Sunshine Coast Council

Shoreline Erosion Management Plan 2025-2035

Volume 2

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Acknowledgements

JB Pacific acknowledges the traditional custodians of the lands and seas where we work. We pay our respects to Elders past, present, and emerging.

Reference document

This document should be cited as follows:
'Sunshine Coast Council Shoreline Erosion Management Plan 2025-2035 – Volume 2'

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Abbreviations

AEP ..... **Annual Exceedance Probability**

ARI ..... **Average Recurrence Interval**

GBBIB-ODAIP ..... **Golden Beach and Bribie Island Breakthrough - Options, Design, Approvals, and Investment Plan**

BIB-PSPD ..... **Bribie Island Breakthrough Preparedness Seawall Planning and Design**

CHAS ..... **Coastal Hazard Adaptation Strategy**

DAF ..... **Department of Agriculture and Fisheries**

DDA ..... **Disability Discrimination Act 1992**

DSDILGP ..... **Department of State Development, Infrastructure, Local Government and Planning**

DTMR ..... **Department of Transport and Main Roads**

ESD ..... **Ecologically Sustainable Development**

GSC ..... **Geosynthetic Sand Containers**

ICOLL ..... **Intermittently Closed and Open Lake or Lagoon**

JBP ..... **JB Pacific**

LGA ..... **Local Government Area**

MCA ..... **Multi-Criteria Analysis**

NbA/NbS ..... **Nature Based Adaptation/Solutions**

NCCARF ..... **National Climate Change Adaptation Research Facility**

PRIF ..... **Pacific Region Infrastructure Facility**

SARA ..... **State Assessment and Referral Agency**

SCC ..... **Sunshine Coast Council**

SEMP ..... **Shoreline Erosion Management Plan**

SLSC ..... **Surf Life Saving Club**

WWN ..... **Working With Nature**

1. Introduction

The Sunshine Coast Local Government Area (LGA) has approximately 60 kilometres of coastline, stretching north from Bribie Island and the Pumicestone Passage to Coolum Beach. This Shoreline Erosion Management Plan (SEMP) fits within Council's strategic policy and planning framework for coastal zone management. Within this framework, the SEMP is the primary plan relating to Council's management of coastal erosion impacts to Council controlled assets and public infrastructure. It sits alongside a number of other coastal planning documents including the Healthy Coast Management Plan (HCMP) and Coastal Hazard Adaptation Strategy (CHAS). The SEMP presents a coordinated, regionally consistent, and prioritised plan to address shoreline erosion issues throughout the Sunshine Coast for a ten-year period spanning 2025 to 2035. It builds on the management actions undertaken during the previous SEMP that spanned 2014 to 2024.

Volume 2 of this SEMP provides the anticipated erosion management actions for Council controlled assets and public infrastructure that may be required between 2025 and 2035. The management of coastal erosion is designed to follow an adaptive pathway, initially monitoring the coastline, and using low impact management approaches where possible before larger erosion control actions are implemented.

Coastal erosion planning has been split into 38 coastal units, which are further categorised as Open Coast (20), Estuary (8), Lagoon (5) and Headlands (5), as shown in Figure 1-1 to Figure 1-5. All units are subject to a range of coast-wide actions, typically delivered under existing maintenance or environmental programmes. The following 15 coast units contain 'priority actions' that aim to address areas identified as having the greatest risk of erosion occurring over the lifetime of the SEMP. They have been investigated in more detail and the preferred approach for future management identified. The following units contain 'priority actions':

- O1 (Coolum Beach)
- E1 (Maroochy River Estuary)
- O7 (Maroochydore Beach)
- O8 (Alexandra Headland Beach)
- O9 (Mooloolaba Beach)
- O10 (Buddina Beach)
- L2 (Currimundi Creek)
- O15 (Dicky Beach)
- L5 (Tooway Creek)
- O16 (Moffat Beach)
- O18 (Kings Beach)
- E4 (North Street to Jellicoe Street)
- E5 (Jellicoe Street to Onslow Street)
- E6 (Onslow Street to Lamerough Canal)
- E7 (Lamerough Canal to Bells Creek)

This report includes information on the options appraisal process used to assess potential management options, as well as the preferred actions to implement if erosion occurs in any coastal unit. It includes the following sections:

- Section 2 Erosion management option evaluation
- Section 3 Actions for all units
- Section 4 to 41 Actions for specific units

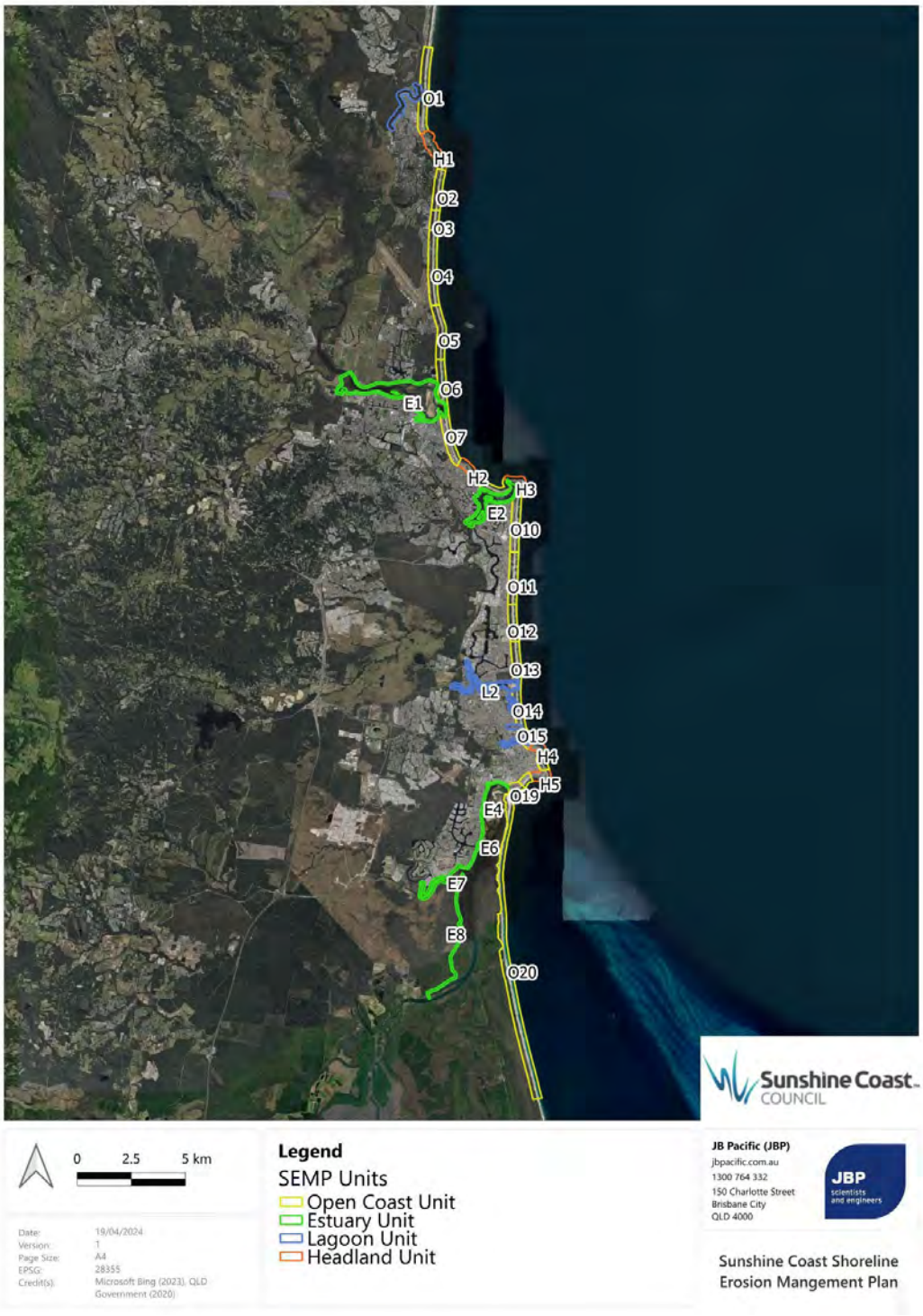

Figure 1-1: SEMP Unit Overview

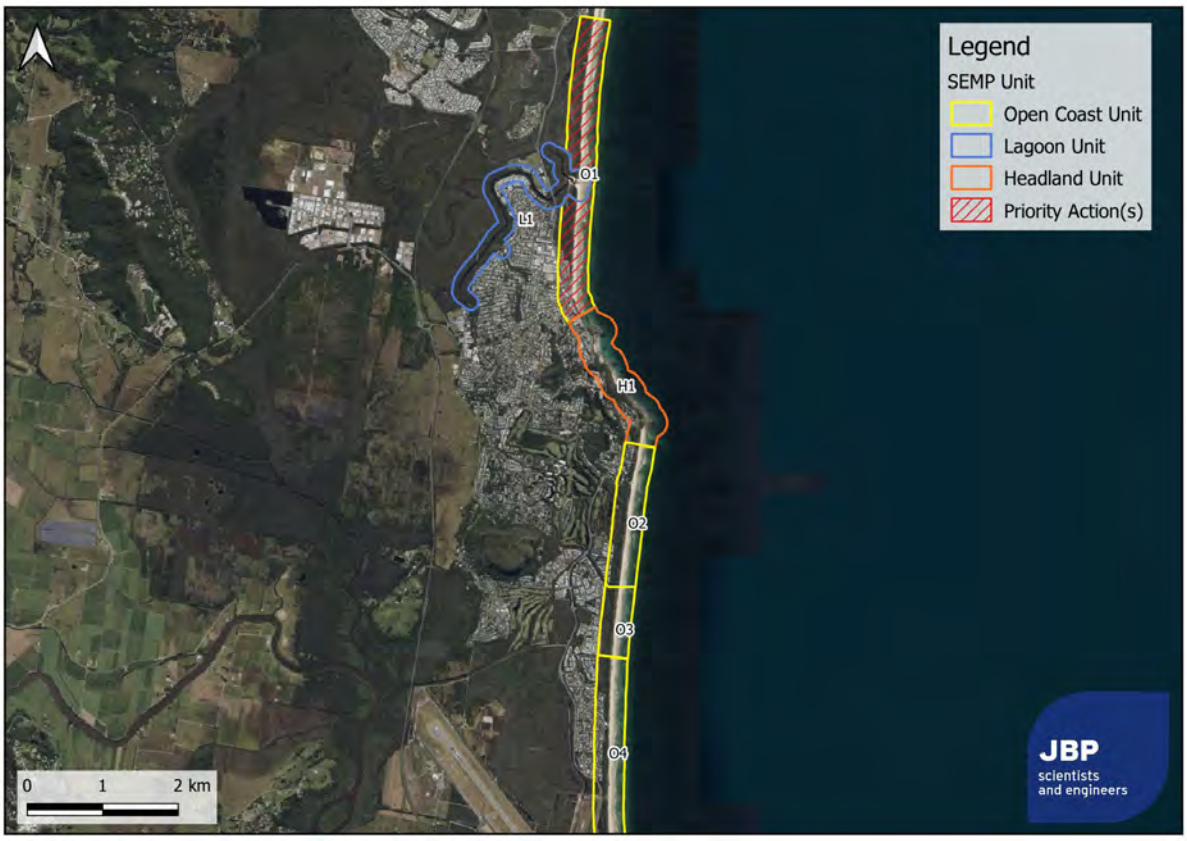

Figure 1-2: SEMP Unit Overview O1 to O4.

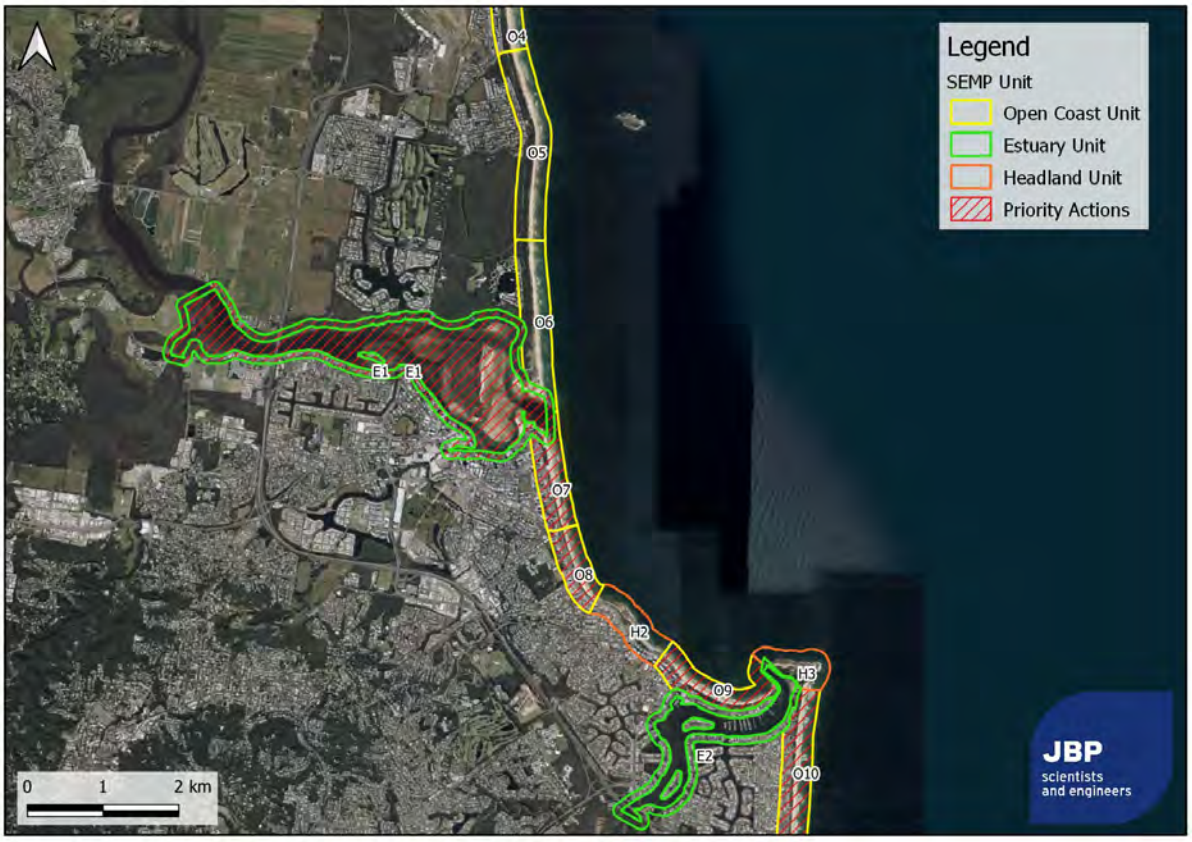

Figure 1-3: SEMP Unit Overview O5 to H3.

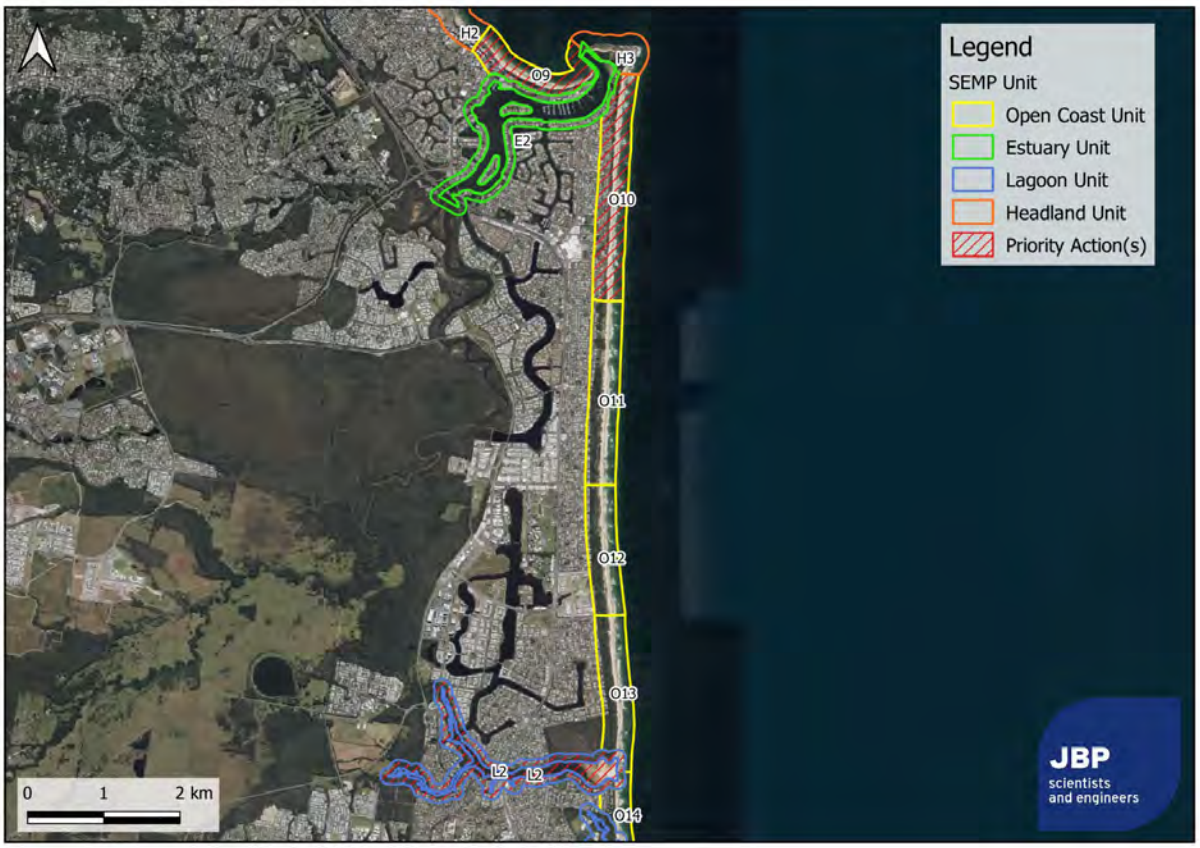

Figure 1-4: SEMP Unit Overview O10 to L2.

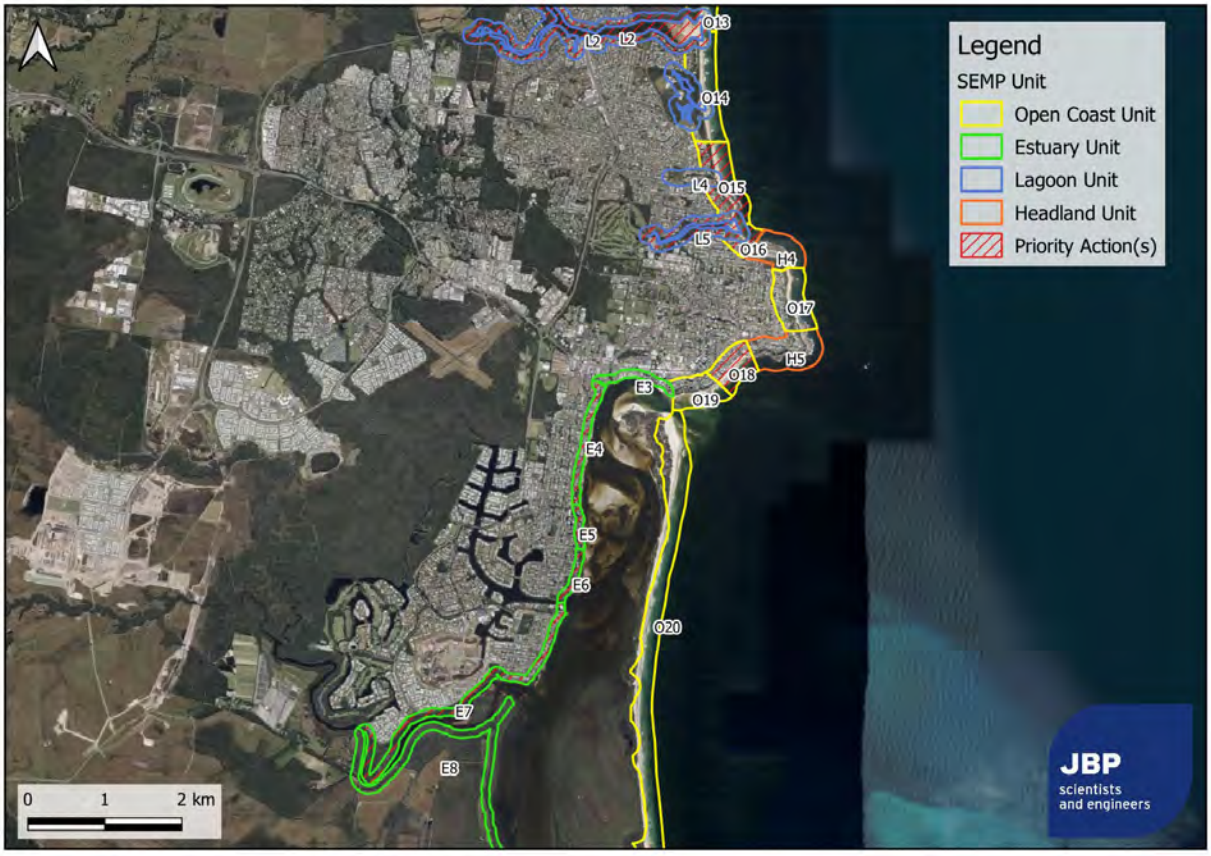

Figure 1-5: SEMP Unit Overview O14 to E8.

2. Management option evaluation

2.1 Assessment approach

All units are subject to a range of coast-wide actions, typically delivered under existing maintenance or environmental programmes that include actions such as ongoing monitoring, dune management, maintenance of accessways, etc. Additional priority actions have been proposed within 15 units, which followed several steps, including:

- the consideration of management approach in the CHAS;
- review of uncompleted actions from the previous SEMP;
- an estimate of residual life for aging structures;
- consideration of management options;
- assessment of option feasibility, viability and acceptability;
- an options appraisal;
- a stakeholder review.

This process has supported the selection of the preferred management options. These options are in many ways provisional and may only be required if erosion or recession occurs. Based on analysis of the previous SEMP (2014-2024), only 85% of proposed actions were started or completed over the ten years with the remaining actions not required.

2.2 Management approach from the CHAS

The CHAS adaptation response is split into three categories[1]:

- Monitor, maintain and prepare;
- Mitigate;
- Transition.

All beach units will follow the monitor, maintain and prepare approach. This includes typical Council activities, including the development of management plans, investigating any notifications of erosion, routine inspections, and maintenance works.

Beach units that have been assigned a Mitigate adaptation approach have typically been identified as having priority actions within the SEMP. This implies the area has an existing or emerging erosion issue that will be addressed through a specific management approach.

1 SSC, 2021. Coastal Hazard Adaptation Strategy. Retrieved from https://assets-us-01.kc-usercontent.com/c631baf8-1b46-001f-580c-d0001b68b4a8/310a0975-c9eb-468f-966a-3754b982e348/9C3D3679-59DF-46F0-9FED-468BE789A2B8

Adaptation response	Monitor, maintain and prepare	Mitigate	Transition
	Monitor the risk of coastal hazards. Monitor until local trigger levels are reached to initiate mitigation. + Maintain existing arrangements and prepare for future actions.	Actively mitigate the risk of coastal hazards through a range of adaptation options. Mitigate until local trigger levels are reached to initiate transition.	A strategic decision to transition to an alternative land use in some areas. Mitigation may be part of the transition process.

Table 2-1: CHAS adaptation response

2.3 Engineering condition and residual life assessment for aging structures

The SCC undertakes ongoing engineering assessments to support the management of existing structures. This is undertaken for all structures and follows internal asset management practices.

Throughout the investigations undertaken for this SEMP development, a range of additional engineering inspections, condition reviews, and end of life assessments have been used to understand the current state and expected lifetime of important structures approaching the end of their useful remaining life. This supports the safe and reliable use of assets and has been used to identify potential risks and opportunities to extend the life of existing structures. These inspections are considered additional inspections, undertaken outside the existing SCC asset management process, specifically to support the timing of projected renewals in the SEMP.

Condition assessments have followed the grading shown in Table 2-2, which use physical descriptors to assign a condition score. The criteria have been taken from 'Practical Guidance on Determining Asset Deterioration and the Use of Condition Grade Deterioration Curves' (DEFRA 2013[2]). The practical guide presents a series of asset deterioration curves (models) applicable to different types of flood and coastal defence assets. The curves are suitable for estimation of future asset condition and expected residual asset life, considering characteristics related to environment, asset age, material type and construction, and past and intended (future) maintenance practices.

Table 2-2: Condition grades[3]

Grade	Description	Extent of defects
1	Very good	Cosmetic defects that will have no effect on performance
2	Good	Minor defects that will not reduce overall performance of asset
3	Fair	Defects that could reduce performance of asset
4	Poor	Defects that would significantly reduce performance of asset
5	Very poor	Severe defects resulting in complete performance failure

2 DEFRA (2013) Practical guidance on determining asset deterioration and the use of condition grade deterioration curves. Revision 1 Report – SC060078/R1

3 Environment Agency, Condition Assessment Manual. (2006).

2.4 Options screening

Management options range from all-unit actions to location-specific renewals. Over 200 options have been proposed throughout the SEMP development process, which exceeds any realistic budget available for coastal management in the area. Consequently, options have been subject to an initial evaluation regarding their feasibility, viability and acceptability, as summarised in Figure 2-1.

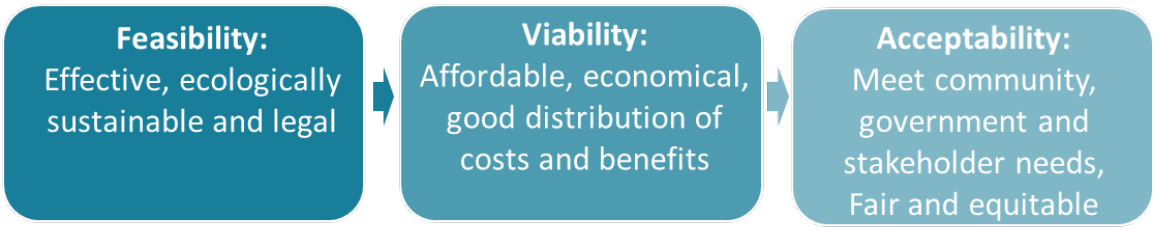

Figure 2-1: Components of the feasibility, viability, and acceptability screening

2.4.1 Assessing feasibility

Coastal management activities are regulated through a range of legislation, including the Coastal Protection and Management Act 1995, Planning Act 2016, and the Building and Engineering Standards for Tidal Works (Operational Policy). Together these regulate the protection, conservation, rehabilitation, and management of the coastal zone, and guide acceptable development assessment decisions for Queensland's coast. This feasibility assessment has been used to screen out any options that are unlikely to be approved under the existing legislative framework. Feasible coastal management actions are those which:

- fit within budgetary constraints;
- comply with statutory and policy requirements at Local, State and Commonwealth levels of Government;
- are environmentally acceptable and consistent with Ecologically Sustainable Development (ESD) principles;
- are feasible in engineering terms, i.e., will ensure a structure can realistically be built and maintained, given the local processes context;
- can address the identified issues, mitigating risks or enhancing opportunities, based on previous experience;
- are adaptive and can transition to alternative approaches when circumstances change;
- are broadly able to be implemented, in terms of available capacity and capability.

2.4.2 Assessing viability

The viability assessment considers the economic justification of a management option, the scale of planning, permits or works for the site, and if a particular option is fit for purpose based on local experiences. This is an initial high-level assessment that considers if an option is being implemented prematurely (e.g., if the hazards are not yet being observed), if a present-day design will sufficiently address future coastal conditions, or if a more economically viable option is available. The management of coastal erosion is designed to follow an adaptive pathway, initially monitoring the coastline, and using low impact management approaches before larger erosion control actions are implemented. This

assessment is not meant to replace a full economic assessment and cost benefit analysis, which may be required for large infrastructure projects.

Supporting the viability assessment is an assessment of open coast erosion risk, based on the 1% Annual Exceedance Probability (AEP) Erosion Prone Area (EPA), mapped for 2041. This mapping is towards the end of the SEMP management timeframe and represents the coastal risks that are anticipated to emerge throughout the upcoming ten-year period. Within this ten-year period there is a 10% chance of encountering a 1% AEP storm, which is considered a rare event. The mapping is considered high-level only, as it does not typically consider the underlying substrate and treats the substrate as a sandy material – which is not the case around rocky shelves and headlands.

2.4.3 Assessing community and stakeholder acceptability

The acceptability assessment considers the response of the community and stakeholders, including consideration of efficiency, equity, and consistency over the LGA. It is an initial assessment of the likely community reaction to a new management action, which could prevent the management approach from being implemented in the future. This includes:

- consistency with the objectives of Coastal Regulations and Acts;
- public interest and wider public benefit;
- effectiveness in reducing risks and issues;
- whether the action is proportional to the level of risk;
- fairness and equity.

2.5 Options assessment to identify preferred actions

Coastal management options that were considered feasible, viable and acceptable were compared using a Multi-Criteria Analysis (MCA). The MCA has been developed as a tool to help facilitate the options review process, using three common assessments to consider the economic, environmental, and social benefits or impacts.

The MCA process uses a 1-3 (Low, Medium, High) approach to score and rank the best performing options (see Table 2-3). The result is a color-coded MCA matrix with green indicating a more preferrable management approach. It is noted that this is primarily a qualitative assessment which attempts to give preference to management options that involve intangible values. The scoring of the options is comparative and could be expanded to consider weighted criteria, e.g., the environmental category may be considered more important than economics.

Table 2-3: MCA categories and scores

Category	Score
High scoring	3
Medium scoring	2
Low scoring	1

2.6 Preferred actions

Following the MCA the preferred management actions to address future coastal erosion have been identified for each coastal unit. These provide an initial preference based on the projected erosion threat and existing infrastructure. However, they are to be treated as being indicative only and the

management preference may change as the scale and nature of the erosion occurs in the future; either through ongoing recession of the coastline, the erosion from an extreme storm, or a sudden failure of an aging asset. Alternatively, several actions are expected to not be required if erosion does not occur as anticipated.

3. Actions for all units

The management of erosion throughout the Sunshine Coast follows the monitor, maintain, and prepare approach outlined in the CHAS (see Section 3). This includes monitoring risk through routine inspections and investigating signs of erosion.

3.1 Monitoring and maintenance

Regular monitoring and maintenance is performed by Council. Monitoring and maintenance actions may include routine inspections and maintenance works for existing defences and beach accessways, review of any post-storm erosion, undertaking beach profiling, undertaking revegetation schemes, collecting beach surveys, maintaining fencing to restrict access, and active ICOLL management.

3.2 Dune management

In addition to contributing to beach amenity and providing environmental, cultural, and recreational benefits, dunes are a natural dynamic defence to coastal hazards. Foredunes dissipate wave energy, which not only protects the land behind them from potential erosion and inundation but allows vegetation to establish and thrive in the hind dunes. Vegetation in turn traps windblown sand, enhancing dune growth and the ability of dunes to rebuild after erosion events. A well vegetated dune system also promotes increased stability by deflecting wind and trapping sand particles in the roots of coastal flora.

To maintain and improve the quality of dunes, a range of dune management actions are recommended as part of this SEMP, which will complement other management activities. They include:

- community education and information sharing. This may include the delivery of dunal education campaigns and installation of informational signage that aims to increase public awareness of the role of dune systems and promote active stewardship;
- weed management and re-establishment of native vegetation. General weed control and vegetation maintenance works should continue to be carried out by Council, in addition to revegetation works following storm, sand pumping and other disruptive events;
- management of public access to rehabilitation areas. Maintenance of fencing and promoting the use of formalised beach access points will encourage dune rehabilitation and revegetation
- dune building. Scheduled beach nourishment activities such as sand profiling and pumping enhance the level of protection that dunes can provide and accelerate the natural rebuilding process of the dunes.

3.3 Management of beach access points

There are almost 300 beach access points located within the Sunshine Coast LGA, which include pedestrian, vehicle, maintenance, and boat accessways. The management of such a large number of access points requires ongoing maintenance to ensure safety and support recreational and visitor use of the beaches, whilst also reducing dune disturbance by minimising informal access across the dunes. Beach access points are regularly monitored and maintained by SCC in coordination with other management activities common to most beach management units.

Beach accesses are maintained through existing asset management procedures, with any maintenance work scheduled 'as-needed'. This may include sand management around the access, which would include beach profiling and dune restoration works whether in response to storm erosion or as pre-emptive works. Due to their position on exposed coasts, accessways are located within the erosion extent

of major events and damage is to be expected. The following should be considered when designing or upgrading accessways:

- limiting pedestrian beach access to formal accesses only, which are minimised in number and footprint;
- orientating accessways to maximise vegetation and dunal resilience to erosion;
- designing removable infrastructure;
- removing infrastructure from the anticipated erosion zone prior to major events;
- accepting that the infrastructure may be damaged.

