trees and Dubai protection, cleared of long term kayaks and boats on shore	Links to what makes the area unique and aesthetically pleasing now and into the future. What makes us different/ unique from the Sunshine Coast and Hervey Bay. Ensuring a sustainable future in 50 years time.

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Natural features or areas	Beach area	This area is perfect for all it is stunning
Natural features or areas	Natural vistas	Being able to look out on natural, undeveloped coastline.
Natural features or areas	swimming beach at high tide.	I love the calm shallow water
Natural features or areas		Love the natural beauty of untouched beaches. When you look back the shoreline from a boat, I think "this is the same scenery the captain Cook saw". I know it's not exactly the same but there is no high rises or huge concrete building. It's truly beautiful.
Natural features or areas	The natural environment is paramount to me.	This inlet is a rare feature on the entire Queensland coast. Regrettably, I have witnessed significant recent degradation of the area through the failure of Council to regulate and enforce requirements on development and land use. Right now, properties fronting this area are undertaking major excavation works, with little or no safeguards regarding run off. This has been the case for more than 3 years. Consequently the area between Endeavour Park and the Caravan Park foreshore is now caked in mud. It was clean sand previously. I have been coming to this region since 1976. I moved here some years ago and the changes have been very recent and I see no action from GRC. It is appalling. Corals have died or been buried. Sea grasses have disappeared, and turtles and dolphins are now rarely seen in the Inlet (its too shallow and mud has killed off the food chain). I paddle several kilometres on the Inlet most days and swim regularly - I have seen this rapid change. The LARC is doing terrible damage to the foreshore. It is a 60 year old, 50 tonne vehicle that belches out diesel particulate and crushes all life on the dunes - this happens multiple times every day. Soldier crabs, once prolific are now in small numbers. Sea birds are now in very small numbers. The ever increasing number of live aboard boats are discharging their waste and raw sewerage directly into the water. I do not swim on an outgoing tide. I know this is an MSQ responsibility but the 'liveability' of the area is suffering. Diesel fuel leaks from there marina. The marina 'workshop' is a disgrace. The operators have little or no understanding or commitment to the marine environment and operate as they please.
Natural features or areas	More shade trees planted along coastal winding walk from 1770 campground to the marina. Way too hot in summer to walk after 10am.	More Trees along the coastal path are essential because: Health and fitness by frequently walking is good. Aging population of visitors, safer for them to walk if cool. Trees are great for the environment.
Natural features or areas	The mangroves to cast shade, kids play in, and beautiful to look at	Natural, free, beautiful

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Natural features or areas	Natural vegetation and overall natural beauty	They attract people to the area, help the local fauna thrive, help us feel connected to nature and give us a sense of wellbeing and pride. When we experience places of natural beauty, we are more inclined to want to protect them. Healthy environments equal healthy people.
Natural features or areas	native vegetation	
Natural features or areas	Grassy areas to play, sit, read. Shade from trees.	The Queensland climate warrants shade to be a priority all year round. And the lifestyle choice of enjoying the outdoors is a high priority reason for residents and visitors to be in 1770.
Natural features or areas	Having nice beaches to sit on.. clean water to swim in	That's what you go to the beach for.. the playgrounds because I have visiting grandchildren
Natural features or areas		Connecting to nature and enjoying the unique environment.
Natural features or areas	The beach areas	Round hill creek is still mostly untouched by development along the foreshore, many other places now feature rock walls and concrete etc, it's so nice to enjoy the natural environment
Natural features or areas	Large established trees	Shade, native habitat for birds/ animals
Natural features or areas	Mangroves, beaches	I value the turtle nesting grounds and the vital role of mangroves to our overall environmental preservation and health
Natural features or areas	Round Hill creek water quality	It is essential to the long term survival of the natural environment
Natural features or areas	1770 Campground to mouth of Round Hill Creek	I like to shallow water dive and swim.
Natural features or areas	Coastal vegetation that prevents erosion, and provides habitat for fauna	Without natural (native) mangrove & vegetation current support, more erosion will happen, and habitat for the local fish and bird wildlife would disappear.
Natural features or areas	As much vegetation as possible	I love how cool and breezy it is down there and shade from vegetation is really important in this heat. In addition it protects us from storms and coastline errosion
Natural features or areas	The mangroves, all the big trees in the park.	Like the space for children. Very relaxing on a blanket or under the roofed seating areas. Need much better childrens playground equipment. What used to be there was better. Should always consult and put in place playground equipment local parents agree with. Respect our choices.
Natural features or areas	Vista, vegetation	Maintaining the mangrove & tree vegetation

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Natural features or areas	I value the natural environment and the beauty that's such a gift to us all including the whole inlet.	The natural environment is what most visitors and certainly residents come here for. I would like to see it managed sustainably so my grandchildren's children could also enjoy it. This may mean a ballot system for boats going into the inlet so keeping the numbers down to a manageable number and alleviating the need for more parking. Bike tracks and walking tracks along this coast and maintaining the bushland could make it even more attractive in the future as a tourist destination and valuable for those that live here as natural environments offer so much for physical and emotional wellbeing.
Natural features or areas	The native vegetation and ecosystems that support flora and fauna.	The native flora and fauna is important to the area as it provides the beauty and scenic outlook. It provides scenic amenity. All other features require this scenic amenity in their area, otherwise people would not visit. It is a well used walking area and trails or board walks are important. Equally important is access points to the creek. People visit 1770 to swim in the creek therefore access is required for all abilities.
Natural features or areas	Beach	Visual appeal
Natural features or areas	Maintaining natural aspect and bushland	Enjoyable walking, view animals, relaxing, my son wants a better playground
Natural features or areas	Natural assets Mixture of native vegetation and open parkland space.	The foreshore are presents the opportunity to connect people (community) with nature. A sterile park does not have the same emotional and psychological benefits that natural bushland does. Semi-wild places that have natural bushland interspersed with parkland provides residents and visitors alike an opportunity to experience how beautiful our endemic species are and hopefully encourage them to use natives in their home gardens. Natural bushland provides habitat for creatures that visitors will enjoy. Move away from boring water front parkland to an area that embraces it's natural identity].
Natural features or areas	The mangroves	They're important as nurseries for fish and bird habitat and they prevent errosion.
Natural features or areas	The sanded dunes and beachfront	To enjoy the outdoors
Natural features or areas	Mangroves/ native vegetation	Mangroves are the start of all littoral life and need protecting. More should be planted and developed near the boardwalk. The native vegetation is sparse and not looked after very well. We need to increase natural bees, birds and reptiles in the foreshore.
Natural features or areas	trees and gardens	the trees and gardens offer shade if you just want to sit down on a nice patch of grass. especially since the gazebos are almost always occupied on a weekend
Other	I like the plaques that tell types of trees above them and their uses	Education and it shows care and thought
Other	Accurate history and appreciation of nature	They are valuable to all.

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Other	Community	The foreshore is in its natural state which allows for those that live here to feel connected to the land water and each other.
Other	Being able to leave the kayak right there at 1770 without any padlock	It feels relaxed and unique to this area … like community matters
Other	Easy and family friendly	
Other	Agnes water beach	A place where I have used since a child

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Appendix C

Other comments about the future of the Seventeen Seventy foreshore

This question was asked at the conclusion of the survey questions.

Comment
Designated beach access points and nature barriers to prevent vegetation degradation as a result of foot traffic. Possibly extended boardwalk, footpath (limited access to headland and caravan park).
It's one of a kind so needs to be protected.
Sometimes problems with dogs running free. I would love the beach to be dog free and the boardwalks dogs on leash.
I'm not a scientist but have spent my lifetime observing and being around costal foreshores between the Whitsundays and Northern NSW, what I have observed is certain areas of coastline are susceptible to forces of man and nature but ultimately will heal itself, I believe it's possible work with nature and nurture/ steer/guide the changes to suit all stakeholders providing the natural environment is the focus.
Please do your very best to preserve the natural beauty.
Strom water run off is causing most of the damage, not tides or waves. Stop water must be managed better! Parking becomes a major issue. Boat trailers take up massive amounts of space NORTH of the trailer carpark and stay there for days on end. Boat trailer overflow must be directed toward the ses grounds. NO boat trailer parking should be allowed north of the VMR. The dead trees on the 1770 beach are a terrible eye sore, they also prevent people using a large stretch of beach. They have been there, blocking the beach for many years now.
As with Agnes Water, just keep it better maintained. Remove, repair or replace any tired infrastructure.
Please don't over capitalize it with shops
Careful planning will be needed to ensure the area is not destroyed. Any major changes to the area outlined in the mapping will impact areas beyond. This needs to be taken into account.
It is the jewel in the crown of our area. It has heritage, cultural and environmental values with protecting. It has a special "feel" about it that makes people relaxed and happy.
Let's keep our pristine area
Keep it for the locals, don't turn it into a tourist spot
Keep it simple and uncluttered with no highrise
To leave things as they are
very special and must be maintained
The natural unspoilt beauty is what drew us to Agnes/1770 I would be hopeful that many future generations will be fortunate to enjoy this pristine area
As above, with the population increasing with all the new developments the infrastructure needs to accomodate this. Look at the stupid new area just done for the dump point - you have just eliminated 50% of the parking for the weekend markets, no consideration or thought for the community there at all.
Yes , keep it natural no man made rock walls hopefully … be amazing to see a skywalk trough bush from headland to Agnes water like at Gold Coast .
Leave it as it is
The one1770 way drive along the foreshore up to the Headland then returning down the powerlines would alleviate the traffic pressures along the Foreshores. This was proposed years ago.
I am deeply concerned about the current state of Round Hill Inlet. My concerns are not all the responsibility of the GRC BUT they are the agency with prime responsibility. MSQ, Fisheries, GBRMPA, and both Federal and State Environment departs and agencies all have responsibilities and I see, to varying extents, all of them not undertaking proactive (or even reactive) management of the area. I welcome this consultation and am very motivated to see improvements.
Love it keep it real please.

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It's a true natural beauty with the view of the setting sun over the water and view of the national park
This beautiful little piece of paradise needs to be retained and all its natural beauty preserved. Environmental weeds need to be removed and replaced with native vegetation to help protect the area.
I love it, I love the trees, the water, everything
Get rid of the grotty freeloading Yachties that make us uncomfortable for walking around THEIR camp
Keep the kayaks
Allow the natural beauty to continue to be the part that attracts people to our area, both to visit or become part of our community
The creek is special for its value as a laid back nature spot and access to get on the water
Maintain what's there is all that's required.
Yes please don't destroy what we all came here to enjoy, Not many towns left now that have their natural beauty intact … I would like to see the sheoaks on main beach protected from erosion.
Would also be good to clean up the fallen trees on the sand. They serve no purpose to stay on the sand at 1770 & do nothing to stop erosion like the EPA thinks.
minimise further development.
Headland Marine areas should be a green zone and better protected
Urgent priority is amending the current council development plan for 1770 & Agnes Water to be more environmentally & culturally sensitive & more suitable to the eco-tourism characteristic of the area - not felling scar trees, not completely stripping whole areas for development, not developing areas next to sensitive environmental ecosystems (like what is happening at Agnes Water paperbark forest), Not building housing/tourist developments that risk compromising the environment (eg sewerage problem at Agnes Main beach when big rains cause effluent to leak into the creek & sea, then surfers & swimmers getting staph infections!) - retaining green corridors and trees/habitat for existing wildlife - including coastal weeding & native regeneration projects - implementing low/sensitive lighting for turtle nesting - including park rangers on weekends (eg to prevent illegal driving on beaches that currently happens in the National park etc) - and NO multi storey hotel/motels anywhere near the foreshore in 1770 or Agnes Water.
Hopefully making data driven decisions matched with community consultation, there doesn't seem to be any vision or if there is it's not being communicated well. The conversations with council app and website are great, but like with other council assets energy is wasted here, this as a topic for the March 1st DCTC general meeting to the community.
It is being loved to death
It's so magnificent, the sunsets, the bush, the beaches and pristine water I'd love those to be the focus of any development how do we work with it so we don't lose it. Sustainable eco development in a tasteful manner, a beachside feel would be ideal.
Please review the caravan park contract for overflowing vehicles in peak times as it affects day visitors to the region.
During holiday periods the public carport next to the caravan park is full of overflow parking from caravan park customers. The customers roll in with 2 vehicles, a caravan and a boat and park their extra car in that carport. This means locals are unable to use the public park and foreshore area due to the parking issue. Caravan park customers should have to keep all vehicles within the caravan park grounds.
Very restricted site so may need to pre-book use of boat ramp and trailer parking. Doesn't this happen in other places already?
More indigenous/First Nations references and names, less European history.
The marina needs alot of improving and parking is a big issue which will get bigger. Council needs to look at alternatives areas for parking or provide transport. Better toilet facilities. As the boat ramp is there, there is still no fish filleting area or disposal of such.

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need to maintain the entrance into Round Hill creek the best we can for the safety of all especially of Volunteer rescue boat crews who assist in times of need 24/7
The current housing boom and destruction of environment and impact on wildlife is very important. This plan must have this in the forefront and priority to make up for developer greed.
Reinstate a Cafe or restaurant at the council caravan park A better playground Non invasive parking
Allow more RVs to camp overnight
Keep it as natural and unspoiled as you can.
Preseve low tourism impacted areas.
This is such a unique area with the addition of a rich cultural significance. Tread lightly, don't rush into development, ask the locals, and preserve this area. Make the natural beauty the draw (like the Paperbark walk which has gained popularity on social media and attracts visitors from around the world) and not a strip of expensive restaurants and shops like Noosa. This is the gateway to the southernmost tip of the Great Barrier Reef, this place ticks all the boxes for an exceptional Eco-focused region.
Dredging of the bar to allow better access for boating.
It’s beauty is it’s simplicity and natural abundance. There is nothing unique about development.
There should not be a caravan park or multi level accommodation on or near the foreshore,
Update the parks and maybe include a fenced area for dogs if possible off lead
Yes please make it EPIC !
The Yeppoon lagoon is a good example of development done well. We need considered and sensitive developments.
It needs more places where you can eat and drink. As one place is not good for competition. (Food Quality)
There MUST be a local Environmental Protection Plan in place to guide planning/development in Seventeen Seventy. The area MUST be protected from the presence and impact of big industry, including from the ocean and Gladstone.

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Appendix D

Drafted Vision Statements – drop-in session

Attendees were asked to cast a vote for their favourite:

1. **Our vision is to foster a deep connection between people, the land and the ocean, instilling a sense of respect and appreciation for the Seventeen Seventy's cultural heritage and ecological diversity.** We strive to live in harmony with the dynamic nature of the winds, water, and weather of our continuously changing foreshore, all the while seeking to preserve the unique natural beauty and relaxed ambience of Seventeen Seventy. We want to balance the needs of residents and visitors alike, allowing for enriching social and recreational experiences while treading lightly on the environment that supports our collective wellbeing.

2. **Our vision is to create a place of play, peace, serenity, and relaxation that inspires all who visit to appreciate and respect the natural beauty, diverse endemic wildlife and rich cultural history of Seventeen Seventy.** We will come together as a community to look after the delicate and dynamic ecosystem of this unique coastal area for future generations to enjoy.

