

Whakarire Ave: Coastal Protection Works Workshop

1 Purpose

The purpose of this workshop (held on 9th September 2014) was to investigate options that could be acceptable to both the Hawkes Bay Regional Council (represented by Richard Reinen-Hamill) and Napier City Council (represented by Stephen Priestley).

2 Objectives

Main

1. Protect Whakarire Ave private and public properties to the extent where the coastal hazard zone can be moved.
2. Works not to cause adverse effects on surfing conditions at Rangatira Reef compared to the existing situation.

Secondary

3. If the coastal hazard zone cannot be moved [as for Objective 1] then works are sufficient to enable re-development in private property.
4. Assist in improving the state of the eastern /southern end of Westshore Beach.
5. Improve public access along/adjacent to the coastal marina area (CMA).

3 Context

■ Table 1: Tide Levels

Condition	Chart Datum (m)	Napier City Datum (m)
Highest tide on record	2.3	11.4
HAT	2.0	11.1
MHWS	1.8	10.9
MHWN	1.5	10.6
MSL	0.9	10.0
MLWN	0.4	9.2
MLWS	0.1	9.2
LAT	0	9.1

- The extent of the works is from the revetment adjacent to the Western Mole of the Ahuriru Harbour entrance to the large concrete blocks on Westshore Beach.

- Existing ground levels seaward of Charles Street, in the Council Reserve and the revetment crest immediately west of the Western Mole are around RL 13.0m (i.e. 3.0m above mean sea level). The existing wall/breakwater has crest levels in the range of RL 11.5 to RL 12.0m.
- There is existing erosion at the eastern end of Westshore Beach. Also there is potential erosion of properties on Whakarire Avenue, including the Council Reserve and Charles Street road.
- The existing wall/breakwater is in poor condition but does perform as a wave break, resulting in the lagoon infilling with fine material which in itself provides some protection to the Council Reserve. This current arrangement is not considered robust enough to enable adjustment of existing coastal hazard zones.
- Non-structural options such as beach nourishment are not viable at Whakarire Ave, without on-going management and on-going importation of larger size beach sediment, due to the angle of the incident waves.
- To address the current and potential erosion issue a 'structural' coastal protection solution is to be pursued.
- The concrete blocks on Westshore Beach assist in stabilising the updrift beach but cause a 'groyne' effect downdrift (to the west) and also wave reflection which further exacerbates local erosion.

4 Approach and Options Evaluation

The extent of works has been broken into components: the area covered by the existing wall/breakwater where it intersects Westshore Beach (Reach 1) and the area along Westshore Beach to the concrete blocks (Reach 2).

For each reach a range of options were considered and commentary offered on each option's ability to meet the objectives set out in Section 2. Options are listed in Table 2. Options 1 to 7 cover Reach 1. Options A to B cover Reach 2. A qualitative evaluation of each option is given in Table 2.

5 Going Forward

It is anticipated that both Councils select about 2 options (or others that may be relevant) and these will be designed on a preliminary basis. This will enable the spatial extent to be assessed and to establish how it could 'fit in' to the surrounds.

Further considerations will include:

- Allowable wave overtopping rates (which will depend on the vulnerability of the downstream areas)
- Optimum configuration of beach alignment (Options 3 and 4 only) based initially on an empirical approach followed by refined wave studies and transport model assessments of any preferred option.
- Wave reflectivity of any new/upgraded wall will have similar or enhanced wave reflection characteristics compared to the existing wall.
- Sea Level Rise (SLR)
- Occupancy of the CMA
- Use of local limestone rock
- Visual effects.
- Cost of capital coastal protection works and on-going management

Before there is further study on any option it is recommended that a topographical survey of the study area be completed, the beach/lagoon sediment be analysed for grading, and the depth of sediment in the lagoon be established.

Table 2 – Qualitative Options Evaluation

Option	Refer Figure	Description	Consequence	Meets Objectives (See Section 2)		
1	1	Do nothing	Existing seawall will deteriorate further and there will be loss of land, particularly with sea level rise (SLR)	1	x	
				2	✓	
				3	x	
				4	x	
				5	x	
2	1	Maintain existing seawall	Status quo will remain. Eventual loss of land with SLR	1	x	
				2	✓	
				3	x	
				4	x	
				5	x	
3	2	Upgrade or modify end structures to existing wall to improve beach retention. Form a gravel beach along back of lagoon adjacent to reserve. Maintain as required.	Better public access. Extreme storms may result in loss of land.	1	x	
				2	✓	
				3	x	
				4	x	
				5	✓	
4	3	Perched beach within the lagoon. Upgrade or modify end structures to existing wall to improve beach retention. Low level back stop wall (buried) in Council reserve.	Good public access. High potential for re-development. Loss of some privacy for Whakarire Ave residents.	1	x	
				2	✓	
				3	✓	
				4	x	
				5	✓	
5	4	5(a) Engineered breakwater along line of existing levels (RL 11.5 – RL 12.0) with 3:1 exposed slopes (to limit wave reflection onto reef).	Existing situation with robust seawall. Will need to be raised with SLR. Better public access with wider crest.	1	x	
				2	✓	
				3	✓	
				4	x	
				5	✓	
			5(b) as for 5(a) except height of breakwater raised to RL 12.50 – 13.0 to reduce overtopping and make some allowance for SLR. Outer slope of wall to have similar wave reflection characteristics as existing wall.	Robust solution. Good public access. Potential visual effects from Council Reserve.	1	✓
					2	✓
					3	NA
					4	x
					5	✓