Figure 3-1: Accessways at Warana Way (Beach Access 112) and Alexandra Parade (Beach Access 166)

3.4 Intermittently Closed and Open Lakes or Lagoons (ICOLL)

Several Intermittently Closed and Open Lakes or Lagoons are present within the Sunshine Coast local government area, including Stumers, Currimundi, Coondibah, Bunbubah, and Tooway Creeks. These systems naturally open and close due to opposing catchment and ocean forces. ICOLLs can also be artificially opened, primarily to reduce the impacts of flooding caused by rainfall trapped within the closed ICOLL.

A strategy within the CHAS is to review and update current ICOLL management actions, in particular how the entrances are managed. This is proposed as a regional ICOLL management strategy, which is supported by the SEMP. This should include an LGA wide trigger based ICOLL management plan, which includes a framework to establish when each ICOLL should be opened, the preferred method, where it should be opened, and where extracted sand should be placed to minimise adjacent shoreline erosion.

3.5 Erosion prone areas (EPAs)

The Erosion Prone Area (EPA) is the width of the coast that is considered to be vulnerable to coastal erosion and tidal inundation. EPA mapping is available for several planning horizons, from present day to 2100. Mapping for a 2041 time horizon provides insight into the location and number of assets at risk of erosion from storm events that may occur within the SEMP lifetime. Typically, beach management units with significant Council controlled assets or public infrastructure within the 2041 EPA have been categorised as units with priority actions within this SEMP. This enables the SCC to plan and implement site-specific erosion management actions in the locations that are most at risk, increasing value for money. In addition to these specific management actions, or where infrastructure identified within the 2041 EPA is not directly protected by current or planned coastal defences, management actions should include:

- increased levels of monitoring, through site inspections, surveys, spatial analysis, and remote sensing (i.e. LiDAR, aerial photography, and satellite imagery);
- prioritisation of routine and post erosion event maintenance to these areas.

3.6 Permits

Coastal management actions are subject to a number of permit requirements. Whilst minor actions like sand profiling may be undertaken as excluded work or accepted development, larger activities and works may require owners' consent, development approval and permits from organisations such as the State Assessment and Referral Agency (SARA), Department of State Development, Infrastructure, Local Government and Planning (DSDILGP), Department of Agriculture and Fisheries (DAF), Marine Parks, etc. Council has a range of ongoing dredging and beach nourishment permits that will expire during the SEMP period and are required to be renewed.

3.7 New studies

A range of new studies have been recommended throughout the SEMP, primarily based on data gaps identified during its development. The following are recommended to be completed within the SEMP period..

- LGA wide trigger based ICOLL management plan
- Surf Management Plan
- Coastal process model
- Coastal process studies
- Offshore sand approvals
- Ongoing beach monitoring
- Future renewal of the Bribie Island Breakthrough Plan

3.8 Additional actions for units with priority actions

Units that have been identified as carrying a priority erosion issue have been classified as having 'priority actions'. In-depth, site-specific management options have been evaluated and recommended for these

units to ensure coastal management actions are cost effective and fit for purpose. Refer to the proceeding relevant sections of this SEMP for detailed management actions for these units.

4. Unit O1: Coolum Beach

4.1 Unit Description

The Coolum Beach unit includes the open coast from the northern border of the Sunshine Coast Local Government Area (LGA), adjacent to the intersection of David Low Way and Emu Mountain Road, south to the northern end of Point Perry. This unit includes the management of the open coastline, including dunes, beaches, the Coolum Beach Holiday Park, the Coolum SLSC and adjacent seawall, and the beginning of the Point Perry Headland. The unit does not include the Stumers Creek ICOLL or its estuary mouth, which are addressed separately within Unit L1.

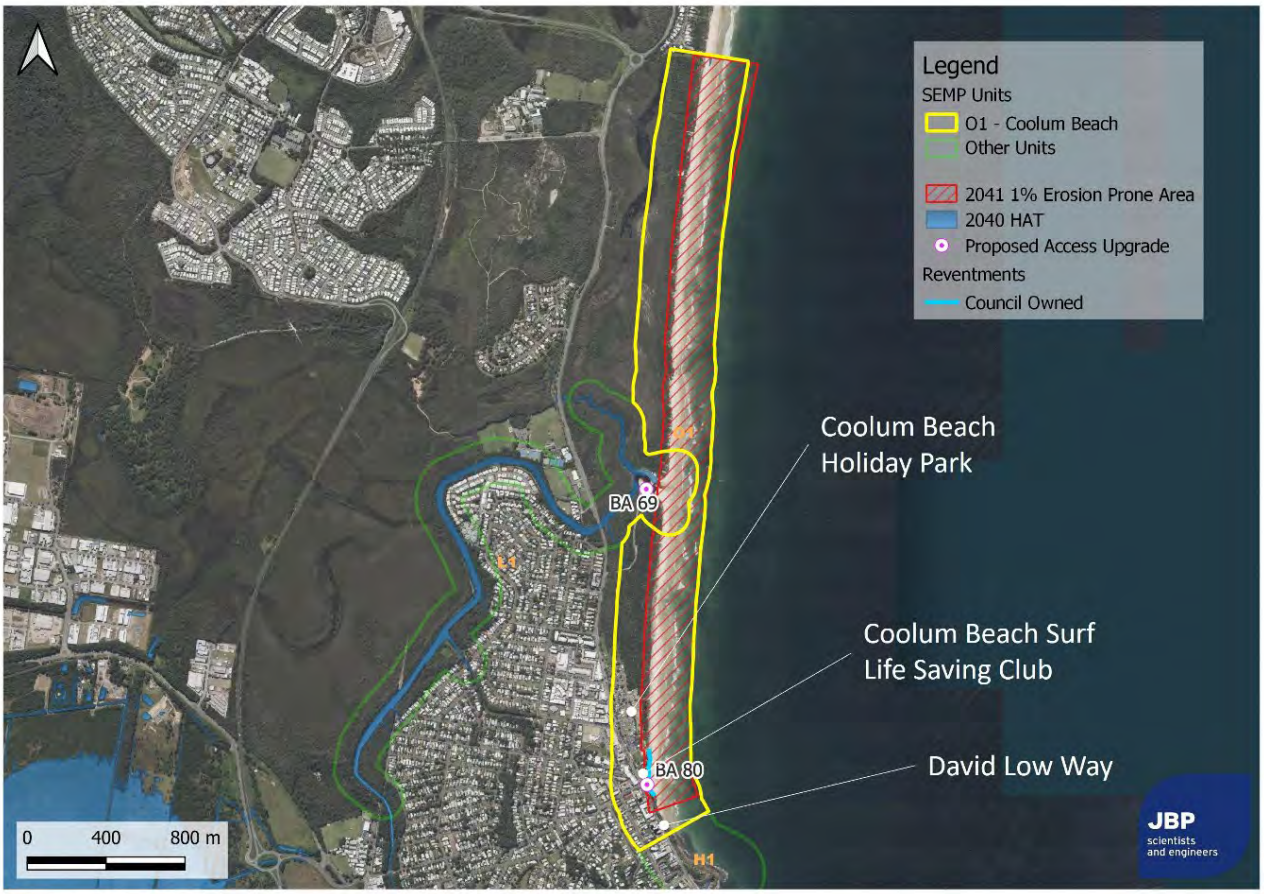

Figure 4-1 Open Coast Unit O1: Coolum Beach

4.2 Historic erosion management

There are no significant erosion issues to the north of the beach unit due to the relatively natural state of the beach and its capacity to accommodate natural processes in a relatively low risk scenario. This has historically been left unmanaged as a national park.

The Coolum Beach Holiday Park is set approximately 40m landward of the frontal dune and has not been subject to historic erosion management works. The southern extent of the beach unit has been subject to previous coastal management. Efforts to protect the southern Coolum Beach shoreline commenced in the late 1960s with the main asset being the grouted rock seawall in front of the SLSC. Recent observations show the beach to be in relatively stable form and, aside from short-term storm related changes, the profile is in general equilibrium with the existing seawall structure. Whilst the terraced seawall is not understood to have been designed to dissipate wave energy, it has not adversely

affected beach amenity. The southern border of the beach unit is located between the existing SLSC seawall and the headland. Similar to the adjacent Coolum embayment, this short section includes a small beach backed by a semi-consolidated, vegetated cliff that is crested by a public footpath and road.

4.3 Review of Existing Structures

The existing vertical seawall protecting the SLSC has been subject to a visual condition assessment. It has been constructed using grouted rock and extends from Beach Access 77 to Beach Access 81. The general condition is grade 2 to 3 (good to fair), featuring a uniform surface, intact mortar and a buried toe for the majority of the alignment. Observed defects are a loss of mortar at the lower section of the wall. If maintenance activities are undertaken its future renewal is not expected within the lifetime of this SEMP.

Figure 4-2: Left: Transition beach and dune towards the south of the unit. Right: General condition of the wall showing minor loss of mortar (JBP 2023)

4.4 Beach unit adaptation response

The CHAS 2041 adaptation response for this beach unit is to 'mitigate'. This has been assessed at a sub-unit level for five zones, as shown in Table 4-1. The management approach for three zones have been subject to further evaluation.

Table 4-1: Unit O1: Coolum Beach – Basic adaptation response

Area	Monitor, maintain and repair	Review through Options Assessment
Northern Areas (A)	Y	
Coolum Holiday Park (B)	Y	
Holiday Park to Seawall (C)	Y	Y
Current Seawall (D)	Y	Y
Southern Section (E)	Y	Y

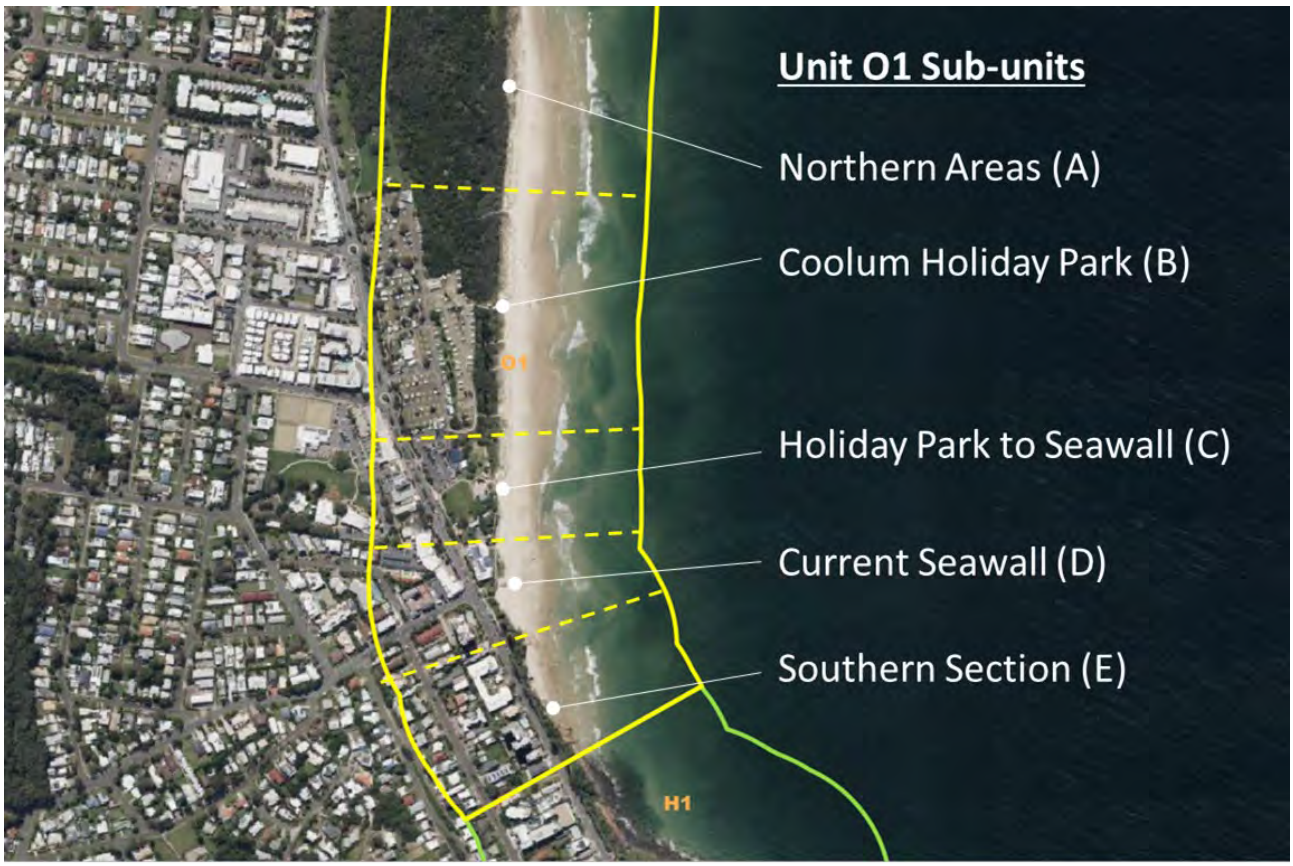

Figure 4-3: Unit O1: Coolum Beach, sub-units

4.5 Management Approach

4.5.1 Holiday Park to Seawall (C)

Five management options have been proposed, considering monitoring, nourishment, and formal erosion defences. An evaluation of option feasibility, viability and acceptability removed two options; beach nourishment from an inland source is not considered feasible given sediment constraints from inland quarries, and a new design for formal erosion defences is not considered viable economically given the low level of asset and population risk throughout the lifetime of this SEMP. A high-level options appraisal of viable options reviewed the relative economic, environmental and social merits. The highest scoring option is nourishment through beach profiling. The preferred approach for erosion management in this sub-unit is listed below.

- Sand profiling as required to strengthen dunes. This would occur during periods when suitable sand volumes are available within the beach compartment.

4.5.2 Current Seawall (D)

Seven management actions have been proposed, considering do nothing, ongoing maintenance, nourishment, and structural options. An evaluation of option feasibility, viability and acceptability removed two options; beach nourishment from an inland source and a seawall renewal; with the latter not considered viable economically as the expected useful remaining asset life extends throughout the SEMP timeframe. A high-level options appraisal identifies both ongoing maintenance works and the development of new designs for formal erosion defences as high scoring options. Initially the life of the

existing structure should be prolonged through maintenance, with design plans prepared for use in case of sudden failure. Sand profiling is high scoring and should be considered in times of available sediment.

The preferred approach for erosion management in this sub-unit is listed below. This is an anticipated action if erosion risks emerge during the SEMP period:

- continued maintenance to address the defects observed identified during site inspections;
- if an opportunity arises, new engineering plans for the wall renewal could be developed (e.g., if the adjacent building was to be upgraded). However, this is considered a low priority action given the lifetime of the existing wall is likely to extend beyond the SEMP period;
- sand profiling to maintain sand levels in front of the wall. This would involve sand being shifted mechanically from the intertidal zone to the toe of the existing structure to prevent undermining. This would occur during periods when suitable sand volumes are available within the beach compartment. Two operational actions have been identified:
- renew vehicle access ramp designs. The existing access is considered poor and not fit-for-purpose. New plans would include a review of its current placement and orientation and may recommend shifting it to the north;
- construction of the renewed ramp.

New engineering plans for the wall

If the opportunity arises for developing new engineering plans, they will require a review of the existing seawall, removal/demolition or integration within the renewed design, structural design options assessment, geotechnical investigation and slope stability analysis given the proximity of the adjacent surf club, designers risk assessments, obtaining all statutory approvals and permits, and certification of the design. The engineering plans are to include details on the existing structure, alignment, tie-ins, materials, and constructability. The approximate extent of works is shown in Figure 4-4.

Figure 4-4: Management Unit O1, sub-unit D - proposed seawall and profiling extent

4.5.3 Southern Section (E)

Six management actions have been proposed, which consider continued monitoring (i.e., 'do nothing'), new investigations, nourishment and structural cliff stabilisation options. An evaluation of option feasibility, viability and acceptability removed three options; beach nourishment from an inland source is not considered feasible due to sediment constraints, offshore sand nourishment is not considered viable given the difficulty in targeting the small beach corner and constraints with nearshore rocky reefs. The design of new cliff stabilisation mitigation options is a feasible option, however not a viable option for the SEMP to address, as it is not a classic shoreline erosion issue.

A high-level options appraisal identifies ongoing monitoring to be the highest scoring option. Performing new geotechnical assessments to support future cliff stabilisation designs scored moderately well, but this is not a recommended action over the lifetime of this SEMP. Sand profiling scored relatively low, given the low levels of available sand to be used.

The preferred approach for erosion management in this sub-unit is listed below.:

- continued monitoring of the unit (i.e., review of any notifications of erosion or cliff movement).

5. Unit L1: Stumers Creek

5.1 Unit Description

The Stumers Creek unit encompasses the Stumers Creek lower estuary, from the creek mouth on Coolum Beach, to the north creek arm ending at David Low Way, and the southern creek arm ending at Park Crescent. The mouth of Stumers Creek acts as an Intermittently Closed and Open Lake or Lagoon (ICOLL). The CHAS 2041 adaptation response for this lagoon unit is to 'Mitigate'. Management actions will follow the coast-wide actions outlined in Section 3.

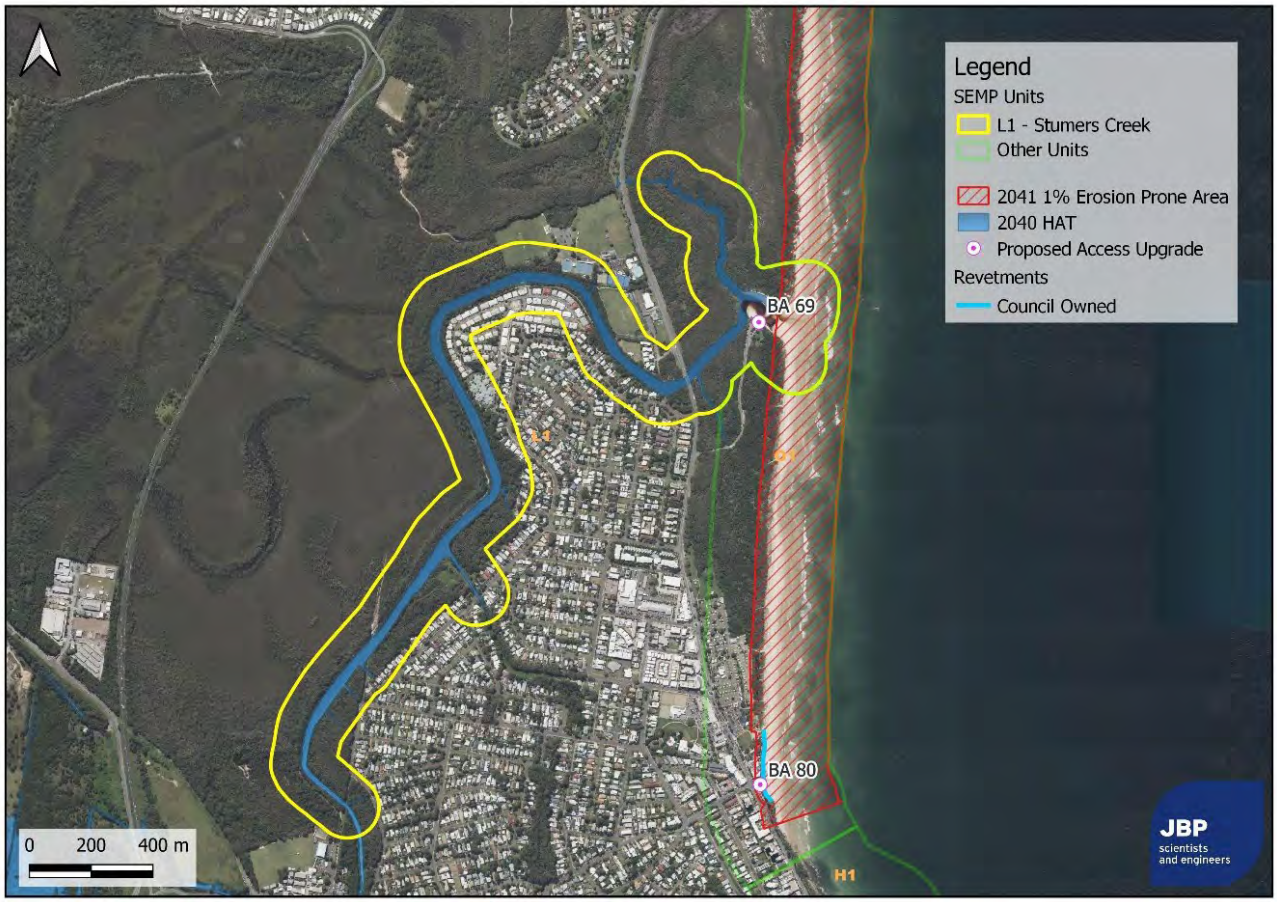

Figure 5-1: Lagoon Unit L1: Stumers Creek

Figure 5-2: Left: Existing condition of the ICOLL entrance. Right: Beach Access 69 (JBP 2023)

6. Unit H1: Point Perry to Point Arkwright

6.1 Unit Description

Unit H1 includes the shoreline of Coolum's First, Second, and Third Bays which are located between Point Perry and Point Arkwright headlands. The bays include small sandy pocket beaches and rocky headland ecosystems. A number of elevated coastal footpaths, picnic areas, and viewing platforms are located along this foreshore. The CHAS 2041 adaptation response for this headland unit is to 'Monitor'. Management actions will follow the coast-wide actions outlined in Section 3.

Figure 6-1: Headland Unit H1: Point Perry to Point Arkwright

Figure 6-2: Drone image of First Bay (JBP 2023)

7. Unit O2: Yaroomba Beach

7.1 Unit Description

The Yaroomba Beach unit encompasses the shoreline from the southern end of Point Arkwright to the Yaroomba suburb southern boundary at Tanah Street East. The coastline includes an extensive stretch of open sandy beach and dune system. The CHAS 2041 adaptation response for this beach unit is to 'Mitigate'. Management actions will follow the coast-wide actions outlined in Section 3.

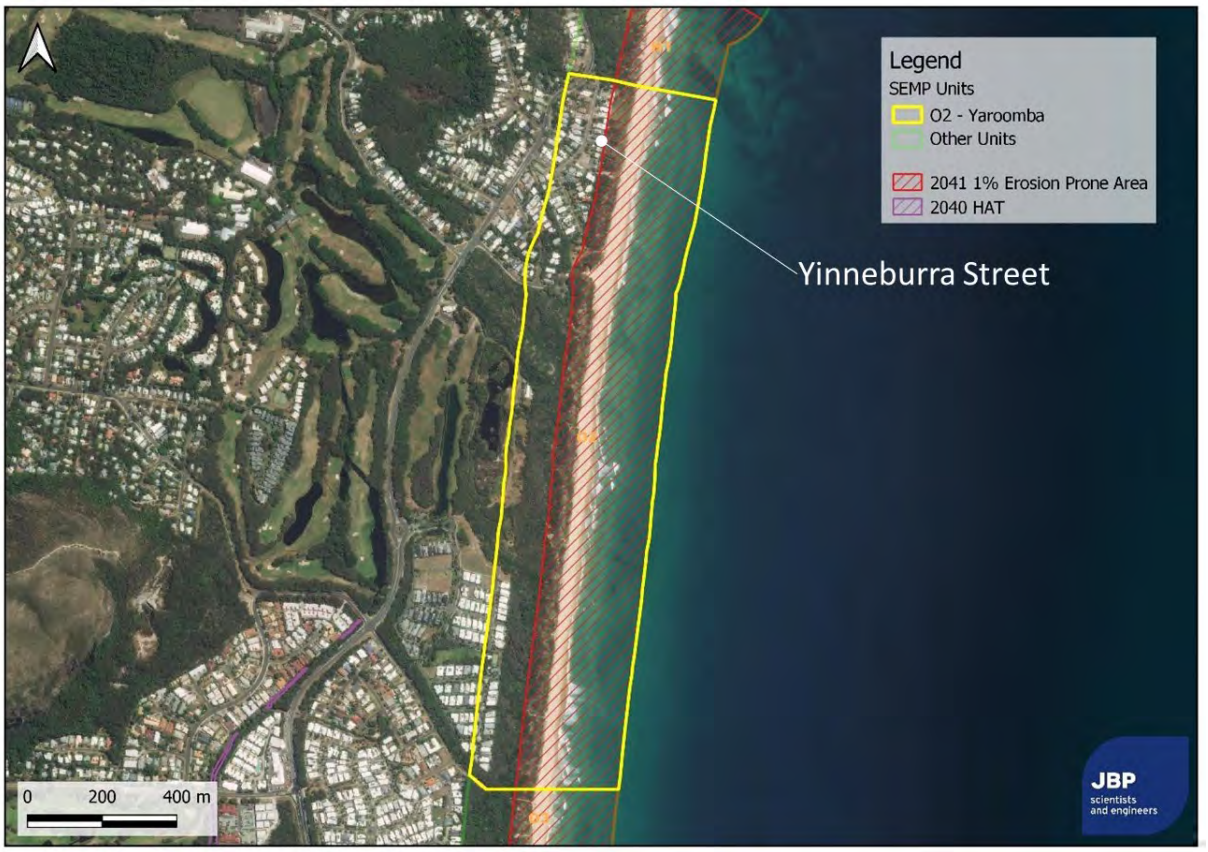

Figure 7-1: Open Coast Beach Unit O2: Yaroomba Beach

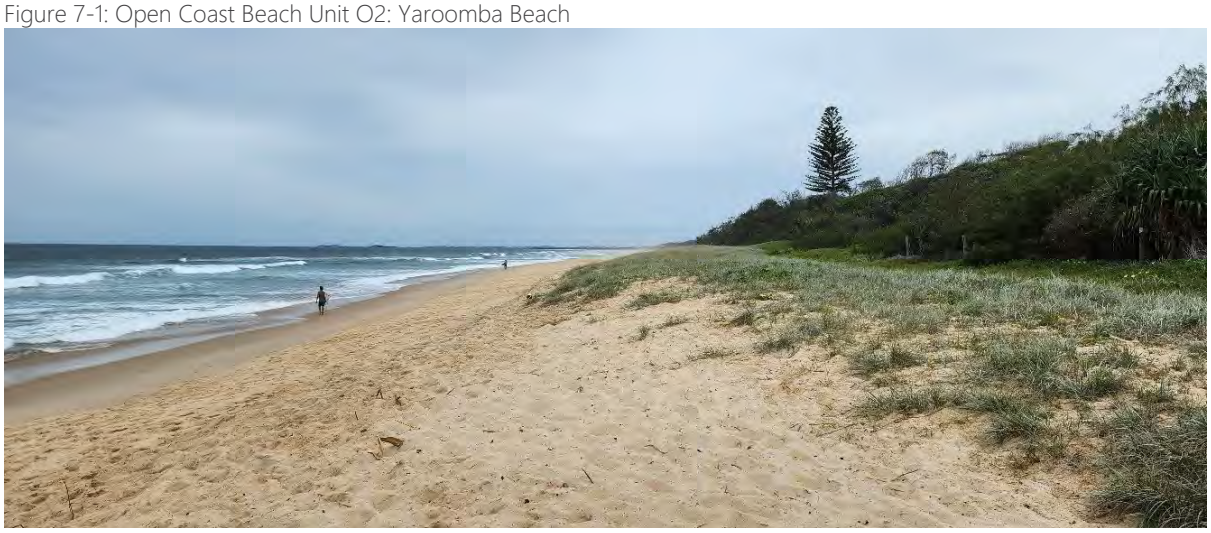

Figure 7-2: Looking South along Yaroomba Beach from its northern boundary (JBP 2023)

8. Unit O3: Mount Coolum Beach

8.1 Unit Description

The Mount Coolum Beach unit extends from the Mount Coolum suburb northern boundary at Tanah Street East, to the Mount Coolum suburb southern boundary at Merchants Parade. This beach Unit is also referred to as Boardwalk Beach. A wide vegetated dune system spans this section of open coastline. The CHAS 2041 adaptation response for this beach unit is to 'Mitigate'. Management actions will follow the coast-wide actions outlined in Section 3.

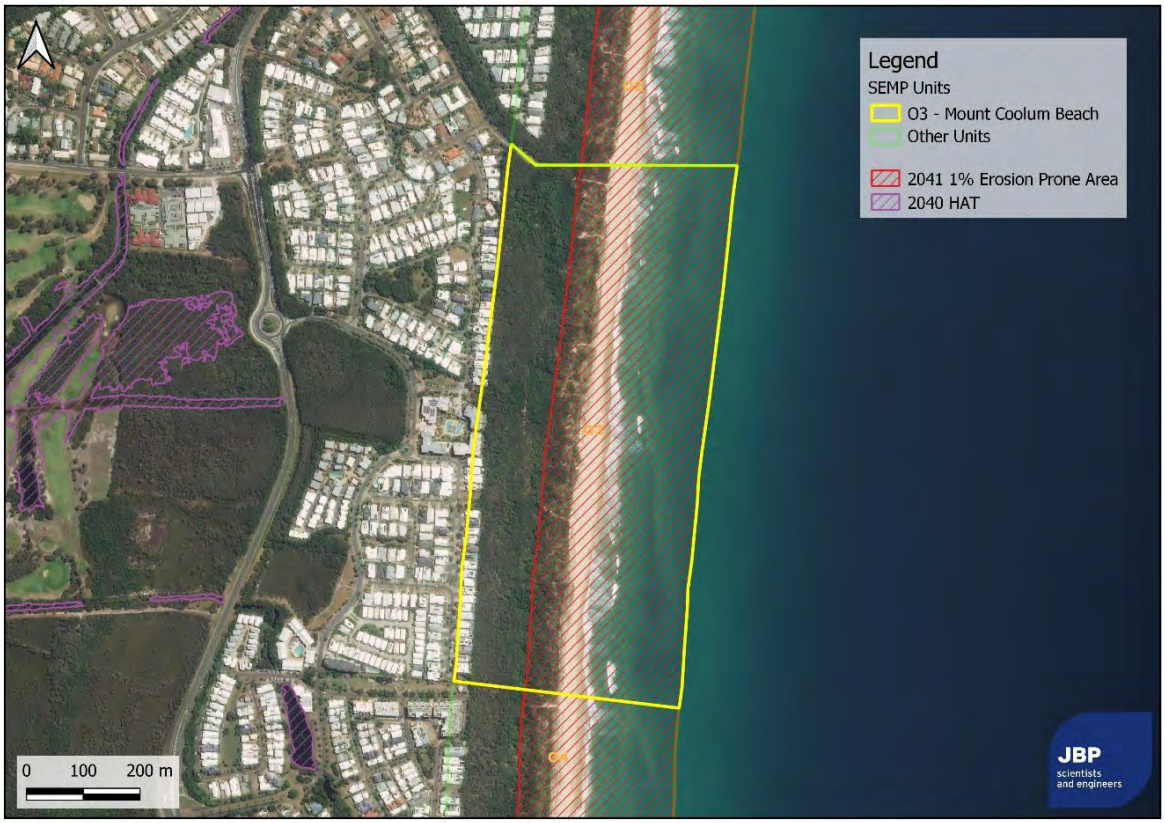

Figure 8-1: Open Coast Beach Unit O3: Mount Coolum Beach

Figure 8-2: Looking south along Mount Coolum Beach from Beach Access 97 (SCC 2024)

9. Unit O4: Marcoola Beach

9.1 Unit Description

The Marcoola Beach unit extends from the Marcoola suburb northern boundary at Merchants Parade, to the Marcoola suburb southern boundary at the Mudjimba Esplanade and David Low Way intersection. The coastline includes an extensive stretch of open sandy beach and the adjoining dune system. The CHAS 2041 adaptation response for this beach unit is to 'Monitor', although a Special Area Adaptation Plan (SAAP) will be completed separately for the Marcoola SLSC. Erosion management actions will follow the coast-wide actions outlined in Section 3.

