

## 2 Deception Bay

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### 2.1 Council Controlled Areas and Current Condition

Council controlled land and shoreline types within the Deception Bay study area are indicated in Figure 2-1. The beach unit is characterised by open public areas protected by seawalls. The area has significant social and recreational value associated with coastal pathways, landscaped foreshore areas, picnic facilities and Council controlled boat ramps. Environmental values are also evident, with small mangrove communities within the beach unit and the offshore areas a declared Habitat Protection Zone (refer Stage 1 report, Figure 2-4). Established mangrove habitats are located to the immediate north and south of the beach unit and form part of a declared Fish Habitat Area (refer Stage 1 report, Figure 2-2). The fisheries values of these waters are summarised in the Stage 1 report (Table 2-4). Significant shorebird habitats are also located to the north and south of the study area (refer Appendix A).

Coastal processes assessments completed in Stage 1 of the SEMP suggest the majority of Council controlled foreshore is vulnerable short-term erosion and minor inundation pressure associated with design storm events. Due to this threat, foreshore assets and values are protected by seawalls. Private lots are generally elevated and not directly exposed to coastal erosion or storm tide processes.

Examples of existing shoreline structures throughout the Deception Bay study area are shown in Figure 2-2, including:

- Stepped seawall (adjacent to Wallin Ave stormwater drain);
- Stone pitched seawall (Captain Cook Parade);
- Stone pitched seawall with shotcrete repair (Captain Cook Parade); and
- Stepped seawall with mangrove buffer (Captain Cook Parade).

The concrete stepped seawalls common throughout the study area are generally in a good condition. Stormwater outfalls or drains are incorporated with shoreline structures at many locations. While ponding during periods of low stormwater flow is evident, the essential infrastructure does not appear to be contributing to significant shoreline erosion. Small mangrove communities are common throughout Deception Bay and act to protect sections of seawall from direct exposure to coastal processes (discussed further in Section 2.1.1).

The need for enhanced shoreline management is most evident at the exposed seawall section north of the Captain Cook Parade boat ramp. Examples of storm damaged shoreline structures that represent temporary public safety and maintenance issues for Council are shown in Figure 2-3 (following ex-TC Oswald, January 2013). The modes of failure are typically associated with a combination of processes, including:

- Wave impact: waves breaking at or near the structure generate high impact pressures of short duration and may cause brittle failure of rigid seawalls or revetments. Wave overtopping can also cause damage or erosion at the crest of a structure.

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- Scour: the presence of a hard, non-erodible structure may increase the current velocity in its immediate vicinity. This in turn increases the sediment transport potential at the toe of the seawall, leading to lowering of the beach due to scour and ultimately the undermining of the structure and the onset of sliding failure.
- Geotechnical failure: at Deception Bay, appears to be associated with the fluidisation of the underlying material due to excess pore water pressures and/or the loss of underlying material through internal channels due to steep hydraulic gradients (referred to as “piping”).

The potential for seawall failure due to the modes described above could be reduced with a seawall design that causes greater wave and current energy dissipation during extreme events.

### 2.1.1 Shoreline Vegetation

Shoreline vegetation in the Deception Bay study area is largely comprised of mangrove forests, dominated by the Grey Mangrove, *Avicennia marina*. Extensive mangrove communities continue occur to the north and south of the Deception Bay section, in the vicinity of the mouths of Burpengary Creek, the Caboolture River and Rothwell. Smaller patches of mangrove occur along the foreshore at the following locations:

- Between Webster Road and Maine Terrace; and
- Along the length of Captain Cook Parade / Beach Road (excluding near the boat ramp, storm water drain and adjacent walls at Emerald Avenue).

The extent of these mangrove patches has expanded notably in recent decades, since prior clearing (refer historical aerial photographs in Stage 1 report). However, the potential for further expansion along the remaining foreshore (i.e. where intertidal vegetation is absent) seems somewhat limited. This is likely associated with the existing shoreline protection infrastructure, and the resultant changes to shoreline morphology, profile, and the resultant hydrological and sedimentary characteristics of existing intertidal shores. Hard shoreline structures will typically reflect wave energy during storm events, often leading to a lowering of the shoreline. There is evidence of these processes impacting mangrove colonisation in front of the shotcrete repaired seawall at Captain Cook Parade (Figure 2-2c).