Option	Refer Figure	Description	Consequence	Meets Objectives (See Section 2)	
6	5	6(a) Revetment within Council Reserve to protect private property. Existing seawall allowed to deteriorate over time or could be removed.	Revetment could be higher (> RL 13) to prevent excessive overtopping into properties. (Extent of overtopping will depend on seabed conditions in front of wall). Loss of privacy for Whakarire Ave residents. Potential to reduce some wave focussing on Westshore Beach if existing seawall removed.	1	✓
				2	✓
				3	NA
				4	✓
				5	x
		6(b) as for 6(a) except located just west of Council Reserve to protect Reserve and private property.	Revetment could be lower than for 6(a) but Reserve would need to collect and discharge wave overtopping flows. Good public access.	1	✓
				2	✓
				3	NA
				4	✓
				5	✓
7		As for 5(b) except that lagoon would be reclaimed as Council Reserve. Outer slope of wall to have similar wave reflection characteristics as existing wall.	Most robust solution to achieve Objective (1) but would occupy large area of CMA.	1	✓
				2	✓
				3	NA
				4	x
				5	✓
A		1:3 Revetment along Westshore Beach in the same fashion as Waimarama Beach.	Robust protection structure for Charles Road. Potentially could increase wave reflection and affect surf-ability.	1	✓
				2	x
				3	NA
				4	x
				5	✓
B		1:7 Wave spending beach with robust end structure.	Use greywacke cobbles to blend in with Westshore Beach. End structure would cover existing concrete blocks. Option would reduce wave energy extending onto Westshore Beach.	1	✓
				2	✓
				3	NA
				4	✓
				5	✓



Photo 1: Existing Wall/Breakwater at Low Tide



Photo 2: Existing Wall/Breakwater during Sea Storm



Figure 1: Existing Layout

(Survey datum to NCC)