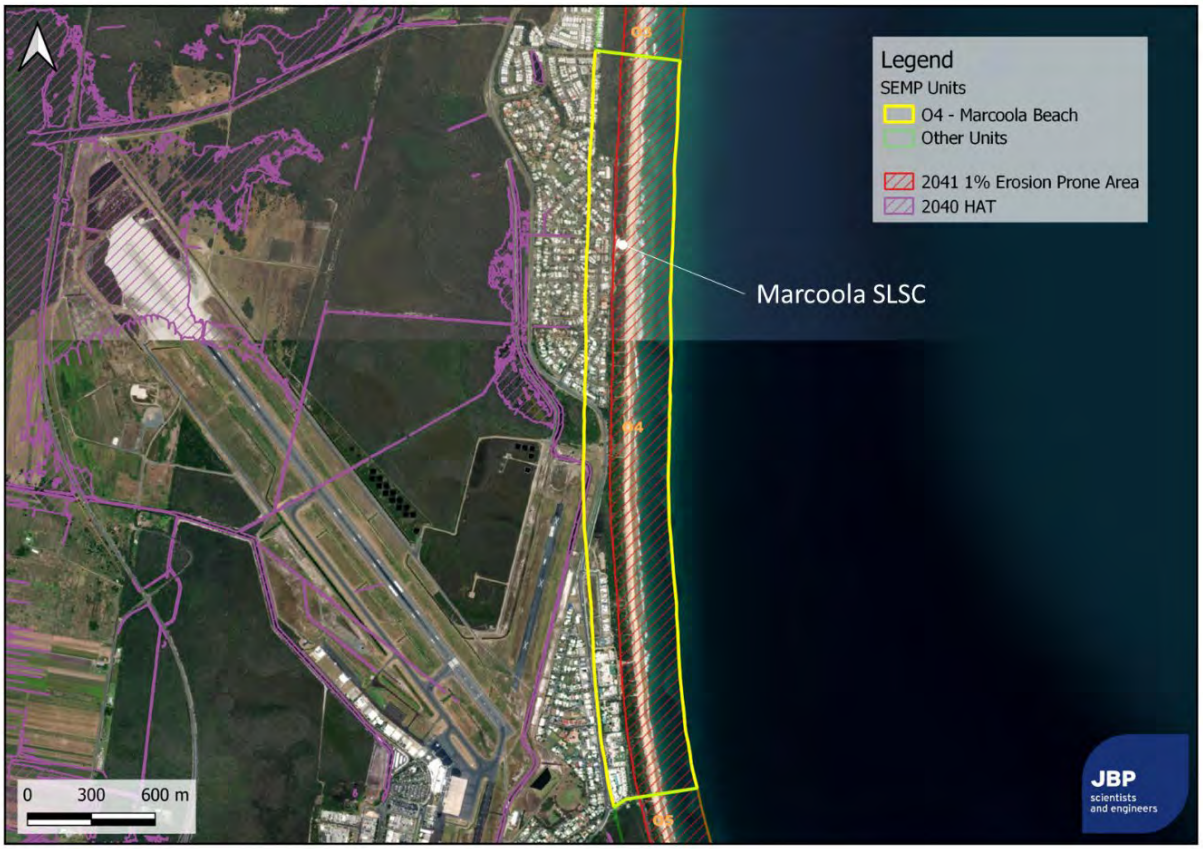

Figure 9-1: Open Coast Beach Unit O4: Marcoola Beach

Figure 9-2: Beach Access 103 near Marcoola SLSC (JBP 2023)

10. Unit O5: Mudjimba Beach

10.1 Unit Description

Unit O5 extends from the Mudjimba suburb northern boundary at the Mudjimba Esplanade and David Low Way intersection, to the Mudjimba suburb southern boundary at the intersection of Ocean Drive and North Shore Road. The northern section of this unit is predominately adjacent to residential development, whilst the southern section adjoins the State Government controlled Maroochy River Conservation Park. The CHAS 2041 adaptation response for this beach unit is to 'Monitor'. Management actions will follow the coast-wide actions outlined in Section 3.

Figure 10-1: Open Coast Beach Unit O5: Mudjimba Beach

Figure 10-2: Beach Access 123 near Mudjimba Park (JBP 2023)

11. Unit O6: Twin Waters Beach

11.1 Unit Description

The Twin Waters Beach unit extends from the Twin Waters suburb northern boundary, at the intersection of Ocean Drive and North Shore Road, to the Twin Waters suburb southern boundary at the Maroochy River mouth. The CHAS 2041 adaptation response for this beach unit is to 'Monitor'. Management actions will follow the coast-wide actions outlined in Section 3.

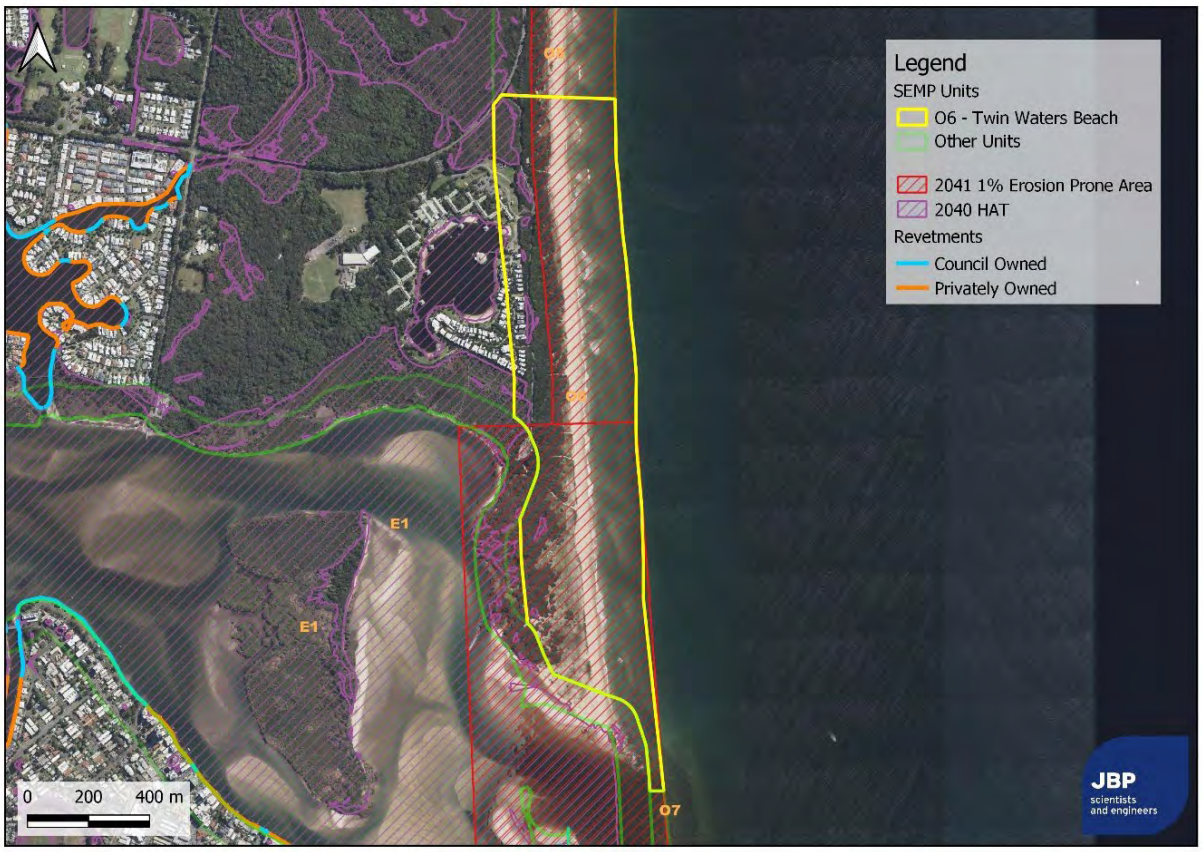

Figure 11-1: Open Coast Beach Unit O6: Twin Waters Beach

Figure 11-2: Looking south along Twin Waters Beach from Beach Access 135 (JBP 2023)

12. Unit E1: Maroochy River Estuary

12.1 Unit Description

The Maroochy River Estuary unit covers the lower Maroochy River estuary main channel, extending from the river mouth to near the river's confluence with Eudlo Creek. This unit includes Pincushion Island and the sand spit that currently connects the mainland to Pincushion Island on the banks. It extends over Cotton Tree Beach and the area surrounding the Cotton Tree Holiday Park.

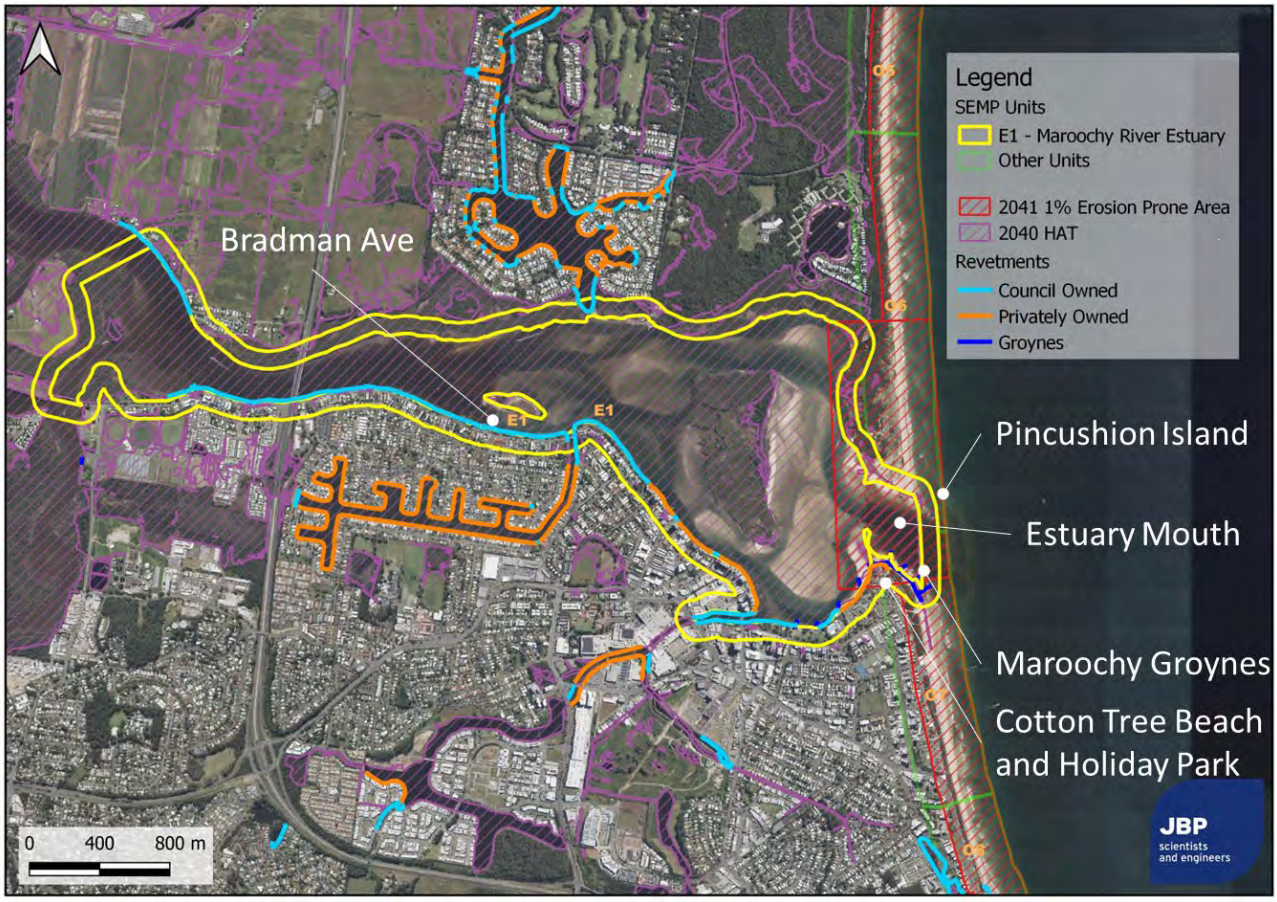

Figure 12-1: Estuary Unit E1: Maroochy River Estuary

12.2.1 Estuary Mouth

Geosynthetic Sand Containers (GSC) have been used to stabilise the Maroochy River mouth for over 20 years. They are one of the earliest GSC groyne fields constructed on the open coast in Australia. Initial design, testing and construction was performed between 1997 and 2003 by the Maroochy Shire Council, which used 2.5 m^3 GSC units to construct four groynes. During their lifetime damage included bag movement and GSC loss, linked to subsidence, deflation and sand loss which required their renewal between 2020 and 2022. New bag shapes, sizes and methods to interlock units were evaluated to increase stability and longevity for the GSC renewal. Physical testing was initially undertaken at the Water Research Laboratory, with further manufacturer and contractor testing then undertaken to develop a bag design with a 4.5 m^3 volume, weighing over 8t. Renewal works began on two groynes in June 2020, with the groyne field completed in 2022.

12.2.2 Estuary seawalls

Immediately upstream of the estuary mouth are revetments and groynes positioned adjacent to Cotton Tree Holiday Park which were constructed in the early 1990s. The rock revetments are typically buried and are considered stable, with the groynes deflecting currents away from the shoreline. A rock revetment extends from The Boat Shed to the Cotton Tree outlet pier, which was built in the late 2000s and extended around the Cotton Tree Aquatic Centre in 2016. Only a small portion of the lower southern estuary remains unprotected between the two piers, with an erosion protection design completed and approvals gained for future construction after triggers are met. A grouted revetment then extends along the majority of the Cotton Tree Park / Rotary Park to Duporth Avenue, which was built in the mid-2000s.

Along the 'river' side of Duporth Avenue to Picnic Point Esplanade are revetments and seawalls that are largely privately owned, all anecdotally constructed in the 1970s. Between Picnic Point and Bradman Avenue are a series of rock revetments which were built in the 1970s, with minor upgrades completed since 2015.

The northern shores of the estuary are largely undeveloped, with a notable exception being the aging rock revetment positioned along Oyster Bank Road. Other areas have localised signs of erosion, however are not posing a significant threat to Council infrastructure.

12.2.2 Chambers Island

Chambers Island is positioned in the centre of the estuary. There are no seawalls or revetments constructed on the island, with previous erosion management approaches using sand nourishment of the western side of the island. Beginning in 2012, there have been around five nourishment campaigns, although the appropriate permits to continue this approach have now lapsed.

12.4 Beach unit adaptation response

The CHAS 2041 adaptation response for the estuary unit is to 'mitigate' which will shift towards a 'transition' plan for Chambers Island by 2041. The management approach has been assessed at a sub-unit level for 12 zones, as shown in Table 12-1. Management actions for eight zones have been subject to further evaluation. This does not include Chambers Island, with the CHAS recommending that a Special Area Adaptation Plan (SAAP) is developed followed by transition steps including relocation of assets.

Table 12-1: Unit E1: Maroochy River Estuary – Basic adaptation response

Area	Monitor, maintain and repair	Review through Options Assessment
River Mouth South (A)	Y	Y
Cotton Tree Beach (B)	Y	Y
Rotary Park (C)	Y	Y
Maroochydore Private Seawalls (D)	Y	
Wharf Street Pier & Park (E)	Y	Y
Picnic Point Esplanade (F)	Y	Y
Chambers Island (G)	Y	
Picnic Point to Seaplanes (H)	Y	Y
Seaplanes to Kuran Street (I)	Y	Y
Kuran Street to Cod Hole Park (J)	Y	Y
Oyster Bank Road (K)	Y	Y
Northern Banks (L)	Y	

Figure 12-2: Unit E1: Maroochy River Estuary, sub-units

12.5 Management approach

12.5.1 River Mouth South (Maroochy Groynes) (A)

The River Mouth South sub-unit contains the Maroochy Groynes. Four management options have been proposed, considering ongoing monitoring (which may include passive actions or minor maintenance), proactive GSC management, proactive sand management and reactive sand management. The evaluation of option feasibility, viability and acceptability removed the option to 'do nothing', as the GSCs within the groynes will require ongoing maintenance and repairs to remain in an acceptable state for the community. The high-level options appraisal of viable options considers the proactive GSC management with reactive sand management to be the highest scoring options. The preferred approach for erosion management in this sub-unit is listed below:

- continued monitoring of the unit;
- proactive GSC management as needed. This would consider repairs to damaged GSCs, removal and replacement of damaged units and restacking of any slumped areas of the groynes - particularly at the head;
- reactive sand management. This would consider the replenishment of sand throughout the groyne area via pumped beach nourishment, to be taken from the Maroochy River mouth. This will help maintain sand cover over the groyne toe and reduce the risk of sliding and slip circle failures. The anticipated nourishment frequency is two years, although this may vary due to sand availability and the need to nourish the beach to the south. It is expected this action would be delivered through ongoing nourishment activities.

Proactive GSC management

GSC groynes are subject to ongoing maintenance costs to replace damaged units. Based on the review of the 2020/2022 renewals, proactive GSC management would allow for restacking of units prior to a significant failure. It should be undertaken when the level of damage warrants the mobilisation of plant capable of restacking the units, expected every 3 years.

12.5.2 Cotton Tree Beach (B)

This sub-unit extends along the north-western portion of the Cotton Tree Holiday Park, through to the Cotton Tree Aquatic Centre. It covers Cotton Tree beach, two shotcrete-covered GSC groynes, The Boat Shed and associated seawall. Five management options have been proposed; ongoing monitoring (which may include passive actions or minor maintenance), increased maintenance, nourishment via pipeline, completing a renewed design and approvals package for the shotcrete groynes, and completion of the actual renewal. The evaluation of option feasibility, viability and acceptability removed the option to increase maintenance as it is not believed to be sustainable over the long-term. Through the high-level options appraisal it is recommended to begin the design process and renew the groynes during this SEMP period, given their poor condition. The preferred approach for erosion management in this sub-unit is listed below:

- complete a new detailed design and permits package if required for the proposed groyne renewal;
- renew the groynes;

- beach nourishment can be considered in the future if the beach becomes depleted and exposes the toes of the groynes. This was a high scoring option that may extend the life of the erosion protection structures.

Concept design

New engineering design would require a review of the existing failure mechanisms, an assessment of the existing groynes to consider their re-use or integration within the renewed design, determination of the most appropriate construction materials, consideration of tie-ins, alignment, constructability and toe depths, designers risk assessments, obtaining all statutory approvals and permits, drainage outlets, and certification of the design. The approximate extent of works is shown in Figure 12-3.

Figure 12-3: Focus area for Unit E1, sub-unit B

12.5.3 Rotary Park (C)

This sub-unit continues from sub-unit B, west of the Cotton Tree Aquatic Centre, through to the bridge on Horton Parade near Sunshine Plaza. It covers the western tie-in area of the rock seawall near The Boat Shed, Maroochydore Rotary Park, its two piers and the internal beach between them, and a footpath and vertical seawall along Cornmeal Creek towards the Horton Parade bridge. SCC currently have a design and permit for a revetment between the two piers. Six management options have been proposed here; ongoing monitoring (which may include passive actions or minor maintenance), minor works to improve functionality of the piers, nourishment via pipeline, construction of the planned revetment between the piers, a renewed design and approvals package for the piers, and renewal of the piers. The evaluation of option feasibility, viability and acceptability removed the option to renew the pier

structures as they have not yet reached the end of their design life; however increased maintenance is required. The high-level options appraisal identified minor works to improve functionality of the piers, a review of the revetment design and approvals, and the construction of the revetment as the preferred management actions, as listed below:

- minor works to improve functionality of the Cotton Tree Piers. This would consider upgrades to the concrete panels at the seaward end of the structures to improve their performance in holding sand along the beach;
- a review and update of the existing revetment design is required. This would review the existing plans and permits, update the detailed design (reviewing tie-ins, crest height, toe depth etc), confirm the triggers for construction and ensure planning approvals are set for the proposed works;
- construction of the revetment, which is dependent on erosion reaching a future trigger point which threatens vegetation (considered to currently be occurring);
- beach nourishment can be considered in the future if the beach becomes depleted and exposes the toes of the structures. This was a high scoring option that may extend the life of the erosion protection structures in the sub-unit.

Minor works

This would consider upgrades to the concrete panels at the seaward end of the structures to improve their performance in holding sand along the beach. This may include the addition of more panels to the eastern sides of the piers where some sections are missing panels. Care should be taken not to disrupt stormwater discharge from the eastern pier, as this may cause issues with localised flooding upstream.

Updated engineering plans and construction of revetment

Engineering plans and permits currently exist to build a revetment between the two piers. These would be reviewed and updated to suit present conditions. The approximate works extent is shown in Figure 12-4.

Figure 12-4: Focus area for Unit E1, sub-unit C

12.5.4 Wharf Street Pier & Park (E)

This sub-unit covers the small parks and seawalls at the end of Baden Powell Street and Wharf Street, and the pier at the end of Wharf Street. The pier was renewed approximately 8 years ago, is managed by Council and is surrounded by private structures. The two seawalls are in poor condition. Four management options have been proposed, considering ongoing monitoring (which may include passive actions or minor maintenance), removal of the pier structure when it reaches the end of its useful design life, completing a renewed design and approvals package for the seawalls, and completion of the actual seawall renewals. The evaluation of option feasibility, viability, and acceptability removed one option; removal of the jetty structure once it reaches its design life as it is not likely to be acceptable to the community. The high-level options appraisal considers the options to begin the design process and renew both seawalls the highest scoring, given their poor condition and efficiencies in undertaking both renewals simultaneously. Ongoing monitoring also scored high however it is not believed to be sustainable over the long-term. The preferred approach for erosion management in this sub-unit is listed below:

- complete a new detailed design and permits package for the proposed seawall renewals;
- renew the seawalls.

Concept design and renewal

New engineering design for the two approximately 20m sections of vertical seawall would require a review of the existing failure mechanisms, an assessment of available materials to consider their re-use,

consideration of tie-ins, alignments, constructability and toe depths, designers risk assessments, obtaining all statutory approvals and permits, and certification of the design. The approximate extent of works is shown in Figure 12-5.

Figure 12-5: Extent of works for Unit E1, sub-unit E

12.5.5 Picnic Point Esplanade (F)

This sub-unit extends along the foreshore adjacent to Picnic Point Esplanade and includes a boat ramp and seawalls. Four management options have been proposed, which consider ongoing monitoring (i.e., passive actions or minor maintenance), management of sand levels via dredging, completing a renewed design and approvals package for the seawalls, and completion of the actual renewal. The evaluation of option feasibility, viability, and acceptability considered all options appropriate to potentially be implemented in a combination over the SEMP lifetime. The high-level options appraisal of viable options considers the current practice of managing the sand levels adjacent to the seawalls as the highest scoring management action, which will help extend the lifetime of the seawalls by offering greater protection to their toe. It also increases the amenity of the area by providing a beach adjacent to the parkland. The second highest scoring option was wall renewals, given their poor condition. The preferred approach for erosion management in this sub-unit is listed below:

- continue sand nourishment adjacent to the parkland and coastal protection structures. Based on previous campaigns, between 8,000 m^3 to 10,000 m^3 of nourishment annually (16,000 m^3 to 20,000 m^3 bi-annually) is considered achievable;
- renewal of the revetment west of Picnic Point. This has a higher priority given the poor state of the structure.
- renewal of the revetment east of Picnic Point. This has a lower priority, however, should be included in the 10-year planning as it is approaching the end of its useful life.

12.5.6 Chambers Island (G)

This sub-unit extends around Chambers Island, which is positioned in the centre of the estuary. No erosion management approaches are proposed, given the CHAS adaptation response is to shift towards a 'transition' plan for the island by 2041. The CHAS recommends that a SAAP is developed followed by transition steps including relocation of assets.

12.5.7 Picnic Point to Seaplanes (H)

This sub-unit extends from Picnic Point in the east, along Bradman Avenue to an area near Paradise Seaplanes. The shoreline along this sub-unit includes sections of vertical seawalls and revetments of varying ages and conditions, some of which have been recently renewed. Sections of unprotected foreshore are also present. The shoreline ranges from good to fair to poor condition, with some protection having past half of its useful design life. Five management options have been proposed, which considered ongoing monitoring (i.e., passive actions or minor maintenance), increased maintenance, management of sand levels via dredging, completing a renewed design and approvals package, and completion of the actual renewal. The high-level options appraisal considers both an increase in maintenance and a plan to renew the structures in two stages. The preferred approach for erosion management in this sub-unit is listed below:

- given the age and current condition of some of the coastal defence structures, the schedule for public/operational safety checks and visual condition assessments should be increased. Any failures should be repaired to prevent further failures;
- renewal of the coastal defence at Thomas Street. This has a higher priority given the poor state of the structure.

- renewal of the coastal defence between Thomas Street to Seaplanes. This has a lower priority, however should be included in the 10-year planning as it is approaching the end of its useful life.

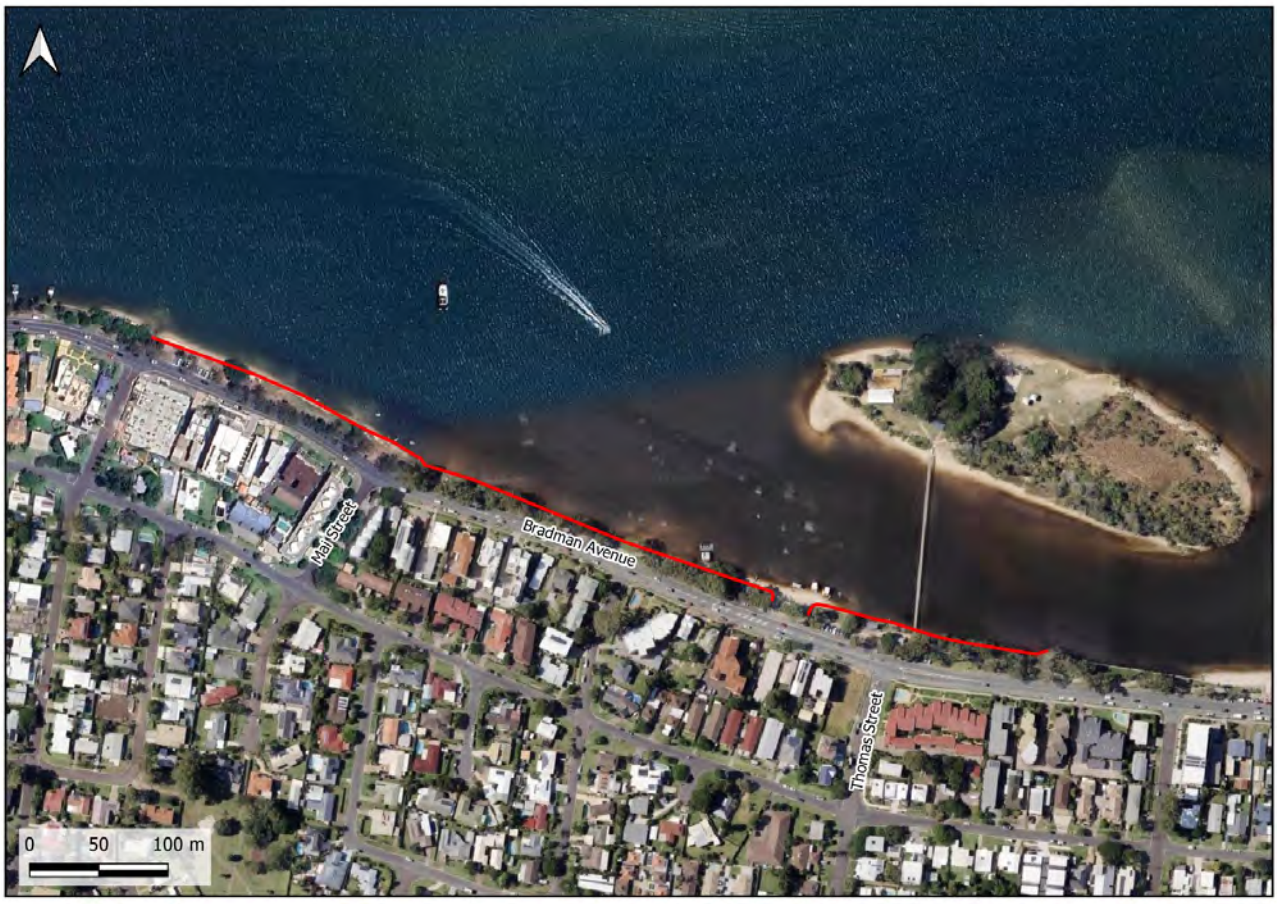

Figure 12-6: Extent of renewals for Unit E1, sub-unit H

12.5.8 Seaplanes to Kuran Street (I)

This sub-unit extends from west of Paradise Seaplanes to Kuran Street, running adjacent to the parkland along Bradman Avenue. The area is very low and prone to riverine flooding. Current defence structures include a rock armour revetment, which is in a poor to very poor condition and approaching the end of its useful design life. Five management options have been proposed, which considered ongoing monitoring (i.e., passive actions or minor maintenance), increased maintenance, management of sand levels via dredging, completing a renewed design and approvals package for the rock revetment, and completion of the actual renewal. All options were taken through the high-level options appraisal where the options to begin the design process and renew the structure scored highly, given the poor state of the existing seawall. Increased maintenance also scored high, however is not believed to be sustainable over the long-term. The preferred approach for erosion management in this sub-unit is listed below:

- increased inspections, given the aging infrastructure. The criticality of any defects should be reviewed, with defects repaired if they would threaten the structure prior to an upgrade being completed;

- complete a new detailed design and permits package for the proposed revetment renewal. This would allow the new construction to be scheduled into a future budget, anticipated to be within the life of this SEMP, and would guide any emergency work in case of sudden failure;
- renew structure.

Design

Early discussions indicate that the new rock revetment design would be slightly seaward of the existing wall for public safety. The seawall spans the entirety of sub-unit I and extends east into sub-unit H, however, as the majority of the seawall is within this sub-unit, the wall is considered to be fully captured in sub-unit I for the purpose of this SEMP. New engineering design would require a review of the existing failure mechanisms, an assessment of the existing rock armour to consider its re-use, consideration of tie-ins, alignment, constructability and toe depths, designers risk assessments, obtaining all statutory approvals and permits, and certification of the design.

Figure 12-7: Proposed extent of works for Unit E1, sub-unit I - wall renewal

12.5.9 Kuran Street to Cod Hole Park (J)

This sub-unit extends from Kuran Street, running west to Cod Hole Park, including the Cruise Maroochy jetty and Maroochy River Boat Ramp. A seawall/revetment wall is present in the form of the typical 'Bradman Avenue' design, and whilst a section at the boat ramp was recently renewed, most of the wall is in a poor to very poor condition and approaching the end of its useful design life. The management approach is coincident with the adjacent eastern sub-unit (Seaplanes to Kuran Street) where the highest scoring options are to start the design process and renew the revetment structure. The preferred approach for erosion management in this sub-unit is listed below:

- increased inspections, given the aging infrastructure. The criticality of any defects should be reviewed, and defects repaired if they would threaten the structure prior to an upgrade being completed;
- complete a new detailed design and permits package for the proposed seawall renewal. This would span from the Cruise Maroochy jetty to the Maroochy River Boat Ramp;
- renew the structure as funding allows or as failure mechanisms appear.

Concept design

Early discussions indicate that the new rock revetment would match the current Bradman Avenue wall design. New engineering designs would require a review of the existing failure mechanisms, an assessment of the existing rock armour to consider its re-use, consideration of tie-ins, alignment, constructability and toe depths, designers risk assessments, obtaining all statutory approvals and permits, and certification of the design.

Figure 12-8: Proposed extent of works for Unit E1, sub-unit J - wall renewal

12.5.10 Oyster Bank Road (K)

This sub-unit is positioned on the northern estuary banks and extends along approximately 750m of roadway adjacent to Oyster Bank Road. The existing shoreline protection consists of sections of unapproved rock armour that are not up to engineering standards and are in a poor to very poor condition. Five management options have been proposed, which considered ongoing monitoring (i.e., passive actions or minor maintenance), increased maintenance, management of sand levels via

dredging, completing a new design and approvals package for a revetment, and completion of the actual renewal. All options were taken through the high-level options appraisal where the options to begin the design process and renew the structure scored highly, given the poor state of the existing revetment. Increased maintenance also scored high, however is not believed to be sustainable over the long-term. The preferred approach for erosion management in this sub-unit is listed below:

- increased inspections, given the aging infrastructure. The criticality of any defects should be reviewed, and defects repaired if they would threaten the structure prior to an upgrade being completed.
- complete a new detailed design and permits package to renew the rock revetment;
- renew the structure.

Concept design

New engineering design would require a review of the existing failure mechanisms, an assessment of the existing rock armour to consider its re-use, consideration of tie-ins, alignment, constructability and toe depths, designers risk assessments, obtaining all statutory approvals and permits, and certification of the design. The section of road is currently very low, therefore flooding should be considered and adaptability included in designs.

Figure 12-9: Proposed extent of works for Unit E1, sub-unit K - wall renewal

13. Unit O7: Maroochydore Beach

13.1 Unit Description

The Maroochydore Beach unit extends from the Maroochy River groyne field to the Maroochydore suburb boundary at Maroubra Street. It is an open coast beach with a narrow, vegetated dune system, which protects the medium to high density infrastructure, including commercial and residential development of the Maroochydore/Mooloolaba coastal strip. It excludes the Maroochy River mouth which is part of section E1.