While most of the mangroves observed in this section were in good condition (Figure 2-4), a small area of mangrove dieback was evident adjacent to Captain Cook Parade (Figure 2-5). In this area, there are a few mature trees displaying visible symptoms of stress, such as leaf abscission, and few juvenile mangroves (i.e. seedlings and saplings) were observed to be present. Mangrove dieback here is likely associated with factors such as sediment accumulation, unfavourable sediment or water chemistry, or biological infection (e.g. leaf galls).

Vegetation above the existing shoreline protection infrastructure (i.e. above the intertidal zone) consists predominantly of the mown grass and landscaped gardens featured in the adjacent public parklands and green space.





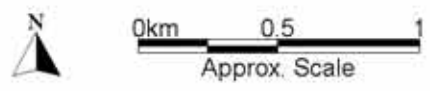
- 1. Beach Rd Stepped Concrete Seawall with Mangrove
- 2. Captain Cook Pde Stepped Concrete Seawall
- 3. Captian Cook Pde Stepped Concrete Seawall with Mangrove
- 4. Captain Cook Pde Stone Pitched Seawall with Shotcrete Repair
- 5. Wallin Ave Stepped Concrete Seawall
- 6. Esplanade Stepped Concrete Seawall
- 7. Esplanade No Shoreline Structure
- 8. Esplanade Stepped Seawall
- 9. Stepped Concrete with Mangrove
- 10. Esplanade South Sloping Concrete Seawall
- 11. Esplanade South No Shoreline Structure

**LEGEND**

- Open Space
- Road Reserve
- Stormwater Outlet
- Canoe/Boat Ramp

Title: <b>Deception Bay Beach Unit - Council Controlled Shoreline Areas and Current Condition</b>	Figure: <b>2-1</b>	Rev: <b>A</b>
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BMT WBM endeavours to ensure that the information provided in this map is correct at the time of publication. BMT WBM does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.







**Figure 2-2 Example Shoreline Condition throughout Deception Bay Study Area: a) Stepped Concrete; b) Stone Pitched; c) Stone Pitched with Shotcrete Repair; d) Stepped Concrete with Mangrove Buffer**



**Figure 2-3 Seawall Damage January 2013: a) Stone Pitched Seawall Failure (prior to Shotcrete Repair); b) Sink Hole behind Stepped Seawall**



Figure 2-4 Healthy Mature (background) and Juvenile (foreground) Mangrove Vegetation Adjacent to Captain Cook Parade



Figure 2-5 Mangrove Dieback Adjacent to Captain Cook Parade



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## 2.2 Shoreline Management Approaches Considered

All generic management options described in the Stage 1 report (refer Chapter 3) have been considered for the Deception Bay shoreline and are summarised in Table 2-1. Through assessment of existing assets and the values associated with the Deception Bay study area the following options were shortlisted:

- Maintain Status Quo;
- Planned Retreat (minor seawall setback);
- Seawall; and
- Mangrove and Coastal Vegetation Management.

**Table 2-1 Deception Bay Shoreline Management Options Assessment**

Generic Options	Advantages	Disadvantages	Comments
1. Maintain Status Quo	a) No additional capital cost (part of routine maintenance)	a) Potential loss of foreshore amenity and risk to public safety b) Ongoing maintenance commitment	Current shoreline management strategy maintaining foreshore values at most locations
2. Planned Retreat	a) Mitigates the immediate shoreline erosion problem b) Shoreline can respond naturally to erosion events	a) Loss of public land with significant social value	Potential opportunity for minor setback and shoreline realignment (Captain Cook Pde)
3. Shoreline Nourishment	a) Maintains beach amenity	a) No known viable source of suitable material b) High capital and maintenance costs, requires ongoing commitment	Unlikely to significantly mitigate erosion pressure during storm events
4. Seawall	a) Provide effective erosion control b) Provide direct property protection	a) Decreased beach amenity and beach lowering during extreme events b) High capital and maintenance cost	Proposed upgrade of existing exposed seawall sections with greater energy dissipating design (Captain Cook Pde)

