Basis of Design

To	Billbergia – Attn: Mr Thomas Nader		
From	Russell Howell	**Date**	24 June 2025
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Subject	25-27 Leeds St, Rhodes		
Reference	230198R002Rev1 – Proposed Seawall Upgrade – Basis of Design – Initial Comment		

This report describes the initial basis of design for the proposed upgrade of the seawall on the northern waterfront boundary of 25-27 Leeds St, Rhodes, NSW.

The purpose of this report is to assist the design and approval process by identifying the various considerations and constraints for discussion across the project team. Tonkin seeks feedback from the other members of the project team in order to resolve the final requirements for the design of the seawall.

Various design inputs and considerations are listed and discussed in Table 1 below. The list is not exhaustive, as other requirements may arise through the discussions. Sections are provided in the table for feedback and return comments.

Table 1: BASIS OF DESIGN

No	Item	Description	Initial Basis of Design	Comments	Actions and Queries to be Resolved	Outcome
1	Key Design Objectives	Overarching design requirements to be addressed	a. Raise seawall crest to RL +3.0m to protect area behind from inundation and retain fill required to raise ground levels. b. Minimise disturbance of seabed c. Minimise impact on boat ramp d. Minimise cost e. Minimise works outside current boundary f. Maintain and maximise public space landward behind crest			
2	Design Inputs	Information available to inform the design	a. New crest level + RL 3.0m (approx. 1m increase to mitigate impacts of flooding and sea level rise – planning requirement) b. Survey: i. Survey provided for landside development, includes levels and boundaries above AHD, does not include bathymetry survey. ii. Crest of existing seawall is approx. RL +2.0m iii. Crest lies approx. 4m from waterfront property boundary iv. Property boundary appears to lie below mean sea level, around -0.5m AHD. c. Existing Structures: i. A line of timber piles cut off just above LAT lies on the waterfront outside the boundary location, suggesting a wharf occupied the footprint at some point. d. Geotech: i. Geotechnical investigation report provided for landside development. ii. Boreholes behind wall indicate rock levels vary from RL -3.0m to RL – 7.0m AHD iii. Boreholes suggest that existing revetment seawall founded on alluvial silty clay and silty sand. iv. Boreholes suggest that backfill behind existing seawall is fill and silty clay. v. Further investigation is required to confirm the existing backfill and founding material design parameters to inform a slope stability assessment. e. Planning Requirements: i. Requirement for open public space on waterfront. Space to be maximised. ii. DECCEW requires levels surrounding building to be raised to +3.0m AHD to			

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			avoid inundation during flooding while accounting for sea level rise. f. Architectural/ Landscape i. Proposed works supported by seawall involve filling to achieve levels required, then construction of pathways. ii. Filling will require a level of compaction. iii. Proposed works are generally not sensitive to settlement but long term effects of settlement may result in trip hazards in pathway.			
3	Design Options	Initial concepts to be considered	a. Raise revetment level to increase height of crest and add stability b. Construct a vertical blockwall and strip footing on the current crest (subject to a favourable slope stability analysis) c. Construct a vertical blockwall and strip footing behind the current crest to minimise impact on stability (if slope stability is not favourable and revetment cannot be extended seaward). d. Construct a timber or FRP boardwalk over the existing seawall revetment extending to a blockwall behind the current crest.			
4	Design Considerations	Initial comments regarding selection of options	a. Proposed works to be supported by seawall are not settlement sensitive (can be repaired with little effort if it becomes an issue). b. Proposed works (fill) will add surcharge loads to ground behind seawall, increasing lateral loads on wall. This will have a tendency to push the wall out which may lead to stability issues of the wall and long term erosion. c. Proposed works also require an increase in height (crest level) of the wall. d. A slope stability assessment is to be undertaken to assess the likely impact the additional loads will have on the stability of the existing wall. e. The stability of the wall can be improved by adding mass (stone) to the revetment on a shallow batter, or by other means such as piling, or reconstruction. f. Addressing the intent to minimise disturbance of the seabed, the placement of additional stone on the existing revetment offers a means of improving the stability of the revetment with the least seabed disturbance, compared to driving piles or reconstructing a seawall. It will however increase the footprint of the revetment. The extent of footprint increase will be determined by the amount of stone to be added, which is subject to the outcome of the stability assessment.			