3. **Surrounded by the beauty of the ocean and the gentle sway of the trees, our vision is for Seventeen Seventy to be a tranquil haven for friends, family and visitors to come together to relax and connect with nature.** A welcoming and inclusive place that offers a mix of peaceful recreational opportunities for all ages and abilities to take in the sights, smells, and sounds of the ocean. We aim to protect and preserve the natural environment where people can recharge their spirits and find peace.

4. **Our vision is for a peaceful, shady Seventeen Seventy where people live in harmony with the natural environment and the movements of the ocean.** We recognise the deep and continuous cultural significance of the place and strive to protect the plants, animals and ecosystems that support our wellbeing. We aim to blend the footprints of modern day living with the natural beauty and ambience of our unique coastal environment.

Drafted Values Statements – drop-in session

Attendees were asked to indicate if they agreed, disagreed or were unsure:

 Environment	Is this value important? (tick/x/?)
Care: The natural environment is the foundation for our wellbeing, identity, and sense of belonging. We value the natural beauty and biodiversity of our coastal environment and will work together to care for natural habitats, prevent erosion, and reduce pollution for the benefit of current and future generations.	
Sustainability: We value the sustainability of coastal ecosystems and work to promote responsible coastal development practices that blend with the natural landscape and evolve with the movements of the ocean. We strive to maintain a balance between economic opportunities and conservation of natural resources.	
Education: We believe in educating people about the importance of coastal environments and the impacts of human activities on these ecosystems. We work to raise awareness and promote responsible behavior among residents and visitors.	
Additions/comments:	

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Economic	Is this value important? (tick/x/?)
Responsible Tourism: We believe in promoting responsible tourism that supports the economy while minimising negative impacts on the natural coastal environment. We work to promote ecotourism and sustainable tourism practices that protect and conserve natural resources.	
Local Businesses: We value the local businesses that support the lifestyle and ambience of the coastal community. We believe in building partnerships and collaborations that promote sustainable economic practices.	
Resource Efficiency: We believe in maximising the efficiency of natural resources used in economic activities in coastal environments. We work to reduce waste, reduce energy consumption, and promote sustainable practices.	
Additions/comments:	

Social and recreation	Is this value important? (tick/x/?)
Community: We believe in nurturing a healthy, inclusive community that is connected to the natural environment. We work to promote social equity and celebrate our strong volunteering spirit.	
Laidback lifestyle: We value the quit ambience and peaceful surroundings and seek to maintain a relaxed look and feel by managing development and busyness of cars, traffic and parking congestion.	
Access: We believe that people of all abilities and ages should have access to enjoy the beauty of our coastal environment. We work to ensure that public access is sustainable and that recreational opportunities are available while also preserving the integrity of the ecosystem.	
Recreation: We are proud of the mix of recreational activities on offer. There is something for everyone here - walking, kayaking, boating, swimming, fishing, cycling or just the quite contemplation of the stunning coastal scenery. We strive to cater for diverse needs while protecting the natural environment and maintaining the aesthetics of the stunning foreshore.	
Amenity: We value the amenity of the shady, breezy natural environment, open spaces and picnic and play areas and seek quality natural and blended solutions to the delivery of services and facilities.	
Additions/comments:	

Culture	Is this value important? (tick/x/?)

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Respect: We value the cultural significance and heritage of the coastal environment and pay our respects to the traditional custodians of the land, the Gooreng Gooreng people, and the broader Aboriginal community whose connection and care for Country is continuous and strong. We will be guided by traditional custodians in how we can help protect culturally significant Aboriginal places.	
Engagement: We believe in engaging with the local Aboriginal community to understand their cultural connection to the coastal environment and to respectfully promote cultural exchange and understanding.	
History and heritage: We value the history of the area and will strive to protect and celebrate cultural heritage sites and landmarks along the coast.	
Additions/comments:	

 Community governance	Is this value important? (tick/x/?)
Collaboration: We believe that effective management and protection of coastal environments require collaboration among diverse stakeholders. We work with local residents in the area, businesses, government agencies, and environmental organisations to deliver good community and environmental outcomes	
Additions/comments:	

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Engineering Assumptions and Methodologies Report

B

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GLADSTONE REGIONAL COUNCIL

MOSAIC insights

alluvium

Gladstone Regional Council

Engineering Assumptions and Methodologies Report

Seventeen Seventy Coastal Adaptation Resilience Plan

FINAL

June 2023

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Alluvium recognises and acknowledges the unique relationship and deep connection to Country shared by Aboriginal and Torres Strait Islander people, as First Peoples and Traditional Owners of Australia. We pay our respects to their Cultures, Country and Elders past and present.

Artwork by Melissa Barton. This piece was commissioned by Alluvium and tells our story of caring for Country, through different forms of waterbodies, from creeklines to coastlines. The artwork depicts people linked by journey lines, sharing stories, understanding and learning to care for country and the waterways within.

Document history

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Checked:	Adam Brook
Approved:	Adam Brook

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1 Study area

Seventeen Seventy is located on the western, sheltered side of the headland, near the mouth of Round Hill Creek. Tides and currents have shaped and changed the Seventeen Seventy coastline and sandy beach ridges form barrier features across the estuary/delta zone. For the purpose of this report, the study area refers to an approximately 1.7 km stretch of foreshore area from north of the 1770 camping ground to south of Seventeen Seventy Marina (Figure 1). Historically, this stretch of the shoreline has been observed to naturally erode and accrete in response to the prevailing coastal processes.

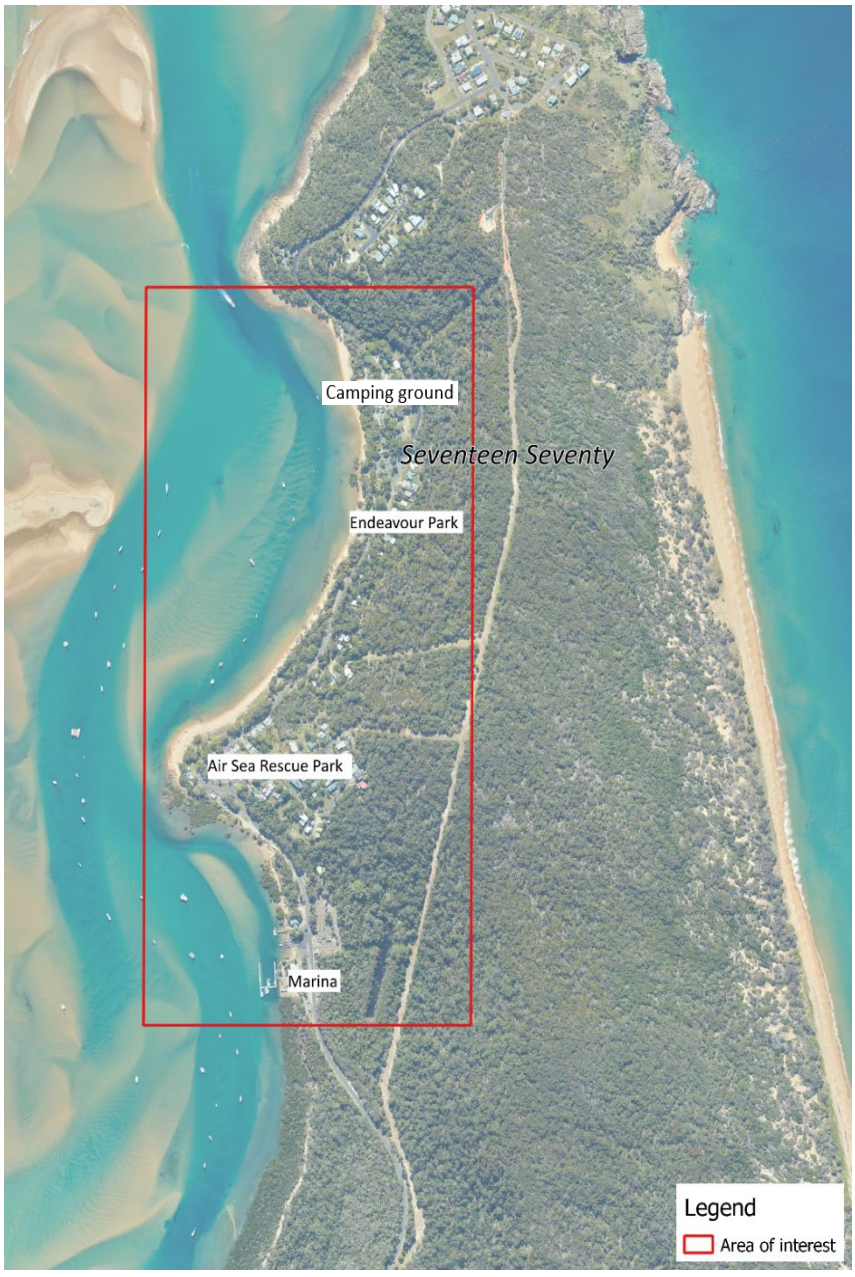

Figure 1: Seventeen Seventy and surrounding area

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1.1 Background

Coastal process and hazard studies previously undertaken as part of the *Our Coast Our Future* Coastal Hazard Adaptation Strategy (CHAS) program (GRC 2021) and Shoreline Erosion Management Plan (SEMP) (GRC 2020), were used to provide the foundation for the assessment of risk along the Seventeen Seventy foreshore area. The program has identified that the Seventeen Seventy foreshore area is increasingly prone to emerging coastal hazards from present day to 2100. Presently, the Seventeen Seventy foreshore has been experiencing coastal erosion, resulting in ongoing impacts on its assets.

1.2 Site observation

A site inspection of the study area was undertaken by GRC and Alluvium representatives on December 6, 2022. The study area from north to south is divided into the following sections/key assets presented in Figure 2 and Table 1.

Figure 2: Key assets in study area

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Table 1: Key asset observations

Key assets	Observations
Sewer gravity main, stormwater pipe and stormwater pits (north of caravan park)	• Pinch point for Captain Cook Drive and assets • Foreshore is fronted by rocky outcrops and erosion width may be limited by rock outcrops • The subsurface formation is stratified unit which comprises of Agnes Water Volcanics • Stormwater management in the section is lacking • Stormwater runoff (from hillside) causing washout on the beach • Not an area of current concern/no immediate threat  
1770 camping ground	• Front row of camp sites and power outlets are at risk of coastal hazards • Stormwater runoff causing washouts at some beach access points • Exposed stormwater pipes observed at a beach access point • Adhoc works are being undertaken to upgrade powered sites as required • Camping ground lease is expiring soon – opportunity to revise lease agreement • Carpark and accessibility issues during peak season • Washout of sand from overland flow and poor onsite drainage • Opportunity to re-design caravan park to better utilise space and move at risk sites away from erosion prone area  
Assets within Endeavour Park	• Localised erosion near picnic shelter from stormwater runoff • Lots of park assets – BBQ pits, picnic tables and chairs, picnic shelters • Limited parking spaces resulting in illegal parking in surrounding areas, exacerbated by overflow from caravan park • SPS AGN73 (pump station) has issues with capacity. Asset is currently being replaced but long-term solution will need to be considered • Existing protection structures along the foreshore (rock revetment and geotextile sandbags) • Erosion caused by overland flow and can be exacerbated by northerly wind/swell • Existing toilet facility is not able to service current demand from both Endeavour Park and caravan park users • Council often receives requests to clean up fallen trees along the foreshore

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Key assets	Observations
	 
Boardwalk between Endeavour Park and Air Sea Rescue Park	• Boardwalk is at risk of coastal hazards • Boardwalk is in poor condition • The subsurface formation is a stratified unit which comprises of Agnes Water Volcanics and sandy alluvial sediments • Sewer rising main under boardwalk • Water pipe servicing Endeavour Park • Sand has been accreting in this area • Boardwalk provides all abilities access to foreshore but requires attention  
Footpath at the foot of Captain Cook Drive	• Old trees (acacias and larger eucalypts) have been removed due to safety concerns • Mulching and revegetation project • Temporary sewer line is running along the footpath, servicing Endeavour Park • Localised erosion caused by overland flow • Footpath acts as a buffer between the foreshore and steep bank along Captain Cook Drive • Power assets along this section  

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Key assets	Observations
Stormwater outlets/discharge on the beach	• Stormwater runoff onto beach causing localised erosion • Not an area of concern/no immediate threat  
Kayaks/crafts are stored along the foreshore	• Kayaks and small crafts are stored along the foreshore • Yachts/boats/watercrafts are anchored on the beach/foreshore area/to vegetation • Anchored watercrafts are impacting swimming and use of the foreshore • Complaints/contention during peak periods • Kayaks and boats potentially contribute to dune erosion from stormwater runoff • Kayaks and watercrafts are considered a hazard by some • Community petition in response to Council's notification to remove kayaks along the foreshore  
Boardwalk with rock armour revetment	• Some sections with no protection • Stormwater outlets along boardwalk • Boardwalk in good condition • Low-lying areas behind dunes build up then break out • Sand has accumulated in front of boardwalk since construction of boardwalk • Rock armour revetment is not an approved structure • Potential Traditional Owners interest in planting in this area • Boardwalk provides all abilities access  

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Key assets	Observations
Park assets within Air Sea Rescue Park	• Various recreational assets such as picnic shelters, benches, chairs, BBQ pits and playground • Foreshore is fronted by rocky outcrops to the north and mangroves to the south • Most park bookings in the region • 14 bins on site can often reach capacity prior to being emptied. Site has not been eligible for additional collection services • Opportunity to rename the park with a Traditional Owner name • Not an area of current concern/no immediate threat  
Air Sea Rescue Park toilet block and parking lots	• The area is elevated on higher ground • Less prone to erosion due to scattered rock protection and being fronted by mangroves and vegetation • Stormwater outlet to the northern side of the toilet block • Only toilet block servicing Air Sea Rescue Park, facility is not able to service current demand • Capacity issues with parking resulting in illegal parking. Not enough parking for Council maintenance works team • Not an area of current concern/no immediate threat  
Sewer rising mains and stormwater culvert	• Sewer rising mains are running parallel to Captain Cook Drive on the seaward side • The subsurface formation is stratified unit which comprises of Agnes Water Volcanics • Erosion is limited in this area • Not an area of current concern/no immediate threat  

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Key assets	Observations
Pocket beach next to VMR	• Kayaks/small crafts are stored along the foreshore • Foreshore is fronted by mangroves • Informal boat ramp for small recreational crafts • Offshore anchored vessel users are using this area to store their tenders  
Boat ramp carpark	• Identified as a future redevelopment project, however requires land for expansion • Insufficient parking, limited boat trailer parking, smaller vehicles parking in boat trailer parks • Skips bins at Seventeen Seventy boat ramp are used as dumping of fish scraps • Seventeen Seventy Marina encroaching on adjoining Council-controlled land • Protected plants to the east • Council looking to negotiate with the State to expand carpark to adjacent State Conservation park land • Entrance into Seventeen Seventy is uncontrolled and messy  

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2 Data availability and gap analysis

The availability of data sources relevant to assessing asset vulnerability and prioritisation for Seventeen Seventy have been reviewed. This includes data relating to coastal hazards (coastal erosion, tidal and storm tide inundation), available tangible and intangible asset information and current management and renewal asset plans. The purpose of the review was to consider:

- Coastal hazards, including climate change assumptions
- Availability of asset information (type, installation date, remaining useful life)
- Quality and limitation of asset data
- Relevance for use in the prioritisation of assets and development of intervention levels

2.1 Coastal hazards

Coastal hazards include erosion, long-term (permanent) tidal inundation in low-lying areas due to sea level rise and storm tide inundation. The outcomes from the *Our Coast Our Future* CHAS have been used to provide the foundation of the asset vulnerability assessment along Seventeen Seventy.

