

## 6 Toorbul

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### 6.1 Council Controlled Areas and Current Condition

Council controlled land and shoreline types within the Toorbul study area are indicated in Figure 6-1. A range of seawalls of varying design and condition exist along The Esplanade shoreline. The majority of the foreshore is open space and includes facilities to support recreational and social values including car parking, boat ramps, public toilets, picnic facilities and pathways. A small section of road reserve (car and boat trailer parking) forms the shoreline boundary to the immediate south of the public boat ramp. The beach unit is within a declared Conservation Park Zone and Fish Habitat Area. Three distinct shorebird habitat areas have been identified within the study area; including a southern roost that is managed and maintained by Council (refer Appendix A).

The sand spit at the northern extent of the study area (Figure 6-2a) and sand accumulation observed at the southern side of the public boat ramp (Figure 6-2f) suggest a net northerly sand transport direction. The narrow sandy beaches at these locations present relatively safe water access.

A variety of seawall designs and shoreline erosion control measures have been implemented throughout the Toorbul study area, including:

- Loosely placed rock rubble (Figure 6-2b);
- Stone and concrete seawalls (Figure 6-2c);
- Stepped seawalls (Figure 6-2e and Figure 6-2f); and
- Stepped seawall with shotcrete repair (Figure 6-2d).

In many cases the implemented structures are deteriorating and require ongoing maintenance. A seawall condition audit undertaken by Council in 2010 identified a number of shoreline management issues throughout the Toorbul study area, including:

- Cracking of rigid seawalls constructed from rock and concrete;
- Significant weathering of concrete surfaces representing a potential safety hazard;
- Sink hole formation behind the seawall crest due to the loss of material from the behind the wall due to wave and tidal current action;
- Safety hazards associated with stepped seawalls being used for shoreline access (as opposed to designated access points that meet relevant standards); and
- Unapproved sections of seawall believed to have been constructed by residents in the late 1970s.

Various management actions recommended as part of the 2010 audit have been implemented by Council, including:

- Shotcrete repair of deteriorated sections of seawall;
- Filling of sink holes as they appear; and

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- Concept design and development application to upgrade and realign an unapproved seawall opposite Second Ave (refer Figure 6-3).

A sloping concrete seawall that extends a further 360m south of Second Avenue is also showing signs of damage related to the loss of material from behind the seawall (refer Figure 6-4). While the shoreline erosion threat at this location appears relatively low, the sections of seawall that have cracked and slumped present public safety hazards.

Generally seawalls have not been installed along the foreshore to the south of Willmer Road, although at some locations loosely placed rock and/or rock and concrete have been used in an effort to limit shoreline recession. This area is generally characterised by a grassy foreshore with an additional buffer to erosion provided by mangroves communities.