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Generic Options	Advantages	Disadvantages	Comments
5. Groyne	NA	NA	Not considered viable due to low longshore sediment transport rates
6. Offshore Breakwaters or Submerged Reef	a) Dissipate wave energy during severe events	a) High capital and maintenance cost b) Significant design challenges and uncertainty	Potential to widen nearshore area and encourage mangrove growth
7. Mangrove and Coastal Vegetation Management	a) Maintains natural buffer to shoreline erosion b) Reduces energy reaching the shoreline during storm events	a) Ongoing commitment b) Difficult to establish new mangrove communities	Long term, mangrove communities unable to migrate landward in response to sea level rise may be permanently lost; mangroves may prolong the lifespan of shoreline protection infrastructure

## 2.3 Proposed Management Strategy

The existing management strategy throughout the Deception Bay study area is maintaining a valuable open public space. Most shoreline structures are in good condition and do not require significant upgrade at this time. Preservation of mangroves and foreshore vegetation is considered an important aspect of ongoing shoreline management. The mangrove communities throughout the study area act to dissipate wave energy offshore before reaching the shoreline, helping to minimise undesirable erosion at the shoreline and damage to structures.

The exposed section of stone pitched seawall damaged during ex-TC Oswald and subsequently repaired with shotcrete in early 2013 (Captain Cook Parade Park, Section 4 in Figure 2-1) represents the most urgent works within the Deception Bay study area. This structure and section of shoreline remains vulnerable and should be upgraded in the short term. Given the exposure of this section, a rock revetment that better dissipates wave energy during storm conditions may be more appropriate than a rigid seawall design. However, stepped seawalls are common throughout the study area and there may be a preference for design consistency. A setback and realignment will also help to reduce lowering of the beach at the toe of the structure and minimise future damage. A slightly higher bed elevation in front of the wall may also allow mangroves to establish in the area. This could be encouraged through a revegetation program or may simply occur naturally if favourable physical conditions prevail (considered further in Section 2.3.1).

A conceptual layout of the proposed seawall upgrade and realignment is shown in Figure 2-6. The realignment would cause a small loss of foreshore area however this is not expected to negatively impact social or environmental values of the area. If a setback was achieved it is expected that the loss of foreshore area would be offset by the establishment of a narrow beach and the potential

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southern expansion of the adjacent mangrove community. Accumulated sand at the nearby stormwater drain (Wallin Avenue, refer below) is a potential source of sand (subject to assessment and approval) for minor shoreline nourishment following seawall construction.

The Wallin Ave drain temporarily removes sand from the beach system due to longshore sand transport processes that deposit material into the drain entrance. During high stormwater flow events, the sand is flushed from the drain and redistributed to the nearshore areas. Occasionally the drain requires mechanical clearing during extended dry (with low stormwater flow) periods. The proposed relocation of sand from the vicinity of the drain for minor nourishment at the adjacent shoreline would also have the benefit of reducing drain blockages.

The proposed use of accumulated sand from the Wallin Ave drain could be enhanced by the addition small “training wall” structures at the drain entrance (approximately 10m length either side of the drain entrance). The intention of the short structures would be to intercept and restrict sand entering the drain. The intercepted sand could be easily accessed and mechanically redistributed to the adjacent beaches to manage any emerging erosion problems (including minor erosion associated with stormwater flows across the beach). This approach would be expected to reduce drain maintenance requirements and provide the benefit of intercepting the marine sand prior to it mixing with potential stormwater contaminants.

### 2.3.1 Vegetation Management Considerations

There are a number of vegetation-related options that could be incorporated into the proposed “hard” shoreline management recommendations to add value by aiming to improve the durability of new, repaired or existing seawalls, while also adding to local ecological values. Potential options for Deception Bay include:

#### Maintain existing foreshore (intertidal) vegetation

Existing seawalls at Deception Bay that are fronted by mangroves (i.e. along Captain Cook Parade) appear to be in good condition, with little need for repair or ongoing maintenance. Mangroves here, and elsewhere within this section (e.g. between Maine Terrace and Webster Road, where there is no seawall), seem to be acting as an effective erosion buffer against coastal processes, most notably during storm events. This presumably contributes to extending the functional life span of the shoreline (either constructed or natural) for providing effective shoreline protection.

Shoreline management actions that seek to maintain or enhance the existing mangrove communities are likely to have the combined benefit of preserving ecological values and minimising shoreline erosion. Maintenance would typically require minimal effort, and may be limited to regular (e.g. opportunistic or annual) inspection of tree health and management of obvious potential stressors such as weeds and accumulated litter. More involved inspection and management may be required from time to time to target problems areas where dieback is observed.