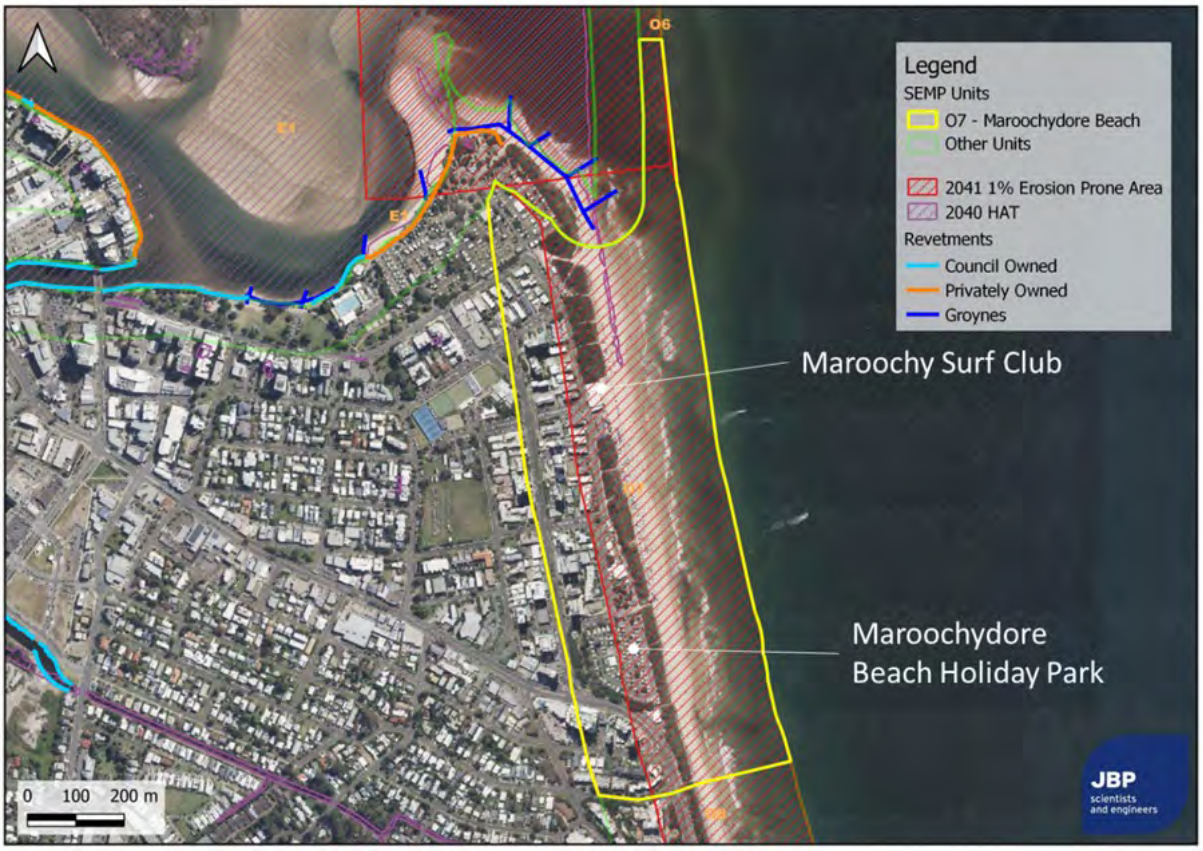

Figure 13-1: Open Coast Unit O7: Maroochydore Beach

13.2 Historic erosion management

The open coast and dune buffers have historically been the main form of coastal protection. A review of historic aerial imagery shows the beach ranges from 20 to 40m wide, with a similar width of landward vegetation. Extensive areas of coffee rock have been observed throughout the nearshore area.

The area is actively managed through beach nourishment which is used to replenish sand along the beach to improve beach amenity and provide long-term protection of the foreshore and community assets. Typically, 100,000m^3 of sand is placed every two years over Maroochydore Beach and the adjacent Alexandra Headland Beach, near Alex Skate Park (Unit O8, sub-unit A). Given the coastline length of 1700m over the two units, this represents a nourishment rate of around 30m^3/m per year. Sand is taken from the lower Maroochy River using a small cutter suction dredge and pumped through an existing 400mm pipeline that has been in place since 2013, which uses two booster pumps to push sand along the length of the beach. Dredging and sand distribution campaigns were completed in 2010, 2013,

2015, 2017, 2019, 2021, 2023 and 2024 and were supported by revegetation and fencing works to help strengthen the dunes.

In late 2022 a new sand nourishment technique was trialled at Maroochydore Beach, which used a ship-based 'rainbowing' technique to importing sand from outside the region and place it in the nearshore around 300m off the beach. Over seven days, 50,000m^3 of sand was placed in the nearshore zone with hydrographic surveys and cameras showing a net increase of 34,000m^3 of sand moving onto the upper beach profile in the four months between December 2022 to April 2023.

Planning began in 2011 to gain early approvals and complete concept designs for a coastal seawall that may protect the beachfront and assets between Alexandra Headland and Maroochydore in the future, however, no further planning has occurred recently. The seawall was designed as a buried structure beneath the dunes which is split into three sections, with two responsible government agencies, and was given approval in 2015 (OPW14/0656). The Department of Transport and Main Roads (DTMR) is responsible for sections one and two, and SCC is responsible for section three. There is no timeframe proposed for the construction of the buried seawall, with approval linked to an expected future beach width trigger to initiate actions. The trigger has been set on a distance between assets and the coastline, which requires the toe of the frontal dune to be reduced to 15m from the road boundary at Okinja Road following an erosion event. Currently the beach exceeds this width, however within the lifetime of this SEMP extreme storms may erode the beach to the required trigger point and initiate the next steps towards construction.

13.3 Review of existing structures

The main infrastructure protected by a seawall is the Surf Life Saving Club, which is not managed by Council. The beach and dune system then forms the primary defence along the unit, which are considered to be relatively healthy, benefitting from the regular beach nourishment programs with only minor signs of localised erosion observed. A review of Beach Access 150 was undertaken, which is considered suitable to allow machinery to access to the beach. Consideration should be given to upgrading a second beach access to allow an additional permanent plant access point. Possible options for this location include the Maroochy SLSC - Beach Access 146 or Beach Access 141 near the Maroochy GSC groynes which is currently used by machinery.

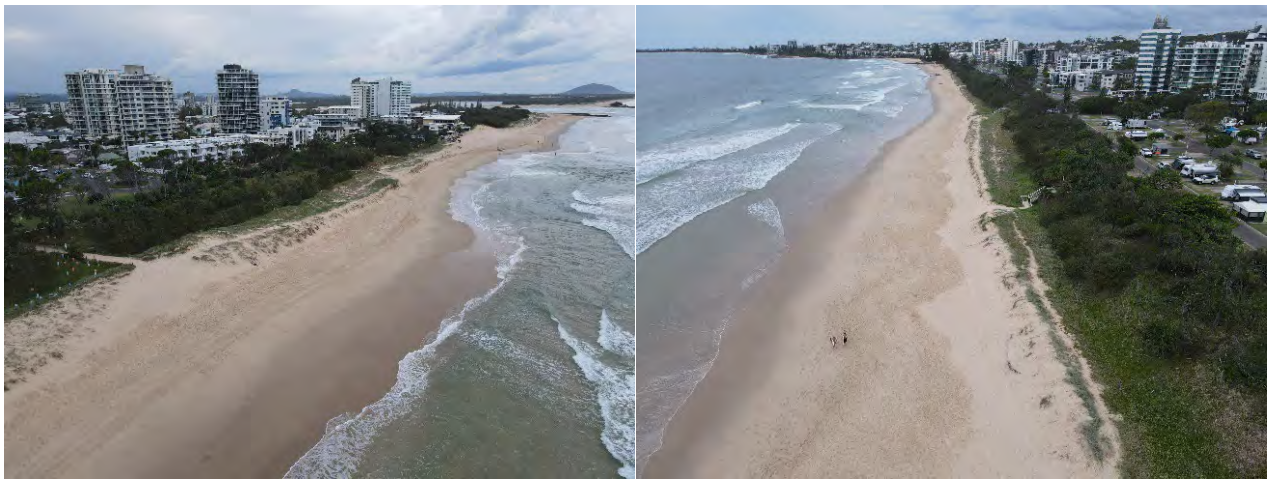

Figure 13-2: Maroochydore Beach. Left: Looking north, showing vegetation and informal access tracks. Right: Looking south, showing informal access tracks (JBP 2023)

13.4 Beach unit adaptation response

The CHAS 2041 adaptation response for this beach unit is to 'mitigate'. This has been assessed at a whole-unit scale, as shown in Table 13-1.

Table 13-1: Unit O7: Maroochydore - Basic adaptation response

Area	Monitor, maintain and repair	Review through Options Assessment
Open Coast	Y	Y

13.5 Management approach

13.5.1 Open Coast

Six management options have been proposed, considering monitoring, nourishment, and structural approaches. The evaluation of option feasibility, viability, and acceptability removed one option; beach nourishment using sand from an inland source. The high-level options appraisal of viable options reviewed the relative economic, environmental, and social merits. The highest scoring option is continued beach nourishment via the pipeline, which is tried and tested, has well documented performance, and is relatively economical given the established pipeline infrastructure. A review of the required nourishment schedule and volume is also recommended in year 5 of this SEMP (2028-29). Other high scoring options include an additional ship-based nearshore nourishment campaign in the future. The lowest scoring options are the monitoring ('do nothing') option which has low social scores. Whilst construction of the Alex Seawall would not be permitted presently due to wide beach widths exceeding the agreed construction trigger, it remains a viable option over the 10-year lifetime of the SEMP if erosion risks escalate. The preferred approach for erosion management in this sub-unit is listed below:

- continued bi-annual beach nourishment, using the existing pipeline infrastructure. Approximately 100,000m^3 of sand is to be placed every two years over Maroochydore Beach and the adjacent Alexandra Headland Beach (Unit O8, sub-unit A), with the schedule and volume of nourishment to be reviewed in the fifth year of this SEMP. Sand extraction to continue from the Maroochy River under permit OPW17/0114.
- review of the existing Coastal Process Study that informed the initial approval;
- upgrades to the beach accessways to increase plant access to the beach, which will support spreading of nourished sand and sand profiling as required;
- consideration of new nearshore nourishment campaigns;
- continued monitoring to capture dune, beach, and coastline width information;
- sand profiling if erosion is threatening assets or infrastructure near the dune systems, and if suitable sand volumes are available within the beach;
- construction of the Alex Seawall if triggers are met.

14. Unit O8: Alexandra Headland Beach

14.1 Unit Description

This open coast beach unit extends from Maroubra Street to the Alexandra Headland rocky foreshore adjacent to Boolarong Crescent. It includes sections of open coast, a seawall, and the southern corner of the beach which includes dunes and a short seawall.

The northern section extends to Maroochydore Beach (Unit O7) and consists of an open coast beach and narrow vegetated dune system which provides protection to the parkland and Alexandra Parade. An approximately 250m long seawall protects the Alexandra Headland Surf Lifesaving Club, Alex Skate Park, and adjacent parks, before returning to a vegetated dune along the short section of Alexandra Headland Beach. To the south of the beach is a short seawall that provides erosion protection to part of Alexandra Parade, which includes a stormwater drain which discharges across the beach.

Figure 14-1: Open Coast Unit O8: Alexandra Headland Beach

14.2 Historic erosion management

The northern section of open coast and dunes is actively managed through beach nourishment which is used to replenish sand along the beach to improve beach amenity and provide long-term protection of the foreshore and community assets. Typically, 100,000m^3 of sand is placed every two years over Maroochydore Beach (Unit O7) and the northern extent of Alexandra Headland beach approximately to the skate park (Unit O8, sub-unit A). Sand is taken from the lower Maroochy River using a small cutter suction dredge and pumped through an existing 400mm pipeline that has been in place since 2013, which uses two booster pumps to push sand to the northern parts of the beach; however, it does not extend past the seawall section at the Alexandra Headland Surf Lifesaving Club.

Few details are available on the approximately 250m long seawall that protects Alex Surf Club and Skate Park, and the adjacent parkland. It is a grouted rock seawall with a near-vertical seaward face, which has shallow foundations into sand or sitting on a coffee rock shelf. A formal structure can be observed in aerial imagery at least as early as 1968, however the form and material are unknown. The northernmost 30m of the structure was constructed in late 2015 as an extension to the original wall. Similarly, historic aerial images show a formalised structure supporting Alexandra Parade where it passes close to the coast along the southern extent of the unit.

Planning began in 2011 to gain early approvals and complete concept designs for a coastal seawall that may protect the beachfront and assets between Alexandra Headland and Maroochydore in the future, however no further planning has occurred recently. The seawall was designed as a buried structure beneath the dunes which is split into three sections, with two responsible government agencies, and was given approval in 2015 (OPW14/0656). The Department of Transport and Main Roads (DTMR) is responsible for sections one and two, and SCC is responsible for section three. There is no timeframe proposed for the construction of the buried seawall, with approval linked to an expected future beach width trigger to initiate actions. The trigger has been set on a distance between assets and the coastline, which requires the toe of the frontal dune to be reduced to 15m from the road boundary at Okinja Road following an erosion event. Currently the beach exceeds this width, however within the lifetime of this SEMP extreme storms may erode the beach to the required trigger point and initiate the next steps towards construction.

Review of existing structures

Both seawalls have been subject to a visual assessment to confirm their current condition. The general condition of the main seawall is 4 (poor) with an estimated residual life of 15 years, however the newer northernmost section is in grade 2 (good) condition. It has been partially renewed through ongoing maintenance activities, which are now needed over the remainder of the wall. The primary defect is scouring at the toe, which is leading to the loss of fines underneath the structure and cavities within the wall due to a loss of mortar (See Figure 14.-2). Inspections of the small southern seawall at Alexandra Headland Beach suggest it is also nearing the end of its useful remaining life within the SEMP period.

Figure 14-2: Northern seawall at Alexandra Headland Beach. Left: Skatepark and SLSC looking south. Right: Scouring underneath the seawall (JBP 2023)

Beach unit adaptation response

The CHAS 2041 adaptation response for this beach unit is to 'Mitigate'. This has been assessed at a sub-unit level for four zones, as shown in Table 4-1. The management approach for each zone has been subject to further evaluation.

Table 14-1: Unit O8, sub-unit C -Alexandra Headland Beach - Basic adaptation response

Area	Monitor, maintain and repair	Review through Options Assessment
South Maroochy Beach (A)	Y	Y
Surf Club Seawall (B)	Y	Y
Seawall to Alex Corner (C)	Y	Y
Alex Corner (D)	Y	Y

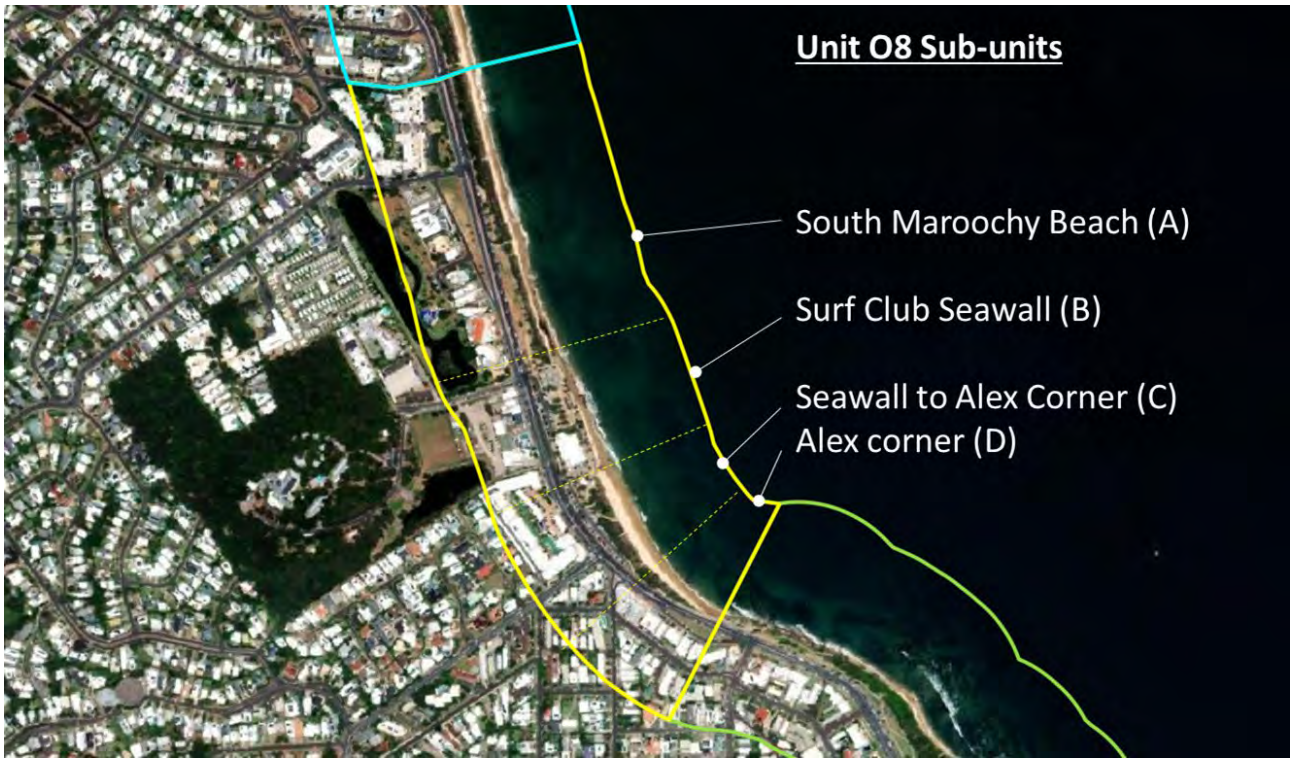

Figure 14-3: Open Coast Unit O8: Alexandra Headland Beach, sub-units

14.5 Management approach

14.5.1 South Maroochy Beach (A)

Six management options have been proposed, considering monitoring, nourishment, and structural approaches. The evaluation of option feasibility, viability, and acceptability removed one option; beach nourishment using sand from an inland source. The high-level options appraisal of viable options reviewed the relative economic, environmental, and social merits. The highest scoring management option is the use of beach nourishment via an extended pipeline from Maroochydore Beach. This approach scores high economically and is expected to perform well given the success of nourishment of the adjacent coastline to the north. By extending the pipeline, beach nourishment can then be

undertaken over a greater placement area while causing less disturbance to the public and dunes during future nourishment campaigns. Other high scoring options include an additional ship-based nearshore nourishment campaign in the future if a sustainable offshore source can be identified. Sand profiling is then the preferred approach to redistribute local sand reserves all the way to Alex Corner when needed. The preferred approach for erosion management in this sub-unit is listed below:

- complete detailed design and planning approvals for an extended sand nourishment pipeline and associated accessways;
- construct the extended pipeline and continue bi-annual beach nourishment (currently 100,000m^3 every two years) under existing permit EA0000800 which covers up to 1,000,000t (625,000m^3) annually;
- consideration of new nearshore nourishment campaigns;
- continued monitoring to capture dune, beach, and coastline width information;
- sand profiling should be considered if erosion is threatening assets or infrastructure near the dune systems, and if suitable sand volumes are available within the beach compartment to scrape and shift to the target erosion risk area.

Sand pipeline extension and future nourishment

New engineering designs and planning approval are required for the pipeline extension. This would require a design for the pipeline extension, including additional booster pump locations, designated outlets, designers risk assessments, obtaining all statutory approvals and permits, and certification of the design. Upgrades would be required to beach accessways to allow plant access to the beach during nourishment periods to allow the distribution of sand. The permits and approval process would need to consider the position and disturbance zone of the pipeline and access works.

A review of the nourishment schedule and volume is to be completed in the fifth year of this SEMP.

14.5.2 Surf Club Seawall (B)

Nine management options have been proposed, considering monitoring, nourishment, and structural approaches. The evaluation of option feasibility, viability and acceptability removed two options; beach nourishment using sand from an inland source and the renewal of the seawall; the latter not yet considered viable given its remaining life is expected to extend throughout the lifetime of the SEMP.

The high-level options appraisal of viable options identified the two highest scoring options to be the extension of the beach nourishment pipeline from Maroochydore Beach and the completion of detailed designs and approvals to support the eventual renewal of the seawall, given the poor state of the existing structure. Other high scoring options include beach sand profiling to give additional cover to the seawall and increasing its monitoring and maintenance to reduce the risk of sudden failure. The preferred approach for erosion management in this sub-unit is listed below:

- complete detailed design and planning approvals for an extended sand nourishment pipeline and associated accessways (see Section 14.5.1);
- increase sand volumes extracted from Maroochy Estuary for nourishment. Given northern beach sections are nourished with a rate of around 30m^3/m per year, an additional volume of 6750m^3 would be required per year. If bi-annual nourishment is used, this requires an additional 13,500m^3 of

sand nourishment. This will not trigger amendments to the existing Maroochy River extraction permit EA0000800 which covers up to 1,000,000t (625,000m^3) annually.

- sand profiling to cover the structure toe when suitable sand volumes are available within the beach compartment;
- complete a new detailed design and permits package for the proposed seawall renewal. This would allow the new construction to be scheduled into a future budget, anticipated to be beyond the life of this SEMP, however it would help guide any emergency work in case of sudden failure.

Concept design for seawall

New engineering design would require a review of the existing failure mechanisms, an assessment of the existing rock armour to consider its re-use, consideration of tie-ins and toe depths, designers risk assessments, obtaining all statutory approvals and permits, and certification of the design. The newer northernmost 30m section of the seawall would likely remain and be incorporated into the new design. The engineering plans are to include details on the existing structure, alignment, tie-ins, materials, and constructability.

Figure 14-4: Proposed seawall extent for Unit O8, sub-unit B

14.5.3 Seawall to Alex Corner (C)

This section is the sandy beach and dune system that spans between the surf club to the Alex Corner seawall. Seven management options have been proposed, considering monitoring, nourishment, and structural approaches. The evaluation of option feasibility, viability and acceptability removed three options; beach nourishment using sand from an inland source due to sediment characteristics, targeted nourishment via ship (i.e., nearshore nourishment) due to the low accuracy in controlling where the sand

will be transported, and the construction of a seawall; the latter not yet considered viable given the wide beach and dune system.

The high-level options appraisal of viable options identified the highest scoring option to be managing the sand levels within the southern beach via sand profiling. This would be supported by regular sand nourishment via a pipeline to the northern beaches, which could then be shifted mechanically to the south. The extension of the pipeline all the way into this beach unit was not considered economical and scored poorly.

14.5.4 Alex Corner (D)

Nine management options have been proposed, considering monitoring, nourishment, and structural approaches. The evaluation of feasibility removed two options; beach nourishment using sand from an inland source and nourishment via ship, the latter not expected to have a high performance in the sheltered corner. The high-level options appraisal of viable options identified the highest scoring options to be management of sand levels via sand profiling to provide protection to the existing seawall toe (linked with Unit O8, sub-unit C), whilst a new detailed design and permits package is developed for the renewal of the seawall, which is then anticipated to occur within the SEMP lifetime. The preferred approach for erosion management in this sub-unit is listed below:

- sand profiling to cover the structure toe when suitable sand volumes are available within the beach compartment;
- complete a new detailed design and permits package for the proposed seawall renewal. This is a highly popular and well used section of Alexandra Headland Beach, and any new designs will need to be cognisant of the community values;
- renewal.

Concept design

The design is likely to require a degree of landscape architecture/placemaking, given the high use location. The engineering elements will require an assessment of the existing structure to consider its demolition or reuse, consideration of tie-ins (the works may tie into the adjacent unit) and connections with street drainage, designers risk assessments, obtaining all statutory approvals and permits, and certification of the design. The engineering plans are to include details on the existing structure, alignment, tie-ins, materials, and constructability.

Figure 14-5: Proposed extent of design for Unit O8, sub-unit D - wall renewal

Figure 14-6: Looking north from the Alex Corner seawall (SCC 2024)

15. Unit H2: Alexandra Headland

15.1 Unit Description

The Alexandra Headland unit extends from the northern extent of the Alexandra Headland rocky foreshore adjacent to Boolarong Crescent, south to the rock outcrop adjacent to Beach Terrace Mooloolaba (Beach Access 171). The rocky shoreline includes small sandy beaches and a steep headland with important natural ecosystems. The CHAS 2041 adaptation response for this headland unit is to 'Monitor'. Management actions will follow the coast-wide actions outlined in Section 3.

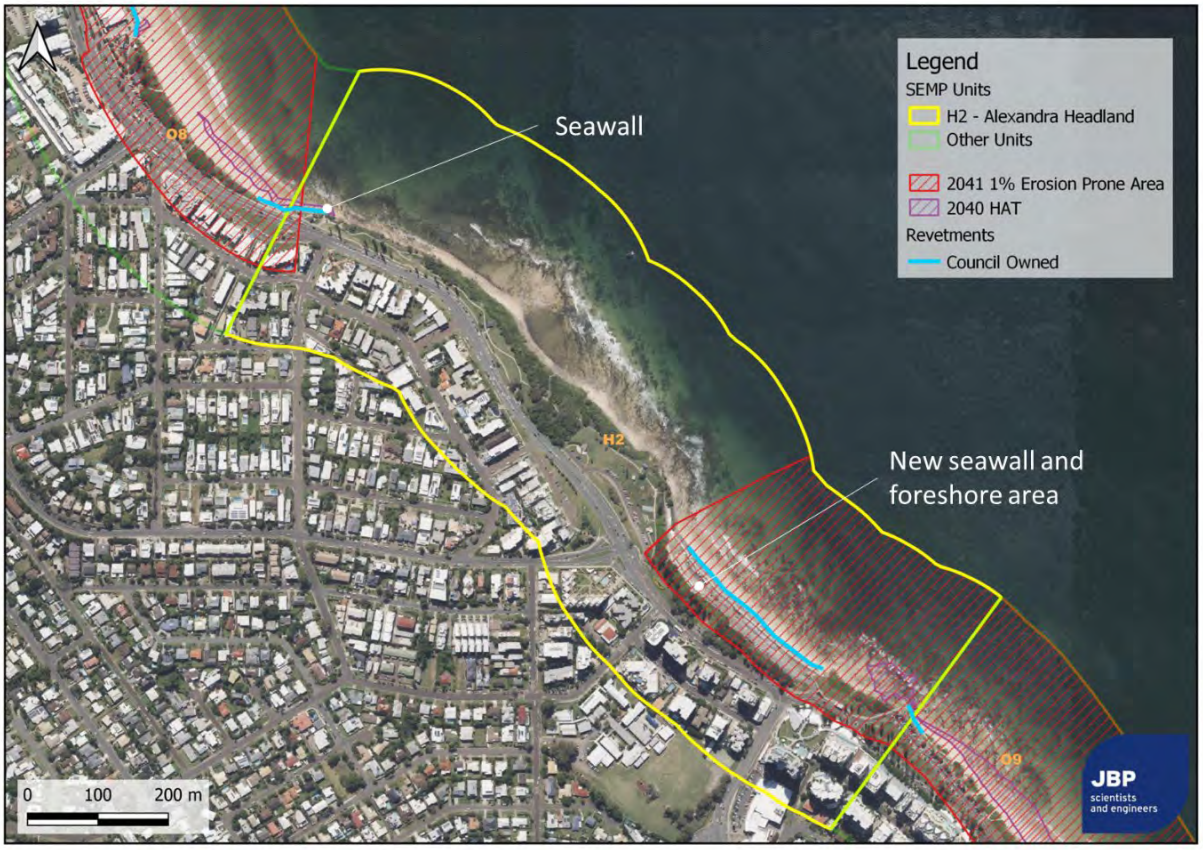

Figure 15-1: Headland Unit H2: Alexandra Headland

Figure 15-2: Drone images of Alexandra Headland (JBP 2023)

16. Unit O9: Mooloolaba Beach

16.1 Unit Description

The Mooloolaba Beach unit extends from the rocky outcrop at the northern end of Beach Terrace (Beach Access 171) to the Mooloolah River mouth. The north-western end of the unit is exposed to higher wave energy, although has some protection due to the presence of nearshore rocky reefs. This end of the unit extends past Mooloolaba Esplanade, Loo with a View, the Mooloolaba Surf Club, and the Mooloolaba Lifeguard Tower. The area has been the focus of the 'Mooloolaba Foreshore Revitalisation Project' which has reviewed coastal erosion risks alongside wider placemaking opportunities. The centre and south-eastern coastline returns to a vegetated dune system with buried coastal protection which extends towards the Mooloolaba Spit, ending at the Mooloolah River western training wall.

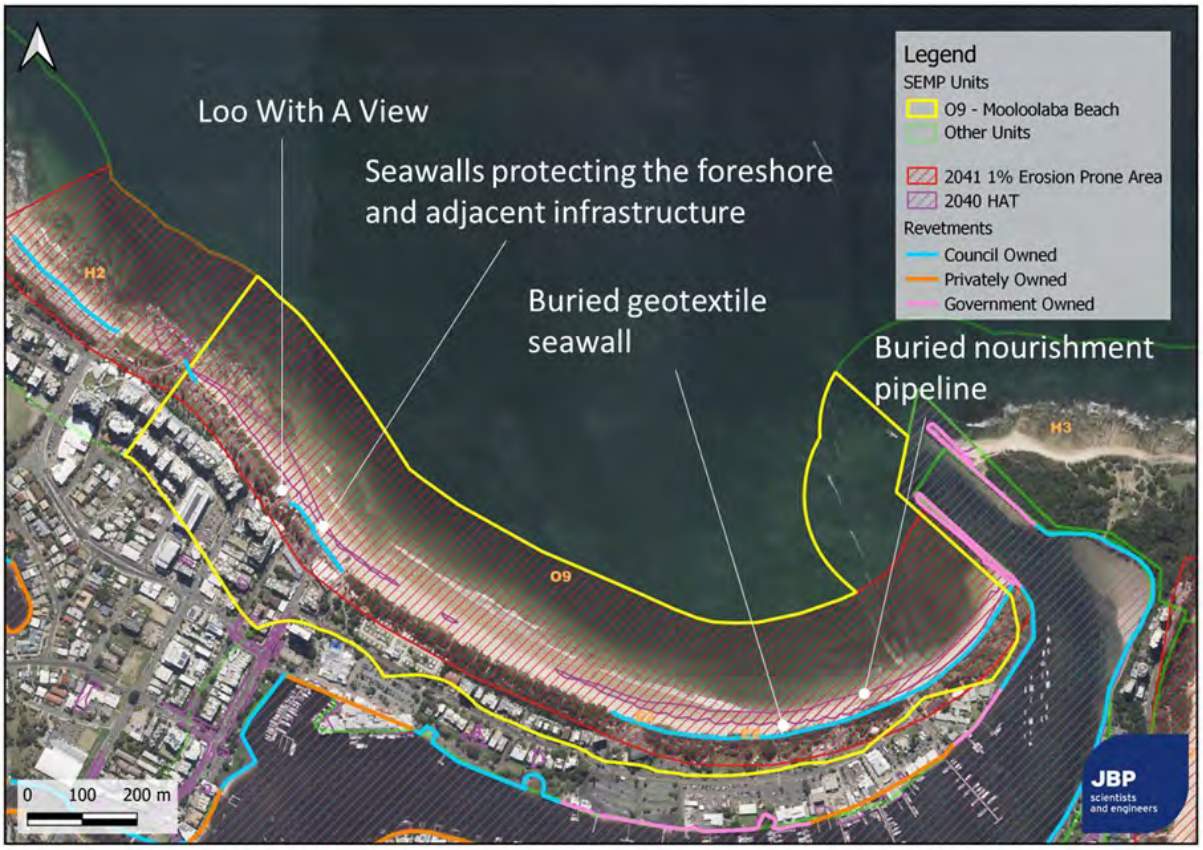

Figure 16-1: Open Coast Unit O9: Mooloolaba Beach

16.2 Historic erosion management

Within the north-western extent of the unit, the Central Meeting Precinct is currently the focus of the 'Mooloolaba Foreshore Revitalisation Project'. This will renew the existing foreshore protection which is currently a combination of a near vertical structure and rock revetment, with a crest level extending above 4m AHD. This existing infrastructure is approaching 30 years old and was subject to damage in 2013 by ex-tropical cyclone Oswald.

At the south-eastern extent of the unit, the Mooloolaba harbour and entrance training walls were built in the late 1960s. Ongoing sand management is required to maintain a navigable entrance. A local contractor dredges the channel entrance using a small cutter suction dredge. A permanent pipeline was installed in 2013 along the eastern breakwater wall and runs across the channel anchored on the

riverbed. The dredged sand is pumped onto Mooloolaba Beach by the pipeline that runs under the beach. Annual dredge/nourishment volumes vary, however are of the order 30,000m^3/year. A buried GSC seawall was constructed in 2010 between Urunga Esplanade and Beach Access 193. This was extended in 2015 from Beach Access 193 to the Mooloolaba harbour training wall to provide a continuous line of defence along the south-eastern parts of the beach unit.

16.3 Review of existing structures

The south-eastern GSC wall is a buried structure and was not able to be inspected. The seawalls throughout the Central Meeting Precinct are in the process of being renewed and were therefore not subject to structural condition assessments within this SEMP update. There is currently an access ramp to the south of the SLSC (Beach Access 179). This ramp is not compliant with the Disability Discrimination Act 1992 (DDA), and although currently used for machinery access, does not extend low enough to be a permanent guaranteed access point for maintenance. Machinery can also access the southern end of the beach at Beach Access 195 when sand levels are coving the stepped geotextile wall, but this is similarly not a permanent or guaranteed access point. Consideration should be given to upgrading a beach access to ensure a guaranteed plant access point. Beach Access 195 is a possible location for this upgrade.