Data availability and suitability are summarised below in Table 2.

Table 2: Suitability of coastal hazard exposure data

Type	Description	Suitability
Erosion prone area	Available for present day, 2060 and 2100. Adopted from *Our Coast Our Future.*	Suitable for exposure assessment to support asset vulnerability assessment.
Tidal inundation	Available for present day, 2060 and 2100. Adopted from *Our Coast Our Future.*	Suitable for exposure assessment to support asset vulnerability assessment.
Storm tide inundation	Available for present day, 2060 and 2100. Adopted from *Our Coast Our Future.*	Suitable for exposure assessment to support asset vulnerability assessment.
Risk outcomes	Available for all available assets. Adopted from *Our Coast Our Future.*	Suitable for asset vulnerability assessment. The site inspection enabled a better understanding of the risk associated with the area, by assessing the levels of risk attributed to geology, erodibility, and asset vulnerability.

All available coastal hazards and risk information from the *Our Coast Our Future* program are suitable for the asset vulnerability assessment to develop intervention levels.

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2.2 Asset data and information

A large number of spatial datasets for assets, infrastructure, utilities and transport networks have been adopted from the *Our Coast Our Future* program.

Data availability and suitability are summarised below in Table 3.

Table 3: Suitability of additional data and information

Type	Description	Suitability
Stormwater infrastructure	Asset types by geographic location is available.	Suitable for location-based asset vulnerability assessment. No available asset condition, life and value/cost information.
Sewer infrastructure	Asset types by geographic location is available.	Suitable for location-based asset vulnerability assessment. No available asset condition, life and value/cost information.
Roads	Local and main road centrelines are available.	Suitable for location-based asset vulnerability assessment. No available asset condition, life and value/cost information.
Electricity network	Powerlink, Ergon and substations data are available.	Suitable for location-based asset vulnerability assessment. No available asset condition, life and value/cost information. It is important to note that there is no electricity coverage at the caravan park.
Coastal protection structures	Several coastal protection structures have been identified through the CHAS and site inspections.	Suitable for location-based asset vulnerability assessment. No available asset condition, life and value/cost information.
Boat ramps	Only one formal boat ramp at Seventeen Seventy. The capacity of the boat ramp and future demand information are available in the Queensland Recreational Boating Facilities Demand Forecasting Study (GHD 2017).	Suitable for location-based asset vulnerability assessment. No available asset condition, life and value/cost information.
Asset assessment framework/inspections programs	Not available	
Breakdowns of past asset management expenditure and forward asset management budgets (planning, maintenance, refurbishment, replacement)	Not available	
Current site-based monitoring and inspection methodology	Shoreline movement**s** Beach profile changes	Annual drone survey CoastSnap at the caravan park beach
Others	Queensland Recreational Boating Facilities Demand Forecasting Study **(GHD 2017)**. Gladstone Region Cemetery Plan 2022 (GRC 2022).	Suitable for assessing future projects/works.

It is understood from the *Our Coast Our Future* program that much of the foreshore is within the erosion prone area in present day, and this will increase by 2100. There are a number of built assets currently within the erosion prone area and coastal hazards can cause extensive damage to these existing land-based assets and infrastructure.

To better understand asset vulnerability, additional information will be required such as asset condition, remaining useful life, and value and cost.

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3 Asset vulnerability assessment

Asset vulnerability assessment is an important process for identifying potential risks and threats to assets and determining the necessary measures to mitigate or eliminate them. Two approaches have been used for conducting asset vulnerability assessment and prioritisation of assets: 1) using a Multi-Criteria Analysis (MCA) as described in Section 3.1 for most assets, or 2) using an alternative assessment (non-MCA) (Section 3.2) where there are limitations on the management actions that Council can take to manage the assets.

Coastal approvals guidance

Prior to assessment of options and committing to any works within the coastal zone, it is important to have an understanding of the approval restrictions associated with each individual asset. It is important to consider whether the MCA assessment approach outlined in Section 3.1 is appropriate, particularly in cases where the infrastructure is critical or where the viable options are limited. In such situations, it may be more suitable to use the alternative assessment (non-MCA) approach detailed in Section 3.2. This ensures that the assessment approach aligns with the specific circumstances and constraints associated with each specific asset.

Undertaking works within the Coastal Management District (CMD) has additional State Government requirements that can restrict options and make approvals more complex and time consuming. This can mean no matter what the preferred option may be from key stakeholders, it may not be possible to get many options approved. Generally, within the coastal zone new hard protection structures can now only typically be constructed to protect existing approved high value infrastructure that is not easily relocatable or replaceable. Protection structures should not be more than the value of the assets they are protection, and they must not adversely impact natural coastal processes.

Operational Works Approval – Tidal Works

To undertake new works within the CMD, works typically require an Operational Works Approval (OPW) – Tidal Works. These can be very complex and time-consuming approvals as they need to be referred to numerous state agencies throughout the process and can take many months to gain approval. For any projects at the tidal interface that extend below the high tide mark, landowners' consent for the unallocated tidal land must first be sought from the Department of Resources (DoR): Part B LA08 Application for owners consent to development applications (www.qld.gov.au). This can take approximately two months and is required prior to being able to lodge the OPW – Tidal Works.

When an OPW – Tidal Works is lodged, at a minimum it is required to meet the requirements of State code 8: Coastal development and tidal works which will see it referred to the Department of Environment and Science (DES) to ensure it complies with all the requirements of this code. If, as part of the works, marine plants are likely to be damaged, it will be referred to the Department of Agriculture and Fisheries (DAF) who will assess for compliance against State code 11: Removal, destruction or damage of marine plants. If works extend into the water, it is also likely to be referred to Marine Safety Queensland (MSQ) to assess against State code 7: Maritime safety. Given the complexity of tidal works approvals, the approval alone can often take six months or more to complete. Factoring in design and Council budget cycles, realistically 2 years is reasonable minimum timeframe to implement and totally commence new works.

However, for Councils there are some circumstances where works implemented within the CMD can occur in much faster timeframes if necessary, and without the need for a full tidal works approval.

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Emergency Works

Should coastal hazards such as erosion, cause a risk to;

- People's safety or health,
- An approved building's structural safety, or
- Operation or safety of approved infrastructure;

Works can immediately be undertaken under the approval/supervision of a registered professional engineer under the Emergency Works Code: ESR/2016/2045 Necessary operational work that is tidal works (des.qld.gov.au). However, these works will still need to gain tidal works approval at a later date, unless they are temporary only, in which case they must be removed at a later date.

Maintenance Works

Maintenance works on approved structures can be undertaken by Council utilising the Excluded Works Code: Excluded Work (Coastal) - Guideline for coastal development (EPP/2016/2081) (www.qld.gov.au). This means that works will not require a new approval when the works comply with the requirements of the code.

Minor Works for Public Benefit

Council can also undertake other minor works using the self-assessable code: EPP/2017/3930 Code for accepted development - For tidal works, or work completely or partly in a coastal management district - August 2017 (des.qld.gov.au), to undertake minor works such as;

- Minor public marine development,
- Stormwater infrastructure,
- Certain work involving boardwalks, beach access and viewing structures, netted swimming enclosures and pedestrian/bikeway bridges,
- Beach re-profiling and beach nourishment,
- Demolition of structures seaward of high-water mark,
- Management of a natural waterway mouth across a beach,
- Reconstruction of a functional seawall or revetment,
- Reconstruction or maintenance of a road, carpark or path, and addition of a footpath to a road.

Works must comply with the requirements of this code and Council must notify DES prior to and on completion of the works.

3.1 Multi-criteria analysis

The Multi-Criteria Analysis (MCA) approach is adopted to assess vulnerability and prioritisation of non-critical and public assets to determine the required levels of intervention. The MCA evaluates each asset against a defined set of decision criteria that represent the objectives of the Seventeen Seventy Foreshore Area. The MCA criteria has been developed through a collaborative process with Council.

The decision criteria are as follows:

1. How at risk is the asset from present day coastal hazards and climate change impacts?
2. What is the criticality of the asset (e.g. essential/critical service, recovery time)?
3. What is the feasibility of asset relocation and intervention (e.g. approvals, costs, capacity)?
4. What is the remaining useful life of the asset?
5. What is the community value of the asset?
6. What is the economic value of the asset?

Each asset is scored out of 5 according to Table 4, and each criterion is weighted based on the importance of each criterion (Figure 3). The decision criteria are presented in Table 4.

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Criteria assessment

Criteria	Definition
Risk	***Potential risk of the asset.*** Existing data and assets including coastal hazards and tangible and intangible assets from the *Our Coast Our Future* program database have been compiled and reviewed in the Stage 1 process. The purpose of this is to better understand the level of risk posed to key assets in the near vicinity of the Seventeen Seventy area. The risk outcome from the *Our Coast Our Future* program set the foundation for prioritising key assets and assessing the risk criteria. The site inspection has also been undertaken to validate key assets in order to identify any visual conditions at the site that may pose a higher or lower risk to these assets or any visible deterioration of the assets that may result in future vulnerability to coastal hazards.
Level of service	***Level of service and function of each asset to determine its priority.*** Each asset provides a service or function, such as protection, community use and environmental or social value. It is important to assess the consequences of asset failure in the servicing area, as well as its impact on emergency situations. Note: Council has conducted asset criticality assessments for water and sewer networks, which can be used to determine the criticality criteria.
Feasibility	***Likelihood of whether the asset can be easily defended, relocated, implemented and readily approved.*** Feasibility considers whether an asset can be defended or relocated under existing and future conditions. The likelihood of successful implementation of each asset as well as any obstacles involved in the approval process should also be considered (i.e. is consistent with current planning policy or legislative requirements).
Asset life	***Remaining useful life of each asset to determine the possibility of asset renewal.*** Asset condition data such as its remaining useful life can help a manager assess whether the asset will be able to provide the services required, identify the nature of its risk, and assess its maintenance and renewal needs. Note: This criterion is subject to data availability. Comprehensive information on asset condition has not been provided by Council. Alternative measures will be discussed if data is not available.
Community value	***Community values and vision.*** The outcome of the community co-design engagement will contribute to shaping the community value criteria. The workshops allow us to seek community feedback on their values and vision for the Seventeen Seventy area by giving them the opportunity to explore problems and solutions collaboratively.
Economic value	***Impact to local economy.*** Disruption or loss of the asset resulting in loss of potential local economy.

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Table 4: MCA assessment criteria scoring

Criteria	1	2	3	4	5
Risk *How at risk is the asset from coastal hazards and climate change impacts?* ***Refer to** Our Coast Our Future**.*	*Extreme – Immediate and/or ongoing action (treatment) is needed to eliminate or reduce risk to acceptable levels.	*High – Short term action (treatment) is needed to eliminate or reduce risk to acceptable levels.	*Medium – Short to longer term action (treatment) is needed to eliminate or reduce risk to acceptable levels.	*Low – Manage the risk as part of current operations, provide for periodic maintenance.	*Very low – Acceptable risk.
	After a large event: High tide mark distance from asset after large events <2m	After a large event: High tide mark distance from asset after large events 2 – 5m	After a large event: High tide mark distance from asset after large events 5 – 10m	After a large event: High tide mark distance from asset after large events 10 -15m	After a large event: High tide mark distance from asset after large events >15m
Level of service ***What is the level of service of the asset (e.g. essential service, recovery time)?***	Essential/critical assets (e.g. water, power, sewer, road)			Non-essential/non-critical assets (e.g. park infrastructure, boardwalk, footpath)	
	Asset servicing 1770 and emergency purposes only.	Asset servicing 1770 only but asset can be reinstated.	Alternate options are available.	Asset servicing 1770 only but asset can be reinstated.	Alternate options are available.
Feasibility *What is the feasibility of asset interventions or implementation (e.g. approvals, costs, capacity)?*	Cannot be defended or relocated. OR Is technically viable and easily implementable at the site.	Can be partially defended or relocated. OR Is technically viable with some effort.	Can be relocated only. OR Is likely to be technically viable at the site but would require further investigations to clarify.	Can be defended but not relocated. OR Is only technically viable with substantial engineering (or other) design investigation and capabilities for implementation.	Can be defended and relocated. OR Is not technically viable at the site.
Asset life *What is the remaining useful life of the asset?*	Remaining useful life >50 years. Asset is likely to become at risk from coastal hazard before it needs to be replaced.	Remaining useful life <50 years.	Remaining useful life <25 years.	Remaining useful life <10 years.	Remaining useful life <5 yrs. Council is likely to replace asset before it is likely to become at risk from coastal hazards. Allowing for relocation
Community value *What is the value or priority that the community places on protecting and managing assets?*	The community places a very high value or priority on this asset.	The community places a high value or priority on this asset.	The community places a moderate value or priority on this asset.	The community places a low value or priority on this asset.	The community does not place any value or priority on this asset.
Economic value *What is the asset contribution to local economy (e.g. tourism)?*	Significant contribution to local economy.	N/A	Moderate contribution to local economy.	N/A	No to little contribution to local economy.

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Weightings

The Pairwise matrix (presented in Figure 3) was developed in consultation with Council, and it generates a series of weightings for each criterion (refer to Table 4). It involves comparing and prioritising each of the selected criteria against each other sequentially. The Pairwise ranking provides decision-makers with oversight into the relative degree of importance of each criterion with respect to each other.

Criteria		Risk	Level of service	Feasibility	Asset life	Community value	Economic value	Total	Weighting (%)	Rank
		a	b	c	d	e	f			
Risk	1	1	1	2	2	2	2	10	28.6%	1
Level of service	2	1	1	1	2	2	2	9	25.7%	2
Feasibility	3	0	1	1	1	0	1	4	11.4%	4
Asset life	4	0	0	1	1	0	0	2	5.7%	6
Community value	5	0	0	1	2	1	2	6	17.1%	3
Economic value	6	0	0	1	2	0	1	4	11.4%	4

Figure 3: Pairwise scoring approach

Intervention levels

The total scores and the recommended intervention levels are summarised in Table 5. Intervention levels have been assigned to immediate, medium-term, future or no implementation required. Intervention timeframes in the table below have been developed with consideration of planning and approval timeframes. Planning should begin within the first year listed, with on-ground works to commence within the second year listed. For example, an asset assigned a medium-term intervention level should commence planning for the chosen management option within two years, and on-ground works should commence within four years. Larger projects or capital works may require longer lead times to secure funding and begin planning.