**Deception Bay**Redesign of seawalls to facilitate further mangrove establishment

For the reasons stated above, it is likewise desirable to expand the current extent of mangrove vegetation, where feasible. Given the highly modified, and at times high energy, nature of the shoreline, it is unlikely that attempts at widespread longshore expansion of mangroves at this section would prove successful or effective. Such efforts can also be expensive. Together, this suggests that widespread mangrove revegetation may not provide value for money in the short term.

While the feasibility, or even desirability, of widespread foreshore (intertidal) revegetation remains undetermined, small, localised measures that enhance existing vegetation values would likely be of benefit. The application of small-scale measures would aim to facilitate the natural (and/or assisted) establishment of mangroves in areas directly adjoining existing vegetation. This would involve identification of suitable areas, either immediately north or south of existing mangrove patches. At these locations, options for the redesign of existing or future structures should consider improvements for better integrating with the natural shoreline features.

At the southern extent of the mangrove community along Captain Cook Parade Park (near Endeavour Street) there is a distinct disparity in the alignment of the seawall where the mangroves end, as shown in Figure 2-7. In contrast to the intact stepped wall fronted by mangroves, the adjoining wall where no mangroves occur is positioned approximately 5m further seaward and requires ongoing maintenance due to scour at the toe of the structure. As illustrated in Figure 2-6, realignment of this structure may improve adjacent environmental conditions that promote further mangrove colonisation and expand the longshore extent of this vegetation buffer.



Figure 2-6 Captain Cook Parade Park Seawall Upgrade and Realignment and Mangrove Rehabilitation



**Figure 2-7 Southern Extent of Mangroves adjacent to Captain Cook Parade Park**



### 2.3.2 Summary

The proposed management strategy for the shoreline sections defined in Figure 2-1 are summarised in Table 2-2. Generally, the existing management plan for the area is considered to be successfully maintaining a valuable open space for the community. The only major capital works promoted within the study area is at Captain Cook Parade Park (Section 4). The sections of shoreline without existing structures (Section 7 and 11) are vulnerable to erosion during severe storm conditions. It is considered important to preserve these areas to allow safe and easy access to the water, thereby maintaining social and recreational values attributed to the area. Providing these areas continue to be inspected following severe storm events, and are re-established with sand and vegetation as required, there is no requirement for additional hard structures at this time.





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Table 2-2 Deception Bay Shoreline Management Summary

Shoreline Section Number	Existing Condition	Proposed Management Strategy
<p>1. Beach Rd – approx. 420m</p> 	<ul style="list-style-type: none"> <li>• Stepped concrete seawall in good condition</li> <li>• Sandy beach and mangrove buffer</li> <li>• Beach lowering in front of seawall</li> </ul>	<ul style="list-style-type: none"> <li>• Maintain status quo including ongoing foreshore and vegetation management</li> <li>• Inspect seawall and foreshore following severe storm events</li> <li>• Perform maintenance as required</li> </ul>
<p>2. Captain Cook Pde – approx. 130m</p> 	<ul style="list-style-type: none"> <li>• Stepped concrete seawall in good condition</li> <li>• Sandy beach buffer</li> <li>• Stormwater outfall</li> <li>• Public boat ramp</li> </ul>	<ul style="list-style-type: none"> <li>• Maintain status quo including ongoing foreshore and vegetation management</li> <li>• Inspect seawall and foreshore following severe storm and stormwater flow events</li> <li>• Perform maintenance as required</li> </ul>

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Shoreline Section Number	Existing Condition	Proposed Management Strategy
<p>3. Captain Cook Pde – approx. 420m</p> 	<ul style="list-style-type: none"> <li>• Stepped concrete seawall in good condition</li> <li>• Sandy beach and mangrove buffer</li> </ul>	<ul style="list-style-type: none"> <li>• Maintain status quo including ongoing foreshore and vegetation management</li> <li>• Inspect seawall and foreshore following severe storm events</li> <li>• Perform maintenance as required</li> </ul>
<p>4. Captain Cook Pde Park – approx. 120m</p> 	<ul style="list-style-type: none"> <li>• Stone pitched seawall with shotcrete repair completed in 2013 (following ex-TC Oswald)</li> <li>• Sinkhole damage along foreshore observed following severe storm conditions</li> </ul>	<ul style="list-style-type: none"> <li>• Upgrade seawall within 2 years</li> <li>• Realign with stepped seawall to the north</li> <li>• Minor beach nourishment in front of realigned seawall</li> </ul>