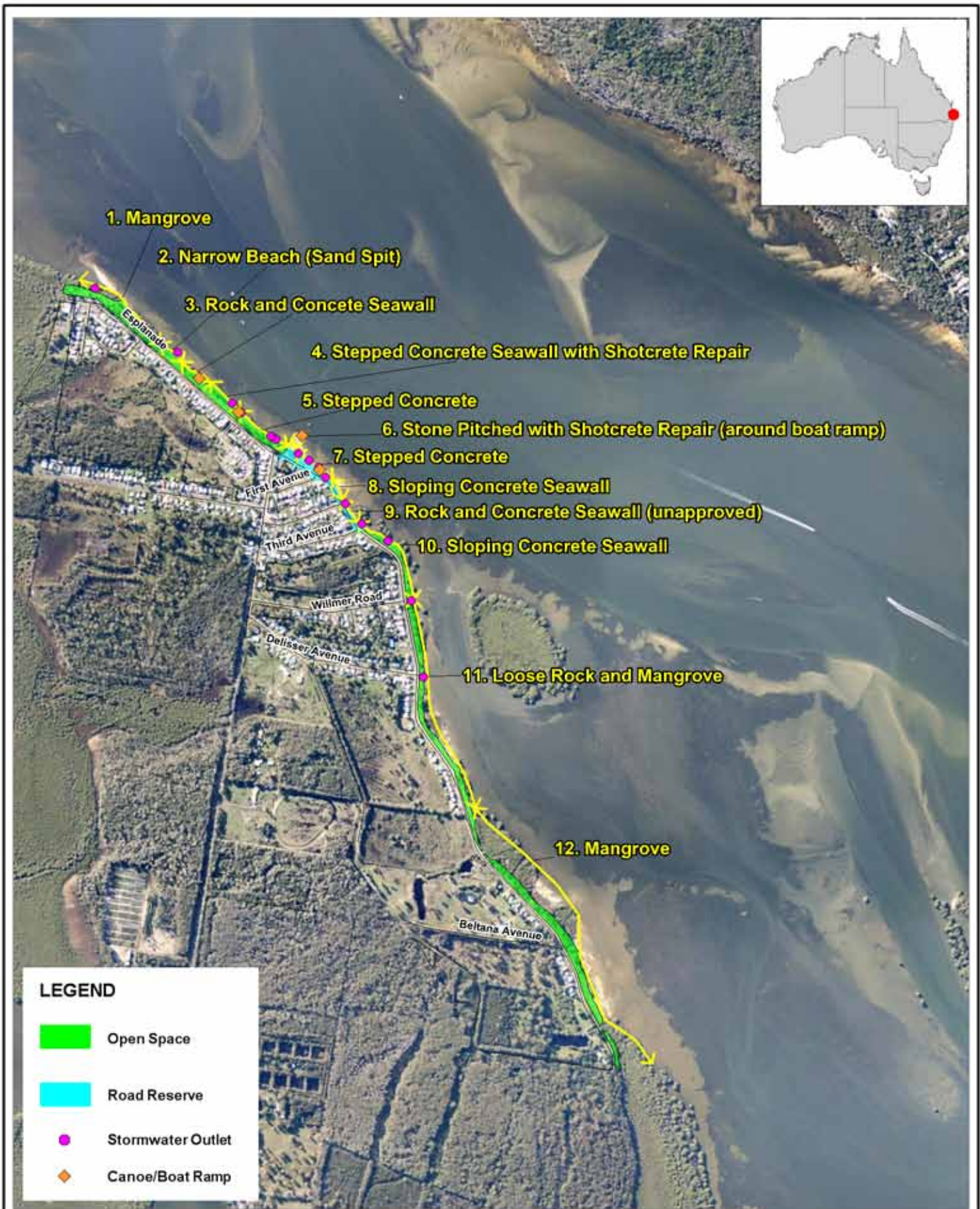
Despite recent maintenance efforts many sections of seawall throughout Toorbul remain in poor condition and/or present safety hazards. In addition, a previous storm tide assessment (Cardno Lawson Treloar, 2009) suggests a relatively high risk of coastal inundation throughout Toorbul. The existing shoreline structures are likely to require a major upgrade in order to maintain the values, protect assets, mitigate inundation and minimise public safety risk.

### 6.1.1 Shoreline Vegetation

Shoreline vegetation condition is highly variable at Toorbul. It ranges from excellent (e.g. a wide, healthy mangrove fringe north of the Beltana Avenue intersection) to virtually non-existent (e.g. only mown lawn adjacent to concrete seawall). The following types of shoreline vegetation are represented:

- Wide, dense mangrove community, dominated by *Avicennia marina*;
- Narrow and/or isolated patches of mangrove fringe consisting of *Avicennia marina*;
- Parklands and public space with mown grass and isolated trees (e.g. *Eucalyptus* species);
- Patches of salt marsh / coastal dune associated species, such as the ground cover plants present among mangroves on the northern sand spit; and
- Isolated trees on eroding shoreline which are highly vulnerable to further erosion, often with roots already exposed (some isolated *Melaleuca*, *Hibiscus* and *Casuarina* observed in this condition).





Title:  
**Toorbul Beach Unit - Council Controlled Shoreline Areas and Current Condition**

Figure:  
**6-1**

Rev:  
**A**

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.



0km 0.5 1  
Approx. Scale





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**Figure 6-2 Example Shoreline Condition throughout Toorbul Study Area: a) Sandy Shore with Mangrove; b) Loose Rock and Erosion Scarp; c) Stone and Concrete Seawall; d) Stepped Seawall with Shotcrete Repair; e) Stepped Seawall; f) Stepped Seawall with Sand Accumulation at Boat Ramp**

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**Figure 6-3 Unapproved Seawall Opposite Second Ave: a) Narrow Section between Pathway and Seawall Crest; b) Sinking Damage following ex-TC Oswald (January 2013)**



**Figure 6-4 Sloping Concrete Seawall Damage Opposite Willmer Road**

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## 6.2 Shoreline Management Approaches Considered

All generic management options described in the Stage 1 report (refer Chapter 3) have been considered for the Toorbul shoreline and are summarised in Table 6-1. Through assessment of existing assets and the values associated with the Toorbul study area the following options were shortlisted:

- Seawall;
- Groyne; and
- Mangrove and Coastal Vegetation Management.