Table 5: Intervention levels and interpretation

Scores	Intervention levels
1 – 2	Immediate – Recommend implementation within 1 to 2 years, unless triggered by emergency works. Commence the design / approvals processes as soon as budget can be secured.
2 – 3	Medium-term – Recommend implementation within 2 to 4 years. Aim to secure budget in 2 years to commence design / approvals processes and complete works within the 4 year timeframe.
3 – 4	Future – Recommend implementation within 5 to 10 years. Aim to secure budget in 5 to 6 years to commence design / approval processes and complete works within the 10 year timeframe.
4 – 5	No implementation required.

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3.2 Alternative assessment (non-MCA)

Assets subject to management restrictions may require a different evaluation approach instead of the MCA assessment. Assets under the following categories that may require an alternative assessment include:

- Critical assets – assets that are critical in the community and cannot be easily relocated;
- Approval restrictions – assets subject to heavy restrictions on management actions due to approval requirements (see more information on this below);
- Privately owned assets – assets where land acquisition is necessary to carry out management actions; and
- Assets that have no viable alternative location to continue to function.

Seventeen Seventy assets that fall under the aforementioned categories are listed in Table 6 below.

Management of these assets should be driven by triggers. Trigger-based intervention relies on identifying events or conditions that could trigger immediate vulnerability or damage to an asset. For example, a trigger could be severe weather conditions that may cause erosion or inundation damage (refer to Table 7). The assessment would focus on identifying the most appropriate intervention measures to address the immediate risks as soon as these triggers occur.

Table 6: Seventeen Seventy Assets requiring alternative assessment

Key assets	Management restrictions	Intervention Type / Trigger
Sewer gravity main, stormwater pipe and stormwater pits (north of caravan park)	Sewer infrastructure is a critical asset for the community and in certain areas, it cannot be easily relocated.	Trigger-based / Event
1770 camping ground	Due to the temporary and mobile nature of camping and caravanning at the 1770 camping ground, any proposed defence measures are unlikely to be approved as the site lacks significant infrastructure to warrant such measures.	Trigger-based / Event
Stormwater outlets/discharge on the beach	There is potential to enhance the management of stormwater discharge points as they are crucial for the proper functioning of the system. Council is currently planning an upgrade to the stormwater infrastructure to further improve overland flow in the area.	Trigger-based / Event
Sewer rising mains and stormwater culvert	Sewer infrastructure is a critical asset for the community and in certain areas, it cannot be easily relocated.	Trigger-based / Event
Boat ramp carpark (management option is dependent on land acquisition negotiation with the State)	Acquisition of additional land is necessary to facilitate any expansion of the boat ramp carpark.	Trigger-based / Land acquisition

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Trigger points

Trigger points could be based on severe conditions or events that signify the need for immediate, medium-term, future, or no implementation of action. Trigger points presented in Table 7 are used to determine the appropriate timing for the implementation of different management actions.

Table 7: Trigger points for trigger-based assets

Trigger points	**Immediate action** Recommended implementation within less than 2 years. Commence the design / approvals processes as soon as budget can be secured.		**Medium-term** Recommended implementation within 2 to 4 years. Aim to secure budget in 2 years to commence design / approvals processes and complete works within the 4 year timeframe.	**Future –** Recommended implementation within 5 to 10 years. Aim to secure budget in 5 to 6 years to commence design / approval processes and complete works within the 10 year timeframe.	**No implementation required**
Risk *How at risk is the asset from coastal hazards and climate change impacts?*	After a large event: High tide mark distance from asset after large events <2m	After a large event: High tide mark distance from asset after large events 2 – 5m	After a large event: High tide mark distance from asset after large events 5 – 10m	After a large event: High tide mark distance from asset after large events 10 -15m	After a large event: High tide mark distance from asset after large events >15m

Seventeen Seventy Lookout

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4 Asset, intervention levels and management options

4.1 Multi-criteria assessment assets

Assets within Endeavour Park

This analysis refers to the assets and infrastructure located within the park, such as park assets (BBQ pits, picnic tables and chairs, picnic shelters), the toilet block, and pump station, but not the land which the park occupies.

Observations	Community insights
• Localised erosion near picnic shelter from stormwater runoff • Lots of park assets – BBQ pits, picnic tables and chairs, picnic shelters • Limited parking lots resulting in illegal parking in surrounding areas and overflow from caravan park • SPS AGN73 (pump station) has issues with capacity. Asset is currently being replaced but long-term solution will need to be considered • Existing protection structures along the foreshore (rock revetment and geotextile sandbags) • Erosion caused by overland flow and can be exacerbated by northerly wind/swell • Existing toilet facility (oldest in the region) is not able to service current demand from both Endeavour Park and caravan park users – reports of perceived overflows and blockages • Council often receives requests to clean up fallen trees along the foreshore	• Highly popular and well-used park • Additional pathways to improve connectivity (Endeavour Park to Capt. Cook Monument) • Parking overflow from camping ground into Endeavour Park is a major issue • Formalised access points to beaches are needed • More bins at beach access points • Need a balance between public use and private/event use of the park • Toilets are unable to keep up with visitation numbers • Some support for designated dog free and dog park areas

Criteria scores

Criteria	Comment	Unweighted score	Weighted scores
Risk	Assets are at high risk, as identified in *Our Coast Our Future*. Some assets situated in the foreshore area are at high to extreme risk, while other assets located further inland are at a lower risk. The overall risk is evaluated as high risk due to some assets at high to extreme risk.	2	0.57
Level of service	Non-critical asset that is servicing 1770 only and asset can be reinstated.	4	1.03
Feasibility	Asset can be defended, which requires engineering design investigation.	2	0.23
Asset life	Assets have <5 years remaining useful life. Council is likely to replace or relocate asset within 5 years.	5	0.29
Community value	The community places a very high value or priority on this asset, Endeavour Park was one of the most popular locations that survey respondents visit on the foreshore. The adaptation options for this asset scored 3rd highest in the prioritisation activity in the community workshop.	2	0.34
Economic value	Significant contribution to local economy.	1	0.11
		Total	**2.57 Medium**

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Recommended management options

Option 1: Implement nature-based solution, including:

- **Designated walkways**
- **Dune stabilisation and protection**

Option 2: If triggered by risk criterion, relocate at risk assets as required, or relocate assets when upgrading/replacing

Option 3: If triggered by risk criterion, install buried geotextile seawall

Council should implement a nature-based solution that combines designated walkways with dune stabilisation and protection at Endeavour Park. In the event of a large storm, if the risk criterion is triggered (resulting in a more urgent intervention level), Council should consider relocating or upgrading any assets that are at risk. Alternatively, Council may consider installing a buried geotextile seawall to mitigate erosion risks.

Description

Council should implement a nature-based solution that combines designated walkways with dune stabilisation and protection at Endeavour Park. This solution would involve constructing designated paths that lead to the beach while simultaneously stabilising and protecting the dunes. This approach could help to reduce erosion and damage to the dunes caused by foot traffic, as well as provide a safe and accessible pathway for park and beach users.

If a large storm occurs, posing a potential risk to existing assets in the area and triggering the risk criterion (resulting in a more urgent intervention level), Council should assess the impacts and consider whether it is necessary to relocate or upgrade any at-risk assets. This may include park assets, such as BBQ pits, seating, shelters, or other assets that are at risk of erosion or inundation. Additionally, it is important to consider relocating assets landward when they require replacement or upgrade after exceeding their useful life.

Alternatively, Council could consider installing a buried geotextile seawall along the Endeavour Park foreshore. The buried seawall would act as a last line of defence to prevent shoreline recession.

The toilet block and pump station at Endeavour Park are at their capacity. It is recommended that the Council assess the feasibility of upgrading and/or relocating these facilities in the near future.

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Boardwalk between Endeavour Park and Air Sea Rescue Park

Observations	Community insights
• Boardwalk is impacted by coastal hazards • Boardwalk is currently held up by acrow props as a temporary solution due to past erosion • Boardwalk is in poor condition, project by Council to renew boardwalk (boards only, not whole structure) • The subsurface formation is stratified unit which comprises of Agnes Water Volcanics • Sand has been accreting in this area in recent times • Boardwalk provides all abilities access to foreshore but requires attention	• Maintaining and improving all-ability access to foreshore and beach • Support for raised boardwalk to protect sections at risk • Preference for rocks over sandbags for revetments, armouring • Seating is highly valued

Criteria scores

Criteria	Comment	Unweighted score	Weighted scores
Risk	Asset is at high risk, as identified in *Our Coast Our Future*.	2	0.57
Level of service	Non-critical asset that is servicing 1770 only and asset can be reinstated. However, the sewer main is considered a critical asset.	2	1.29
Feasibility	Asset can be partially defended or relocated.	2	0.23
Asset life	Asset has <25 years remaining useful life.	3	0.17
Community value	The community places a very high value or priority on this asset, boardwalk and walking paths scored highly in the community survey for important foreshore features. The adaptation options for this asset scored 5th highest in the prioritisation activity in the community workshop.	1	0.17
Economic value	Moderate contribution to local economy.	3	0.34
		Total	**2.00 Immediate**

Recommended management options

Option 1: Relocate or upgrade asset at risk as required.
Option 2: If triggered by risk criterion, implement protection for Captain Cook Drive that preserves functionality of the footpath.

Council should consider relocating or upgrading asset at risk, as required. In the event of a large storm, if the risk criterion is triggered (resulting in a more urgent intervention level), it is essential to protect the steep bank in order to protect the stability of Captain Cook Drive.

Description

Due to the changing climate, our coastline is becoming more vulnerable to the risk of erosion. The boardwalk has already undergone emergency works in response to imminent threat of erosion. Council should consider relocating or upgrading assets that are at risk of being damaged by erosion. This may involve moving the footpath further inland or upgrading the asset to withstand coastal hazards. It is important to consider relocating assets landward when they require replacement or upgrade after exceeding their useful life. It is highly recommended that Council commences the design / approvals processes as soon as budget can be secured.

If a large storm occurs, posing a potential risk to the asset and triggering the risk criterion (resulting in a more urgent intervention level), it is critical to protect the steep bank to maintain the stability of Captain Cook Drive. One approach that could be considered is relocating the lower pathway or boardwalk to a toe protection revetment. This would provide protection to the pathway while preserving its functionality. Additionally, the revetment would be concealed, allowing the lower pathway to remain intact and accessible.

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Further assessment is required to assess the feasibility of relocating the lower pathway or boardwalk onto a toe protection revetment and consider the costs and environmental impact of the proposed option.

Footpath at the foot of Captain Cook Drive

Observations	Community insights
• Old trees (acacias and larger eucalypts) have been removed following an arborist safety assessment • Mulching and revegetation project – plans to plant more smaller shrubs to avoid contributing to fallen tree issue • Temporary sewer rising main is running along the footpath, servicing Endeavour Park • Localised erosion caused by overland flow and coastal processes • Ad hoc repairs were conducted in 2021 • Footpath acts as a buffer between the foreshore and steep bank along Captain Cook Drive • Power assets along this section for foreshore lighting	• Maintaining and improving all-ability access to foreshore and beach • Adding pathways to improve connectivity (marina to Air Sea Rescue Park, and Endeavour Park to Capt. Cook Monument) • Support for raised boardwalk to protect sections at risk • Preference for rocks over sandbags for revetments, armouring • Seating is highly valued • Provide seating along any additional pathways

Criteria scores

Criteria	Comment	Unweighted score	Weighted scores
Risk	Asset is at medium risk, as identified in *Our Coast Our Future*.	3	0.86
Level of service	Footpath is considered a non-critical asset and alternate options are available. However, the sewer main is considered a critical asset.	2	0.51
Feasibility	Asset can be partially defended or relocated.	2	0.23
Asset life	Asset has <25 years remaining useful life.	3	0.17
Community value	The community places a very high value or priority on this asset, walking paths scored highly in the community survey for important foreshore features. The adaptation options for this asset scored the highest in the prioritisation activity in the community workshop.	1	0.17
Economic value	Moderate contribution to local economy.	3	0.34
		Total	**2.29 Medium**

Recommended management options

Option 1: Gravel pathway or elevated boardwalk to replace concrete pathway
Option 2: If triggered by risk criterion, relocate pathway further inland

As coastal hazards continue to threaten the pathway or when they require upgrading, Council should consider replacing existing concrete pathway with gravel or compressed earth surfaces or elevated boardwalk.

Description

As coastal hazards continue to threaten the pathway, Council needs to regularly monitor and assess the condition of existing pathways that are at risk of being impacted by coastal hazards such as erosion or inundation. In cases where the pathway is significantly damaged or requires upgrading, Council should consider replacing the existing concrete pathway with a gravel or compressed earth surface or constructing an elevated boardwalk.

A gravel or compressed earth footpath can be used as an interim measure before constructing elevated boardwalks. Gravel or compressed earth surfaces are more permeable, which allows for better drainage and reduces the impact of stormwater runoff on the surrounding environment. They also have a lower carbon footprint compared to concrete, making them a more environmentally sustainable option. Elevated boardwalks, on the other hand, provide a safer and

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more resilient alternative to traditional pathways by allowing water to flow underneath and minimising the risk of damage from waves or storm surge.

In the event of a large storm, if the risk criterion is triggered (resulting in a more urgent intervention level) and the pathway is at risk of being damaged or destroyed, Council should consider relocating the pathway further inland to a more stable and safer location. This will help to ensure that the pathway remains accessible to the public and provide a safe and functional pathway along Seventeen Seventy.

Kayaks/crafts stored along the foreshore

Observations	Community insights
• Kayaks and small crafts are stored along the foreshore • Yachts/boats/watercrafts are anchored on the beach/foreshore area/to vegetation • Anchored watercrafts are impacting swimming and use of the foreshore • Complaints/contention during peak periods • Kayaks and boats have contributed to dune erosion from stormwater runoff • Kayaks and watercrafts are considered a hazard by some • Community petition in response to Council's notification to remove kayaks along the foreshore	• Continue to allow locals to store kayaks on foreshore, but manage in an environmentally sensitive way • Support for designated kayak storage area • Strong support for removal/limitation of larger boats mooring onshore/close to shore • Support for removal of kayaks was present but less prominent

Criteria scores

Criteria	Comment	Unweighted score	Weighted scores
Risk	Asset is at high risk, as identified in *Our Coast Our Future*.	2	0.57
Level of service	Non-critical asset and alternate options are available.	5	1.29
Feasibility	Can be defended and relocated.	5	0.57
Asset life	Kayaks have been left on the beach for a long time. Asset life is highly variable and not considered as fixed assets.	3	0.17
Community value	The community places a lower value or priority on this asset. The adaptation options for this asset scored 8th highest in the prioritisation activity in the community workshop.	4	0.69
Economic value	Moderate contribution to local economy.	3	0.34
		Total	**3.63 Future**

Recommended management options

Option 1: Continue to enforce a designated kayak storage area

This option is to help keep kayaks organised and easy to access. It also helps protect the environment by preventing damage to sensitive ecosystems.