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Shoreline Section Number	Existing Condition	Proposed Management Strategy
<p>5. Wallin Ave – approx. 130m</p> 	<ul style="list-style-type: none"> <li>• Stepped concrete seawall in good condition</li> <li>• Open channel stormwater outlet</li> <li>• Sand accumulation in outlet</li> <li>• Accumulated sand disposed offshore during channel flow events</li> </ul>	<ul style="list-style-type: none"> <li>• Redistribute accumulated sand to adjacent areas</li> <li>• Potential sand source for minor nourishment proposed at Section 4</li> <li>• Consider minor training wall structures designed to intercept sand prior to entering the drain</li> </ul>
<p>6. Esplanade – approx. 370m</p> 	<ul style="list-style-type: none"> <li>• Stepped concrete seawall in good condition</li> <li>• Narrow sandy beach</li> </ul>	<ul style="list-style-type: none"> <li>• Maintain status quo including ongoing foreshore and vegetation management</li> <li>• Inspect seawall and foreshore following severe storm events</li> <li>• Perform maintenance as required</li> </ul>



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Shoreline Section Number	Existing Condition	Proposed Management Strategy
<p>7. Esplanade – approx. 200m</p> 	<ul style="list-style-type: none"> <li>• Grassy foreshore</li> <li>• Narrow sandy beach buffer</li> <li>• Vulnerable to severe erosion during severe storm conditions</li> <li>• Stormwater outfall</li> </ul>	<ul style="list-style-type: none"> <li>• Maintain status quo including ongoing shoreline stabilisation and vegetation management</li> <li>• Inspect foreshore following severe storm and flow events</li> <li>• Revegetation, landscaping and minor beach re-profiling following severe erosion or stormwater flow event</li> </ul>
<p>8. Esplanade – approx. 200m</p> 	<ul style="list-style-type: none"> <li>• Stepped concrete seawall in good condition</li> <li>• Lowered beach submerged at high tide</li> <li>• Structure directly exposed to severe storm conditions</li> </ul>	<ul style="list-style-type: none"> <li>• Maintain status quo</li> <li>• Inspect seawall and foreshore following severe storm events</li> <li>• Perform maintenance as required</li> </ul>

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Shoreline Section Number	Existing Condition	Proposed Management Strategy
<p>9. Coastal Pathway – approx. 330m</p> 	<ul style="list-style-type: none"> <li>• Stepped concrete seawall in good condition</li> <li>• Sandy beach and mangrove buffer</li> <li>• Shorebird Habitat</li> </ul>	<ul style="list-style-type: none"> <li>• Maintain status quo including ongoing foreshore and vegetation management</li> <li>• Maintain shorebird habitat</li> <li>• Inspect seawall and foreshore following severe storm events</li> <li>• Perform maintenance as required</li> </ul>
<p>10. Esplanade South – approx. 110m</p> 	<ul style="list-style-type: none"> <li>• Uneven sloping concrete seawall in fair condition (signs of recent repair)</li> <li>• Stormwater outfalls</li> <li>• Lowered beach submerged at high tide</li> <li>• Structure directly exposed to severe storm conditions</li> </ul>	<ul style="list-style-type: none"> <li>• Maintain status quo</li> <li>• Inspect seawall following severe storm events</li> <li>• Perform maintenance as required</li> </ul>

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Shoreline Section Number	Existing Condition	Proposed Management Strategy
<p>11. Esplanade South – approx. 160m</p> 	<ul style="list-style-type: none"> <li>• Grassy foreshore</li> <li>• Narrow sandy beach buffer</li> <li>• Vulnerable to severe erosion during severe storm conditions</li> <li>• Sheltering provided by adjacent dense mangrove community</li> <li>• Shorebird habitat</li> </ul>	<ul style="list-style-type: none"> <li>• Maintain status quo including ongoing shoreline stabilisation and vegetation management</li> <li>• Inspect foreshore following severe storm events</li> <li>• Revegetation and landscaping following severe erosion event</li> </ul>



## 2.4 Cost Estimate

Council's existing commitments to shoreline management throughout the Deception Bay area are maintaining social and recreational values associated with coastal pathways, landscaped foreshore areas, picnic facilities and Council controlled boat ramps. These activities are expected to continue and be included as part of Council's routine maintenance budget. The proposed inspection of mangrove habitat may be undertaken by Council or community groups, ideally in conjunction with a coordinated mangrove monitoring program such as Mangrove Watch (information provided in Appendix A).