**Table 6-1 Toorbul 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	Not suitable for locations under immediate erosion threat or where ongoing structural damage occurs
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	No significant assets under immediate threat
3. Shoreline Nourishment	a) Maintains beach amenity	a) High capital and maintenance costs, requires ongoing commitment	Not considered viable; potential constraints associated with declared FHA
4. Seawall	a) Provide effective erosion control b) Provide direct property protection	a) Decreased beach amenity b) High capital and maintenance cost	Seawall upgrade and realignment
5. Groyne	a) Maintains local shoreline by increasing width of beach	a) Reduces sediment supply to downdrift locations b) High visual impact	Potentially viable in north of the boat ramp; constraints associated with Fish Habit Area zoning

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Generic Options	Advantages	Disadvantages	Comments
6. Offshore Breakwaters or Submerged Reef	NA	NA	Not considered suitable at this location; not likely to be effective due to existing wide tidal flats; marine park constraints
7. Mangrove and Coastal Vegetation Management	<ul style="list-style-type: none"> <li>a) Maintains natural buffer to shoreline erosion</li> <li>b) Reduces energy reaching the shoreline during storm events</li> </ul>	<ul style="list-style-type: none"> <li>a) Ongoing commitment</li> </ul>	Maintenance of coastal vegetation to provide ongoing stabilisation of the shoreline and foreshore areas

### 6.3 Proposed Management Strategy

Shoreline management throughout the Toorbul study area presents Council with challenges due to:

- A variety of seawall designs in varying states of condition;
- Existing safety hazards associated with seawall design and/or necessary repair works;
- Unapproved sections of seawall built by residents; and
- Management option constraints associated with Marine Park and Fish Habitat Area zoning.

Council has identified a need to upgrade a section of seawall (Figure 6-1, Section 9) where significant damage occurred during ex-TC Oswald, January 2013. The seawall at this location was originally built by local residents in the 1970s and is therefore an unapproved structure. The proposed upgraded structure opposite Second Avenue will follow a straight alignment and is intended to protect the adjacent footpath and road. Council submitted a development application for the proposed structure in early 2014; the conceptual layout is shown in Figure 6-5. These proposed works are supported in this study.

Seawalls to the north of the main public boat ramp have either undergone recent repair or are in a relatively poor condition (Figure 6-1, Sections 3, 4 and 5). The beach has lowered at the toe of the structures and they are directly exposed to severe conditions during storms. Sink holes behind the crest of the structures typically develop during storm events. There is also a general concern that the geometries of the structures present safety hazards. It is anticipated that approximately 500m of seawall will need to be upgraded within a 10 year timeframe.

Council should consider having the northern Esplanade structures assessed and commence planning to upgrade the seawalls along this section. A conceptual layout of the proposed seawall upgrade and realignment is shown in Figure 6-6. The conceptual layout also indicates an opportunity to stabilise the shoreline using small groynes to intercept the north-westerly directed sediment transport. Together with a setback of the seawall, it's expected that groynes could be



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used to intercept sand and stabilise small beaches, similar to the groyne-like effect observed at the nearby public boat ramp and storm water outfalls. The small beaches would provide additional buffer to storm conditions and enhance the social and recreational value of the area. It is noted that the option to install groynes and beach nourishment may not be supported by State agencies due to restrictions associated with Marine Park and Fish Habitat Area zoning.

Seawalls in the vicinity of the public boat ramp show some signs of weathering but are generally in a fair condition. While the structures appear structurally sound, they should continue to be monitored and inspected following severe storm conditions.

The sloping concrete seawall south of the Second Avenue (Figure 6-1, Section 11) is in a poor condition in some locations. Large cracks and subsequent slumping of the structure present a trip hazard and suggest significant loss of sediment from behind the rigid structure. While the immediate risk to assets appears low, planning to upgrade this structure should commence.