Description

The option provides a designated storage area for kayaks and aims to improve the organisation and accessibility of kayaks, which can make them more convenient and efficient to use. This can be particularly beneficial in the foreshore area of Air Sea Rescue Park. The designated area also helps to protect the environment by reducing the potential for damage to sensitive ecosystems that can occur when kayaks are left on the foreshore area. By utilising this option, there will be more foreshore areas for users to enjoy.

Larger motored boats (e.g. tinnies) and sailing boats (e.g. catamarans) that are parked onshore, tied to vegetation, or are

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moored permanently or semi-permanently in very close proximity to the shore appear to be of larger concern to the community. These crafts present greater impacts on vegetation and to swimmers and contribute more so to any erosion issues than kayaks. Council may wish to focus management and enforcement efforts on these types of crafts, by limiting permanent or long-term 'parking' through notices and removal of crafts that are not relocated. This could be combined with some discussion and collaboration between Council, Maritime Safety Queensland, and/or the Department of Transport and Main Roads to determine a potential solution.

Boardwalk with rock armour revetment

Observations	Community insights
• Some sections with no protection • Stormwater outlets along boardwalk • Boardwalk in good condition • Low-lying areas behind dunes build up then break out • Sand has accumulated in front of boardwalk since construction of boardwalk • Rock armour revetment is not an approved structure • Potential Traditional Owners interest in planting in this area • Boardwalk provides all abilities access	• Maintaining and improving all-ability access to foreshore and beach • Support for raised boardwalk to protect sections at risk • Preference for rocks over sandbags for revetments, armouring • Seating is highly valued

Criteria scores

Criteria	Comment	Unweighted score	Weighted scores
Risk	Asset is at medium risk, as identified in *Our Coast Our Future.* However, based on site observations, the presence of the existing rock protection indicates a lower level risk than what was identified in Our Coast Our Future.	4	1.14
Level of service	Non-critical asset and alternate options are available.	5	1.29
Feasibility	Asset can be partially defended or relocated.	2	0.23
Asset life	Asset has <25 years remaining useful life.	3	0.17
Community value	The community places a very high value or priority on this asset, the boardwalk and walking paths scored highly in the community survey for important foreshore features. This asset scored 6th highest in the community workshop.	1	0.17
Economic value	Moderate contribution to local economy.	3	0.34
		Total	**3.63 Future**

Recommended management options

Option 1: Implement dune revegetation and maintenance
Option 2: If triggered by risk criterion, upgrade or replace rock armour revetment

Council should continue to monitor and implement dune revegetation and maintenance to promote dune stability. If triggered by a large event, Council should consider upgrading or replacing of rock armour revetment if necessary.

Description

The aim of this option is to promote dune stability by regular monitoring and implementing regular maintenance of dune revegetation. This will help to prevent erosion and maintain the integrity of the dune ecosystem.

If a large storm occurs and triggers the risk criterion (resulting in a more urgent intervention level), Council should be prepared to upgrade or replace the rock armour revetment, as necessary, to provide an additional layer of protection in front of the boardwalk and nearby infrastructure. This structure must be appropriately engineered to ensure the design

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(size, height, grade, layers, filters and materials) meet the required standards to provide sufficient protection from the local wave climate.

Park assets within Air Sea Rescue Park

This analysis refers to the hard assets and infrastructure located within the park, such as park assets (BBQ pits, picnic tables and chairs, picnic shelters) and toilet block, but not the land which the park occupies.

Observations	Community insights
• Various recreational assets such as picnic shelters, benches, chairs, BBQ pits and playground • Foreshore is fronted by rocky outcrops to the north and mangroves to the south • Most park bookings in the region for events • 14 bins are always full, limited by no weekend bin collection service • Opportunity to rename the park with a Traditional Owner name • Not an area of concern	• Highly popular and well-used park • Formalised access points to beaches are needed • More bins at beach access points • Need a balance between public use and private/event use of the park • Some support for designated dog free and dog park areas • Preference for natural playgrounds and natural play, but also diverse play options (e.g. sand dumpers)

Criteria scores

Criteria	Comment	Unweighted score	Weighted scores
Risk	Asset is at high risk, as identified in *Our Coast Our Future*.	2	0.57
Level of service	Non-critical asset that is servicing 1770 only and asset can be reinstated.	4	1.03
Feasibility	Asset can be partially defended or relocated.	2	0.23
Asset life	Asset has <5 years remaining useful life. Council is likely to replace or relocate asset within 5 years.	5	0.29
Community value	The community places a very high value or priority on this asset, Air Sea Rescue Park was one of the most popular locations that survey respondents visit on the foreshore. This asset scored 4th highest in the community workshop.	2	0.34
Economic value	Significant contribution to local economy.	1	0.11
		Total	**2.57 Medium**

Recommended management options

Option 1: If triggered, relocate or upgrade asset at risk as required

In the event of a large storm, if the risk criterion is triggered (resulting in a more urgent intervention level), Council should consider relocating or upgrading any assets that are at risk.

Description

This asset is not at immediate risk.

If a large storm occurs, posing a potential risk to the asset and triggering the risk criterion, Council should assess the impacts and consider whether it is necessary to relocate or upgrade any at-risk assets. This may include park assets, such as BBQ pits, seating, shelters, or other assets that are at risk of erosion or inundation. Additionally, it is important to consider relocating assets landward when they require replacement or upgrade after exceeding their useful life.

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Toilet block and parking lots

Observations	Community insights
• The area is elevated on higher ground • Less prone to erosion, within presence of scattered rock protection • Fronted by mangroves and vegetation • Stormwater outlet to the northern side of the toilet block • Only toilet block servicing Air Sea Rescue Park, facility is not able to service current demand in peak periods • Capacity issues with parking resulting in illegal parking, not enough parking for Council maintenance works team • Not an area of concern for coastal hazard impacts	• Toilets are inadequate for the high number of visitors

Criteria scores

Criteria	Comment	Unweighted score	Weighted scores
Risk	Asset is at high risk, as identified in *Our Coast Our Future*. However, based on site observations, the presence of vegetation and scattered rock protection indicate a lower level risk than what was identified in *Our Coast Our Future*.	4	1.14
Level of service	Non-critical asset and alternate options are available.	4	1.03
Feasibility	Asset can be defended and relocated.	5	0.57
Asset life	Asset has <25 years remaining useful life.	3	0.17
Community value	The community does not place any value or priority on this asset. This asset scored the lowest in the community workshop. *(Note that this asset still provides some functional value to the community, but it is not a significant reason for why they use and enjoy the foreshore).*	5	0.86
Economic value	Moderate contribution to local economy.	3	0.34
		Total	**4.11** **No implementation required**

Recommended management options

Option 1: Maintain existing assets
Option 2: Relocate or upgrade assets at risk as required

Council should continue to maintain existing assets and provide additional protection or upgrades when necessary. In cases where assets are at risk, Council should be prepared to relocate or upgrade them as required.

Description

Council should continue to maintain existing assets and provide additional protection to ensure the longevity and functionality of the toilet block. Council should also investigate and upgrade the toilet block capacity as this is the only toilet block servicing Air Sea Rescue Park. This should be undertaken concurrently when nearby assets need relocation or in cases where upgrades to stormwater drainage are required to minimise disruption to park users and reduce the overall impact of maintenance activities.

If a large storm event occurs and triggers the risk criterion (resulting in a more urgent intervention level), Council should consider relocating or upgrading these assets away from the hazard area. This could involve identifying alternative sites that are less exposed to coastal hazards or upgrading the assets to improve their resilience to these risks. Relocation of

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assets may require careful consideration and planning, as it could involve significant costs and potential disruption to park users.

Pocket beach next to VMR

Observations	Community insights
• Kayaks/small crafts are stored along the foreshore • Foreshore is fronted by mangroves • Informal boat ramp for small recreational crafts • Offshore anchored vessel users are using this area to store their tenders	• Adding pathways to improve connectivity (marina to Air Sea Rescue Park) • Continue to allow locals to store kayaks on foreshore, but manage in an environmentally sensitive way • Support for designated kayak storage area • Strong support for removal/limitation of larger boats mooring onshore/close to shore • Support for removal of kayaks was present but less prominent

Criteria scores

Criteria	Comment	Unweighted score	Weighted scores
Risk	Asset is at high risk, as identified in *Our Coast Our Future*.	2	0.57
Level of service	Non-critical asset that is servicing 1770 only and asset can be reinstated.	4	1.03
Feasibility	Asset can be partially defended or relocated.	2	0.23
Asset life	Asset has <25 years remaining useful life.	3	0.17
Community value	The community places a high value or priority on this asset, community value the well-established vegetation here and its recreational value. Though the adaptation options for this asset scored the highest in the prioritisation in the community workshop, this was primarily linked to the suggestion to construct a connecting pathway (see 4.3 Additional recommendations for more detail).	2	0.34
Economic value	Significant contribution to local economy.	1	0.11
		Total	**2.46 Medium**

Recommended management options

Option 1: Continue to enforce a designated kayak storage area

This option is to help keep kayaks organised and easy to access. It also helps protect the environment by preventing damage to sensitive ecosystems.

Description

The option provides a designated storage area for kayaks and aims to improve the organisation and accessibility of kayaks, which can make them more convenient and efficient to use. This can be particularly beneficial in areas where kayaking is a popular activity. The designated area also helps to protect the environment by reducing the potential for damage to sensitive ecosystems that can occur when kayaks are left on the foreshore area. By utilising this option, there will be more foreshore areas for users to enjoy.

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4.2 Alternative assessment assets (non-MCA)

Sewer gravity main, stormwater pipe and stormwater pits (north of camping ground)

Observations	Community insights
• Pinch point for Captain Cook Drive and assets • Foreshore is fronted by rocky outcrops and erosion width may be limited by rock outcrops • The subsurface formation is stratified unit which comprises of Agnes Water Volcanics • Stormwater management in the section is lacking • Stormwater runoff (from hillside) causing washout on the beach • Not an area of concern/no immediate threat due to subsurface formation and rocky outcrop.	[Note: feedback on this asset was not explicitly sought from the community] • Major concerns of pollution from perceived sewage outflows • Better management linked to disaster planning is required

Recommended management options

Option 1: Continue to monitor coastal hazard impacts and maintain asset
Option 2: If triggered by risk criterion, investigate capacity needs and functionality of asset

Continue to monitor and maintain sewer gravity main, stormwater pipe and stormwater pits. In the event of a large storm, if the risk criterion is triggered (resulting in a more urgent intervention level), Council should investigate the asset's capacity needs and functionality. Additional consideration by Council is required before a definitive

Description

The sewer gravity main, stormwater pipe, and stormwater pits are essential components of the infrastructure for Seventeen Seventy. The sewer gravity main provides essential sewer for the community and the stormwater assets manage stormwater runoff to prevent flooding. It is crucial to monitor and maintain these assets regularly to ensure that they remain functional and effective in addressing potential risks and threats.

If a large storm event occurs and triggers the risk criterion (resulting in a more urgent intervention level), Council should investigate the asset's capacity needs and functionality. This investigation would help determine whether the asset is still able to perform its intended function and if any upgrades or repairs are necessary to mitigate risks. It is important to note that the sewer gravity main may require a capacity assessment and possible upgrade to accommodate the increased demand if there are any significant development upstream.

It is also important to note that addressing the risk to these assets requires careful consideration by Council. The selection of a management option to address the risk should be based on a thorough assessment of the asset, including the severity of the risk, the potential consequences of decommissioning, and the available resources. Council should consider all available options and choose the one that is most effective and sustainable in the long term.

1770 camping ground

Observations	Community insights
• Beachfront row of camp sites and power outlets are at risk of coastal hazards • Stormwater runoff causing washouts at some beach access points and beachfront camp sites • Exposed stormwater pipes observed at a beach access point • Loss of sand from overland flow and poor onsite drainage • Drain functionality limited by blockages from leaves and debris	[Note: feedback on this asset was not explicitly sought from the community] • Improve vegetation around camping ground and surrounding areas •

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- Emergency works are being undertaken to upgrade powered sites
- Camping ground lease is expiring soon – opportunity to revise lease agreement
- Carpark and accessibility issues during peak season
- Opportunity to re-design caravan park to better utilise space and move at risk sites away from erosion prone area

Recommended management options

Option 1: Remove the power supply from the front row of camping sites and convert to unpowered sites
Option 2: Opportunity to re-design camping ground to better utilise space and move at risk sites away from erosion prone area
Option 3: If triggered by risk criterion, investigate appropriate areas for relocating the camping ground

Council should remove the power supply from the front row of camping sites and convert them to unpowered sites. Council should also review the lease agreement and consider redesigning the caravan park to optimise space and move any at-risk sites away from the erosion prone area. Additionally, improvements should be made, such as designated roads, paths, and kerb and channel, while enhancing and protecting the vegetation. In the event of a large storm, if the risk criterion is triggered (resulting in a more urgent intervention level), Council should investigate appropriate areas for relocation of the camping ground.

Description

In order to reduce the risk of damage from inundation, Council should consider removing the power supply from the front row of camping sites and converting them to unpowered sites. Council could relocate the power supply sites to a more inland location, where they would be less susceptible to the effects of coastal erosion and flooding.

Council should also consider reviewing the lease agreement for 1770 camping ground with leaseholder and use the opportunity to redesign the camping ground layout. This will allow Council to address the issues such as utilisation of space and the placement of at-risk sites. By revising the lease agreement, Council can ensure that the camping ground is laid out in a way that is more efficient and functional for its users.

In addition to revising the lease agreement, Council should also consider making improvements to the layout and drainage of the camping ground. Designated roads, paths, and kerb and channel should be implemented to protect vegetation and reduce potential damages caused by stormwater runoff. Enhancing and protecting the vegetation in the foreshore area will also reduce erosion and stormwater runoff issues.

By making these improvements, Council can ensure that the camping ground is a safe and enjoyable place for visitors to stay. It will also provide a more sustainable long-term solution to the potential risks associated with erosion. The redesign will require careful planning and consultation with stakeholders, but the end result will be a safer and more functional space for all users.

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Stormwater outlets/discharge on the beach

Observations	Community insights
• Stormwater runoff onto beach causing localised erosion • Not an area of concern	[Note: feedback on this asset was not explicitly sought from the community] • Major concerns of pollution from perceived sewage outflows • Better management linked to disaster planning

Recommended management options

Option 1: Continue to monitor and maintain asset

Continue to monitor and maintain stormwater outlets/discharge on the beach at Air Sea Rescue Park. Council is currently planning an upgrade to the stormwater infrastructure to further improve overland flow in the area.

Description

Council should continue to regularly monitor and maintain the stormwater outlets and discharge points along the beach at Air Sea Rescue Park to manage any potential exacerbation to coastal hazard risks.

Council is in the process of planning an upgrade to the stormwater infrastructure in the area to improve roadside drainage and overland flow in the area. The upgrade will ensure the stormwater infrastructure can manage any potential risks posed by climate change and extreme weather events.