16.4 Beach unit adaptation response

The CHAS 2041 adaptation response for this beach unit is to 'Mitigate'. This has been assessed at a sub-unit level for three zones, as shown in Table 16-1. The management approach for three zones have been subject to further evaluation.

Table 16-1: Open Coast Unit O9: Mooloolaba Beach – Basic adaptation response

Area	Monitor, maintain and repair	Review through Options Assessment
Northern Frontage (A)	Y	Subject to Concurrent Revitalisation Project
Centre Frontage (B)	Y	Y
Eastern Frontage (C)	Y	Y

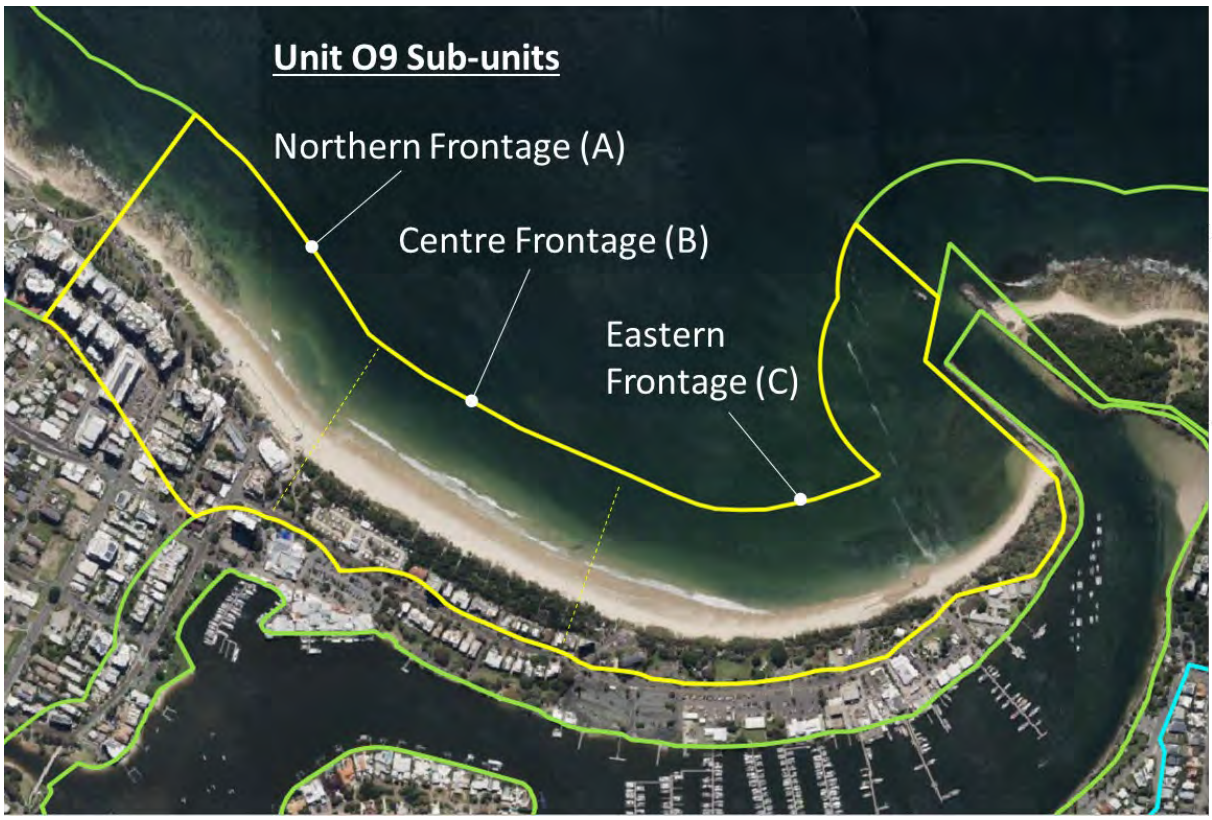

Figure 16-2: Open Coast Unit O9: Mooloolaba Beach, sub-units

16.5 Management approach

16.5.1 Northern Frontage (A)

The northern frontage area is the focus of detailed coastal processes studies and coastal engineering designs that are being incorporated into the Central Meeting Precinct. This includes structures designed to mitigate against erosion within the southern parklands and central parklands renewals. In association with these projects is the need to upgrade a new beach access ramp south of the Mooloolaba Lifeguard Tower.

16.5.2 Centre Frontage (B)

Eight management options have been proposed for the central beach unit, considering monitoring, nourishment, and structural approaches. The evaluation of feasibility removed one option; beach nourishment using sand from an inland source. The high-level options appraisal of viable options identified the three highest scoring options to be a review of the current nourishment permit to include the entire beach, beach nourishment via an extended pipeline, and the new detailed design and permits package for an extended seawall which would be tied to a beach trigger width. The preferred approach for erosion management in this sub-unit is listed below:

- review and development of dredging and nourishment permits. The dredging permit is intended to give Council approval to conduct dredging of the estuary sand shoals; given current extraction is based on DTMR permits. Additionally, the review would investigate the existing placement permits along the beach, including any required extensions to allow nourishment further west along the entirety of Mooloolaba Beach;

- continue to nourish along the beach using existing sand sources. In 2023 a nourishment campaign placed 15,000m^3 of sand along the beach to the Surf Life Saving tower. However, operational estimates consider this volume may need to be repeated annually, and even increased to 30,000 m^3 in the SEMP lifetime;
- complete a new detailed design and permits package for a GSC seawall extension between the existing GSC wall and the proposed Central Meeting Precinct renewal. This would use a trigger-based approach to initiate the construction process when the erosion scarp is within 10m of critical infrastructure. This would allow the new construction to be scheduled into projected future budget, anticipated to be beyond the life of this SEMP. The designs would also help guide any emergency work in case of sudden extreme erosion in the next ten years.

Concept designs for GSC seawall extension

New engineering design would consider tie-ins, crest levels and toe depths, designers risk assessments, obtaining all statutory approvals and permits, and certification of the design. The engineering plans are to include details on the existing structure, alignment, tie-ins, materials, and constructability.

Figure 16-3: Concept design extent for Unit O9, sub-unit B - GSC seawall extension

16.5.3 Eastern Frontage (C)

Six management options have been proposed, considering monitoring, nourishment, and structural approaches. Beach nourishment using sand from an inland source is not considered feasible, and the viability evaluation removed the option of renewing the existing GSC wall given it is anticipated to have a useful remaining life beyond the lifetime of the SEMP (although as a buried structure its condition has not been inspected in detail). The high-level options appraisal identified the continued beach nourishment using the existing pipeline to be the highest scoring option. This approach is considered an

economical, successful beach management approach that uses the existing pipeline and would require a beach access upgrade to ensure guaranteed plant access. The preferred approach for erosion management in this sub-unit is listed below. This is an anticipated action if erosion risks emerge during the SEMP period:

- undertake beach nourishment, using the existing pipeline infrastructure (see Section 16.5.2);
- upgrades to a beach accessway (e.g., BA195) to ensure guaranteed plant access to the beach, which will support spreading of nourished sand and sand profiling.

17. Unit E2: Mooloolaba River Estuary

17.1 Unit Description

The Mooloolaba River Estuary unit encompasses the lower Maroochy River estuary main channel, extending from the river mouth training wall to the Nicklin Way bridge crossing the river. The unit features artificial waterways, which are beyond the scope of this assessment. The CHAS 2041 adaptation response for this estuary unit is to 'Mitigate'. Management actions will follow the coast-wide actions outlined in Section 3.

Figure 17-1: Estuary Unit E2: Mooloolaba River Estuary

Figure 17-2: Mooloolaba Estuary (SCC website, "Canals")

18. Unit H3: Point Cartwright

18.1 Unit Description

The Point Cartwright unit covers the extent of the Point Cartwright headland, from the Mooloolaba River mouth to the Point Cartwright carpark at the northern end of Pacific Boulevard. The headland shoreline consists of rocky intertidal shore and pockets of sandy beach. Beyond the foreshore, the east section of the headland is formed of rock bed and cliff. The CHAS 2041 adaptation response for this headland unit is to 'Mitigate'. Management actions will follow the coast-wide actions outlined in Section 3.

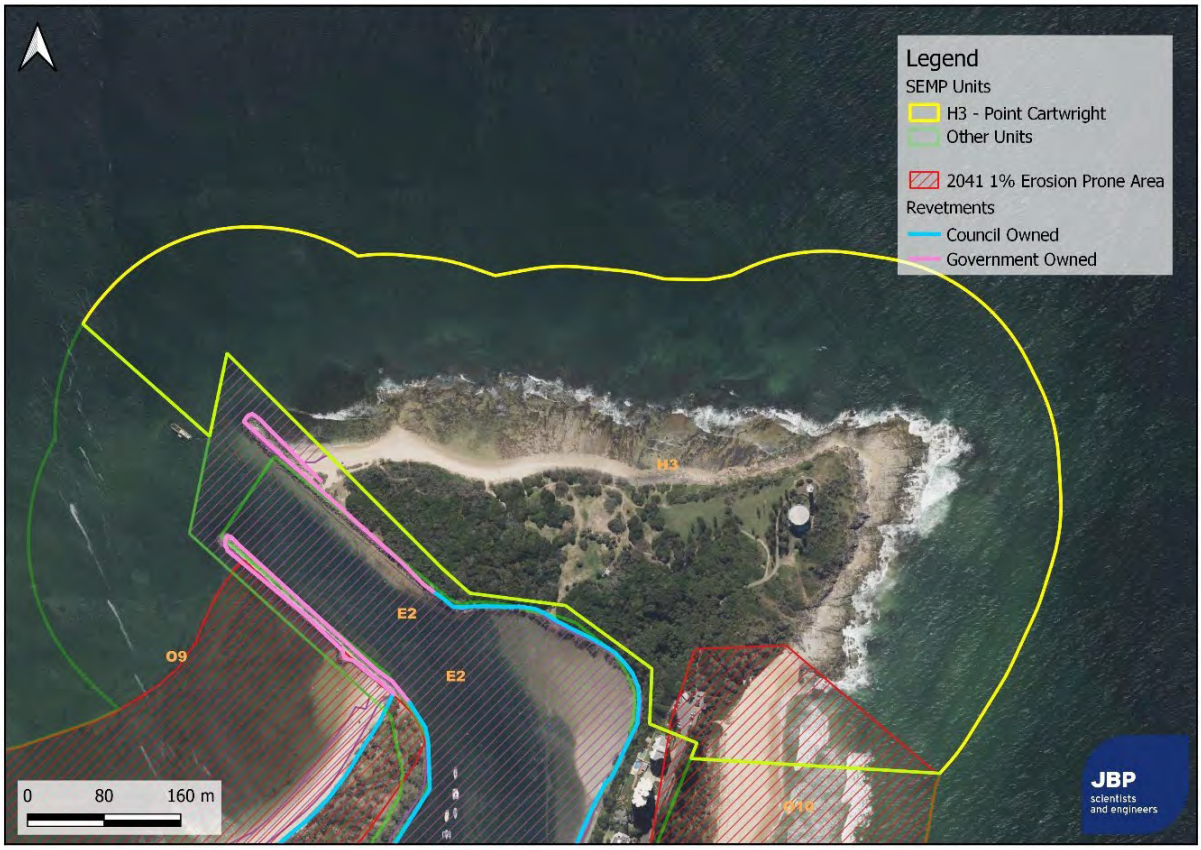

Figure 18-1: Headland Unit H3: Point Cartwright

Figure 18-2: Point Cartwright rocky intertidal foreshore and headland (SCC 2024)

19. Unit O10: Buddina Beach

19.1 Unit Description

The Buddina Beach unit extends from the southern end of Point Cartwright (Point Cartwright carpark at the northern end of Pacific Boulevard) to the Buddina suburb southern boundary at Koorin Drive. It runs adjacent to Pacific Boulevard, which has a relatively narrow beach and dune system that is wider in the north than the south; the latter reducing to around 25-30m near Maloga Street. The unit includes the Kawana Surf Club, Buddina Lifeguard Tower, and surrounding parklands and carpark.

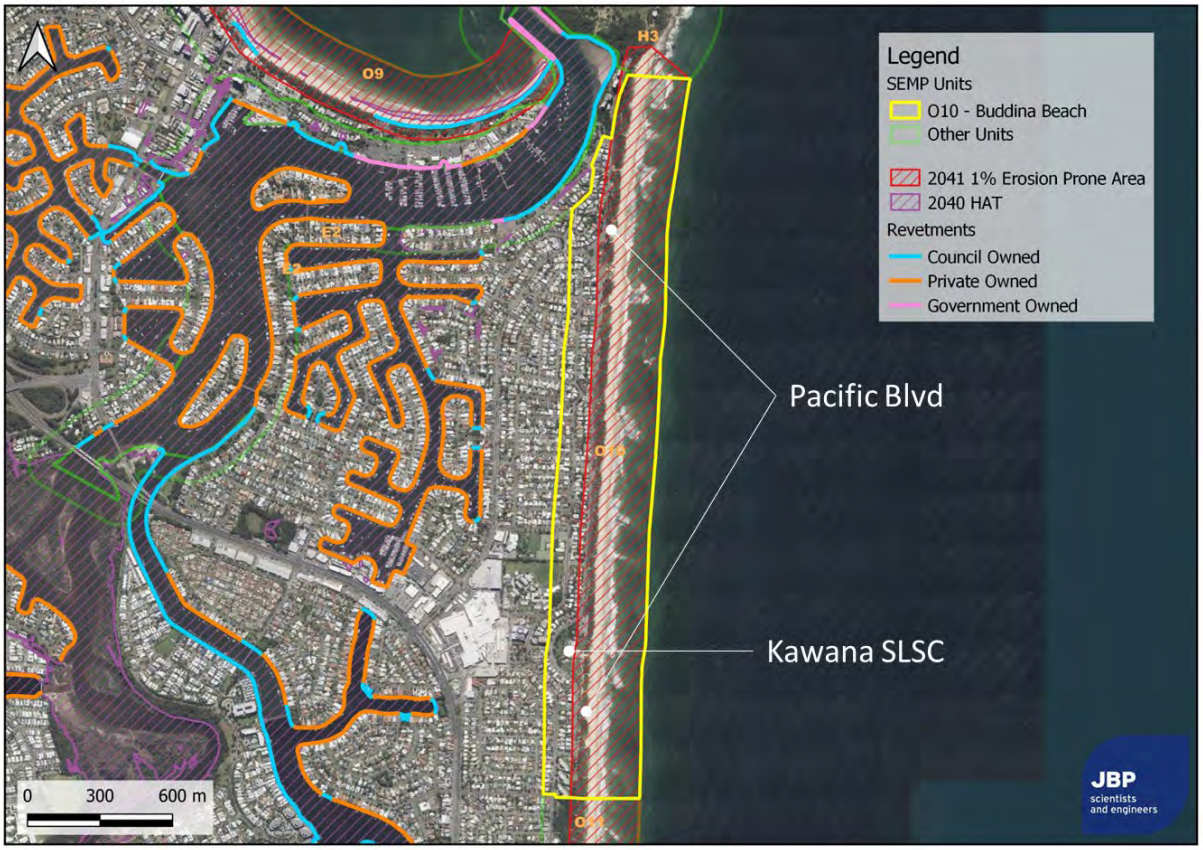

Figure 19-1: Open Coast Unit O10: Buddina Beach

19.2 Historic erosion management

Development along the coastline commenced in the 1960s during which time sections of the natural dune system were altered and often used as a source of fill for adjacent development. No formal coastal defences have been constructed along the open coast with the beach largely unmanaged. The majority of Pacific Boulevard and a large number of houses fall within the 2041 EPA. The Kawana Surf Club is the focus of a new Special Area Adaptation Plan (SAAP), delivered externally to this SEMP.

19.3 Review of existing shoreline

No formal erosion protection structures exist along the unit, with the only Council assets being beach access staircases. A general beach inspection was undertaken which shows the coastline to appear relatively stable, with localised erosion zones due to informal walking tracks. Temporary wash overs or breakthroughs of the dunes are known to have occurred in the past near Gulai Street in the north of the unit, and north of the Kawana SLSC in the south of the unit. The wave climate in this unit is relatively

severe compared to other management units and has the potential to cause rapid erosion to the natural dune system during extreme events.

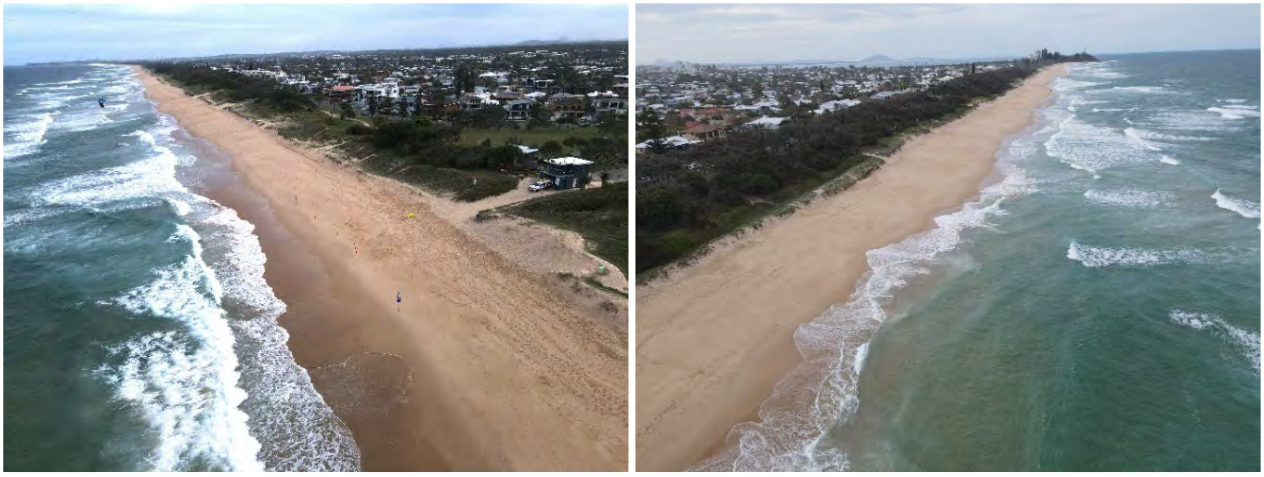

Figure 19-2: Buddina Beach. Left: South past the Kawana Surf Club. Right: Looking north (JBP 2023)

19.4 Beach unit adaptation response

The CHAS 2041 adaptation response for this beach unit is to 'Mitigate'. This has been assessed at a sub-unit level for two zones, as shown in Table 19-1.

Table 19-1: Open Coast Unit O10: Buddina Beach - Basic adaptation response

Area	Monitor, maintain and repair	Review through Options Assessment
Open Coast	Y	Y
Kawana Surf Club	Y	Subject to separate SAAP

19.5 Management approach

19.5.1 Open Coast

Seven management options have been proposed, considering monitoring, nourishment, groynes, and other structural approaches. An evaluation of feasibility removed one option; beach nourishment from an inland source. A high-level appraisal considered nearshore nourishment via ship to be the highest scoring option, given its similar geographical setting to the Maroochydore Nourishment Trial area. Other high scoring options were sand profiling, which could help position the nourished sand along the beach, and an investigation into a groyne field or terminal groyne, which would help retain the nourished sand. A sand nourishment or backpassing pipeline had a poor economic score due to the required length to a sand source, and the construction of a hard defence was also deemed a costly option considering the existing dunes offer a degree of protection. Continued monitoring under a 'do nothing' approach was not considered to be a favourable option in terms of social benefits, given the public assets at risk of future erosion. The preferred approach for erosion management in this sub-unit is listed below:

- begin discussions with the Department of Transport and Main Roads on the future management of the area, as any nourishment along Buddina Beach is likely to interact with the requirements to dredge the Mooloolah River mouth. This may include an investigation of the likely downdrift impacts

of nourishment, and approaches to stabilise the nourished sand through a groyne field or terminal structure;

- development of a nourishment permit and plan. This would build on from the recommendations made in the SEMP Volume 1 report on identifying a new offshore sand source. Additional steps would require placement permits and determining the required nourishment volume and frequency.
- Following development of the permits and plans, nourishment could occur as needed.

20. Unit O11: Warana Beach

20.1 Unit Description

The Warana Beach unit extends from the Warana suburb north boundary at Koorin Drive, to the Warana suburb south boundary at Wyanda Drive. A relatively wide and mostly intact dune system buffers the public and private assets along Oceanic Drive. The CHAS 2041 adaptation response for this beach unit is to 'Monitor'. Management actions will follow the coast-wide actions outlined in Section 3.

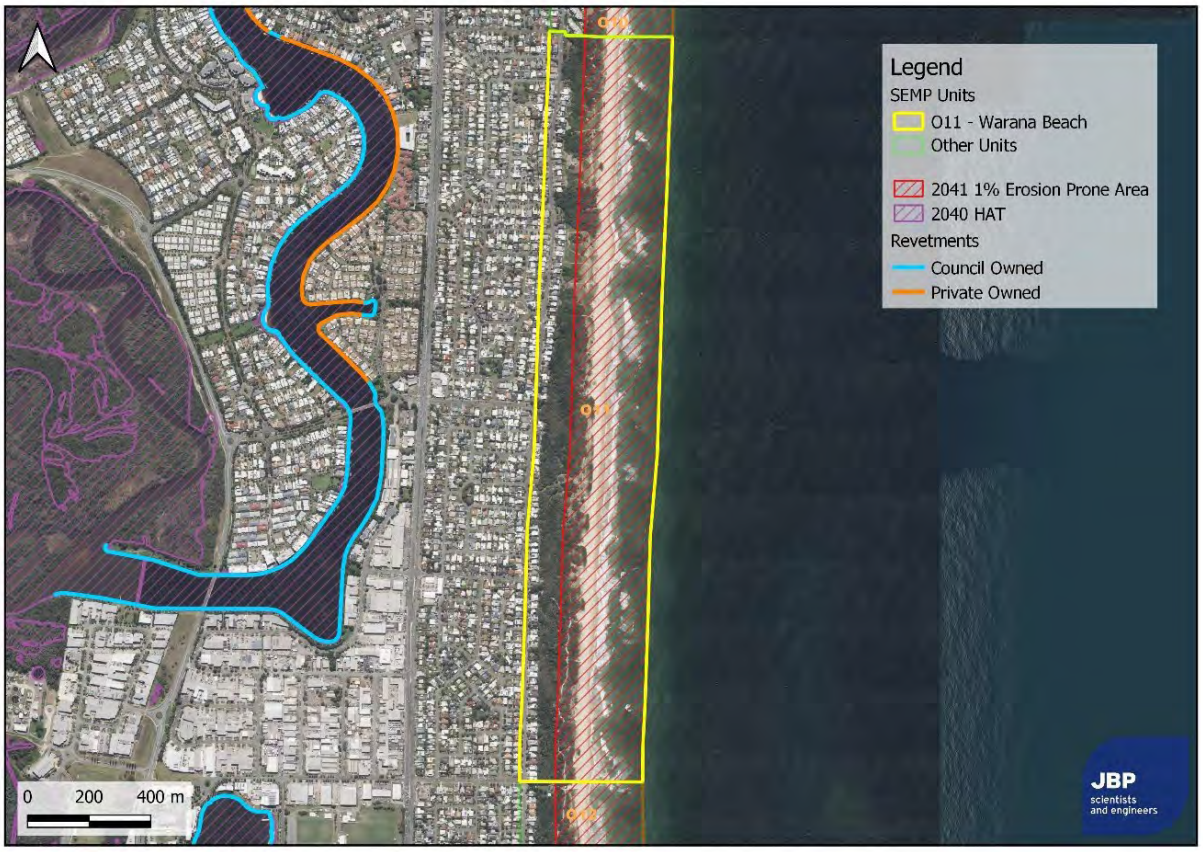

Figure 20-1: Open Coast Beach Unit O11: Warana Beach

Figure 20-2: Looking north along Warana Beach from Beach Access 236 (SCC 2024)

21. Unit O12: Bokarina Beach

21.1 Unit Description

The Bokarina Beach unit extends from the Bokarina suburb northern boundary at Wyanda Drive, south to the Bokarina suburb southern boundary at Wurley Drive. A relatively wide and intact dune system buffers public and private assets. The CHAS 2041 adaptation response for this beach unit is to 'Monitor'. Management actions will follow the coast-wide actions outlined in Section 3.

Figure 21-1: Open Coast Beach Unit O12: Bokarina Beach

Figure 21-2: Looking north along Bokarina Beach from Beach Access 245 (SCC 2024)

22. Unit O13: Wurtulla Beach

22.1 Unit Description

The Wurtulla Beach unit extends from the Wurtulla suburb northern boundary at Wurley Drive, to the Wurtulla suburb southern boundary at the mouth of Currimundi Creek. A relatively wide and intact dune system buffers public and private assets. The CHAS 2041 adaptation response for this beach unit is to 'Monitor'. Management actions will follow the coast-wide actions outlined in Section 3.

Figure 22-1: Open Coast Beach Unit O13: Wurtulla Beach

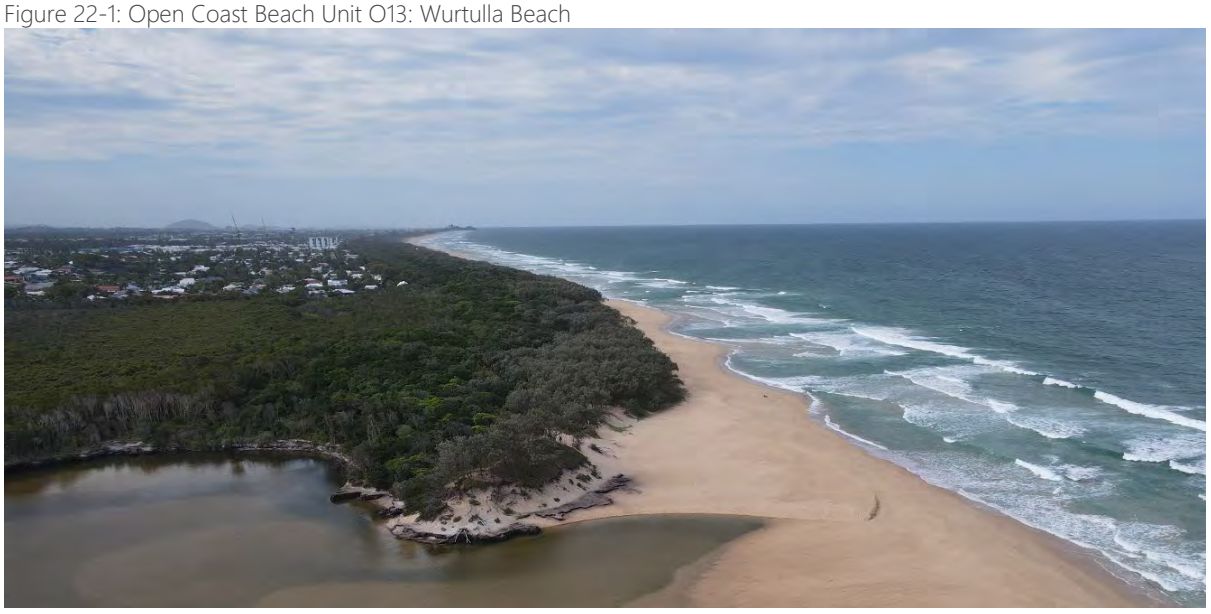

Figure 22-2: Looking north along Wurtulla Beach from Currimundi Creek (JBP 2023)

23. Unit L2: Currimundi Creek

23.1 Unit Description

This unit extends throughout the Currimundi Creek lagoon, from the mouth into the northern creek arm ending at Birtinya Boulevard and the southern creek arm ending in Leacys Bushland Reserve. At the creek mouth the unit includes the assets and infrastructure surrounding Cliff Hargreaves Park and Westaway Parade, which includes a café and commercial buildings, carpark, and amenities block. The unit generally spans the first row of waterfront properties around the lake, which includes the southern waterfront properties along Cooper Street, Hume Parade and the northern end of Watson Street. Watson Street has been identified within the CHAS as a case study site for a coordinated erosion strategy that considers public and private assets, which is being investigated through a Special Area Adaptation Plan (SAAP). The unit does not consider the northern inland canals of Lake Kawana.

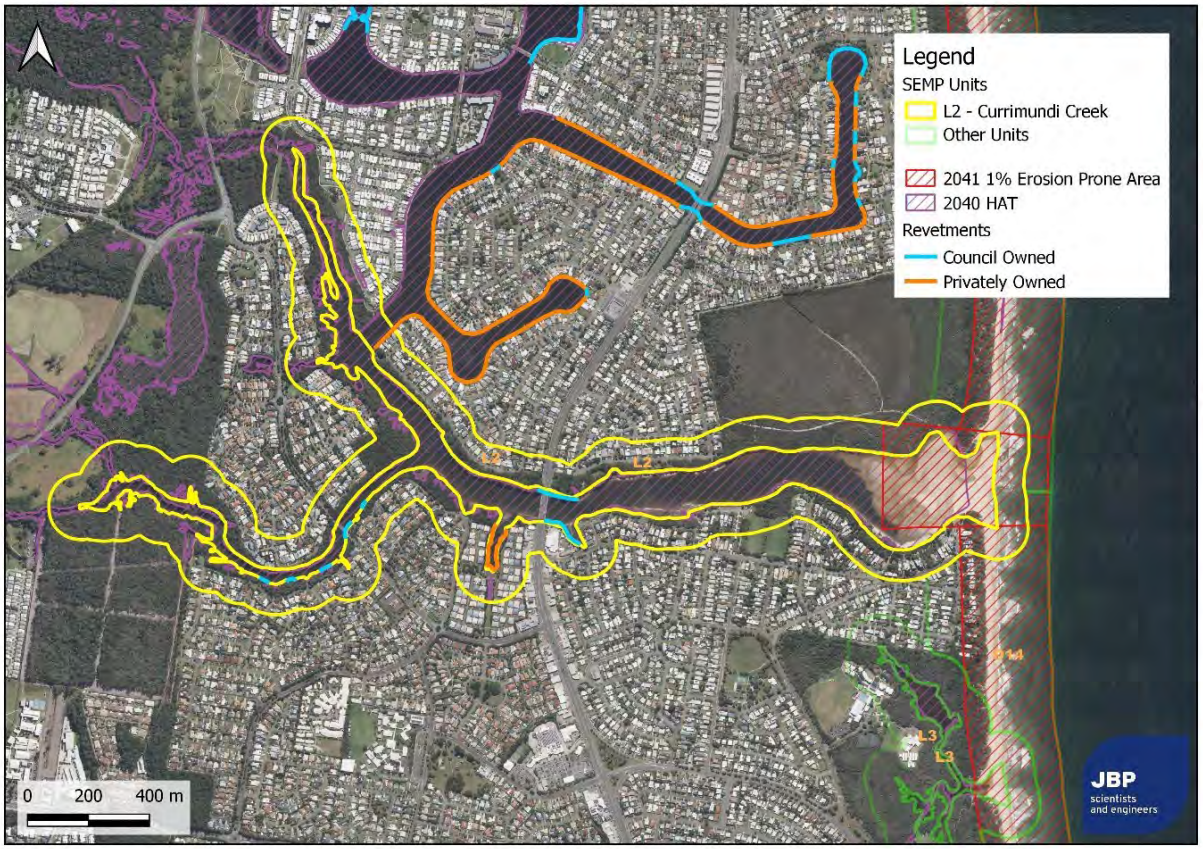

Figure 23-1: Lagoon Unit L2: Currimundi Creek

23.2 Historic erosion management

As an ICOLL, during periods when Currimundi Creek is closed to the ocean, water levels can increase due to freshwater runoff, which can lead to inundation of low-lying areas and the creek becoming stagnant. The entrance is periodically mechanically opened, guided by an existing management plan and approval associated with the management of drainage and water quality.

Small erosion protection structures exist around the ICOLL, including a retaining wall at the creek mouth and formalised abutments and scour control at the Nicklin Way bridge. The majority of the waterway in the main estuary has vegetated banks, which extend approximately 20m from the waterway.

23.4 Beach unit adaptation response

The CHAS 2041 adaptation response for this beach unit is to 'Mitigate'. This has been assessed at a sub-unit level for three zones, as shown in Table 23-1. The management approach for the creek mouth was further evaluated through an options appraisal.

Table 23-1: Lagoon Unit L2: Currimundi Creek – Basic adaptation response

Area	Monitor, maintain and repair	Review through Options Assessment
Creek Mouth (A)	Y	Y
Estuary Banks (B)	Y	Subject to separate SAAP
Watson Street (C)	Y	Subject to separate SAAP

23.5 Management approach

23.5.1 Creek Mouth (A)

Nine management options have been proposed, considering monitoring, removal of assets, new training options, nourishment, and structural approaches. Given the management of the ICOLL typically requires mechanically opening the entrance, using sand nourishment to also manage erosion was not considered feasible as it is likely to make artificial openings a greater challenge.