### 6.3.1 Vegetation Management Considerations

The primary focus of vegetation management efforts in the Toorbul section should be the rehabilitation and revegetation of eroding natural shorelines (i.e. those where seawalls are absent and are not proposed as part of future works). This would aim to stabilise the shoreline in these areas and enhance its resilience to future erosion. Such works would typically require a combination of reprofiling, planting and maintenance. Measures to manage pedestrian access should also be incorporated to complement erosion management incentives and protect rehabilitation works from pedestrian disturbance.

Additional vegetation management options could include: i) monitoring existing shoreline vegetation to identify any maintenance requirements (e.g. indications of mangrove dieback), and ii) landscaping of adjacent parklands to enhance social and environmental values, although this would not necessarily provide direct erosion protection value.

### 6.3.2 Summary

The proposed management strategy for the shoreline sections defined in Figure 6-1 are summarised in Table 6-2. A number of existing seawalls have been identified as being in fair or poor condition and it is assumed significant maintenance and/or upgrade will be required to ensure these structures continue to perform as intended. Seawall works priorities based on recent site inspections have been provided in Section 8; however, it is advised that the assumptions and priorities be further informed by structural integrity assessments.



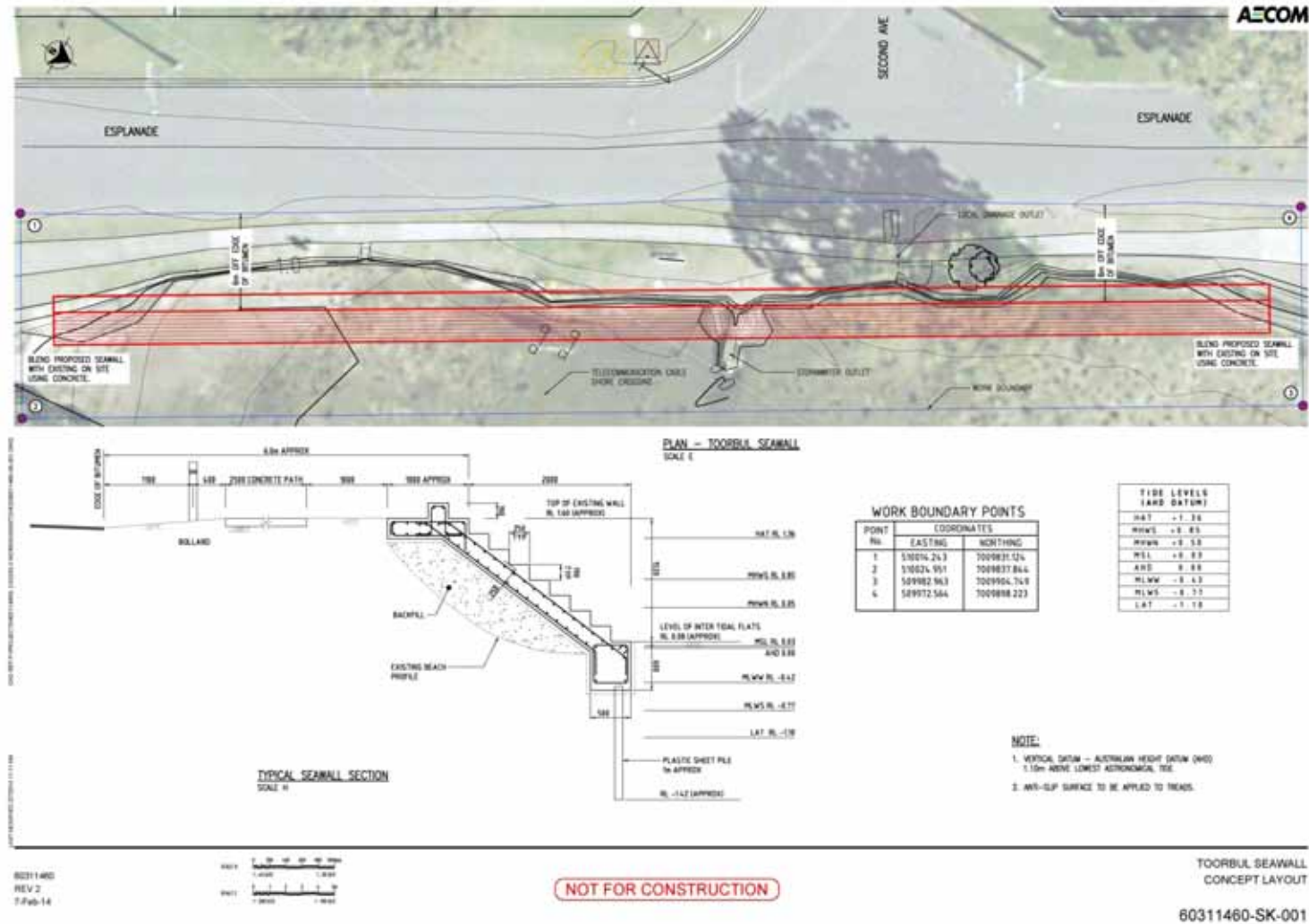


Figure 6-5 Conceptual Design of Seawall Upgrade and Realignment opposite Second Avenue