Sewer rising mains and stormwater culvert

Observations	Community insights
• Sewer rising mains are running parallel to Captain Cook Drive on the seaward side • Sewer rising main scheduled for relocation in financial year 2023/24 • The subsurface formation is stratified unit which comprises of Agnes Water Volcanics • Erosion is limited in this area • Not an area of concern	[Note: feedback on this asset was not explicitly sought from the community] • Low pressure sewage system is unsafe and unreliable • Major concerns of pollution from perceived sewage outflows • Better management linked to disaster planning

Recommended management options

Option 1: Continue to monitor and maintain asset.
Option 2: If triggered by risk criterion, investigate suitable areas to relocate the asset.

Continue to monitor and maintain sewer rising mains and stormwater culvert between the marina and Air Sea Rescue Park. In the event of a large storm, if the risk criterion is triggered (resulting in a more urgent intervention level), Council should investigate appropriate areas for relocation assets.

Description

Council should continue to monitor and maintain the sewer rising mains and stormwater culverts between the marina and Air Sea Rescue Park to identify any potential issues, such as blockages or damage, that may be caused by inundation or erosion.

If a large storm event occurs and triggering the risk criterion (resulting in a more urgent intervention level), Council should investigate appropriate areas for relocation of the stormwater culverts. This is important to mitigate potential risks and ensure the safety and functionality of the infrastructure. Relocation of infrastructure requires careful consideration and planning by Council. Council should also take into account the current and future needs of the community and other stakeholders in the area.

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Boat ramp carpark

Observations	Community insights
• Identified as a future redevelopment project • Insufficient parking, limited boat trailer parking, smaller vehicles parking in boat trailer parks • Industrial bins at Seventeen Seventy boat ramp are used as dumping of fish scraps • Seventeen Seventy Marina encroaching on adjoining Council-controlled land • Protected plants to the east • Council looking to negotiate land resumption of adjacent State Conservation Park for additional parking • Entrance into Seventeen Seventy is uncontrolled and messy	[Note: feedback on this asset was not explicitly sought from the community] • Additional parking pressure at marina resulting from new businesses • Long-term vs short-term designated parking areas • Shuttle services and/or electric scooters into 1770 to reduce parking pressure • No carpark in the Conservation Park

Recommended management options

Option 1: Council to negotiate with state agencies to expand carpark to adjacent state park

Council should engage in negotiations with state agencies to explore the possibility of expanding the carpark into the adjacent state park.

Description

Council should engage in negotiations with relevant state agencies to explore the possibility of expanding the existing boat ramp carpark to the adjacent state park. This should involve discussions with the Department of Environment and Science (DES) or other relevant agencies, to identify any regulatory or environmental requirements that need to be considered.

The expansion of the carpark could provide numerous benefits for the community, such as increasing the capacity of the carpark to accommodate more visitors and reducing the overflow of cars parked along Captain Cook Drive during peak times.

During negotiations, Council should ensure that any potential environmental impacts are considered, and any necessary measures are put in place to mitigate these impacts. Council should also seek input from stakeholders to ensure that any concerns or needs are addressed.

It is important to note that utilising the conservation park for the intended purpose may not be endorsed or supported – comments to this effect were received during community engagement activities. Therefore, it is recommended to investigate alternative land parcels, including the directly adjacent state land that is not designated as a conservation park.

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4.3 Additional recommendations

Council should consider constructing a pathway to improve connectivity. While not a coastal management option to protect from coastal hazards, there was strong support from the community to construct a pathway at the pocket beach next to VMR which would connect the marina and the toilet block at Air Sea Rescue Park. Currently, users of this area often walk along the road to move between these areas, which creates significant safety and accessibility concerns. This pathway would fully connect the foreshore pathways in the project area, and potentially reduce vehicle traffic for users that are not already walking along the road instead. This project also aligns with the community's Vision and Values, specifically around amenity (i.e. "blended, balanced and sustainable use of natural and built assets", "celebrating the scenic landscapes") and responsible tourism (i.e. "supporting tourism that is gentle on the environment and considerate of local residents"). Future construction of this pathway should still consider the current and projected risk of the land to erosion and other coastal hazards, perhaps including sections of elevated boardwalk where appropriate, which are more resilient to inundation and erosion.

4.4 Region-wide triggers

The proposed eroded distances from an asset after large events to assess the risk criterion (outlined in Table 5 for the MCA and Table 7 for the non-MCA) are considered suitable for adoption along the majority of the Gladstone coastline.

While Seventeen Seventy is protected from offshore swell waves due to the adjacent headland as well as the presence of sediment deposits forming sand bars at the mouth of the river, there are some locations in the region which are more exposed to erosion. If we take Agnes Water as an example, it is primarily influenced by swell waves, which is indicative of the prevailing conditions along the majority of the Gladstone coastline. Despite this contrast, based on *Our Coast Our Future* (CHAS) (GRC 2021), the calculated erosion prone areas (EPA) between Seventeen Seventy and Agnes Water are within relatively similar ranges. For a 1% Annual Exceedance Probability (AEP) event in the present day, the EPA ranges between 19 m to 62 m and it expands to 46 m to 93 m for a 1% AEP event in 2100.

Therefore, the eroded distances from an asset after large events proposed in Table 5 for the MCA and Table 7 for the non-MCA are deemed appropriate for adoption across the majority of the region. However, there are other areas that are more exposed to dynamic characteristics and/or high energy beach environments. Therefore, the following locations may require further consideration:

- Estuarine areas, based on the State EPA width is 400 m by 2100:
    - Boyne Island
    - Tannum Sands
    - Bangalee
    - Turkey Beach
    - Port of Baffle Creek
- Open coast beach, based on the State EPA width is equal to or larger than 180 m by 2100:
    - Agnes Water
    - Deepwater
    - Rules Beach

Given the dynamic characteristics of the estuarine and high energy beach environments, these areas may require additional and detailed assessments. It is recommended that Council seek expert guidance and advice for the listed areas when conducting a CARP or similar, when there are high value assets situated within the foreshore area.

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5 Summary of criteria scorings and intervention levels

Table 8 presents the overview of criteria scores for each asset against the weighted assessment criteria and the corresponding intervention levels.

Table 8: Criteria scorings and intervention levels

Key assets	Unweighted: Risk	Level of service	Feasibility	Asset life	Community value	Economic value	Total	Weighted: Risk 29%	Criticality 26%	Feasibility 11%	Asset life 6%	Community value 17%	Economic value 11%	Total	Intervention levels
Assets within Endeavour Park	2	4	2	5	2	1	16	0.57	1.03	0.23	0.29	0.34	0.11	2.57	Medium
Boardwalk between Endeavour Park and Air Sea Rescue Park	2	2	2	3	1	3	13	0.57	0.51	0.23	0.17	0.17	0.34	2.00	Immediate
Footpath at the foot of Captain Cook Drive	3	2	2	3	1	3	14	0.86	0.51	0.23	0.17	0.17	0.34	2.29	Medium
Kayaks/crafts are stored along the foreshore	2	5	5	3	4	3	22	0.57	1.29	0.57	0.17	0.69	0.34	3.63	Future
Boardwalk with rock armour revetment	4	5	2	3	1	3	18	1.14	1.29	0.23	0.17	0.17	0.34	3.34	Future
Park assets within Air Sea Rescue Park	2	4	2	5	2	1	16	0.57	1.03	0.23	0.29	0.34	0.11	2.57	Medium
Toilet block and parking lots	4	4	5	3	5	3	24	1.14	1.03	0.57	0.17	0.86	0.34	4.11	No implementation required
Pocket beach next to VMR	2	4	2	3	2	1	14	0.57	1.03	0.23	0.17	0.34	0.11	2.46	Medium
Sewer gravity main, stormwater pipe and stormwater pits (north of camping ground)	Not applicable														Future
1770 camping ground	Not applicable														Medium
Stormwater outlets/discharge on the beach	Not applicable														Medium
Sewer rising mains and stormwater culvert	Not applicable														Future
Boat ramp carpark	Not applicable														Medium

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Glossary

Choice experiment	Method of estimating non-market values through the use of surveys to determine consumer values for hypothetical changes to attributes of an environmental asset. If cost/ price is included as an attribute, a monetary value can be derived.
Economic life of assets	Length of time an asset is expected to remain useful.
Ecosystem services	The benefits people obtain from natural ecosystems.
Market price/value	Observed price of goods or services traded in existing markets.
Non-market value	The value of goods, services, or resources that are not bought or sold in traditional markets. It includes things like natural resources, environmental benefits, and cultural heritage.
Non-use value	The economic value derived from the existence of a non-market good or service, or the value of having it available for future generations (i.e. future use or non-use values).
Price premium	The percentage by which a product's selling price exceeds (or falls short of) a benchmark price.
Travel cost method	Method of estimating non-market values through the analysis of actual cost/expenditure data (e.g., transportation, accommodation) for visiting a site or participating in an activity.
Use value	The economic value derived from the use (direct or indirect) of a non-market good or service.
Willingness to pay	An estimate of how much consumers are willing to pay for a non-market good or service.

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Introduction

Background

Coastal hazards are projected to cause erosion of sections of the Seventeen Seventy foreshore[1]. This potential erosion-induced loss could have significant economic and social repercussions for the community. While sandy beaches are just one aspect of the town's coastal environment, they hold value for both locals and visitors. Apart from their natural beauty, the sandy beach plays a vital role in attracting tourists and complementing a wide range of recreational activities. If the beach disappears it has the potential to affect the local economy, impacting businesses that rely on tourism and diminishing the overall appeal of the town. Additionally, the loss of the beach can impact the community's social fabric, as it forms part of their identity. In this section, we will explore the potential economic consequences that may arise from the erosion-induced loss of the sandy beach within the study area.

Key point

Coastal hazards are projected to cause erosion of sections of the Seventeen Seventy foreshore, which may change the way in which locals and visitors interact with the coastline.

Purpose

The purpose of this analysis is to examine and provide estimations of the potential economic impacts that could occur if the sandy beach is lost in Seventeen Seventy. By evaluating various economic factors influenced by the presence of the sandy beach, including tourism revenue, local businesses, property values, and employment opportunities, our aim is to offer insights into the potential scale of the economic consequences of erosion. This analysis will help gain a better understanding of the significance of the sandy beach to the town's economy, facilitating informed decision-making regarding conservation efforts, adaptation strategies, and potential investments in Seventeen Seventy. Due to the limited availability of local economic data, the information provided is based on high-level estimations and insights from similar cases in other locations.

Key point

This analysis has been undertaken to better understand some of the economic values associated with Seventeen Seventy's sandy beach and how they might be impacted by erosion.

Socio-economic context

It is important to first understand the socio-economic context of Seventeen Seventy. This section outlines some of the key demographic and economic data for the town and discusses any implications this might have for the value of the sandy beach. When considering this data it should be noted that due to the low overall population, small changes can appear as relatively large proportional changes.

Demographics

The population of Seventeen Seventy has experienced notable growth in the last decade, with the number of residents increasing from 69 in 2016 to approximately 125 as per the latest census conducted in 2021.

[1] It is also possible that sand accretion occurs in some sections of the foreshore.

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Resident population and age

The Seventeen Seventy community is characterised by a relatively older population compared to both Gladstone and the wider state of Queensland. According to the most recent census conducted in 2021, the median age for Queensland was reported as 37 years, while Gladstone had a slightly younger median age of 35 years. In contrast, Seventeen Seventy displayed a significantly higher median age of 54 years.

In the last decade, Seventeen Seventy has experienced notable changes in its age structure, characterised by significant increases in specific age groups. The presence of individuals between the ages of 60 and 69 has seen a substantial rise, indicating a larger population of retirees or individuals approaching retirement in the town. Additionally, the age group between 30 and 39 years old has witnessed a notable increase, reflecting a growing segment of young professionals and families settling in the area. Interestingly, there has also been the emergence of age groups, particularly those between 10 and 29 years old, which were previously absent in the 2016 census. These shifts in the age structure suggest a diversifying population composition, influenced by various factors such as lifestyle choices, economic opportunities, increasingly flexible working arrangements, and potentially the impact of the COVID-19 pandemic.

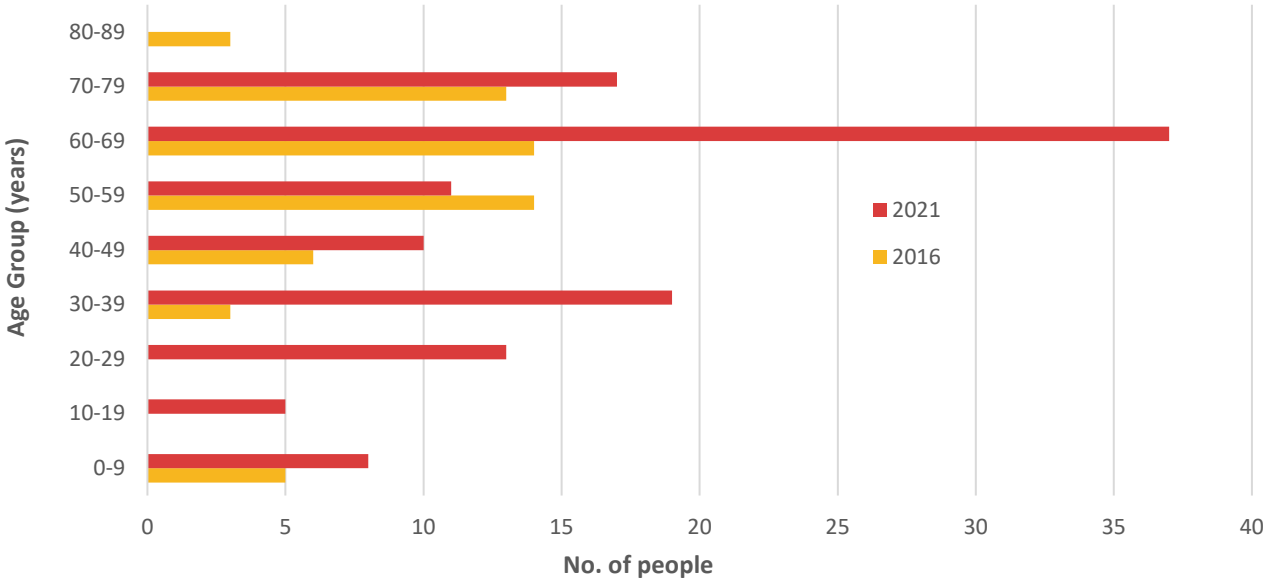

Figure 1: Seventeen Seventy age distribution

Source: ABS (2022)

Inward migration

The transformation observed in the growing population of Seventeen Seventy is not solely reflected in changes in age dynamics but also to the origin of newcomers, as revealed by an in-depth analysis of the 2016 and 2021 census data. By examining responses to the question concerning the location of residents' place of residence five years prior, it becomes apparent that the town's demographics have undergone a significant diversification compared to the 2016 census. The influx of individuals from different states within Australia, encompassing five distinct Local Government Areas (LGAs) in Queensland other than Gladstone, as well as overseas, has contributed to this shift (Table 1). This departure from the migration data of 2016, where the entire population relocating to Seventeen Seventy originated solely from three LGAs within Queensland, including Gladstone, emphasises the changing landscape of migration patterns. These evolving demographics indicate the increasing allure of Seventeen Seventy as an appealing destination for newcomers from various backgrounds and geographical locations and reflect the trend during the COVID-19 pandemic of city-dwellers relocating to regional areas.