A high-level options appraisal reviewed the relative economic, environmental, and social merits of remaining options. The highest scoring option is to develop and follow the LGA wide trigger-based ICOLL management plan. Sand profiling was a high scoring option, which is an economical way for Council to re-use available sand from the beach profile to strengthen dunes, as was the option to begin a design process for hard defences along the southern shoreline to protect public assets. The option to remove at-risk assets scored poorly economically and due to its potential social impact. The preferred approach for erosion management in this sub-unit is listed below:

- develop and follow an LGA wide trigger-based ICOLL management plan (refer to Section 3.4);
- sand profiling as required to strengthen dunes adjacent to the estuary mouth, coinciding with periods when suitable sand volumes are available within the beach compartment.

23.5.1 Estuary banks (B) and Watson Street (C)

Management options of the estuary banks and coastal frontage around Watson Street are subject to a separate SAAP. This should be consulted for agreed management actions.

24. Unit O14: Currimundi Beach

24.1 Unit Description

The Currimundi Beach unit begins at the Currimundi Lake Entrance and extends to the Currimundi suburb southern boundary at Buderim Street. It extends past Unit L3 (Coondibah Creek) but does not include the entrance. The CHAS 2041 adaptation response for this beach unit is to 'Mitigate'. Management actions will follow the coast-wide actions outlined in Section 3. The northern areas of coastline may also be influenced by the SAAP being developed for Unit L2.

Figure 24-1: Open Coast Beach Unit O14: Currimundi Beach

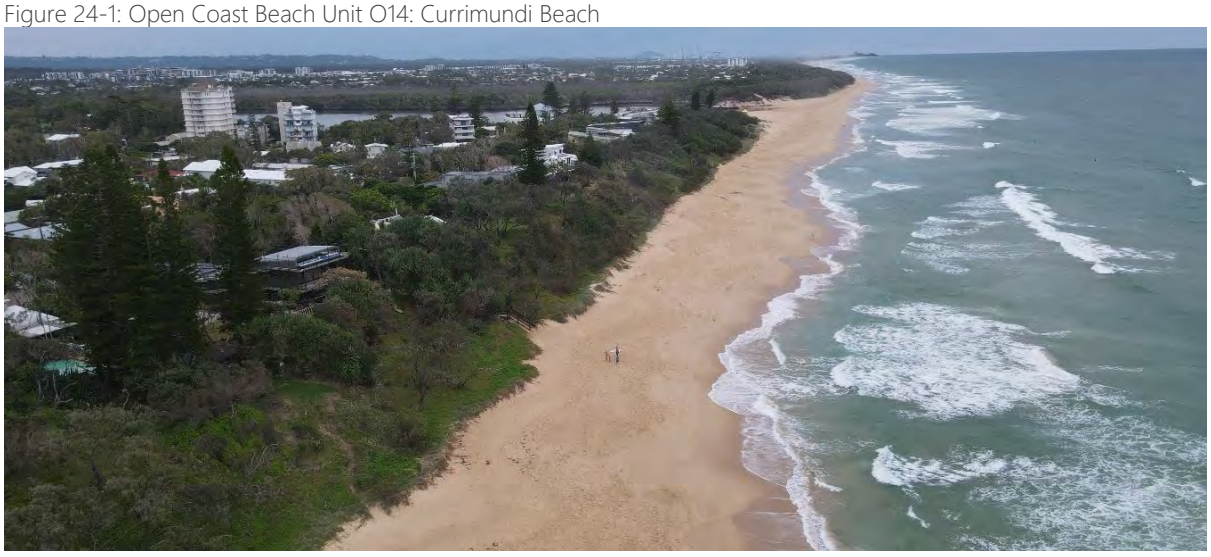

Figure 24-2: Looking north along Currimundi Beach, from near Coondibah Creek (JBP 2023)

25. Unit L3: Coondibah Creek

25.1 Unit Description

The Coondibah Creek unit encompasses the Coondibah Creek lagoon, from the creek mouth on Currimundi Beach to the lagoon extent, which lies mostly within the Coondibah Creek Environment Reserve and Currimundi Recreation Camp land parcel. The mouth of Coondibah Creek acts as an ICOLL and requires management. The CHAS 2041 adaptation response for this lagoon unit is to 'Mitigate'. Management actions will follow the ICOLL specific and coast-wide actions outlined in Section 3.

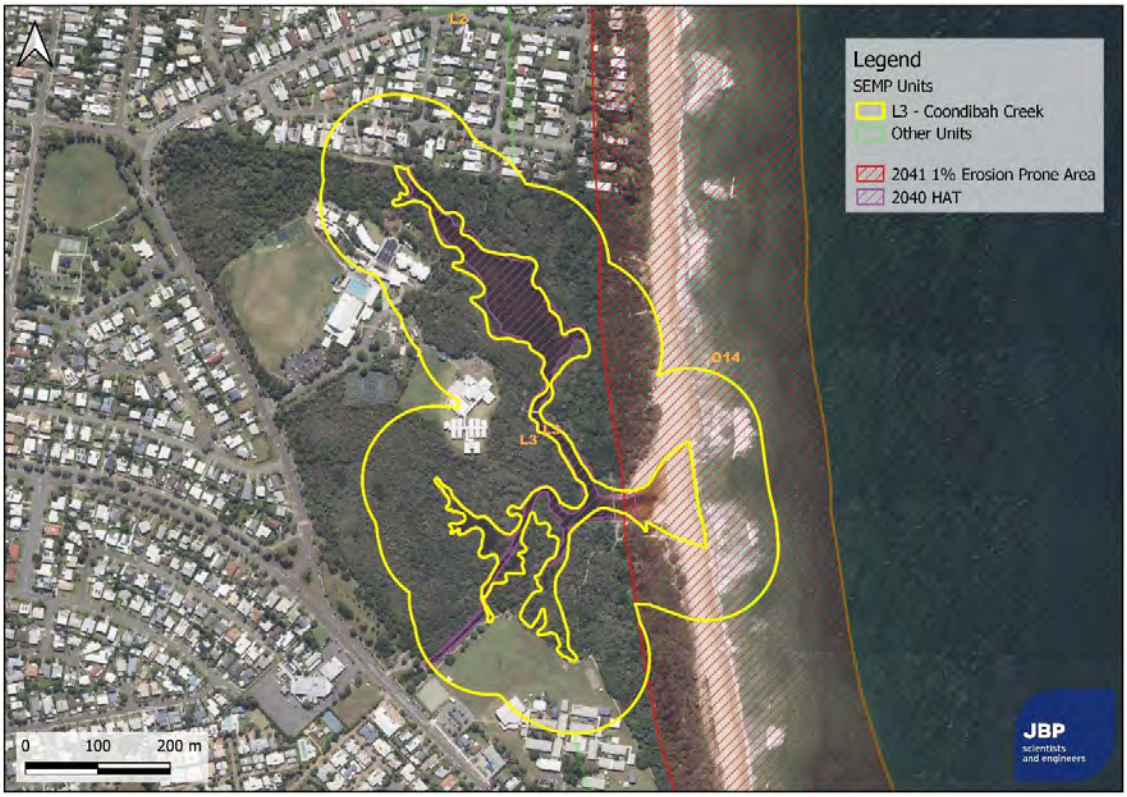

Figure 25-1: Lagoon Unit L3: Coondibah Creek

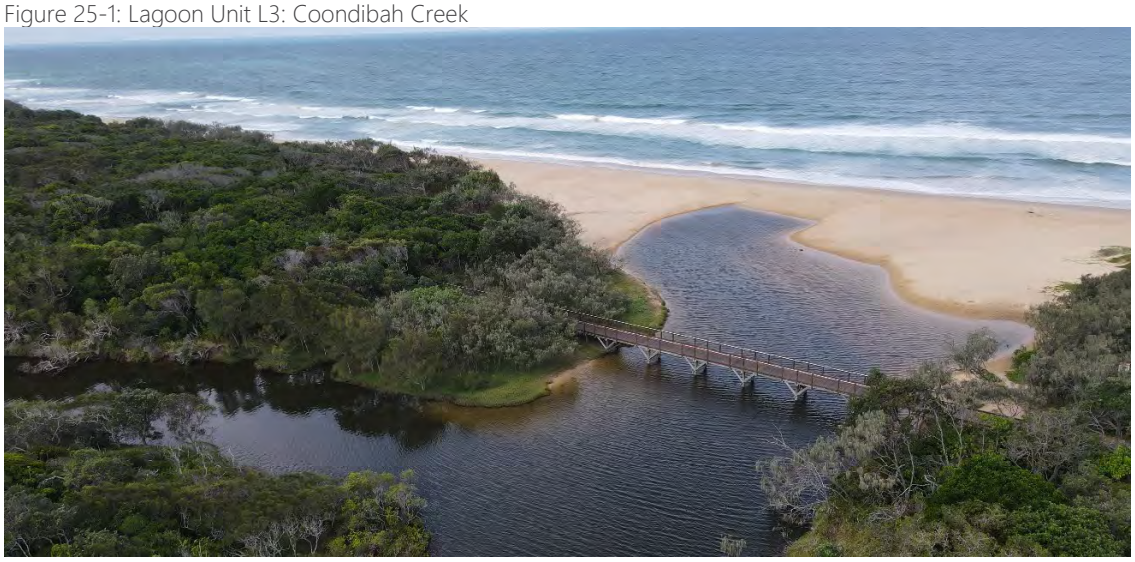

Figure 25-2: Drone image of Coondibah Creek mouth (JBP 2023)

26. Unit O15: Dicky Beach

26.1 Unit Description

This unit extends over the Dicky Beach suburb boundaries from Buderim Street to Tooway Creek. It includes the open coast and dunes, and the Dicky Beach Surf Club, Skate Park and Holiday Park. In the northern parts of the unit the vegetated dune system extends between 40m to 50m over the Dicky Beach Foreshore Bushland Reserve. South of Bunbubah Creek the dunal system is narrower and often sparsely covered, it includes a coastal pathway, mown open space, and a short (approximately 65m) rock wall near Lower Neill Street. The unit does not include the Bunbubah Creek ICOLL or its estuary mouth, which are addressed separately within Unit L4.

Figure 26-1: Open Coast Unit O15: Dicky Beach

26.2 Historic erosion management

Limited details are available on the short rock seawall near Lower Neill Street. No evidence of the wall can be observed within aerial imagery accessed from QSpatial in in the 1950s and 60s, which shows a wide coastal strip with limited houses and a small vehicle access track adjacent to the coastline. Stabilisation appears to have been in the 1970s through the addition of rubble/rock at the end of the road reserve. Engineering plans of a refurbishment are available from 2014[4], which show a double layer of rock armour graded between 2.25t to 3.75t (M_{50} = 3t) placed in a 1:1 grade over geofabric. Some of

4 Projex Partners (2014) Dicky Beach Seawall Refurbishment, prepared for Sunshine Coast Council

the most seaward houses lie within the present day 1% AEP Erosion Prone Area, while a large number of houses and parts of Wilson Avenue fall within the 2041 EPA.

26.3 Review of existing shoreline

The existing rock revetment at Lower Neill Street has been subject to a visual condition assessment. It has been constructed using narrow graded rock armour, with large units placed to form a steep terraced revetment with a crest flush with the rearward land. The general condition is grade 2 (good), featuring a relatively uniform surface and buried toe for the majority of the alignment. Observed defects include rock spalling, which should be closely monitored. The estimated residual life for the wall is 30 years, with a renewal not likely to be required within the SEMP period.

Figure 26-2: Left: Dicky Beach protection structure looking south. Right: Spalling rock (JBP 2023)

26.3.1 Beach access assessment

Beach Access 260 at the northern end of the unit can be used for plant access. Beach Access 265 near the Dicky Beach Surf Club can also be used for vehicle access to the beach.

26.4 Beach unit adaptation response

The CHAS 2041 adaptation response for this beach unit is to 'Mitigate'. This has been assessed for the open coast, with a number of options evaluated within an options appraisal.

Table 26-1: Unit O15: Dicky Beach – Basic adaptation response

Area	Monitor, maintain and repair	Review through Options Assessment
Open Coast	Y	Y

26.5 Management approach

26.5.1 Open coast

Six management options have been proposed, considering monitoring, nourishment, and structural approaches. A feasibility evaluation removed the nourishment option from an inland source. A high-level options appraisal of the remaining viable options identified ongoing beach nourishment through sand profiling as the highest scoring option. This was followed by equal scores for either nourishment via ship (i.e., future nearshore placement if an offshore sand source can be established) or beginning a formal

design process for a future coastal defence. Continued monitoring under a 'do nothing' approach was not considered to be a favourable option in terms of social benefits, given the value of property at risk of future erosion. The preferred approach for erosion management in this sub-unit is listed below:

- sand profiling as required to strengthen dunes adjacent to the estuary mouth (~200m length), coinciding with periods when suitable sand volumes are available within the beach compartment;
- continue monitoring to capture dune, beach, and coastline width information. Should erosion begin to threaten public assets, further review of options should be undertaken.

27. Unit L4: Bunbubah Creek

27.1 Unit Description

The Bunbubah Creek unit encompasses the lower Bunbubah Creek catchment, from the mouth on Dicky Beach to the western end of Coochin Park. The mouth of Bunbubah Creek acts as a natural ICOLL and requires management. The CHAS 2041 adaptation response for this lagoon unit is to 'Mitigate'. Management actions will follow the ICOLL and coast-wide actions outlined in Section 3.

Figure 27-1: Lagoon Unit L4: Bunbubah Creek

Figure 27-2: Bunbubah creek mouth (JBP 2023)

28. Unit L5: Tooway Creek

28.1 Unit Description

This unit spans the Tooway Creek lagoon. It extends from the upstream Cooroora Street cycle path to the creek mouth and includes a portion of the open coastline spanning approximately 150m north and 250m south. However, given the layout of southern assets and coastal protection, the practical limit of the unit management is the stand of Cottonwood trees (i.e., the seawall is included in unit O16). The unit includes the Eleanor Shipley Park and public assets, the carpark and infrastructure along Kingsford Smith Parade, the Hardie Buzacott Wildflower Reserve, Norfolk Island Pines, and waterfront residential properties (i.e., along Bryce Street, Cooroora Street, Crees Street, McDonald Street etc).

Figure 28-1: Unit L5: Tooway Creek

28.2 Historic erosion management

Historic erosion management of the northern coastline has been through beach profiling, which is used to restore beach amenity following storm erosion. A short section of rock seawall has been constructed as emergency works following a series of erosion events in 2009, adjacent to No 2 Coomoora Street. A detailed design for a new formal seawall was completed and approved for the area in 2020 (permit OPW20/0281), however this approval has since expired.

Existing management of the Tooway Creek entrance involves beach profiling and nourishment to maintain beach amenity and specific flushing characteristics of the creek. Beach profiling is used to replenish the northern and southern banks, including the area adjacent to Eleanor Shipley Park. The southern coastline extends into Unit O16 (Moffat Beach) which features a rock revetment seawall, upgraded by Council in 2008.

28.3 Beach unit adaptation response

The CHAS 2041 adaptation response for this beach unit is to 'Mitigate'. This has been assessed at a sub-unit level for four zones, as shown in Table 28-1. The management approach for three zones have been subject to further evaluation.

Table 28-1: Unit L5: Tooway Creek – Basic adaptation response

Area	Monitor, maintain and repair	Review through Options Assessment
Northern Open Coast and Mouth (A)	Y	Y
Crees Parade (B)	Y	Y
Estuary Banks (C)	Y	
Southern Open Coast and Mouth (D) (note: also covered in Section O16)	Y	

28.4 Management approach

28.4.1 North Open Coast and Mouth (A)

Eight management options have been proposed, considering monitoring, nourishment, and structural approaches. A review of option feasibility removed nourishment from an inland source or by ship, the latter due to navigational constraints around rocky outcrops. A high-level options appraisal of remaining viable options identified ongoing beach nourishment through sand profiling, developing and following the LGA wide trigger-based ICOLL management plan, renewal of the seawall permits, and construction of the seawall to be the highest scoring options. The preferred approach for erosion management in this sub-unit is listed below:

- develop and follow the LGA wide trigger-based ICOLL management plan (refer to Section 3.4);
- sand profiling to strengthen dunes, particularly along the northern open coast. This would occur during periods when suitable sand volumes are available within the beach compartment;
- renew permit OPW20/0281 and construct the proposed seawall when erosion threatens the road reserve and Council infrastructure, following the existing detailed design.

Construction of revetment

The detailed design was completed in 2020 (SMEC drawing reference 30032500) and consists of a rock pitched revetment. It has a target rock M_{50} of 3t, placed at a 1:1 gradient with concrete infill of the top units to allow capping (see Figure 28-2). It extends from the existing rock revetment at the northern mouth.

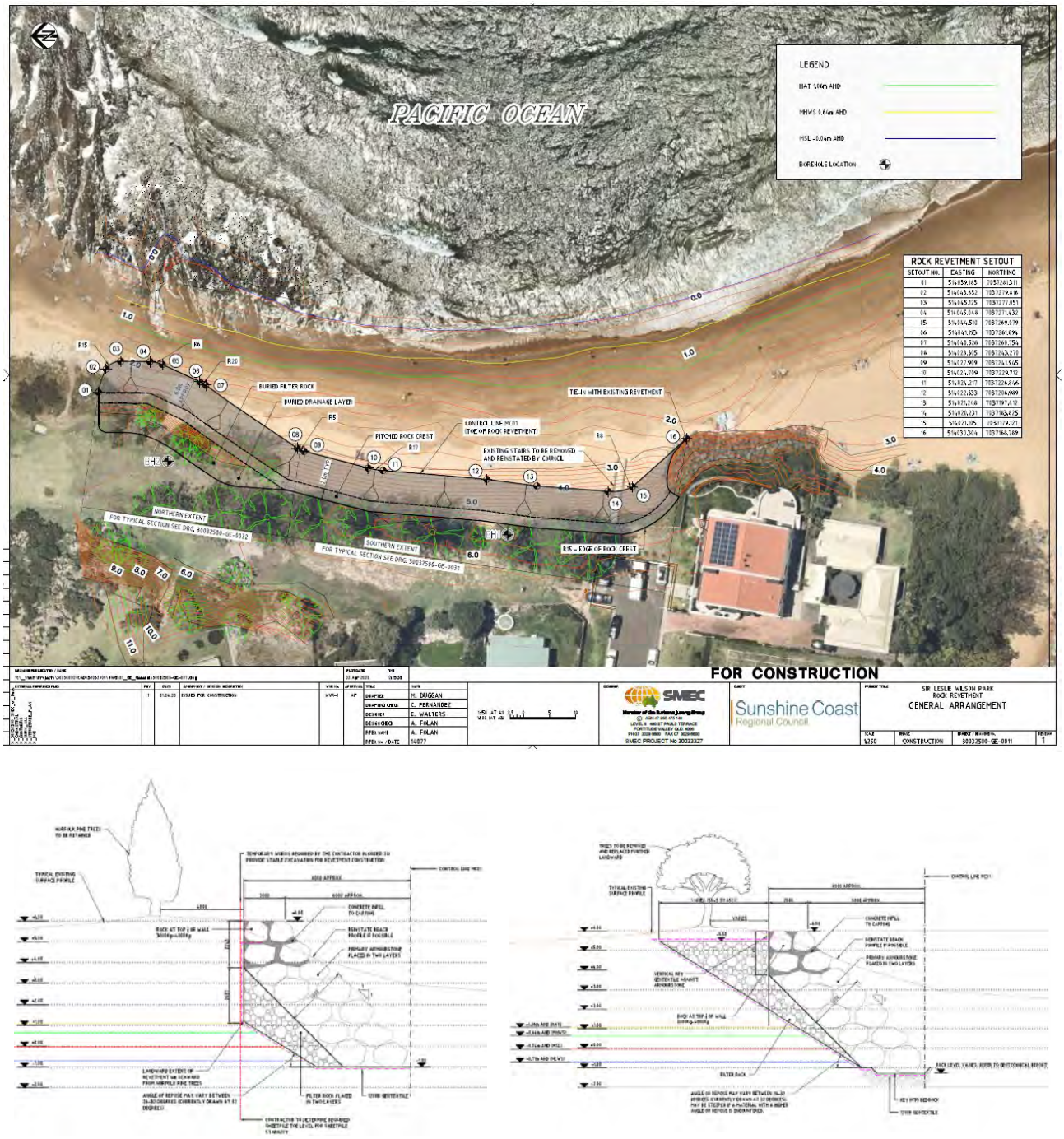

Figure 28-2: Detailed revetment design for Tooway Creek northern sub-unit (Unit L5, sub-unit A) from SMEC (2020)

28.4.2 Crees Parade (B)

Eight management options have been proposed, considering monitoring, nourishment, and structural approaches. The feasibility and viability evaluation removed nourishment from an inland source, by ship or by a pipeline, which are either not permitted, are expected to have poor performance or excessive costs. A high-level options appraisal identified the development of a trigger-based ICOLL management plan as the highest scoring option, followed by the completion of engineering designs and future construction of a new shoreline protection structure to mitigate against the erosion and potential stability issues to the east of the cul-de-sac. The preferred approach for erosion management in this sub-unit is listed below:

- develop and follow the LGA wide trigger-based ICOLL management plan (refer to Section 3.4);
- complete a new detailed design and permits package for erosion protection along Crees Parade, east of the Elizabeth Street bridge. This would allow the new construction to be scheduled into a future budget if Council infrastructure becomes threatened, anticipated to be within the life of this SEMP, and could be used to guide any emergency work in case of sudden failure;
- the ICOLL would then continue to be managed in accordance with the ICOLL management plan, and the new detailed designs can be scheduled within a works budget.

Design of revetment

New engineering design would require a review of the existing shoreline, consideration of any ad-hoc protection, consideration of tie-ins with the bridge abutment, a return into the embankment at the end of Crees Parade, structural and geotechnical investigation and slope stability analysis given the proximity of the adjacent houses, designers risk assessments, obtaining all statutory approvals and permits, and certification of the design. The engineering plans are to include details on the existing structure, alignment, tie-ins, materials, and constructability. Whilst the shoreline is only 105m, given the need for tie-ins and a return, the actual length may be 120m. The approximate extent of works is shown in Figure 28-3.

Figure 28-3: Extent of Crees Parade revetment (Unit L5, sub-unit B)

29. Unit O16: Moffat Beach

29.1 Unit Description

This unit extends from Tooway Creek (unit L5) to the southern extent of Moffat Beach. The practical northern extent of the unit is the stand of Cottonwood trees, with the unit then encompassing the Bryce Street carpark, existing boat ramp, rock revetment, part of Eleanor Shipley Park and public assets, Moffat Beach Park and carpark, and Queen of Colonies Parade.

Figure 29-1: Open Coast Unit O16: Moffat Beach

29.2 Historic erosion management

A rock revetment seawall is positioned along the majority of the unit. Whilst the original construction date is unknown the structure is not visible in early 1958 aerial imagery, which does however show the rows of planted pine trees along the coastline. The revetment becomes more visible through the 1970s. The structure was upgraded by Council in 2008, which now extends 230m from Moffat Headland to the boat ramp at the Bryce Street car park. Additional repairs were undertaken after a severe weather event in February 2022. An engineering rectification plan has been completed that includes ongoing targeted maintenance and upgrades to the wall. New subsidence or slip circle failures are now emerging, which are being investigated. A number of engineering challenges exist through the unit, including the fluctuating beach levels and the limited space due to the Norfolk Pines that are positioned along the frontage. These challenges are being addressed through new concept design plans that will consider an extension of the seawall north to the Cottonwood Trees, moving the existing ramp into the new seawall section, and ongoing remediation of the existing seawall.

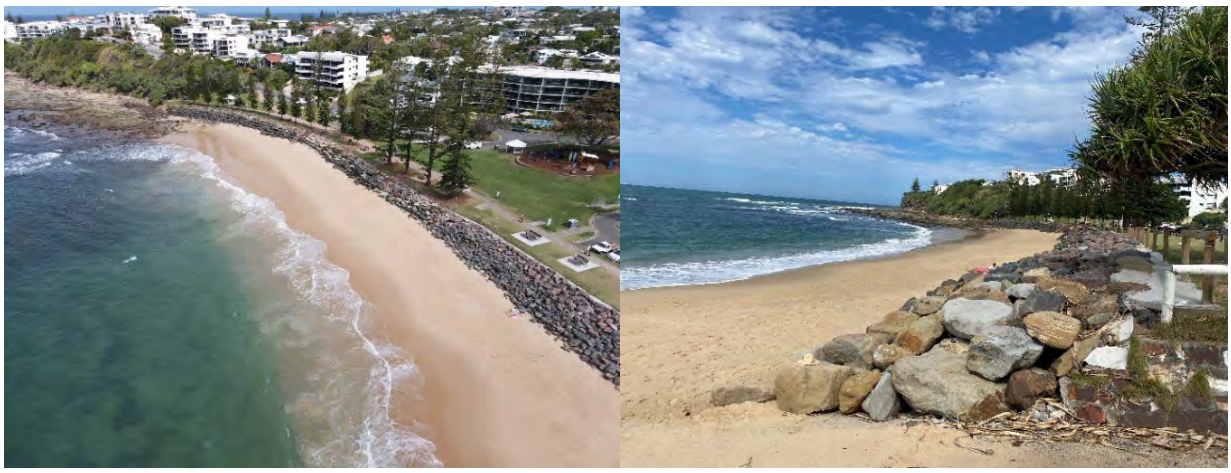

Figure 29-2: Existing defence at Moffat Beach. Left: Aerial view. Right: The new structure near the boat ramp (JBP 2023)

29.3 Beach unit adaptation response

The CHAS 2041 adaptation response for this beach unit is to 'Mitigate'. This has been assessed at a sub-unit level for two zones, as shown in Table 29-1. The management approach for each zone has been subject to further evaluation.

Table 29-1: Unit O16: Moffat Beach – Basic adaptation response

Area	Monitor, maintain and repair	Review through Options Assessment
Cottonwood Trees to Existing Ramp (A)	Y	Y
Existing Seawall (B)	Y	Y

26.4 Management approach

29.4.1 Cottonwood Trees to Existing Ramp (A)

Given the availability of conceptual engineering plans only two management options have been assessed; undertaking the proposed works or delaying their construction. Both options scored equally, with the new construction scoring lower on economics but higher on social benefit. Given the high popularity of the site and observed failure mechanisms, the preferred approach for erosion management is to complete the detailed designs and planning approvals package, then construct the proposed seawall and new ramp to maintain a continuous coastal defence.

29.4.2 Existing Seawall (B)

The existing seawall extends to the south-east. Potential management options have considered ongoing monitoring or engineering renewal works; the latter considering reactive maintenance which is required presently as signs of failure are being observed, proactive maintenance (increasing the level of the current response) or a full renewal of the seawall. Initially reactive maintenance is the highest scoring option, until new renewal designs can be included in the sub-unit A actions. The preferred approach for erosion management in this sub-unit is listed below:

- continued reactive maintenance to address any existing or emerging failures;
- include renewal designs in the sub-unit A plans;
- renewal of the seawall as a second-stage of works in Moffatt Beach.

Seawall renewal

The renewal design would require a review of the existing failure mechanisms, which appear to be through slip circles and sliding, an assessment of re-using the existing rock armour, potentially deepening the toe, tie-ins with the proposed ramp replacement to the west and rock shelf to the east, a designer's risk assessments, statutory approvals and permits, and certification of the design. Consideration should be given to any changes to its alignment due to the existing Norfolk pines.

Figure 29-3: Extent of proposed Moffat Beach revetment after expansion (Unit O16, sub-unit A and B)

30. Unit H4: Moffat Headland

30.1 Unit Description

The Moffat Headland unit extends from the southern extent of the Moffat Beach seawall, near the Moffat Beach car park, to the Moffat Beach suburb southern boundary at Russell Street. Moffat Headland is dominated by steep rocky cliffs on the north side of the headland, with a sandy beach on the east facing section of the headland. The CHAS 2041 adaptation response for this headland unit is to 'Mitigate'. Management actions will follow the coast-wide actions outlined in Section 3.

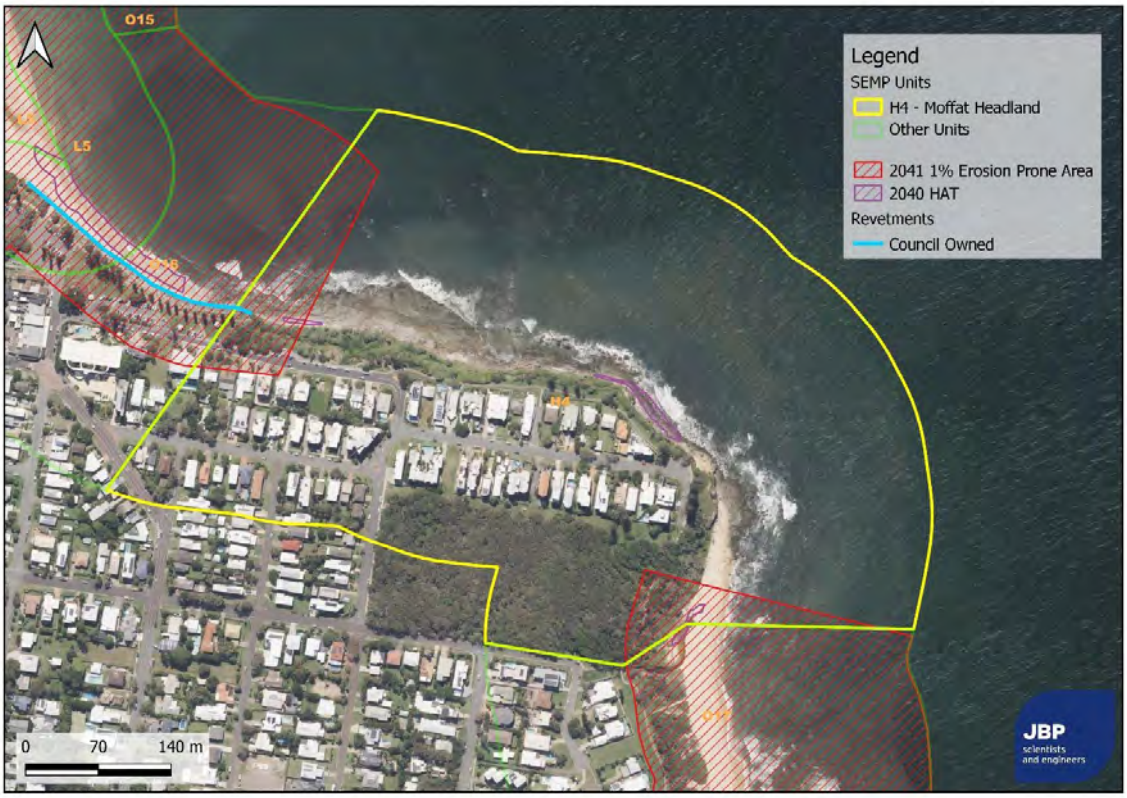

Figure 30-1: Headland Unit H4: Moffat Headland

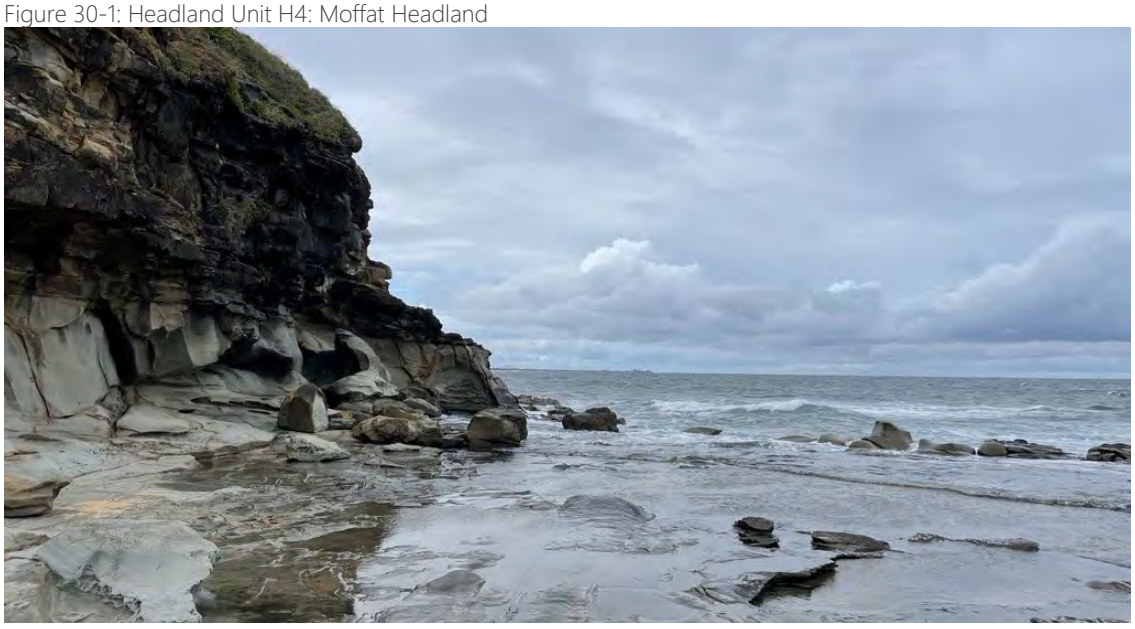

Figure 30-2: Rocky cliffs at Moffat Headland (SCC 2024)

31. Unit O17: Shelly Beach

31.1 Unit Description

The Shelly Beach unit is a small pocket beach located between Caloundra and Moffat Headlands, running from the Shelly Beach suburb northern boundary at Russell Street to the suburb southern boundary at King Street. The unit includes a narrow-vegetated dune system and a nearshore platform reef. The CHAS 2041 adaptation response for this beach unit is to 'Mitigate'. Management actions will follow the coast-wide actions outlined in Section 3.