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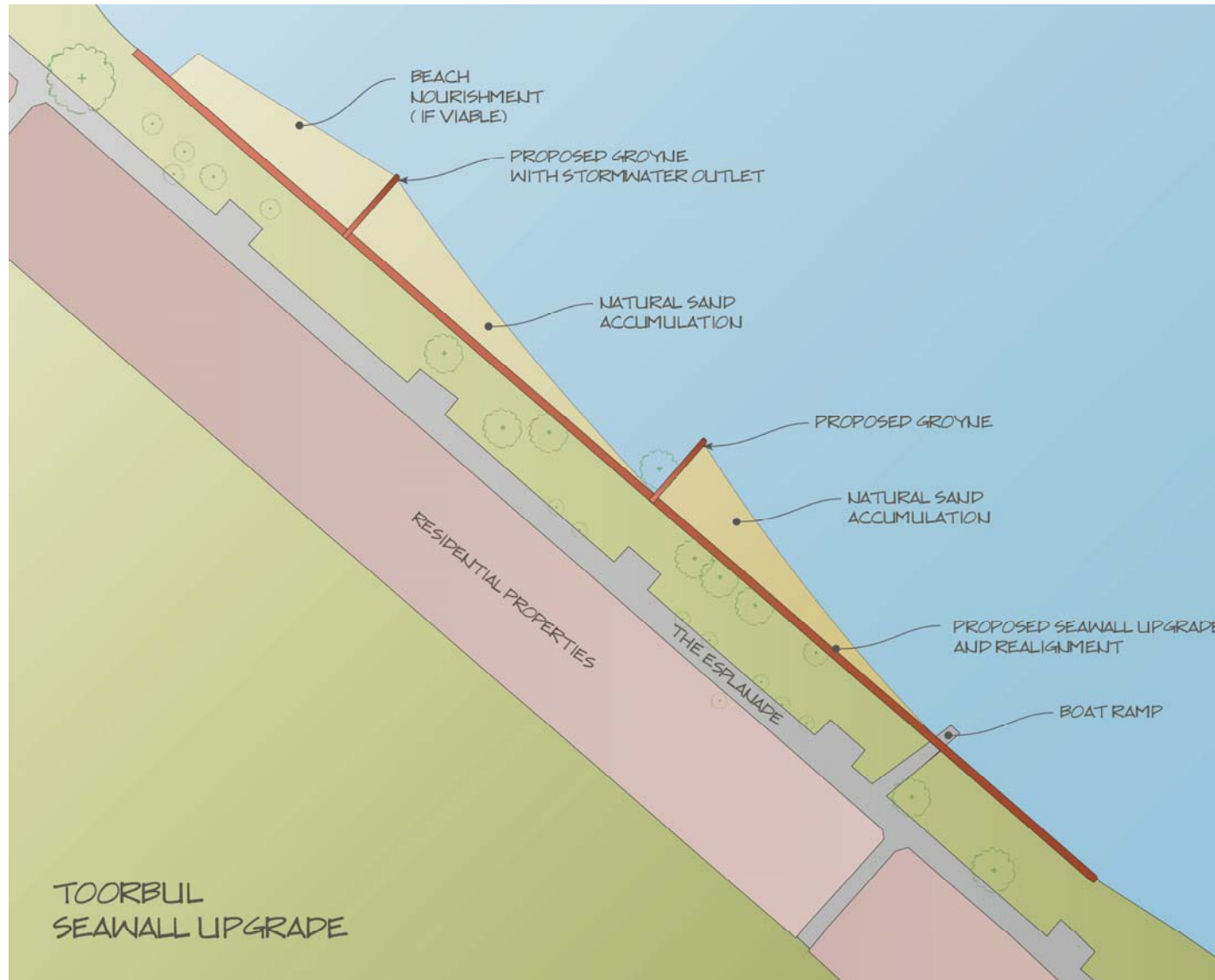