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			g. Driving piles carries a risk of intercepting buried obstructions which will either need to be removed (seabed disturbance) or pile positions adjusted (irregular structure).			
5	Concept Design Intent	Reasons for selection of proposed concept	a. Tonkin has taken a "worst case" approach to describe potential works to the seawall to show the likely maximum extent of proposed works. This is in the form of Option 3(a) above. b. Placement of stone will add mass to the revetment itself and result in some settlement, however the revetment is not considered to be sensitive to settlement. c. The existing timber piles can potentially improve the stability of the revetment. Timber piles typically do not deteriorate below the seabed surface in low-oxygen environments, and the stumps may act to stiffen the founding material to the base of the existing and new revetment. As such the existing piles are proposed to be retained, which also minimises the disturbance of the seabed. d. Further behind the existing seawall revetment typical retaining wall structures can be built to retain the new fill. This would apply to the western boundary adjacent the boat ramp, where an increase in revetment footprint is not desirable. e. In the northwest corner of the seawall the crest may need to be brought back from the water to prevent the revetment from encroaching on the boat ramp approach. It is noted that boat ramp users will tend to stay in the middle or west side of the boat ramp for launching and retrieval so a small increase in the revetment footprint is unlikely to impact use of the facility, but can also be avoided if necessary.			
6	Concept Design Risks	Risks associated with the various concepts	a. Cost – the quantity of rock require is not currently known but in the worst case scenario is substantial. Slope stability assessment and hydrographic survey are needed to confirm. b. Approval process – the proposed development is not "typical" and may not follow the normal approval process as described below. c. Alternative concepts pose different risks around disturbance of the seabed d. Retention of existing timber pile stumps is preferable however Transport has a general requirement that all piles are to be completely removed from the seabed unless they cannot physically be removed. Transport may require the stumps to be removed, however this would seem unlikely if they are to be covered by the revetment toe.			

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7	Approvals	Approval process considerations	a. The purpose of this concept design is to define the proposed seawall for the purpose of approvals. b. The current approval authorities for the proposed development are expected to be involved with the approval process of the seawall, however a seawall proposed to be constructed in part below the Mean high Water Mark is expected at a minimum to require approval from the following authorities: a. Canada Bay Council b. Transport for NSW c. DPI Fisheries c. The approval process may be complicated by the position of the waterfront boundary, which appears to lie at approx. RL -0.5m AHD. The typical maritime boundary would lie at approximately RL +0.5m AHD at the Mean High Water Mark. Tonkin is not a planning consultant and we cannot advise on how Transport would approach this. d. If the revetment needs to extend beyond the current waterfront property boundary, it is expected to require a change in the position of the boundary to the new revetment footprint. This might take the form of a lease of additional area from Transport for NSW, so it is desirable to avoid the structure crossing the boundary. Advice from a planning consultant and Transport would be required to confirm the requirements and costs. e. Tonkin has documented the potential worst case scenario where the revetment crosses the boundary and triggers either a new maritime lease or relocation of the boundary. This may not be required subject to the slope stability assessment of the existing revetment but should not be ruled out until the investigation is complete. f. If a maritime lease or relocation of the boundary is not a feasible option, then (subject to the slope stability analysis) the revetment would need to be pushed back landward which would reduce the available public space behind the crest of the seawall. In this case other options may need to be considered, such as provision of a new suspended timber or FRP boardwalk out to the existing boundary. g. Existing use rights may apply? h. Maritime zoning - W1 Maritime Waters i. SREP Sydney Harbour 2005 identifies Leeds St foreshore as a Strategic Foreshore Site (no 19)			

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8	Further Investigations	Further investigations required to address risks and develop design	a. Geotechnical investigation in the vicinity of the seawall to inform slope stability assessment and foundation design parameters b. Hydrographic survey c. Slope stability assessment d. Contamination assessment e. Aquatic ecology assessment f. Planning pathway advice regarding construction of a revetment across the boundary. g. Confirm minimum requirement for public space behind seawall and as a result how far the seawall crest could potentially move landward.			