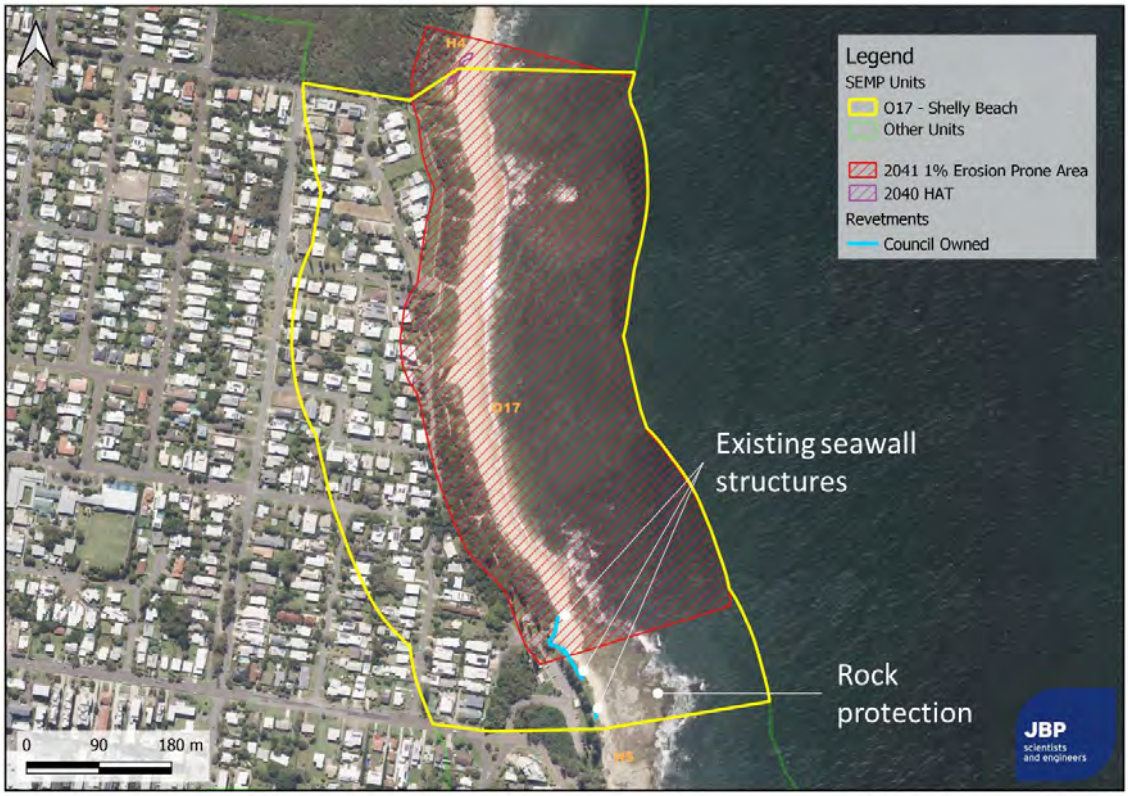

Figure 31-1: Open Coast Beach Unit O17: Shelly Beach

Figure 31-2: Looking north along Shelly Beach, from its southern boundary (JBP 2023)

32. Unit H5: Caloundra Headland

32.1 Unit Description

The Caloundra Headland unit extends from the Shelly Beach / Kings Beach suburb boundary at King Street, south to the Kings Beach swimming pool. The headland consists of relatively gently sloping rocky cliffs with a seaward rock shelf. The CHAS 2041 adaptation response for this headland unit is to 'Mitigate'. Management actions will follow the coast-wide actions outlined in Section 3.

Figure 32-1: Headland Unit H5: Caloundra Headland

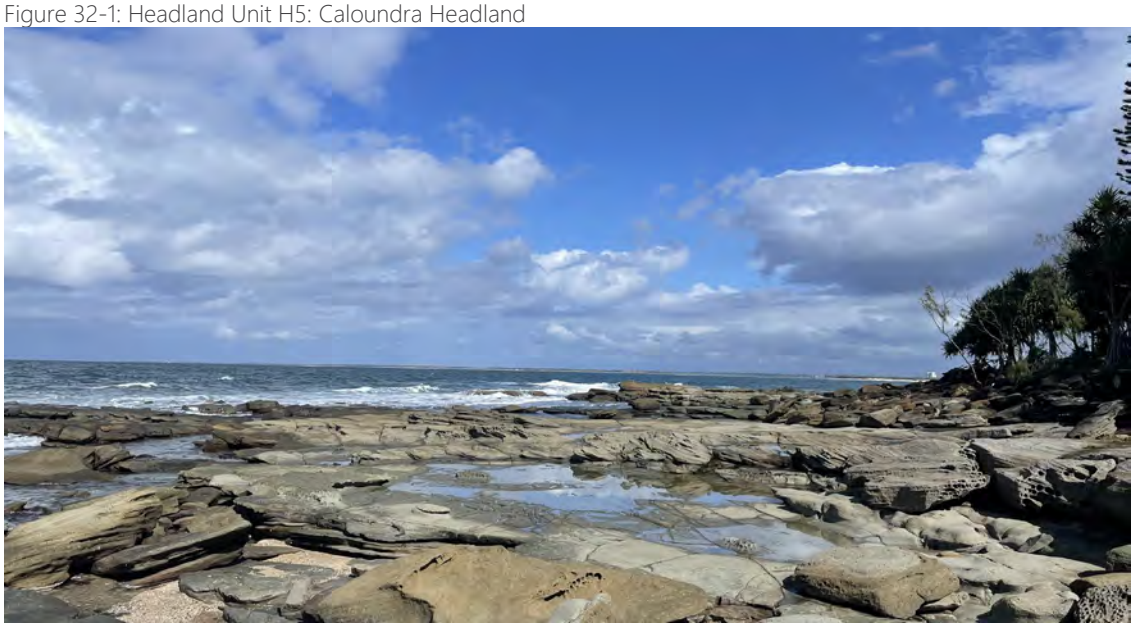

Figure 32-2: Looking seaward over the rock shelf at Caloundra Headland (SCC 2024)

33. Unit O18: Kings Beach

33.1 Unit Description

This unit extends from the Kings Beach beachfront pool to the southern suburb boundary at Dingle Avenue. The management area includes the Kings Beach bathing reserve, the Caloundra Major Activity Centre hub; the heritage listed swimming pool pavilion, Metropolitan Caloundra Surf Lifesaving Club, lifeguard towers, Lions Park, and buildings along Levuka, Merrima and Dingle Avenues.

Figure 33-1: Open Coast Unit O18: Kings Beach

33.2 Historic erosion management

The beach unit is oriented south-east, with a degree of protection from the northern headland and both northern and southern boundaries including a rock shelf. A low seawall extends along the northern half of the shoreline, which includes vertical and terraced seawall components around the swimming pool. A groyne has been constructed at the southern unit boundary opposite Dingle Avenue. The initial construction date is unknown; however, a structure can be observed in early 1970s imagery. In 2016 the groyne was repaired and realigned to its original footprint after storms dislodged the armour stone rocks from their original position. Large boulders are visible toward the southern end of the beach which provide evidence of historic shoreline protection (likely placed in the 1960s), which is now buried within the small sand dunes.

Historically, beach profiling has been used in front of the existing seawall to maintain the upper beach and dune. This regular, ongoing maintenance controls the immediate erosion threat to public assets (primarily the beach and coastal footpath). A detailed design has been completed for a buried rock revetment that spans the entire unit, however no formal permit for it has been acquired. The design

consists of a buried rock revetment with a pitched rock crest with a target rock M50 of 3.5t, placed at a 1:1.5 gradient with concrete infill between the top units to allow capping (SMEC drawing reference 30031876, see Figure 33-2). It extends from Merrima Avenue to the existing concrete wall at the north-eastern end of the beach.

Investigations are beginning into future upgrades to the Metropolitan Caloundra SLSC building, located in the centre of the beach. Once completed this may require a change to the buried rock revetment design plans.

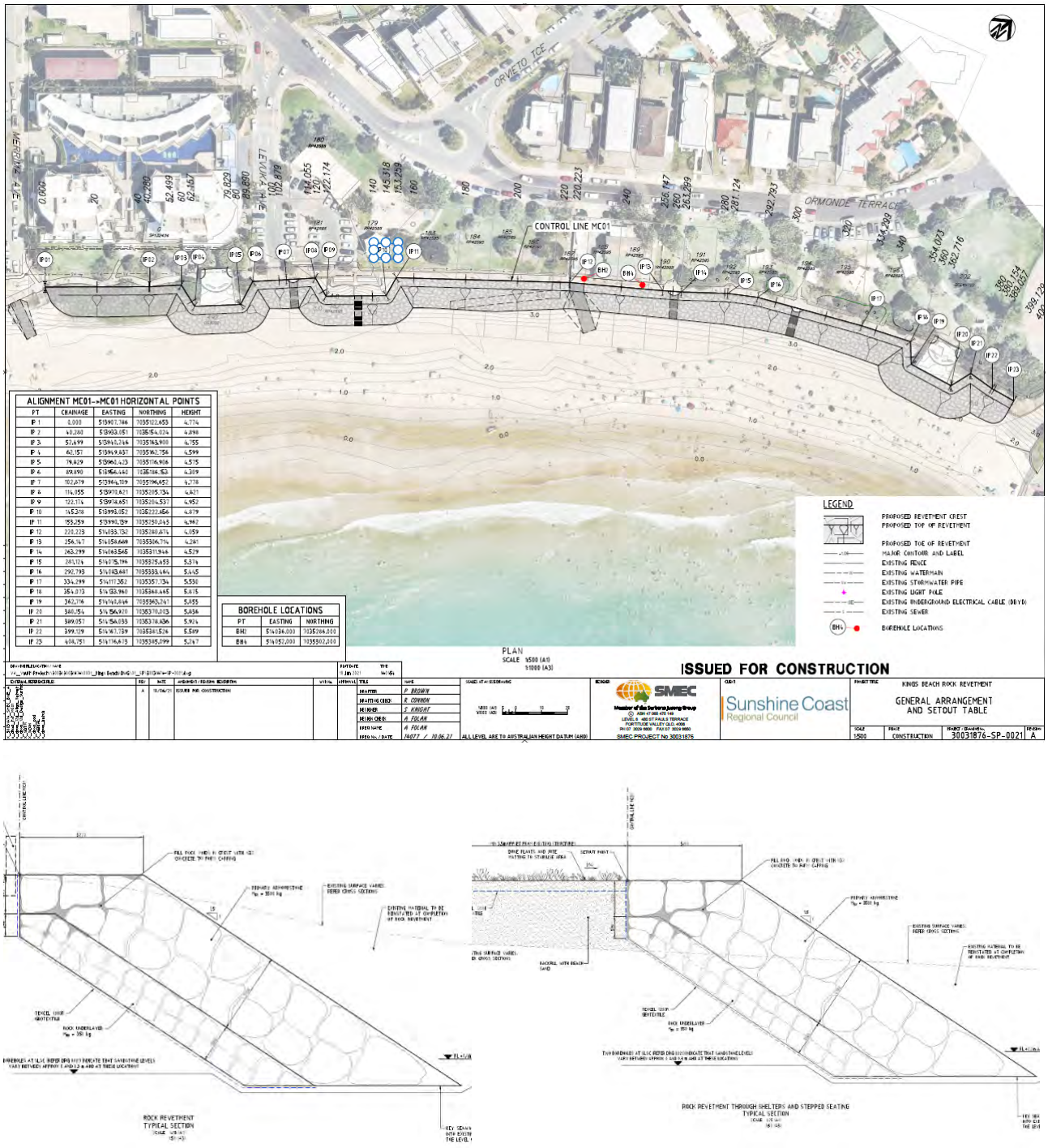

Figure 33-2: Detailed seawall design for Kings Beach from SMEC (2021)

33.3 Review of existing shoreline

The hard defence adjacent to the swimming pool was subject to a visual condition assessment. It includes vertical and terraced seawall components as shown in Figure 33-3 (left). The general condition is grade 2 (good), featuring a uniform cross section with no major cracking. The estimated residual life for the wall is 45 years, and therefore a wall renewal is not recommended within the lifetime of this SEMP.

The visual condition assessment of the groyne identified the renewed section that was realigned in 2016. This seaward section will experience the largest wave forces and is expected to be the dominant component to derive the condition score. This was scored a condition grade 2 (good), featuring renewed rock armour that follows its original design alignment. The estimated residual life for the groyne head is 45 years, and therefore further renewal is not considered needed within the lifetime of this SEMP. A detailed design with no formal permit was completed for a buried rock revetment that spans the entire unit to facilitate future protection. A construction date has not been set for the structure.

Figure 33-3: Left: General condition of the terraced seawall. Right: General condition of the groyne (JBP 2023)

33.3.1 Beach access assessment

The beach within this unit can be accessed by machinery via a ramp at the northern section near the SLSC, Beach Access 283. The footpath requires close monitoring as the side has dropped and its foundation may be exposed to wave actions leading to a loss of fines. An additional beach access to the southern unit may be required during the SEMP period.

Figure 33-4: Left: Exposed footpath foundation. Right: Beach access ramp (JBP 2023)

33.4 Beach unit adaptation response

The CHAS 2041 adaptation response for this beach unit is to 'Mitigate'. This has been assessed for the entire open coast frontage, as shown in Figure 33-1. The management approach has been subject to further evaluation.

Table 33-1: Unit O18: Kings Beach – Basic adaptation response

Area	Monitor, maintain and repair	Review through Options Assessment
Open Coast	Y	Y

33.5 Management approach

33.5.1 Open coast

Management options have considered monitoring, nourishment, and structural approaches. Nourishment using land-based sources was not considered feasible due to sediment requirements. A high-level options appraisal identifies initial management to continue sand profiling until designs are complete for any upgrade to the Metropolitan Caloundra SLSC building. This may then require an update of the existing rock revetment design plans before permits are obtained for construction.

34. Unit O19: Happy Valley

34.1 Unit Description

The Happy Valley unit extends from the Kings Beach and Caloundra suburb boundary at Dingle Avenue, to the Bulcock Beach carpark at Beach Access 296 (which is the intersection of the Caloundra, Bribie Island North and Golden Beach suburbs). The unit's foreshore consists of gently sloping rocky cliffs in the northeast section and a rock revetment seawall in the southwest section. There is currently a build-up of sediment to the south of this unit due to the changed dynamics caused by the Bribie Island Breakthrough. The CHAS 2041 adaptation response for this beach unit is to 'Mitigate'. Management actions will follow the coast-wide actions outlined in Section 3.

Figure 34-1: Open Coast Beach Unit O19: Happy Valley

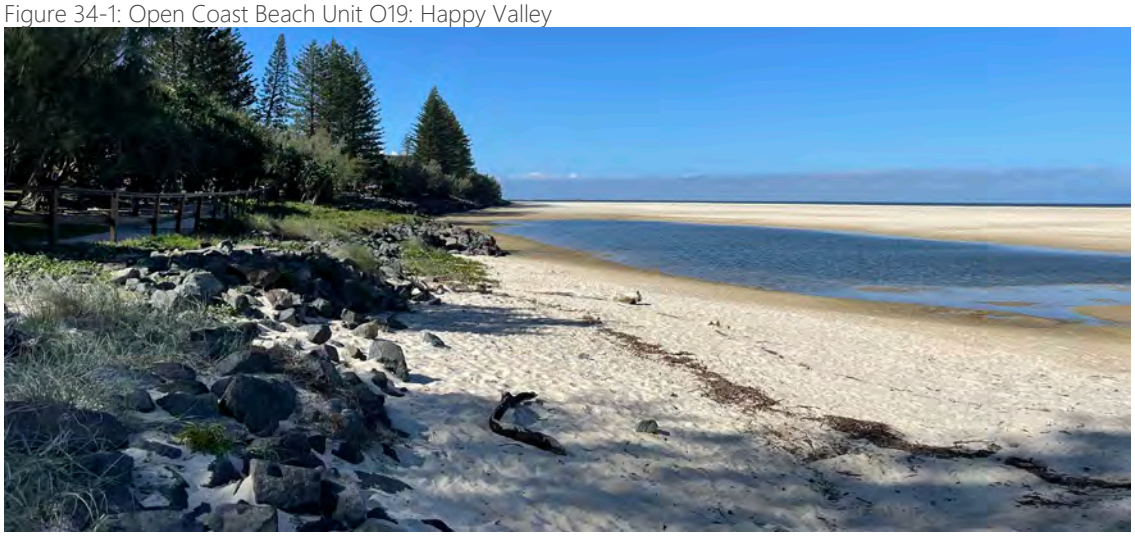

Figure 34-2: Looking east over Happy Valley foreshore (SCC 2024)

35. Unit E3: Bulcock Beach to North Street

35.1 Unit Description

The Bulcock Beach to North Street unit extends from Bulcock Beach carpark at Beach Access 296 (the intersection of the Caloundra, Bribie Island North and Golden Beach suburbs), west to the southern extent of the Caloundra Holiday Park (adjacent to North Street). This unit is part of the Pumicestone Passage estuary. The foreshore is heavily modified with rock seawalls, overhanging boardwalks, and piers along its entire length. Following the Bribie Island Breakthrough, the channel alongside this unit is filling with sediment and naturally closing. The CHAS 2041 adaptation response for this estuary unit is to 'Mitigate', however given the shoreline is primarily private property, Councils management approach will follow the coast-wide actions outlined in Section 3.

Figure 35-1: Estuary Unit E3: Bulcock Beach to North Street

Figure 35-2: The western extent of Unit E3, near Caloundra Holiday Park (JBP 2023)

36. Unit E4: North Street to Jellicoe Street

36.1 Unit Description

This estuary unit begins at North Street, adjacent to the Caloundra Holiday Park. It continues south along the Golden Beach area of the Pumicestone Passage, ending between the Gemini Resort and Riviere on Golden Beach near Jellicoe Street. The estuary foreshore includes open space, public amenities, the coastal pathway, Short Street and its carpark, Leach Park, waterfront commercial premises along Landsborough Parade, Ayliffe Park, sections of the main Esplanade thoroughfare, and the Gemini Resort.

Figure 36-1: Estuary Unit E4: North Street to Jellicoe Street

36.2 Historic erosion management

The estuary unit is located in the northern section of the Pumicestone Passage. Significant changes to the passage outlet have been observed since the regular capture of aerial photography commenced in 1940. Since this time, the outlet has migrated north and south, which has changed the way the currents flow along the estuary banks between North Street and Jellicoe Street. In early 2022, a breakthrough occurred across the northern spit of Bribie Island, which has now increased the tidal range within the Pumicestone Passage by approximately +/- 300mm.

Various foreshore works have been completed along the frontage, with anecdotal reports suggesting a buried rubble/informal seawall runs along the length of the unit. Foreshore improvements along Leach Park were completed in 2012 forming part of the wider Golden Beach Foreshore Master Plan (BMT WBM, 2015). Works completed in December 2010 included an upgrade of the existing revetment and the formalisation of a GSC groyne where degraded units were replaced by rocks. Beach nourishment has been undertaken to provide a sandy shoreline to complement the rock groynes. Protection works

between Oxley Street to Jellicoe Street include the establishment of a GSC groyne field between 1999 and 2000. Numerical modelling was originally undertaken to determine an optimal groyne field arrangement in 1999 which was the basis for the approval and construction of the first eight groynes and corresponding sand renourishment program[5]. The groyne design extended 50 metres into the channel from mean sea level with a 30-metre extended beach width between the groynes via nourishment, however basic measurements from Google Earth suggest that the groyne structures may only range from 20 to 30 metres in length overall. At numerous locations along the shoreline the GSCs provide scour protection to stormwater outfalls that form part of the local drainage infrastructure. GSCs have a shorter design life than rock structures and need to be progressively upgraded during the SEMP period.

Recent active erosion management has been through nourishment via a cutter suction dredge and temporary pipeline, which is undertaken through existing permit IPDE00381806A11 which has been active since 2006. This permit allows dredging of 3250m^3 annually, which spans the estuary unit E4. Operational reports indicate erosion management through nourishment alone is becoming more challenging due to the new tidal currents and range within the estuary. However, since the breakthrough, dredging has become slightly easier due to reduced currents, giving the area the attributes of a pond.

Increased planning to manage a potential Bribie Island Breakthrough was undertaken in the leadup to the 2022 event, and included several studies and approvals:

- Golden Beach and Bribie Island Breakthrough - Options, Design, Approvals, and Investment Plan (GBBIB-ODAIP) (BMT 2015)[6];
- Bribie Island Breakthrough Preparedness Seawall Planning and Design (BIB-PSPD) (GHD 2016)[7];
- subsequent permits.

Unit E4 is contained within Areas 2 and 3 of the BIB-PSPD. Adjacent to Leach Park two options have been proposed; including regular beach nourishment and dune management to improve amenity and provide a buffer against storm erosion, and continued monitoring of the existing revetments. The recommended management approach between Oxley Street to Jellicoe Street includes shoreline monitoring, beach nourishment, dune management, an investigation of the effectiveness of the geotechnical groyne field to determine renewal timeframes, and investigation of the extent of the buried revetment walls along the frontage.

The unit is the subject of the Golden Beach Coastal Hazard Adaption Infrastructure (CHAI) Options Analysis. Once complete it is anticipated to include recommendations for new erosion protection, to be continued through detailed designs.

36.3 Review of existing shoreline

Structural conditions vary throughout the unit and have been reviewed through new inspections and previous reports. The existing grouted vertical revetment wall from Oxley Street to the boat ramp is generally in good condition (grade 2), however shows localised signs of scour at the wall toe, differential settlement, minor rotation, and spalling. Between the boat ramp and the creek near Caloundra Caravan Park, the grouted vertical revetment includes dumped rock along the foreshore which limits toe

5 BMT (1999) Golden Beach Restoration Hydrodynamic Modelling DRAFT report (1999).

6 BMT (2015) Golden Beach and Bribie Island Breakthrough - Options, Design, Approvals, and Investment Plan.

7 GHD (2016) Bribie Island Breakthrough Preparedness Seawall Planning and Design. Management Areas 1 - 5.

observations. The boat ramp is considered to be in good condition (grade 2), with some small defects which can be addressed in future maintenance. The estimated useful residual life of the northern walls and ramp are considered beyond the lifetime of this SEMP (after 2035).

The groyne field begins with a rock groyne approximately 40m south of the Short Street ramp and includes a rock revetment extending approximately 260m. The revetment spans to the second rock groyne, located near Oxley Street. All elements of the initial two rock groynes and the rock revetment are in fair (grade 3) to good (grade 2) condition. They are constructed with large, interlocked rock armour units.

South of the second rock groyne there are 15 additional groynes within Unit E4. Currently (2024) this includes 12 GSC groynes, and three that have been upgraded to rock groynes. The 12 GSC groynes have typical signs of degradation, loss or dislodgement of bags, toe scour, and settlement. The spacing of the existing GSC groynes is considered sufficient, based on the observed shoreline condition, with renewal anticipated to remain within their current footprint.

A jetty is located near the southern end of the unit, opposite the Belvedere Apartments, just north of the Golden Beach Lifeguard Tower at Fraser Park. Overall, the jetty is in fair (grade 3) condition, however, is showing significant signs of marine borers which may trigger early remedial works. This is being addressed initially by installing marine piling tape around the affected piles.

At the southernmost end of the unit, one of the GSC groynes is located at the north end of Esplanade and is the last structure within Unit E4. A rock revetment is located directly adjacent to the groyne, which falls within Unit E5.

Figure 36-2: Estuary Unit E4 boat ramp, vertical seawall, and groyne structures (JBP 2023)

36.4 Beach unit adaptation response

The CHAS 2041 adaptation response for this beach unit is to 'Mitigate'. This has been assessed through an options evaluation and muti-criteria analysis.

Table 36-1: Unit E4: North Street to Jellicoe Street – Basic adaptation response

Area	Monitor, maintain and repair	Review through Options Assessment
Estuary Frontage	Y	Y

36.5 Management approach

36.5.1 Estuary Frontage

Management options have considered continued monitoring, nourishment using the existing dredge approach or new sand sources, beginning the design process for hard defences, or construction of hard defences. The evaluation of option feasibility, viability and community acceptability removed four options, including monitoring (i.e., do nothing) given the existing need for ongoing maintenance, sand profiling given the lack of available sediment, or nourishment via an inland source or via ship.

A high-level options appraisal considered the continuation of existing nourishment practices to be the most appropriate initial management action, in addition to any required GSC groyne renewals. However, over the long term a change in nourishment approach is likely to be required, with a capital nourishment campaign likely. Other structural requirements will include additional GSC groyne maintenance throughout the SEMP lifetime, a capital renewal of the revetment between the northern creek and Bill's Boat Hire, and to begin the design process for hard defences along the remainder of the unit following the completion of the Golden Beach CHAI Options Analysis. The preferred approach for erosion management in this sub-unit is listed below:

- continue the current nourishment programme under Permit IPDE00381806A11 (20 July 2006). This existing permit allows the dredging and placement of 3250m^3 annually within the estuary unit E4;
- complete an initial round of GSC groyne renewals;
- complete a minor renewal of the revetment between the northern creek and Bill's Boat Hire;
- towards the end and following completion of the Golden Beach CHAI Options Analysis, complete:
    - begin plans for an additional permit (or a variation to existing permits) allowing a large capital nourishment campaign. This larger capital campaign is anticipated to be in the order of 20,000m^3 in a single placement, likely to be towards the end of the SEMP period;
    - begin the design process for erosion protection over the southern extent of the unit, following future outcomes and recommendations from the CHAI;
- complete a second round of GSC groyne renewals, likely to be towards the end of the SEMP period.

37. Unit E5: Jellicoe Street to Onslow Street

37.1 Unit Description

This estuary unit begins between the Gemini Resort and Riviere on Golden Beach near Jellicoe Street. It continues south to Onslow Street and includes the TS Onslow Australian Navy Cadet building. The estuary foreshore includes open space and public amenities, the coastal pathway, the most seaward section of the Esplanade, Vernes Beach, and Jellicoe Street Foreshore Park.

Figure 37-1: Estuary Unit E5: Jellicoe Street to Onslow Street

37.2 Historic erosion management

This unit features a narrow coastal foreshore protected by a formalised revetment. Historic erosion protection works include a range of rock/rubble and concrete structures. The need to renew the northern section was noted within emergency works requests in 2010 by Council. A renewed rock revetment was constructed between Riviere on Golden Beach and extends 300m south to end at a small GSC groyne adjacent to Nelson Street. This was completed in 2016 as part of foreshore works that included the new rock revetment and widening of the shoreline to accommodate a 3m wide pedestrian/cycle path.

The southern end of the unit continues in a degraded form and is currently the subject of new detailed designs for a planned renewal. The area contains a number of unapproved concrete blocks which were placed generally along the eastern boundary of the site prior to 2010 in response to an erosion event. Ongoing regression of the shoreline has been observed since the placement of the concrete blocks, with periodic nourishment and attempts to revegetate the site being unsuccessful. Erosion has structurally undermined a boat ramp and concrete hardstand along the TS Onslow frontage, and exposed

uncontrolled fill which contains asbestos. Interim management works have included the placement of geofabric along the uncontrolled fill embankment and nourishment of approximately 2,000m^3 of sand from existing dredge approvals.

Increased planning to manage a potential Bribie Island Breakthrough was undertaken in the leadup to the 2022 event, and included several studies and approvals:

- Golden Beach and Bribie Island Breakthrough - Options, Design, Approvals, and Investment Plan (GBBIB-ODAIP) (BMT 2015);
- Bribie Island Breakthrough Preparedness Seawall Planning and Design (BIB-PSPD) (GHD 2016);
- subsequent permits.

Unit E5 is contained within Area 4 of the BIB-PSPD. The recommended management approach was for shoreline monitoring, beach nourishment initially, dune/vegetation management, detailed design of the groyne structure adjacent to Jellicoe Street, and detailed design of a rock revetment structure between TS Onslow and the existing revetment at Nelson Street.

37.3 Review of existing shoreline

Structural conditions have been reviewed through new inspections and previous reports. The existing rock revetment between Riviere on Golden Beach and Nelson Street is considered to be good (grade 2), having been constructed in 2016. Crest scour and rock top-ups have been noted along the structure suggesting the crest height could be increased (also noting the increased tidal range now affecting the estuary). The condition of the Jellicoe Street groyne is considered good (grade 2), having been completed within the same works package. Both are projected to have a lifetime extending to 2060-2070, beyond the lifetime of the SEMP.

The Nelson Street GSC groyne is in fair to poor condition (grade 3 to 4). It is representative of a mid-life GSC structure, benefitting from being covered by sand for the majority of its length. Its estimated remaining useful residual life is 10 years, which may fall within the SEMP period, depending on the speed of deterioration over the next decade.

The existing concrete block protection and boat ramp at TS Onslow are in a state of failure (grade 5), with a renewal required within the SEMP period. The frontage includes damage to the minimal remaining concrete capping, dislodged concrete cubes that have settled differentially, and extensive rear-side erosion. The TS Onslow land is owned by the Department of Resources and leased to the Department of Defence. No historic management actions have been undertaken by Council without state support. The design and construction of a 200m section of wall at TS Onslow has been initiated through state funds. Following construction, the ownership status of the wall needs to be confirmed, which may progress through a Council lease.

The construction of a parkland upgrade was finished in 2024 between Jellicoe Street and 81 Esplanade. This used a combined rock and grouted rock armour seawall which increased the crest height to 1.9m AHD to provide further mitigation against erosion and wave overtopping.

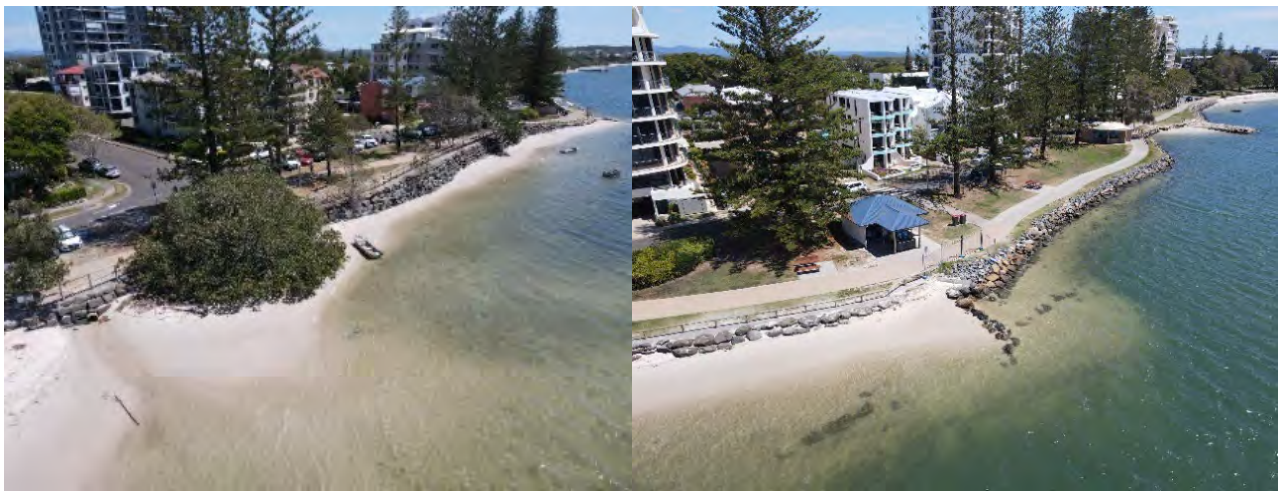

Figure 37-2: Left: Northern seawall adjacent to Nelson St. Right: Groyne and beach general condition (JBP 2023)

Figure 37-3: Left: Erosion at the failed seawall (JBP 2023). Right: Images of concrete blocks from previous SEMP[8]

37.4 Beach unit adaptation response

The CHAS 2041 adaptation response for this beach unit is to 'Mitigate'. This has been assessed through an options evaluation and muti-criteria analysis.