Figure 6-6 Esplanade North Seawall Upgrade and Realignment and Sandy Shoreline Development

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Table 6-2 Toorbul Shoreline Management Summary



Shoreline Section Number	Existing Condition	Proposed Management Strategy
<p>1. The Esplanade 157-141 – approx. 350m</p> 	<ul style="list-style-type: none"> <li>• Sandy beach part of small sand spit</li> <li>• Mangrove and grassy foreshore provide erosion buffer</li> <li>• No significant assets in erosion prone area</li> </ul>	<ul style="list-style-type: none"> <li>• Maintain status quo including ongoing foreshore and vegetation management</li> </ul>
<p>2. The Esplanade 141-135 – approx. 90m</p> 	<ul style="list-style-type: none"> <li>• Erosion scarp and loosely placed rock rubble in lee of stormwater outlet</li> <li>• Small beach on updrift side of outlet due to groyne-like effect trapping northerly sand transport</li> </ul>	<ul style="list-style-type: none"> <li>• Sort loose rock at shoreline</li> <li>• Consider feasibility and likelihood of obtaining permits to implement small groyne to hold sand and create a small beach</li> <li>• Potential for vegetation rehabilitation</li> <li>• Management options potentially constrained by zoning Fish Habitat and Marine Park zoning</li> </ul>



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Shoreline Section Number	Existing Condition	Proposed Management Strategy
<p>3. The Esplanade 135-128 – approx. 120m</p> 	<ul style="list-style-type: none"> <li>• Irregular rock and concrete seawall</li> <li>• Signs of material being lost from behind wall</li> <li>• Lower beach completely submerged at high tide</li> <li>• Minor buffer provided by sporadic mangroves</li> </ul>	<ul style="list-style-type: none"> <li>• Inspect seawall following severe storm conditions</li> <li>• Repair sink holes as required</li> <li>• Upgrade seawall within 5 years</li> </ul>
<p>4. The Esplanade 128-120 – approx. 140m</p> 	<ul style="list-style-type: none"> <li>• Stepped concrete seawall with shotcrete repair in fair condition</li> <li>• Lowered beach completely submerged at high tide</li> <li>• Some safety hazard concern regarding steepness of wall</li> </ul>	<ul style="list-style-type: none"> <li>• Structural assessment of structure due to uncertain design life</li> <li>• Plan to upgrade seawall within 10 years, consider seawall realignment (setback)</li> <li>• Assess and improve existing safety hazard and shoreline access</li> </ul>

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Shoreline Section Number	Existing Condition	Proposed Management Strategy
<p>5. The Esplanade 120-108 – approx. 190m</p> 	<ul style="list-style-type: none"> <li>• Stepped concrete seawall with shotcrete resurfacing</li> <li>• Lowered beach completely submerged at high tide</li> <li>• Some safety concern regarding step height and potential trip hazard</li> </ul>	<ul style="list-style-type: none"> <li>• Structural assessment of structure due to uncertain design life</li> <li>• Plan to upgrade seawall within 10 years, consider seawall realignment (setback)</li> <li>• Assess and improve existing safety hazard and shoreline access</li> </ul>
<p>6. Public Boat Ramp – 130m</p> 	<ul style="list-style-type: none"> <li>• Stone pitched seawall with concrete repair along boat ramp access</li> <li>• Some safety concern and potential slip hazard</li> </ul>	<ul style="list-style-type: none"> <li>• Structural assessment of structure due to uncertain design life</li> <li>• Plan to upgrade seawall within 10 years</li> <li>• Assess and improve existing safety hazard</li> </ul>

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Shoreline Section Number	Existing Condition	Proposed Management Strategy
<p>7. The Esplanade 108-103 – approx. 150m</p> 	<ul style="list-style-type: none"> <li>• Stepped concrete seawall with signs of weathering</li> <li>• Small beach on updrift side of boat ramp due to groyne-like effect trapping northerly sand transport</li> </ul>	<ul style="list-style-type: none"> <li>• Monitor seawall condition with plan to resurface if weathering leads to an unacceptable safety hazard</li> </ul>
<p>8. The Esplanade 103-101 – approx. 75m</p> 	<ul style="list-style-type: none"> <li>• Sloping concrete seawall in fair condition</li> <li>• Narrow sandy beach</li> <li>• Toe of structure exposed</li> </ul>	<ul style="list-style-type: none"> <li>• Monitor seawall condition with plan to resurface if weathering leads to an unacceptable a safety hazard</li> <li>• Inspect scour at toe of structure following severe storm conditions</li> <li>• Consider upgrade to design consistent with proposed seawall to immediate south (Section 9)</li> </ul>