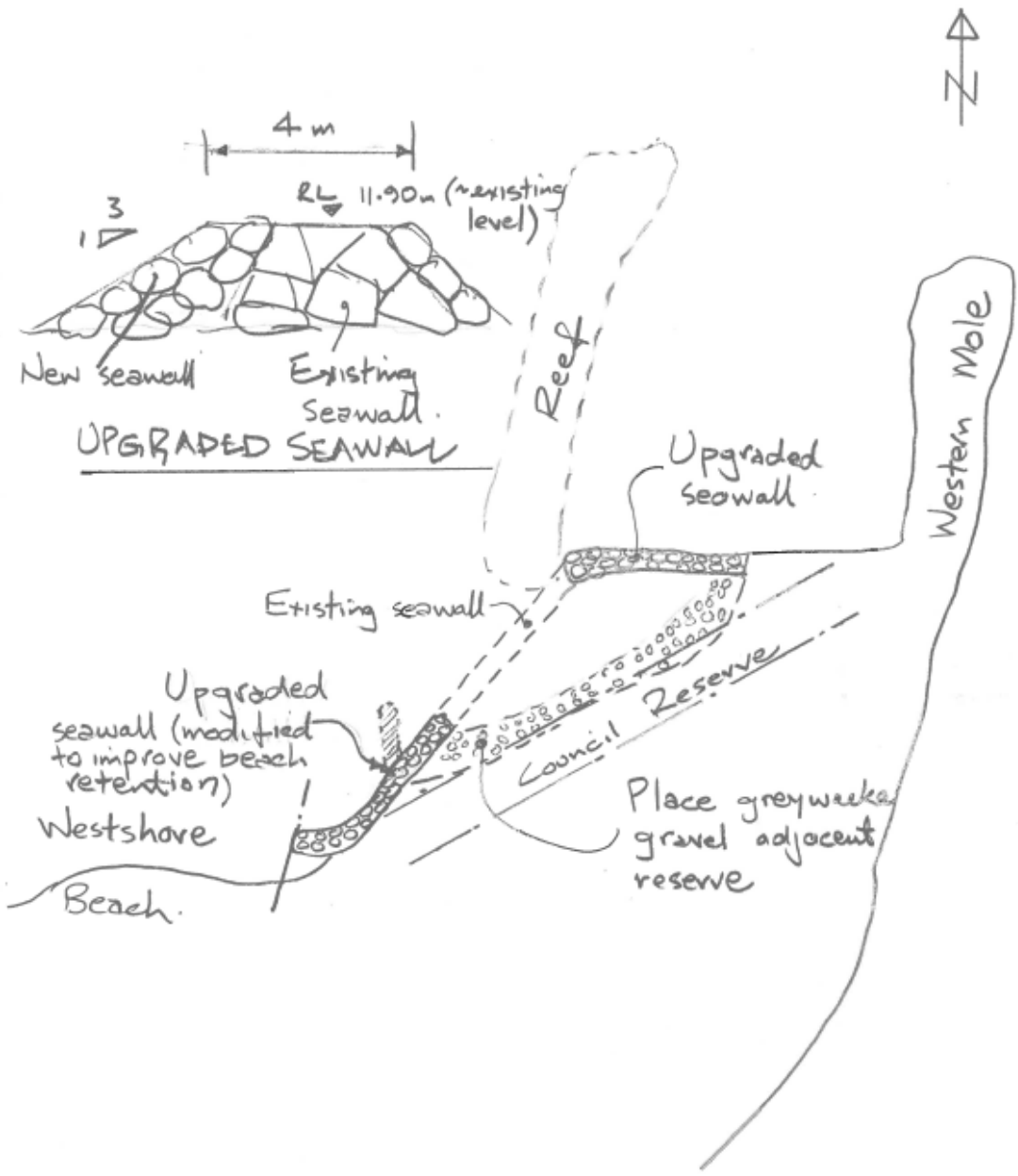


FIGURE 2
OPTION 3

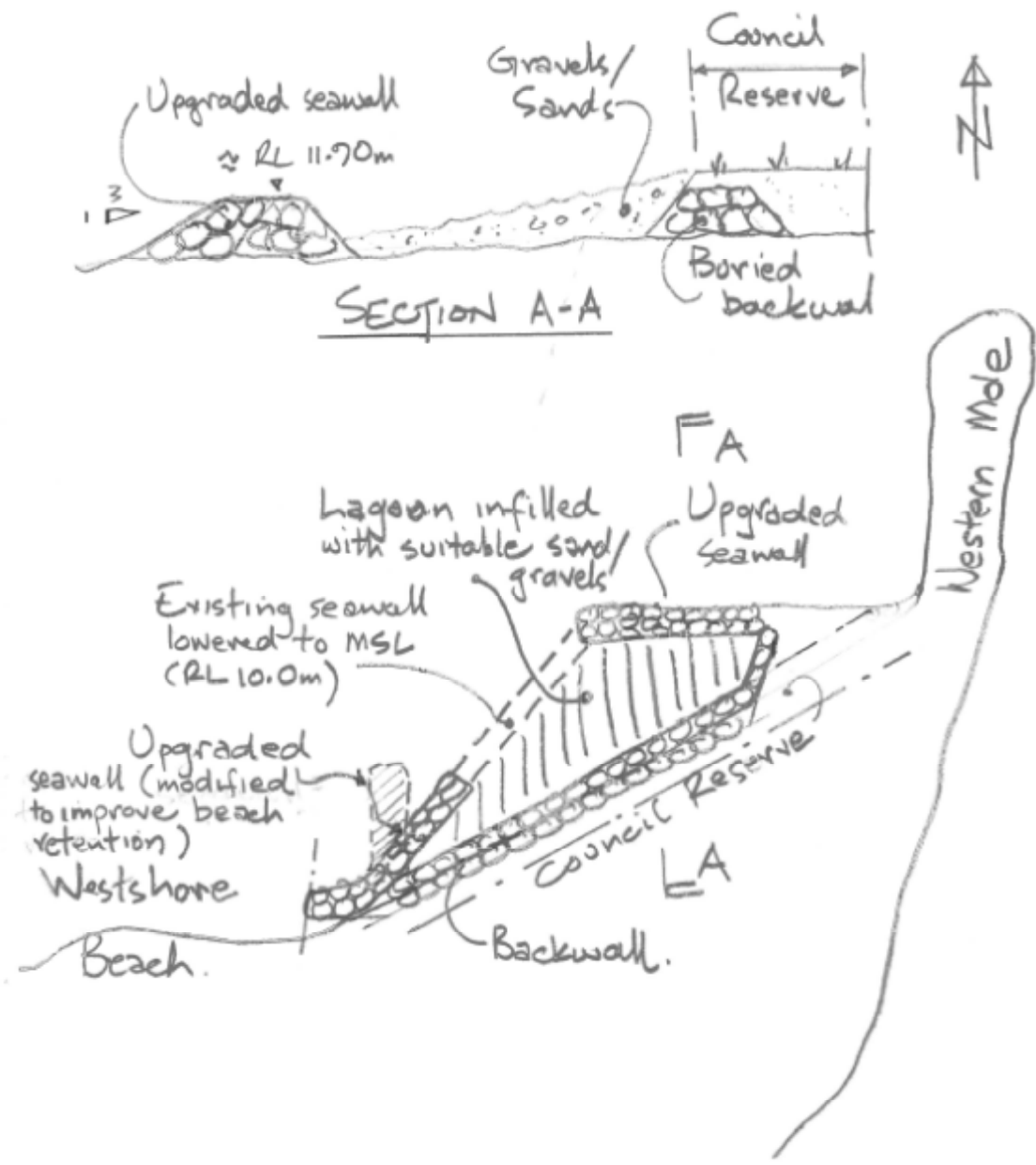