Table 37-1: Unit E5: Jellicoe Street to Onslow Street – Basic adaptation response

Area	Monitor, maintain and repair	Review through Options Assessment
Estuary Frontage	Y	Y

8 Sunshine Coast Council. (2014). Shoreline Erosion Management Plan. Accessed 19/07/2023 https://www.sunshinecoast.qld.gov.au/Environment/Rivers-and-Coast/Coastal-Management/Shoreline-Erosion-Management-Plan

37.5 Management approach

37.5.1 Estuary Frontage

Management options have considered ongoing monitoring, continued or expanded nourishment campaigns, and structural approaches. Several options were not considered feasible, economically viable, or socially acceptable, including a monitor only (i.e., do nothing) scenario for the TS Onslow foreshore, significant sand profiling given the lack of available sediment, and nourishment via an inland source or via ship.

A high-level options appraisal reviewed the continuation of existing nourishment practices, to begin the design process for new hard defences, or to limit engineering work to a reconstruction of the existing hard defence of the TS Onslow seawall which is currently progressing through detailed design.

The construction of the 200m TS Onslow seawall is a preferred management action, as its design and funding have been confirmed, with an expected completion timeframe of mid-2025 through state funds. This would occur in conjunction with continued beach nourishment, which remains a preferred short-term action, however, may not be sustainable over the long term given the operational concerns of decreased performance under the new tidal regime. Currently around 1,000m^3 of sand is placed annually between Nelson St to Onslow St. Increases in nourishment volume or frequency may be required in the future to meet performance expectations; with a review proposed mid-way through the SEMP period. The preferred approach for erosion management in this sub-unit is listed below:

- continue existing beach nourishment activities under permit MPW2017/MBMP0138;
- regularly review the volume and placement approach for nourishment as the Bribie Island Breakthrough evolves and the new tidal regime stabilises. This integrates with actions in Unit E6 and Unit E7 regarding an extended nourishment volume allowance;
- construct the TS Onslow seawall once detailed designs are completed.

38. Unit E6: Onslow Street to Lamerough Canal

38.1 Unit Description

This unit extends from Onslow Street to Lamerough Canal in the Pumicestone Passage, Golden Beach. The shoreline includes approximately 400m of mangrove habitat and pockets of sandy beach, backed by the main access road of Esplanade. Sections of existing rock revetment are present, with upgrades and extensions currently planned in the southern area near where the Caloundra Power Boat Club is located, adjacent to Apex Park.

The shoreline between the Lamerough Canal and the Caloundra Power Boat Club consists of a small section of rock revetment between the bridge and the canal mouth, unprotected shoreline, and the boat ramp and associated car park infrastructure. North of the club is a vegetated shoreline which includes mangroves and riparian species.

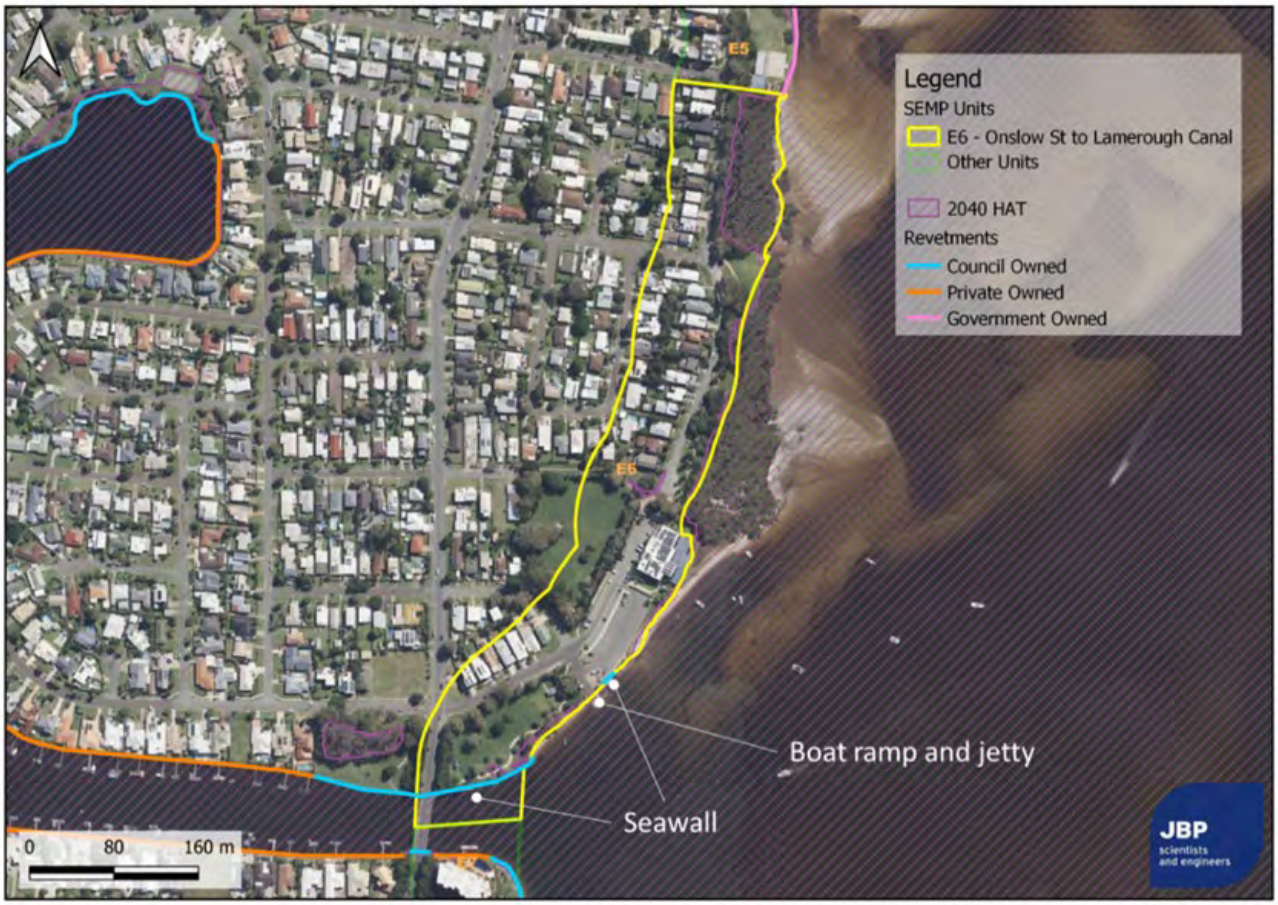

Figure 38-1: Estuary Unit E6: Onslow Street to Lamerough Canal

38.2 Historic erosion management

Historic erosion management has varied over the northern and southern ends of the unit. While the northern extent of the unit consists primarily of naturally vegetated shoreline, the southern end of the unit includes both natural and hardened shorelines. A small section of rock revetment exists between the bridge and the canal mouth. The shoreline between the southern existing revetment and the boat club remains unprotected. The carpark extends approximately 90m and includes a boat ramp with a floating walkway. They are situated immediately on and behind the shoreline with no protection.

Increased planning to manage a potential Bribie Island Breakthrough was undertaken in the leadup to the 2022 event, and included the following studies and approvals:

- Golden Beach and Bribie Island Breakthrough - Options, Design, Approvals, and Investment Plan (GBBIB-ODAIP) (BMT 2015);
- Bribie Island Breakthrough Preparedness Seawall Planning and Design (BIB-PSPD) (GHD 2016);
- subsequent permits.

The vegetated area within the northern extent of the unit is contained within Area 5 of the BIB-PSPD, and the southern powerboat club area within Area 6. In the north, the vegetation is believed to be providing a buffer against significant coastline movement. Historically there has been a large lobe of sand directly seaward of the vegetation, which has provided a degree of protection against wind generated waves.

The proposed management approach within the BIB-PSPD report contains hard and soft measures, including the construction of a new revetment in the south of the unit following a foreshore erosion trigger. Minor nourishment works have been completed under permits which limit volumes to 10,000m^3/year along the Golden Beach shoreline. Increased nourishment volumes can now occur under permit MPW2017/MBMP0138, however, this needs to be balanced between the estuary units E4, E5, E6 and E7. Currently around 400m^3 of nourishment is placed annually along the Unit E6 frontage.

38.3 Review of existing shoreline

Structural conditions and the general condition of the shoreline has been reviewed through new inspections and previous reports. The condition of the existing rock revetment between the bridge and the canal mouth wall suggests it remains in fair condition (grade 3) with a raised crest supported by established vegetation (see Figure 38-2). No further details could be identified for the revetment, which lacks available engineering plans and may have been part of the original canal development.

Following the Bribie Island Breakthrough, large quantities of sand have been deposited throughout the vegetated area between TS Onslow and the Caloundra Power Boat Club, with the topsoil now predominantly sand, rather than the swamp-like topsoil observed before the breakthrough. Excess sand deposition has the potential to smother mangroves, causing suffocation and eventual death, and some stress and dieback of mangroves has already been observed in the area.

The remaining areas of unprotected shoreline are considered to be generally in good condition, free of significant signs of erosion. Consequently, the BIB-PSPD trigger that would initiate the construction of the new revetment is not considered to have been met.

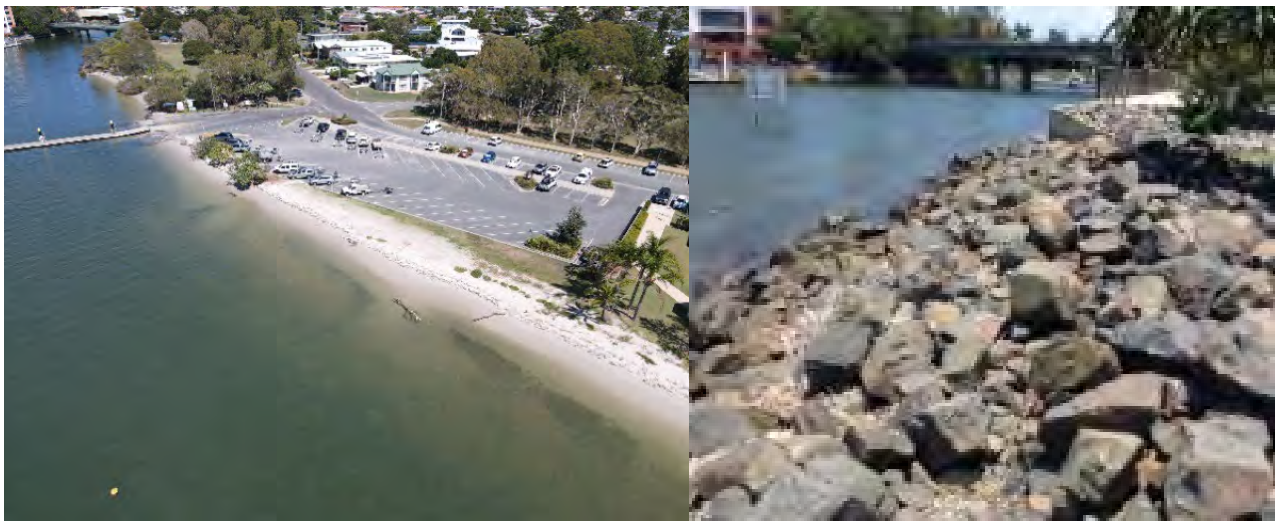

Figure 38-2: Estuary Unit E6 frontage and rock armour (JBP 2023)

38.4 Beach unit adaptation response

The CHAS 2041 adaptation response for this beach unit is to 'Mitigate'. This has been assessed as a single zone, as shown in Table 38-1.

Table 38-1: Unit E6: Onslow Street to Lamerough Canal– Basic adaptation response

Area	Monitor, maintain and repair	Review through Options Assessment
Estuary Frontage	Y	Y

38.5 Management approach

38.5.1 Estuary Frontage

Management options have considered ongoing monitoring over the unit, following the planning adopted within the Bribie Island Breakthrough plans (i.e., the BIB-PSPD and GBBIB-ODAIP), changing the management strategy away from these plans, and updating available concept design and permits for coastal protection. An evaluation of option feasibility removed the option to progress the seawall concept presented in the Bribie Island Breakthrough plans, given it extends beyond the management of public infrastructure. A reduced revetment extent is considered a suitable management action, in addition to continued sand nourishment and ongoing monitoring of changes to the vegetation in the northern section of the unit to identify any significant dieback due to the changing hydrodynamics and tidal range within the passage. The preferred management actions for this unit are:

- continue existing beach nourishment activities under permit MPW2017/MBMP0138, with an extended nourishment programme allowed as triggers are met. Currently around 400 m^3 of sand is placed along the foreshore annually;
- monitor changes to the vegetation throughout the unit to identify any significant dieback. If significant dieback is observed, removal of sand from the vegetation area or nature-based solutions like revegetation with a rock/reef fillet should be considered;
- update the engineering plans for future coastal protection. This should focus on public infrastructure at Apex Park and the adjacent carpark;

- construct future coastal protection under two stages; Apex Park (Stage 1) and the adjacent carpark (Stage 2).

New engineering plans

New engineering plans would require a review of the existing seawall design, particularly in relation to crest heights and rock armour sizes due to the new hydrodynamic conditions. It would reduce the extent to limit the protection to public assets at Apex Park and the adjacent carpark. Designs would consider tie-ins to the existing infrastructure, designer's risk assessments, updating approvals and permits, and certification of the design. The engineering plans are to include details on the existing structure, alignment, tie-ins, materials, and constructability.

39. Unit E7: Lamerough Canal to Bells Creek

39.1 Unit Description

This unit extends from the Lamerough Canal entrance, south to the lower Bells Creek estuary, adjacent to Parks Link Court, Pelican Waters. The unit includes the Pumicestone Passage foreshore from Lamerough Canal in the north towards Booker Parade in the south, extending past the Military Jetty, public boat ramps, drainage outlets, the Keith Hill Park pathway and parkland, and includes the northern bank of Bells Creek to the cul-de-sac at Parks Link Court.

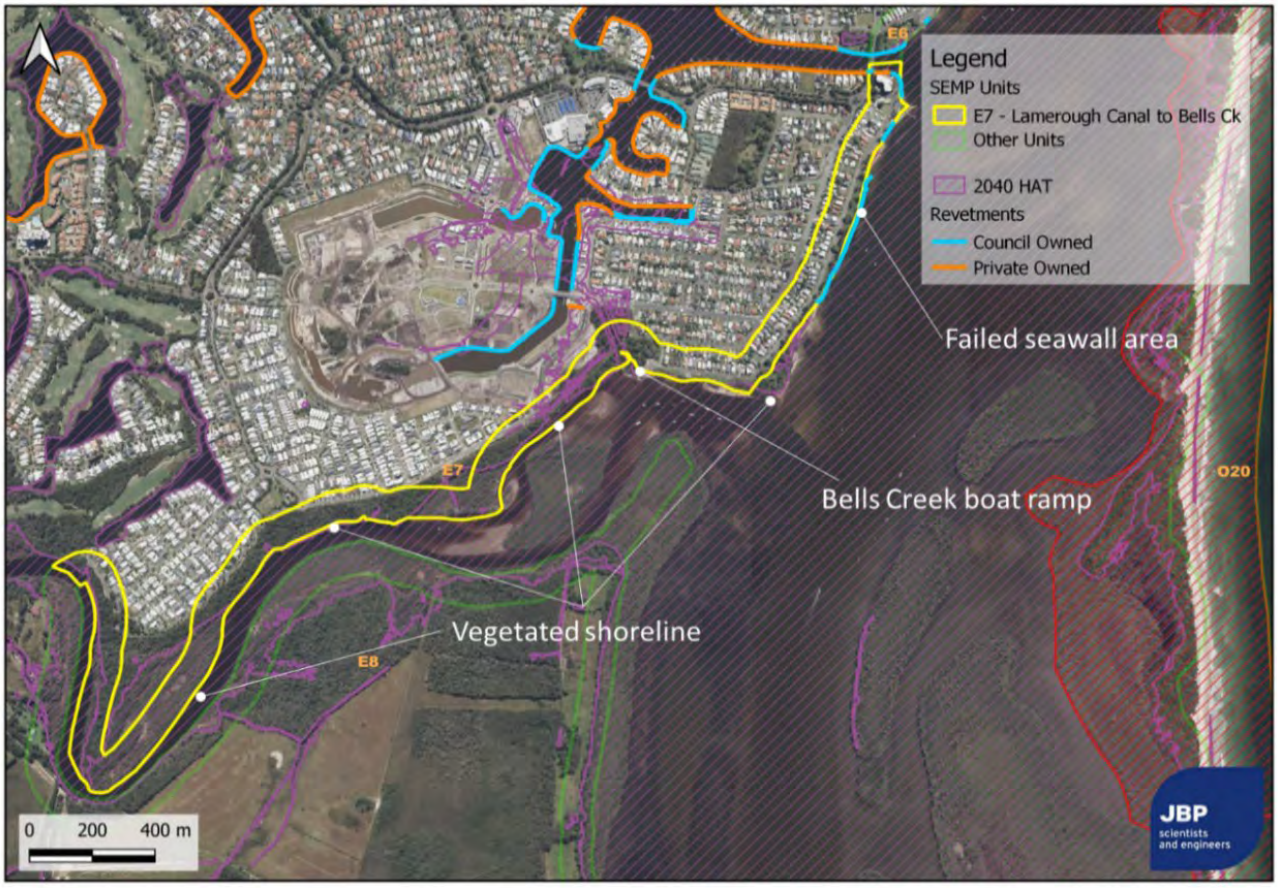

Figure 39-1: Estuary Unit E7: Lamerough Canal to Bells Creek

39.2 Historic erosion management

This section of shoreline has a history dating to the late 1950s, mangrove clearing, and land reclamation works occurred between Bells Creek and Lamerough Canal. Dredging of the Bells Creek entrance has occurred since 1970 to provide a deep-water shelter for small boats. During the 1970s some of the material was used for land reclamation. Initial canal construction of Pelican Waters occurred in the 1980s, continuing to expand the canal system in the early 1990s.

The unit has several examples of historic erosion management. A rock revetment exists at the southern side of the Lamerough Canal mouth extending towards the Military Jetty carpark. The Military Jetty was erected in 1941 to assist in the transportation of goods and personnel to Fort Bribie. It was used throughout World War 2 and is identified as a Local Heritage Place within the SCC Planning Scheme. The

shoreline adjacent to the Jetty is initially undefended before returning to a vertical stone pitched seawall near the amenities block. Two boat ramps are positioned along the coast, designed as 'quasi' groyne structures that protrude from the shoreline and appear to have a role in shoreline stabilisation. A rock revetment then extends south along the Esplanade, ending near Joan Street. The revetment is in poor condition and is estimated to have a residual life of 10 years. Further south the unit is vegetated with no protective works.

Recent erosion management has followed the SEMP (SCC, 2014) and planning documents released prior to the Bribie Island Breakthrough:

- Golden Beach and Bribie Island Breakthrough - Options, Design, Approvals, and Investment Plan (GBBIB-ODAIP) (BMT 2015);
- Bribie Island Breakthrough Preparedness Seawall Planning and Design (BIB-PSPD) (GHD 2016);
- subsequent permits.

The northern unit falls within the BIB-PSPD Management Area 7 and includes maintenance or renewal works for the existing rock revetment at the mouth of the Lamerough Canal, and for either crest raising or seawall renewal between 134 to 156 Esplanade. Monitoring of the vertical stone pitched seawall was recommended, along with sealing of the interface between the seawall and the footpath along its crest. Minor beach nourishment along the current sections of unprotected shoreline was also recommended. The coastline further south falls within the BIB-PSPD Management Area 8 with a preferred management regime of minor beach nourishment. Vegetation management and general monitoring is proposed for all areas without formal defences in place as this section may require armouring in the future depending on potential Bribie Island Breakthrough scenarios.

Under the BIB-PSPD, when nourishment alone is not able to control erosion the management approach will move to the construction of a new revetment between Lamerough Canal mouth to the Bells Creek boat ramp, along with block terrace rock pools north of Military Jetty.

38.3 Review of existing shoreline

Structure condition and the general condition of the shoreline has been reviewed through new inspections and previous reports. The existing rock revetment between the Lamerough Canal mouth and the Military Jetty is in relatively poor condition (grade 4), does not appear to have a geotextile filter layer, and appears to use undersized rock, of which there are signs of displacement. The unprotected shoreline between the revetment and the Military Jetty appears to be in good condition, with minimum erosion, which is similar to the unprotected shoreline immediately south of the Jetty.

The vertical pitched stone seawall between the Military Jetty and the two public boat ramps is in fair to good (grade 3 to 2) condition, with some localised deterioration of its face and separation between the footpath and crest observed. The two public boat ramps near 135 Esplanade feature pitched stone batters which are also in fair to good (grade 3 to 2) condition. The boat ramps are acting as 'quasi' groyne structures, trapping a small amount of sand, and having a contribution to shoreline stabilisation.

South of the boat ramps, the rock revetment between Roy Street and Joan Street is generally in poor condition (grade 4). It shows signs of overtopping and rear-side scour, as shown in Figure 39-2. A geotextile layer could not be observed, and the interlocking of the rock appears to be poor. The revetment has an estimated residual life of 10 years and is expected to require replacement or significant repair within the lifetime of the SEMP.

South of the rock revetment, the shoreline has some protection from vegetation and appears to be in fairly good condition. Some localised erosion is observed at the entrance to Bells Creek, where the formation of a small escarpment was observed between 180 Esplanade to the Bells Creek boat ramp, as seen in Figure 39-2. The Bells Creek boat ramp is considered to be in fair (grade 3) condition.

Figure 39-2: Estuary Unit E7. Left: Overtopping and scouring of revetment near Roy Street. Right: Erosion along the shoreline at Bells Creek entrance (JBP 2023)

39.4 Beach unit adaptation response

The CHAS 2041 adaptation response for this beach unit is to 'mitigate'. This has been assessed as a single zone, as shown in Table 39-1.

Table 39-1: Unit E7: Lamerough Canal to Bells Creek – Basic adaptation response

Area	Monitor, maintain and repair	Review through Options Assessment
Estuary Frontage	Y	Y

39.5 Management approach

39.5.1 Estuary Frontage

Management options have considered continued monitoring over the unit, following the planning adopted within the Bribie Island Breakthrough Plans (e.g., the BIB-PSPD), changing the management strategy away from the BIB-PSPD, piecemeal renewals to failing defences, updating the concept design plans for the seawall, or the construction of hard defences. The evaluation of option feasibility and community acceptability removed the option of continued monitoring without action which is not considered acceptable given the poor condition and failed state of existing defences. A high-level options appraisal considers the progressive upgrade to formal coastal protection throughout the unit as the most viable option, which may consider the potential to implement nature-based solutions for the areas experiencing the least erosion impacts currently. The preferred management actions for this sub-unit are:

- complete a design and construct project for coastal protection renewal at the Military Jetty. This would span between Roy Street to the northern ramp.
- continue existing beach nourishment activities under permit MPW2017/MBMP0138. Currently around 2000 m3 are placed annually.

- when triggers are met, plan for the extended nourishment programme which would allow a single capital nourishment of 40,000m^3, to be split over the Golden Beach estuary units.
- monitor changes to the shoreline, particularly for erosion due to the new wave and tidal regime. Monitor vegetation throughout the unit to identify any significant dieback.
- Split future renewals into three consecutive stages:
    - Design and approvals - zone 1 (likely to be the remainder of the northern section)
    - Construction - zone 1
    - Design and approvals - zone 2 (likely to be the central section)
    - Construction - zone 3
    - Design and approvals - zone 3
    - Construction - zone 3

40. Unit E8: Bells Creek to Southern Boundary

40.1 Unit Description

This unit extends from the lower Bells Creek estuary, adjacent to Park Link Court, Pelican Waters, south to the southern boundary of the Sunshine Coast local government area and is part of the Pumicestone Passage. The foreshore is predominately a wide and well vegetated mangrove and riparian system. The CHAS 2041 adaptation response for this estuary unit is to 'Mitigate'. Management actions will follow the coast-wide actions outlined in Section 3.

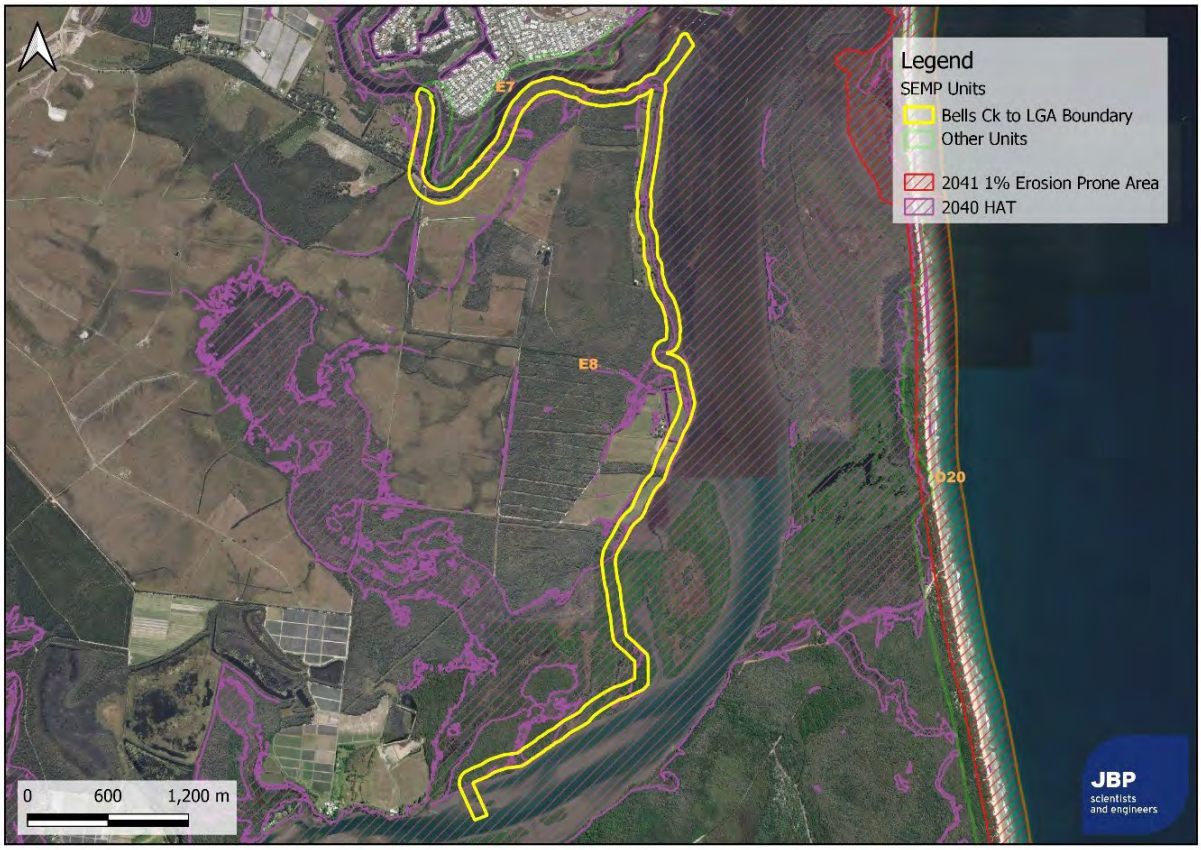

Figure 40-1: Estuary Unit E8: Bells Creek to Southern Boundary

Figure 40-2: Southern Pumicestone Passage catchment (SCC)

41. Unit O20: Bribie Island Beach

41.1 Unit Description

The Bribie Island coastal unit extends from the northern tip of Bribie Island to the southern extent of the Sunshine Coast local government area at the Bribie Island North suburb southern boundary. The unit consists entirely of the Bribie Island National Park and is under the management of the State Governments Department of Environment, Science and Innovation (DESI). A wide and healthy dune system exists along the majority of the unit. An open coast breakthrough of Bribie Island into the Pumicestone Passage occurred in January 2022 and is now the dominant northern entrance to the passage, with the former entrance at Bulcock Beach narrowing over time. No adaptation response was given for this beach unit in the CHAS.

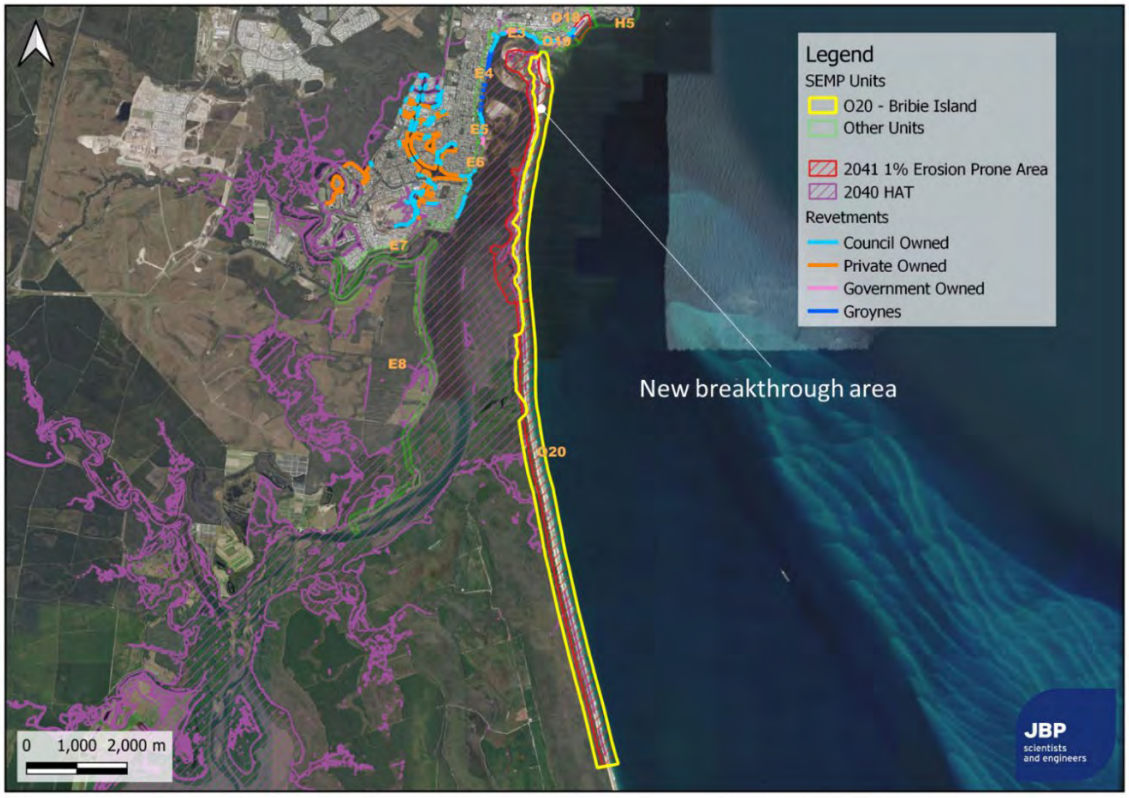

Figure 41-1: Open Coast Beach Unit O20: Bribie Island Beach

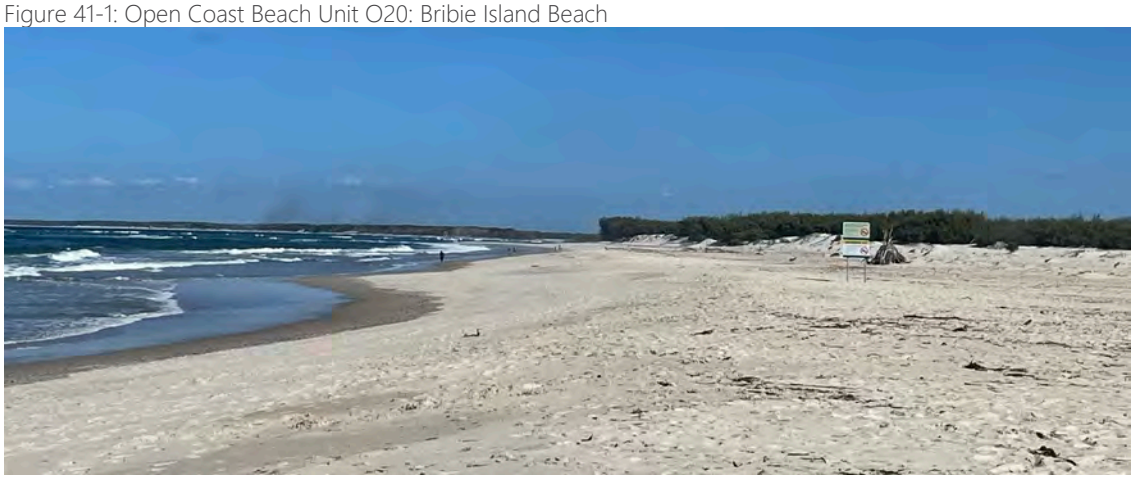

Figure 41-2: Bribie Island open coast beach (SCC 2024)

Sunshine Coast COUNCIL

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