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Shoreline Section Number	Existing Condition	Proposed Management Strategy
<p>9. The Esplanade 101-97 – approx. 90m</p> 	<ul style="list-style-type: none"> <li>• Stone and concrete seawall in poor condition</li> <li>• Unapproved structure built by residents in 1970s</li> <li>• Narrow foreshore buffer between seawall crest and footpath</li> </ul>	<ul style="list-style-type: none"> <li>• Upgrade and realign seawall within 1 year</li> <li>• Seawall realignment potentially constrained by zoning Fish Habitat and Marine Park zoning</li> </ul>
<p>10. The Esplanade 97-Wilmer Rd – approx. 340m</p> 	<ul style="list-style-type: none"> <li>• Sloping concrete seawall in fair to poor condition</li> <li>• Mangroves provide additional buffer to erosion</li> <li>• Significant cracking and slumping of wall at some locations</li> <li>• Some safety concern due to potential trip hazard</li> </ul>	<ul style="list-style-type: none"> <li>• Repair and resurface damaged sections of seawall within 1 year</li> <li>• Structural assessment of structure due to uncertain design life</li> <li>• Plan to upgrade seawall within 10 years</li> </ul>

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Shoreline Section Number	Existing Condition	Proposed Management Strategy
<p>11. Wilmer Rd-The Esplanade 47 – approx. 720m</p> 	<ul style="list-style-type: none"> <li>• Erosion scarp and loosely placed rock rubble</li> <li>• Rock and concrete in some small sections</li> <li>• Shorebird habitat</li> </ul>	<ul style="list-style-type: none"> <li>• Sort loose rock at shoreline</li> <li>• Potential for vegetation rehabilitation</li> <li>• Maintain status quo including ongoing foreshore and vegetation management</li> <li>• Maintain shorebird habitat</li> </ul>
<p>12. The Esplanade 47-14 – approx. 1000m</p> 	<ul style="list-style-type: none"> <li>• Narrow sandy beach with grassy foreshore</li> <li>• Dense mangrove toward the south</li> <li>• Shorebird habitat</li> </ul>	<ul style="list-style-type: none"> <li>• Maintain status quo including ongoing foreshore and vegetation management</li> <li>• Potential for vegetation rehabilitation</li> <li>• Maintain shorebird habitat</li> </ul>

**Toorbul****6.4 Cost Estimates**

A general recommendation for the Toorbul study is a comprehensive structural integrity assessment of the existing seawalls. Given the variety of seawall designs of varying condition, a complete suite of assessments may cost up to \$50,000 in 2014. The structural assessments would identify the expected design life of the existing structures and further guide capital works prioritisation.

Close to 1km of seawall throughout Toorbul has been identified as potentially requiring significant repair or upgrade (to be informed by the proposed structural assessments). The seawall capital cost estimates provided below are based on pre-cast concrete stepped seawalls and consider design, approval, construction and foreshore rehabilitation at an assumed cost of \$6000 per metre:

- Section 3 (The Esplanade 135-128), 120m seawall: \$720,000;
- Section 4 (The Esplanade 128-120), 140m seawall: \$840,000;
- Section 5 (The Esplanade 120-108), 190m seawall: \$1,140,000;
- Section 6 (Public Boat Ramp), 130m seawall: \$780,000;
- Section 9 (The Esplanade 101-97), 90m seawall: \$540,000 (note: detailed design being prepared in 2014); and
- Section 10 (The Esplanade 97-intersection with Wilmer Road): \$2,040,000.

Proposed works associated with stabilising the shoreline through shoreline vegetation maintenance (including reprofiling and planting) have not been explicitly costed. It is likely such works would form part of Council's routine maintenance budget at an annual average cost of \$10,000-\$20,000.

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).

**6.5 Approvals Plan**

The approvals plan for the Toorbul study area considers the following:

- Approvals required under SPA and relevant government agencies;
- Extent of works that are 'excluded works' for the purpose of SPA and SPR;
- Marine park permit requirements; and
- Issues related to the loss of land subsequent to the seawall realignment.