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Table 1: Place of usual residence five years ago

Census	State	LGA	Number	% State	% LGA
Census 2021	QLD	Gladstone	49	79.8%	55.1%
		Sunshine Coast	6		6.7%
		Ipswich	5		5.6%
		Brisbane	4		4.5%
		Noosa	4		4.5%
		Rockhampton	3		3.4%
	NSW	Eurobodalla	5	9.0%	5.6%
		Waverley	3		3.4%
	VIC	Greater Geelong	3	3.4%	3.4%
	Overseas	Overseas	7	7.9%	7.9%
	Total	Total	89	100%	100.0%
Census 2016	QLD	Gladstone	50	100%	55.1%
		Brisbane	6		6.7%
		Townsville	5		5.6%
	Total	Total	61	100%	100.0%

Source: ABS (2022)

Other socio-demographics

Table 2 presents a summary of some other key demographic variables. It shows that Seventeen Seventy has relatively low household income compared to the previous census and compared to the state. This is relatively consistent with the age of many new residents that are at retirement age where cashflow incomes will tend to be relatively lower, but wealth (including the ability to purchase property) is relatively higher. Despite declining average household incomes, weekly rents have increased, and while less than the state, there is a smaller disparity compared to household income.

According to the 2021 census data, a total of 48 individuals stated that they are actively engaged in the labour force, comprising both employed and unemployed residents. Out of the total labour force, 45 individuals are currently employed, representing a percentage of 94%, while 3 individuals are reported as unemployed, accounting for 6%. Comparing across years and locations, it appears that unemployment in Seventeen Seventy is quite variable (perhaps reflecting the variable nature of its industries (e.g., tourism).

Table 2: Socio-demographic statistics for Seventeen Seventy and comparator areas

	Seventeen Seventy		Agnes Water		Queensland	
Measure	2016	2021	2016	2021	2016	2021
People (no.)	69	125	2,210	2,729	4,703,193	5,156,138
Median weekly household income ($)	$1,281	$949	$980	$1,112	$1,402	$1,675
Median weekly rent	$270	$300	$295	$320	$330	$365
Unemployment	0.0%	6.1%	10.9%	8.1%	7.6%	5.4%

Source: ABS (2022)

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Key point

Seventeen Seventy has seen some considerable demographic changes in recent years, many of which indicate its desirability as a place to live. This reflects the 'relaxed coastal lifestyle' culture discussed during the community engagements.

Economy

Identifying the key industries that drive local employment is vital for gaining economic understanding of growth in Seventeen Seventy. The 2021 census data reveals that there is relatively little diversity in the industries contributing to local employment in Seventeen Seventy, with a concentration in six key sectors. A noteworthy difference between the 2016 and 2021 censuses is the significant representation of Accommodation and Food Services, as well as the Real Estate sector in the last census. This aligns with the growing tourism industry and the increasing population, both residents and visitors, which is likely to generate a higher demand for these services. A notable addition in the 2021 census is the presence of the Professional, Scientific and Technical Services, which likely reflects professionals taking advantage of the rising flexibility in work arrangements, such as remote work.

Table 3: Proportion of employment by industry for Seventeen Seventy and comparator areas

	Seventeen Seventy		Agnes Water		Queensland	
Industry	2016	2021	2016	2021	2016	2021
Accommodation and Food Services	23%	44%	17%	17%	7%	7%
Rental, Hiring and Real Estate Services	14%	16%	3%	2%	2%	2%
Professional, Scientific and Technical Services	0%	14%	4%	5%	6%	7%
Education and Training	0%	9%	7%	9%	9%	9%
Other Services	0%	9%	4%	4%	4%	4%
Construction	23%	7%	15%	13%	9%	9%
Agriculture, Forestry and Fishing	23%	0%	2%	1%	3%	2%
Mining	0%	0%	4%	7%	2%	2%
Manufacturing	0%	0%	3%	4%	6%	6%
Electricity, Gas, Water and Waste Services	0%	0%	2%	1%	1%	1%
Wholesale Trade	0%	0%	1%	1%	3%	2%
Retail Trade	0%	0%	10%	9%	10%	9%
Transport, Postal and Warehousing	0%	0%	5%	3%	5%	5%
Information Media and Telecommunications	0%	0%	0%	0%	1%	1%
Financial and Insurance Services	0%	0%	1%	1%	3%	3%
Administrative and Support Services	18%	0%	4%	5%	4%	3%
Public Administration and Safety	0%	0%	5%	5%	7%	6%
Health Care and Social Assistance	0%	0%	6%	7%	13%	15%
Arts and Recreation Services	0%	0%	1%	1%	2%	2%
Inadequately described	0%	0%	5%	2%	3%	3%
Not stated	0%	0%	1%	3%	1%	1%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Source: ABS (2022)

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Despite the growing working population, there has been an absence of associated growth in construction within Seventeen Seventy (likely a result of the lack of additional land available for new housing). Table 4 presents a summary of key dwelling statistics focusing on tenure and occupancy. While the number of houses has remained relatively unchanged between the 2016 and 2021 census, the proportion of unoccupied dwellings in the area has significantly decreased from 32.8% in 2016, which was above the average for the neighbouring Agnes Water area and the State as a whole, to just 16% in 2021, which is considerably lower than the State average and Agnes Water. Given the high proportion of properties owned outright in Seventeen Seventy (58.7%) compared to Agnes Water (44.5%) and the State (30.0%), it is possible that the decrease in unoccupied dwellings is due to an increase in permanent residency, rather than properties being used for tourism purposes. This could be due to retirees moving into permanent residences given the demographic data above, or owners utilising the property for an extended period during COVID-19 lockdowns.

Table 4: Dwelling summary

	Seventeen Seventy				Agnes Water				Queensland			
Measure	2016		2021		2016		2021		2016		2021	
Tenure Type	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
Owned outright	123	71.5%	115	58.7%	342	37.9%	517	44.5%	490,384	29.8%	563,484	30.0
Owned with a mortgage	15	8.7%	21	10.7%	295	32.7%	306	26.3%	559,908	34.0%	644,475	34.3
Rented	30	17.4%	55	28.1%	244	27%	314	27%	560,272	34.0%	632,484	33.6
Occupied rent free	4	2.3%	0	0%	17	1.9%	16	1.4%	16,548	1.0%	18,912	1.0
Other	0	0.0%	5	2.6%	5	0.6%	9	0.8%	18,599	1.1%	21,587	1.1%
Dwelling type	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
Dwelling records (no.)	264	100%	262	100%	1,427	100%	1,825	100%	1,992,609	100%	**2,195,510**	100%
Occupied private dwellings	178	67.2%	218	82.3%	1,012	71%	1,338	73.7%	1,791,736	89.9%	1,998,032	91.0%
Unoccupied private dwellings	87	32.8%	44	16.6%	399	28%	461	25.4%	195,572	9.8%	192,393	8.8%
Non-private dwellings	0	0%	3	1.1%	14	1%	17	0.9%	5,301	0.3%	5,085	0.2%

Source: ABS (2022)

The changing nature of work in Seventeen Seventy is seen not only in the shifting industries but the distance to work reported by Seventeen Seventy residents. In the 2021 census, a lower proportion (13% compared to 40% in 2016) of individuals reported working locally (nil distance), while a higher proportion (17.4%) stated a distance to work of 250 km and over. This shift suggests a change in work patterns, potentially indicating occupations that involve longer commutes (e.g., commute to Gladstone or Bundaberg, or fly-in, fly-out work arrangements) or the growing prevalence of online or remote work arrangements. As shown in Table 5, a shift towards flexible work arrangements and the utilisation of technology for remote work seems supported by the fact that a higher proportion of individuals reported working from home the week before the census day in the 2021 compared to 2016.

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Table 5: Commute to work for Seventeen Seventy and comparator areas

	Seventeen Seventy				Agnes Water				Queensland	
Measure	2016		2021		2016		2021		2016	2021
Distance to work	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**%**	**%**
Nil distance	11	40.7%	6	13%	97	12.3%	76	8.4%	8%	6%
Over 0 km to less than 2.5 km	3	11.1%	8	17.4%	101	12.8%	124	13.6%	10%	11%
2.5 km to less than 10 km	4	14.8%	17	37%	215	27.2%	277	30.5%	32%	31%
10 km to less than 30 km	0	0%	4	8.7%	19	2.4%	35	3.9%	34%	34%
30 km to less than 50 km	0	0%	0	0%	23	2.9%	20	2.2%	8%	8%
50 km to less than 250 km	5	18.5%	3	6.5%	234	29.6%	244	26.8%	6%	6%
250 km and over	4	14.8%	8	17.4%	101	12.8%	133	14.6%	3%	3%
Total	**27**	**100%**	**46**	**100%**	**790**	**100%**	**909**	**100%**	**100%**	**100%**
Method of Travel to Work*	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**%**	**%**
Worked at home	4	18.0%	17	36.2%	61	7.0%	134	13.5%	5.3%	14.2%
Other method	18	82.0%	30	63.8%	768	93.0%	860	86.5%	94.7%	85.8%
Total	**22**	**100%**	**47**	**100%**	**829**	**100%**	**994**	**100%**	**100%**	**100%**

*Method of travel to work on census day.
Source: ABS (2022)

Key point

Seventeen Seventy's economy has also seen a period of transition with new industries of employment and flexible working arrangements potentially increasing the attractiveness of working and living there.

Economic values

It is important to understand the contribution of Seventeen Seventy's sandy beaches to the local economy, as well as the value people associate with beach visitation more broadly.

The potential impact of coastal hazards on the region's significant tourism assets, such as the erosion of Seventeen Seventy's sandy beaches, could affect visitor numbers and associated economic activity. Seventeen Seventy's beaches offer a diverse range of recreational activities for visitors to enjoy, including sunbathing, picnicking, swimming, surfing, fishing, boating, diving, and wildlife observation. While these activities do not necessarily rely on the presence of sandy beaches, they could be adversely affected if the existing beaches are reduced in width or disappear entirely. Although this may not result in an overall decline in tourism's economic activity at the state or national level, as tourists may opt for alternative destinations, it would lead to a transfer of economic activity from Seventeen Seventy to other areas.

Tourism contribution to the local economy

Tourism plays an important role in the local economy of Seventeen Seventy, driven in part by its beaches that attract visitors. As outlined above, sectors associated with providing services to tourists play a crucial role in employment within the region. An analysis of employment sectors and their evolution between the 2016 and the 2021 census reveals significant growth, especially in the accommodation sector, which has experienced a remarkable 175% increase in employment (ABS, 2022), suggesting that the local economy heavily relies on tourism-related activities to generate employment opportunities and sustain livelihoods. A quick search conducted in May 2023 on the Airbnb website

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revealed that 10 properties were being offered as tourist accommodations. This indicates a thriving tourism market that is likely to experience further growth during peak seasons.

While specific data on tourism in Seventeen Seventy is not available, information from the broader tourism region of Agnes Water - Miriam Vale reveals that the primary reasons for visiting the region in 2018/2019 were holidays (77%) and visiting family and friends (23%), indicating the region's appeal as a tourist destination (TRA, 2020). In addition, further data from the 2018/2019 financial year shows the impact of tourism in the Gladstone Region, including Seventeen Seventy (TRA, 2023). During this period, the broader region attracted a total of 1,100,000 visitors, with tourism contributing to 2.4% of the regional economy (gross value added of $145 million) and employing a total of 1,787 people. The expenditure breakdown reveals that food, drink, and accommodation accounted for 43% of visitor spending, while transportation expenses represented 32%, and shopping accounted for 21%.

When assessing the contribution of tourism, it is important to consider its broader impact on the local community. Uncontrolled growth in tourism can have consequences, especially for local residents who may have limited options for alternative recreational destinations. As part of the community consultation undertaken in the area, various undesirable consequences of growing tourism were mentioned. Firstly, blocked access to local residents emerged as a significant concern, as popular tourist spots become overcrowded during peak seasons, making it difficult for residents to navigate their own neighbourhoods or access locations and facilities which attracted them to reside there in the first place. Secondly, the constant influx of tourists led to the loss of amenity values for locals due to the disruption of peaceful atmospheres, strain on resources, and damage to natural and cultural sites. Moreover, the uncontrolled increase in tourist numbers could result in a surge in rubbish production that exceeds the local capacity to effectively manage and dispose of waste. This not only potentially causes environmental degradation but also places strain on public services, further impacting the overall well-being of the community.

Key point

Seventeen Seventy's economy benefits from visitation (driven by beach visits), although there is also a degree if disamenity for local residents when numbers of visitors are at their peak.

Non-market values associated with beach visitation

Many of the economic values of the natural assets of Seventeen Seventy are 'non-market values'. That is, they are values that are not traded in a formal market and therefore, there is no 'market price' to observe from transactions or actions. Therefore, non-market valuation approaches are required to identify and estimate the economic value of the coastal assets.

Non-market valuation

When participants of the community consultation were requested to assess the importance of amenities and natural elements within the foreshore area, beach received the highest ratings out of the 15 features analysed. However, quantifying this qualitative assessment in monetary terms is not straightforward.

Obtaining market values for sandy beaches can be challenging due to the complexities involved. Unlike private goods with clear market prices, sandy beaches offer multiple benefits that are not easily monetised, such as environmental, recreational, and aesthetic. Since sandy beaches are often public goods or common resources, they lack well-defined markets where prices are readily available. Non-market valuation methods provide a means to quantify the economic value of natural assets by considering factors like visitor preferences, willingness to pay, and the associated costs of visiting.

Existing non-market values

A brief literature review was conducted to determine whether previous research has examined the economic values associated with Seventeen Seventy's sandy beaches; however, no existing literature specifically addressed these values. Nevertheless, some studies have explored the economic values of various beaches in Queensland, primarily focusing on the southeastern region. For instance, Windle and Rolfe (2013) estimated the nonmarket values of beach recreation for

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residents of Brisbane. Their research revealed that Brisbane households undertake approximately 5.78 million day trips and 2.97 million overnight trips to the beaches in southeast Queensland annually. This translated into a total annual value of $1,039 million, ranging from $839 million to $1,416 million, for the beaches in southeast Queensland, including the Gold Coast and Sunshine Coast.

Focusing on the Gold Coast, Raybould and Lazarow (2009) conducted a study indicating that approximately 507,000 local residents made around 40 million visits to the beaches in 2007. They estimated the value of a beach trip to range from $0.50 to $2.30 per adult, resulting in an annual value ranging from $21.5 million to $91 million for the 57-kilometer coastline. Another study by Blackwell (2007) surveyed 243 visitors across four beaches on the Sunshine Coast. They found that the average economic value per person for a beach trip was $17.41 for residents (adjusted to 1999/2000 dollar values) and $107.75 for visitors. The total annual value for one highly popular beach, Mooloolaba, was estimated at $152.6 million for local residents and $204.5 million for visitors.