The additional capital cost associated with the proposed 120m seawall upgrade at Captain Cook Parade Park (Section 4) is approximately \$720,000 in 2014. This estimate is based on a pre-cast concrete stepped seawall design, corresponding to \$6,000/meter for detailed design, approval, construction and foreshore rehabilitation costs. Consideration to relatively minor works at the Wallin Ave drain, intended to intercept sand before it enters the drain, could be considered at this time (at an additional cost not expected to exceed \$100,000). The intercepted material could provide an ongoing source of sand for minor beach nourishment at adjacent shorelines.

## 2.5 Approvals Plan

The approvals plan for the Deception Bay study area considers the following:

- Approvals required under SPA and relevant government agencies;
- Issues related to the loss of land subsequent to the seawall realignment; and
- Marine Parks permits.

### Approvals under the Sustainable Planning Act 2009

Coastal erosion management works will require development approval under the *Sustainable Planning Act 2009 (SPA)* through the Integrated Development assessment System (IDAS). Assessment under SPA for potential shoreline erosion management recommendations within the Deception Bay beach unit will be required for prescribed tidal works. Works also require owners consent from the Department of Natural Resources and Mines (DNRM) for work on State land.

Prescribed tidal works relates to the works involved with the realignment of the Captain Cook Parade Park seawall (Section 4). This is assessable development under the *Coastal Protection and Management Act 1995 (CPMA)* and needs to demonstrate compliance with the requirements of the prescribed tidal works IDAS code in Schedule 4A of the *Coastal Protection and Management Regulation 2003 (CPMR)*. Any removal or disturbance of marine plants will be assessable development and will require an offset if more than 25m<sup>2</sup> of material is to be removed.

The movement of sand below the high water mark (i.e. for nourishment purposes) may also require resource allocation under the CPMA, depending on the source and placement location of the nourishment material.

Government agencies with an interest in these applications are:

- MBRC Planning Division;

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- Department of State Development, Infrastructure and Planning (DSDIP), in regards to compliance with State Planning Instruments (SPIs) and the State Development Assessment Provisions (SDAP);
- Department of Environment and Heritage Protection (DEHP), in regards to coastal management and quarry material allocation (if this source of material is required);
- Department of Agriculture, Fisheries and Forestry (DAFF), in regards to disturbance to marine plants;
- Maritime Safety Queensland (MSQ)/Regional Harbour Master (RHM), in regards to impacts to navigation in a coastal management district; and
- DNRM, in regards to works on State land.

### Seawall realignment considerations

Realigning the seawall within the reserve (7/SP177812) will involve the loss of some land above the high water mark. Considering this, it may be necessary to formally revoke the lost land so as to match the new cadastral boundaries. Further advice should be sought from the DNRM State Land Asset Management (SLAM) team on this matter at the time of development application. Despite the decrease in total reserve area, however, it is considered this represents a very minor loss which is adequately offset by the increased protection provided by the seawall alignment and reestablishment of mangrove communities.

### Moreton Bay Marine Park permit

As the Moreton Bay Marine Park covers all tidal land and waters in this beach unit, prescribed tidal works and any other activities may require a marine park permit under the *Marine Parks Act 2004* (MPA). Where works consist of a 'low impact activity not involving fishing or collecting' no permit is required. This may include the movement of sand within tidal waters. Other activities, however, including the upgrade of capital infrastructure, will be permitted where they are consistent with the objects of the zone. These are:

- To provide for the conservation of the areas of the marine park within the zone; and
- Subject to this objective, to provide opportunities for reasonable use and enjoyment, including, for example, limited extractive use, of the areas.

An application for a marine park permit is considered by the Department of National Parks, Recreation, Sport and Racing (DNPRSR).