Approvals under the *Sustainable Planning Act 2009*

The proposed shoreline erosion management actions in the Toorbul study area include development requiring approval under SPA. This consists of the following activities:

- Groyne construction – prescribed tidal works under the CPMA;
- Seawall upgrade/reconstruction – prescribed tidal works under the CPMA;



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- Works within a fish habitat area under the Fisheries Act 1994; and
- Interference with marine plants under the Fisheries Act 1994.

Prescribed tidal works is assessable under the CPMA and is required to comply with the provisions of the prescribed tidal works IDAS code in Schedule 4A of the CPMR. This applies to both the proposed groyne construction and the various seawall upgrades proposed throughout the beach unit.

As the Pumicestone Channel Fish Habitat Area includes the intertidal area of Section 1 to 6, prescribed tidal works in these areas will require assessment under the Fisheries Act 1994 and Fish Habitat Management Operational Policies (FHMOPs). In particular, the application must demonstrate compliance with the policy positions provided by FHMOP010 Tidal fish habitats, erosion control and beach replenishment and may be required to consider offsets under FHMOP005.2 Marine fish habitat offset policy. FHMOP010, amongst other things, requires the works to be justified by 'significant erosion' and favours works that align proposed structures with existing tidal infrastructure.

Clearing marine vegetation may be required as part of the proposed seawall upgrade/groyne construction works. An application for these works will also require assessment under the *Fisheries Act 1994* and FHMOPs (e.g. FHMOP001 and FHMOP010). Loss of marine plants also usually requires offsetting in accordance with FHMOP005.2. A permit will not be required, however, where marine plant disturbance complies MP06: *Minor impact works in a declared fish habitat area or involving the removal, destruction or damage of marine plants*.

Government agencies with an interest in these applications are:

- MBRC Planning Division;
- DSDIP, in regards to compliance with SPIs and the SDAP;
- DEHP, in regards to coastal management;
- MSQ/RHM, in regards to impacts to navigation in a coastal management district;
- DAFF, in regards to management of fish habitat and marine plants; and
- DNPRSR, in regards to Fish Habitat Areas.

### Other approvals under the *Fisheries Act 1994*

In addition to a development permit for works in a Fish Habitat Area and the disturbance of marine plants, resource allocation authority will be required for the development of any works within a Fish Habitat Area. This requires compliance with FHMOP002 Management of declared Fish Habitat Areas: departmental policy position. In relation to revetments, groynes and gabions this policy specifically requires the proposed location to show evidence of significant erosion (or an immediate threat of significant erosion) that impacts on the use of the land or non-relocatable structures and where managed retreat is not possible.

Resource allocation authority is sought from DAFF.

**Toorbul**Excluded works under the Sustainable Planning Regulation 2009

Other proposed coastal works are classified as 'excluded works' under SPA and will not require any approvals. These works consist primarily of maintenance work on an already approved work. The examples given by the DEHP guideline Excluded works (EM2734) include replacing a structural element of an approved structure in accordance with an approved plan, replacing displaced material (e.g. rocks) from an approved structure (e.g. seawall) and resurfacing an existing approved structure in accordance with an approved plan. Further discussion with DEHP at a later stage as to whether or not certain works are excluded works is advised.

Moreton Bay Marine Park permit

As the Moreton Bay Marine Park covers all tidal land and waters in this beach unit, coastal engineering works will also require a marine park permit under the MPA. The permit application would need to demonstrate the consistency of the development with the objects for the conservation park zone, as listed under the MPR Schedule 1, s4. 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 DNPRSR.

If any realignment works require backfilling on existing tidal land, this may be perceived of as reclamation of tidal land in a marine park. This requires an additional permit under the MPA following the declaration of a 'works area' by the chief executive of DNPRSR. Alternatively, an application can be made for a revocation of marine park area to match the new reclamation alignment. Further discussions with DNPRSR would be required to determine if these actions are required for any proposed realignment works.

Land boundary realignment

Realigning the seawall along the Esplanade near Second Avenue (Section 9) and on Lot 1/SP164588 (Section 5) will involve the changing of the alignment of the road reserve, causing either a net gain or loss of public land. While MBRC is the trustee for the management of this land, it may be necessary to have the proposed alignment of the property formalised through an application to DNRM. Further advice should be sought from the DNRM SLAM team at the time of development application.