Closer to Seventeen Seventy, Rolfe and Gregg (2012) surveyed 1,101 local residents along the Great Barrier Reef coast, spanning from Bundaberg to Cairns that encompasses Seventeen Seventy. They estimated that these residents made approximately 16.7 million beach visits annually. The calculated value of beach recreation per person per trip for local residents was $35, resulting in a total annual value of $587.3 million for the 1,400-kilometer coastline. This estimate of value per person per trip could be used to provide an indication of the value for Seventeen Seventy Beach; however, appropriate visitation data was not available for this aggregation.

Key point

While there are no specific studies of the value of beaches in Seventeen Seventy, studies conducted elsewhere indicate that the values could be significant.

Non-market valuation of specific beach characteristics

Some studies have expanded beyond beach valuation to identify the value associated with specific features like sandy beaches, dunes, headlands, and rocky shores. Notable examples of such studies conducted in Australia include the works of Pascoe & Doshi (2018) in New South Wales (NSW) and Rogers & Burton (2019) in Western Australia (WA). The findings from these studies have been summarised in Table 6. Although the value attributed to sandy beaches may vary depending on the specific location, these research outcomes serve as a benchmark for evaluating the importance ascribed by both visitors and residents in Australia.

Additional valuation studies have attempted to uncover the ecological importance of sandy beaches beyond their recreational value. Estimating the ecological value of sandy beaches, particularly their role in supporting nesting habitats for turtles and providing a habitat for various bird species, is especially relevant for Seventeen Seventy, as nature-based tourism plays a significant role in attracting visitors to the area. Seventeen Seventy has a remarkable diversity of bird species, with a documented count of over 170 according to the platform eBird (2023). This includes endangered species like the Far Eastern Curlew (*Numenius madagascariensis*), which has been spotted in the sandy beaches and mudflats around the study area. Additionally, the sandy beaches of Seventeen Seventy have been acknowledged as nesting sites for three turtle species: Loggerhead, Flatback, and Green turtles (Queensland Globe,2023; DCTC, 2023). Although some studies in Australia have attempted to assess the value of the existence or protection of certain species whose life cycle depends on sandy beaches (Tisdell & Wilson, 2000), the specific value attributed to sandy beaches in the life history of these species remains unassessed. While no specific economic studies on the value of sandy beaches for biodiversity in Australia were found, overseas research, such as Hamed et al. (2016), estimated that households were willing to pay between USD$42 and USD$57 per year for five years to preserve sea turtle nesting habitats in Florida. This highlights the potential for similar economic valuation of sandy beaches in Australia to understand their importance and support conservation efforts.

It is important to acknowledge that the travel cost and willingness to pay methods used in some of the aforementioned studies do not encompass the entirety of economic values associated with the analyzed beaches and coastal areas. These methods do not account for factors such as local economic expenditure, which contribute to the overall economic value. Additionally, the travel cost method is limited in its ability to assign values to on-site environmental

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features and functions that may not be deemed valuable by visitors. It also fails to capture values that are not directly related to visitation, including non-use values. Consequently, the values presented above should not be interpreted as comprehensive or total economic values, as they are likely to underestimate the true worth. Moreover, while these estimates provide insights into the high values attributed to the respective beaches or coastal areas, they do not delve into potential impacts on these values due to coastal hazards.

Table 6: Summary of non-market values associated with sandy beaches

Reference	Valuation method	Unit	Location	Feature	Value
Rolfe et al., 2021	Discrete choice experiment	Willingness to pay to avoid a 1% loss (width)	Victoria	Beach	• $3.69/year (Residents) • $1.41/year (Visitors)
Pascoe & Doshi, 2018	Analytic Hierarchy Process (AHP) Discrete choice experiment	Willingness to pay for coastal protection per quarter	Coastal areas, New South Wales	Sandy beach	• $88.47/ha/household (all NSW residents) • $44.67/ha/household (Sydney residents) • $115.18 /ha/household (non-Sydney residents)
				Dunes	• $61.87 /ha/household (all NSW residents) • $31.24 /ha/household (Sydney residents) • $80.56 /ha/household (non-Sydney residents)
				Adjacent scrubland	• $50.27/ha/household (all NSW residents) • $25.38 /ha/household (Sydney residents) • $65.45/ha/household (non-Sydney residents)
Rogers & Burton, 2019	Discrete choice experiment	Willingness to pay for 1% increase in area	Cottesloe Beach, Western Australia	Sandy beach	• $2.13/household /year for 10 years.
Rogers et al. 2019			Yanchep Beach, Western Australia	Sandy beach	• $3.00/household/year for 10 years (Visitors)* • $2.04/household/year for 10 years (non-visitors)*

* Visitors: individuals who had been to Yanchep Beach within the last 12 months.

Key point

There are considerable values associated with a wide range of aspects of sandy beach environments found in the literature. These represent the maximum potential value which could be lost due to erosion of the sandy beach in Seventeen Seventy.

Property value impacts

People choose to live close to beaches and the coastline due to the significant amenity values enjoyed from living in such an environment. These values are also reflected in the price of properties close to the coastline. To understand the potential magnitude of the impacts for locals from a loss of coastal and beach assets, a hypothetical scenario is illustrated below which outlines the decline in property values that may be associated with a loss of the sandy beach.

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This should be thought of not just as a financial impact, but as a proxy for the amenity and cultural/recreational values provided by the sandy beach.

Context

Several studies have been undertaken to estimate the value of proximity to a beach using residential property values. The beach amenity values are linked to several factors such as proximity, ease of physical access, ocean views and even ocean breezes (Hamilton & Morgan, 2010; Conroy & Milosch, 2011; Bin et al. 2008; Pompe et al. 1995). These previous studies indicate that proximity to the beach leads to property price premiums. The price premiums for properties close to the beach are driven by two key components and these are beach access and view (Hamilton & Morgan, 2010).

Bin et al. (2008) and Hamilton and Morgan (2010) found that increasing distance between a property and an access point to the beach leads to a decline in property price premium. A study by Conroy and Milosch (2011) in San Diego County, US, found that properties located within 152m of a beach attract premiums of 101.9% compared to properties located 10km away. Another study by Anning (2012) in Sydney found that beachfront properties attracted a 201% price premium while those located one block away from the beach attracted a 75% price premium. These previous studies indicate that beaches have a significant impact on the value/price premium of nearby properties and that this effect declines with increasing distance away from the beach. Figure 2 illustrates a distance-decay function derived from Conroy and Milosch (2011).

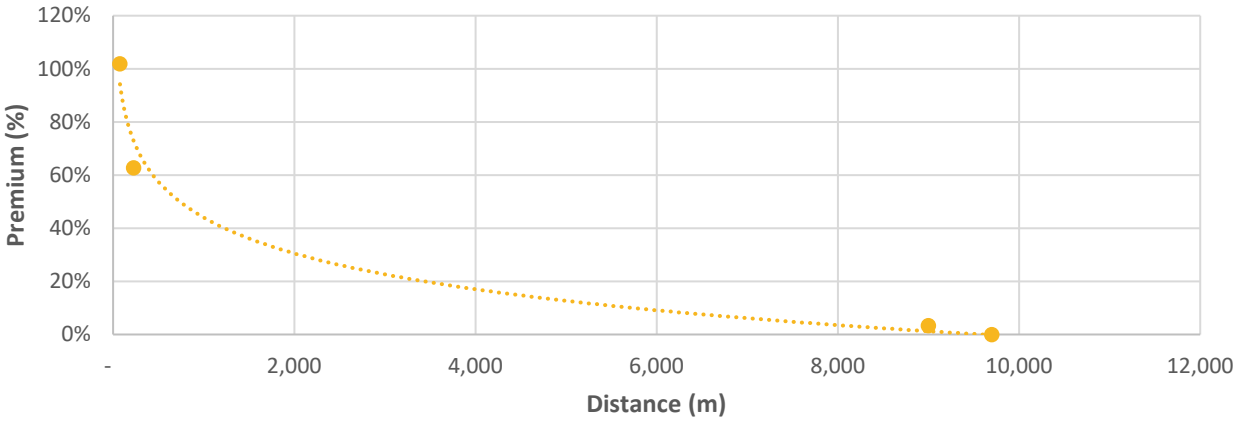

Figure 2: Relationship between distance from the beach and property values

Source: Based on result from Conroy and Milosch (2009)

As indicated above, beachfront properties and other properties near beach sites command a price premium. A key driver of this premium is the ability to access the beach. If Seventeen Seventy's sandy beaches are permanently closed/disappear, there will be some long-term economic impacts on local property prices.

Approach

Two different representative properties have been adopted to demonstrate potential property value impacts from the loss of beach site access at Seventeen Seventy's sandy beach. Hypotheticals were developed based on two recent property sales in Seventeen Seventy. Both properties are assumed to have a price premium from both view and access; however, the analysis considered one beachfront property and one property that is within walking distance (but not beachfront). If Seventeen Seventy's sandy beach is permanently eroded or inundated, local residents who typically engage in activities such as swimming, walking or sunbathing, will have to access the beach at a different access point in nearby areas, or visit an alternative beach that is further away.

The sandy beach likely provides a considerable portion of the benefits from the coastal zone but does not represent the entirety of the value provided to visitors/residents. In the likelihood of beach erosion, some benefits would still be realised like boating (or other watercraft-based recreation), fishing, or visual amenity from ocean views. This limitation should be considered when interpreting the estimates below.

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To assess the potential change in property value due to loss of the nearby sandy beach at Seventeen Seventy, the assessment considered the current walking distance to Seventeen Seventy Beach, and then estimated the change in walking distance for using a nearby substitute access and beach instead (i.e. Agnes Water Beach).[2]

Property value impact estimates

Table 6 provides a summary of the impact of a loss of a beach access point on nearby property values. Based on previous beach valuation studies (outlined above) it is estimated that the loss in property values due to increased distance from the beach access point is around 40% for a beachfront property and 30% for a property within a short walking distance (Hamilton & Morgan, 2010; Bin et al. 2008).

Table 7: Long-term economic cost of beach loss two property types

	Beachfront property	Walking distance property	Source
Current selling price ($)	$1,700,000	$1,558,000	Realestate.com.au (2022)
Estimated beach premium pre-erosion	94%	67%	Calculation using findings from Conroy and Milosch (2009)
Distance from a beach access point (m)	75	300	Realestate.com.au (2022)
Nearest beach access point after coastal hazard (m)	4,100	4,100	Assumption
Estimated beach premium post-erosion	16%	16%	Calculation using findings from Conroy and Milosch (2009)
Loss in total property value ($)	$682,000	$475,000	Calculation using findings from Conroy and Milosch (2009)
Loss in total property value (%)	40%	30%	Calculation using findings from Conroy and Milosch (2009)

The potential losses in property values are significant. This is particularly the case when considering that there are a number of properties that could be affected within the study area. It should again be noted that while erosion may result in the loss of the *sandy* beach, a property's location near the coast may still provide recreation and amenity values which would temper the economic costs outlined above.

Key point

Beaches often have a significant impact on the value/price premium of nearby properties. Price premiums for properties close to the beach are driven by two key components: beach access and beach view.

If Seventeen Seventy's sandy beach is permanently closed or disappears, there could be significant losses to nearby property values due to the distance of beach access for these properties increasing significantly.

Adaptation

The economic values outlined above provide justification for adaptation to maintain the characteristics of Seventeen Seventy's sandy beach. This section outlines some key considerations for adaptation, particularly where they have implications for economic values (i.e. economic costs or benefits).

[2] While Agnes Water Beach is the closest alternative it should also be noted that it has different characteristics to Seventeen Seventy Beach. Agnes Water Beach is an open coast beach while Seventeen Seventy is much more sheltered and some beach-goers may have a preference for different beach characteristics.

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Natural or artificial?

Firstly, it is important to consider the wide range of options available for adaptation and how they align with the coastal values for Seventeen Seventy. Table 8 presents a summary of some of the pros and cons associated with natural and hard infrastructure solutions.

Table 8: Natural versus hard coastal protection solutions

Adaptation type	Examples	Pros	Cons
Natural solutions	• Beach nourishment • Revegetation (i.e. saltmarsh/mangrove) • Living shorelines (i.e. habitat tiles) • Sand dune restoration / fencing • Coral reef restoration	• Ecosystem services provided in addition to coastal protection. • Aesthetic value maintained compared to hard infrastructure. • Wider, more stable beach for increased recreational opportunities and economic benefits. • Dune restoration supports habitat preservation and nesting sites for endangered species (e.g. turtles). • Saltmarshes and mangroves store carbon, mitigating climate change impacts.	• Natural solutions require higher maintenance, including monitoring and invasive species management. • Beach nourishment may disrupt marine ecosystems and sediment transport processes. • Vegetation restoration or fencing may impact views and restrict access to the coast. • Coral reef restoration/revegetation projects carry a risk of low survival rates or failure. • Natural solutions require time to reach full efficacy.
Hard infrastructure	• Seawalls • Groynes • Breakwaters • Revetments • Dikes / Levees • Storm surge barriers / tidal barriers	• Hard infrastructure has higher efficacy rates compared to natural solutions. • Hard infrastructure offers greater stability and durability. • Immediate protection and full efficacy upon construction. • Precise control over design and placement of protective structures.	• Loss of recreational beach amenity and visual appeal. • Significant investment required for construction and ongoing maintenance. • Alters natural coastal processes, including sediment transport and erosion patterns. • Can cause beach erosion in adjacent or downstream areas.

Key point

There are a range of pros and cons associated with natural and hard coastal protection solutions which should be carefully considered in any adaptation planning for Seventeen Seventy.

What does cost-effective adaptation look like?

Funding available for coastal adaptation is not unlimited and therefore it should be ensured that adaptation is implemented in a cost-effective manner (i.e. in a way that provides the greatest value for money). There are a range of factors which can affect cost-effectiveness; however, there are some which decision-makers have direct control over that should be considered:

- **Timing of adaptation** – Adaptation should not be implemented sooner than necessary. The optimal timing should be informed by the value of the risk being addressed and how that is likely to increase over time. Early adaptation may result in incurring the costs required to adapt without delivering the benefits until years down the track.
- **Maintenance** – It is important that any adaptations are maintained in order to maximise effectiveness. Keeping assets in good condition will not only maximise the coastal protection value they provide but, in the

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case of natural assets, will also maximise the other co-benefits or ecosystem service values provided. Furthermore, well maintained assets may require replacement less frequently, therefore reducing the total lifecycle cost of providing coastal protection.

- **Consideration of the economic life of assets** – Where retreat or upgrade of existing assets is being considered, the economic life of those assets should be factored into decision-making. It can be much more cost-effective to relocate or upgrade assets when replacement would have been required regardless (i.e. when an asset has reached the end of its economic life), rather than taking those actions immediately. Delaying these actions means that costs do not need to be incurred outside of regular refurbishment timeframes and therefore the costs associated with these actions are effectively included in business-as-usual operations.

Key point

Adaptation decisions should consider timing, ongoing maintenance, and the economic life of assets to maximise cost-effectiveness.

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