FIGURE 3

OPTION 4

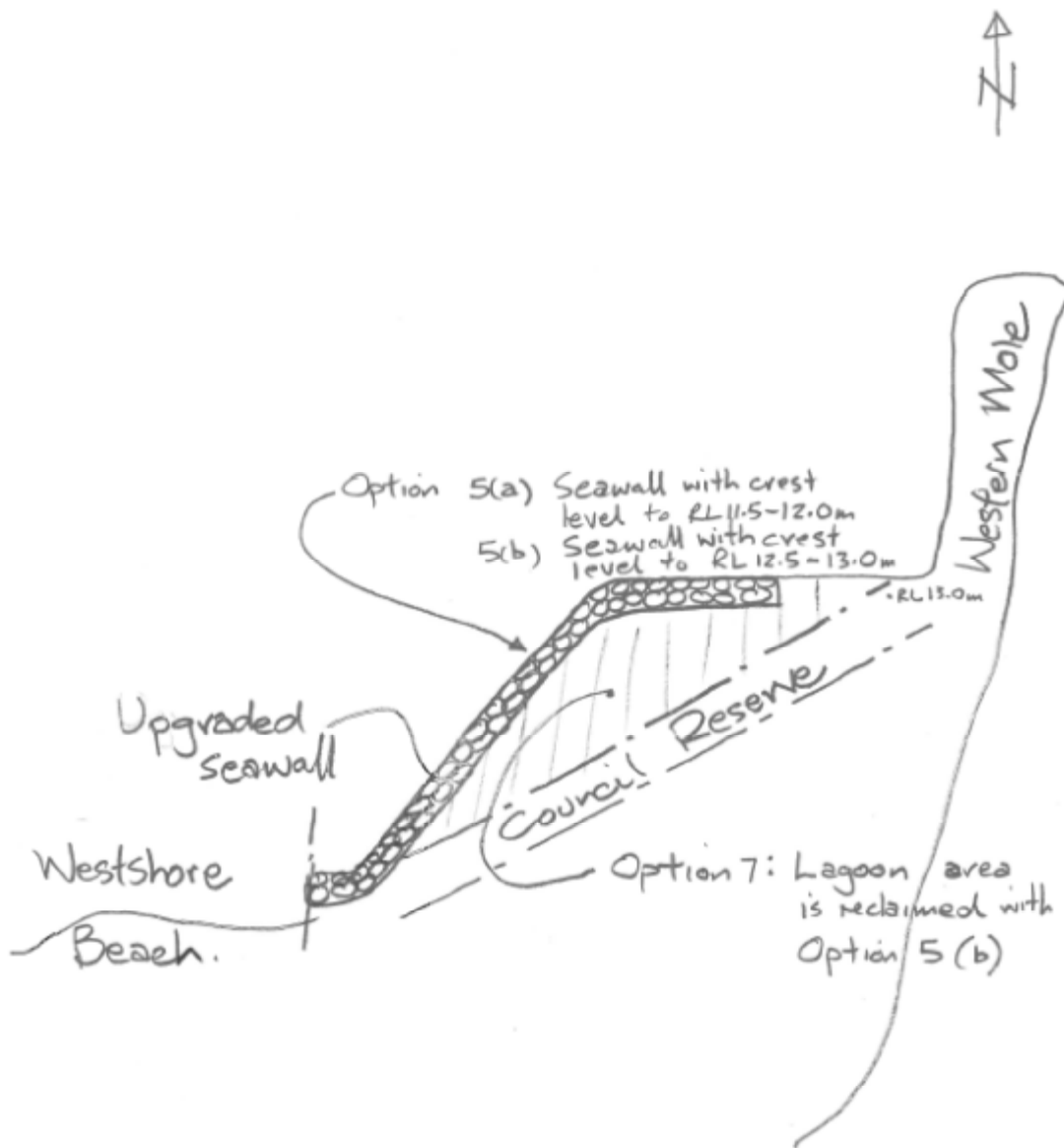


FIGURE 4
OPTION 5

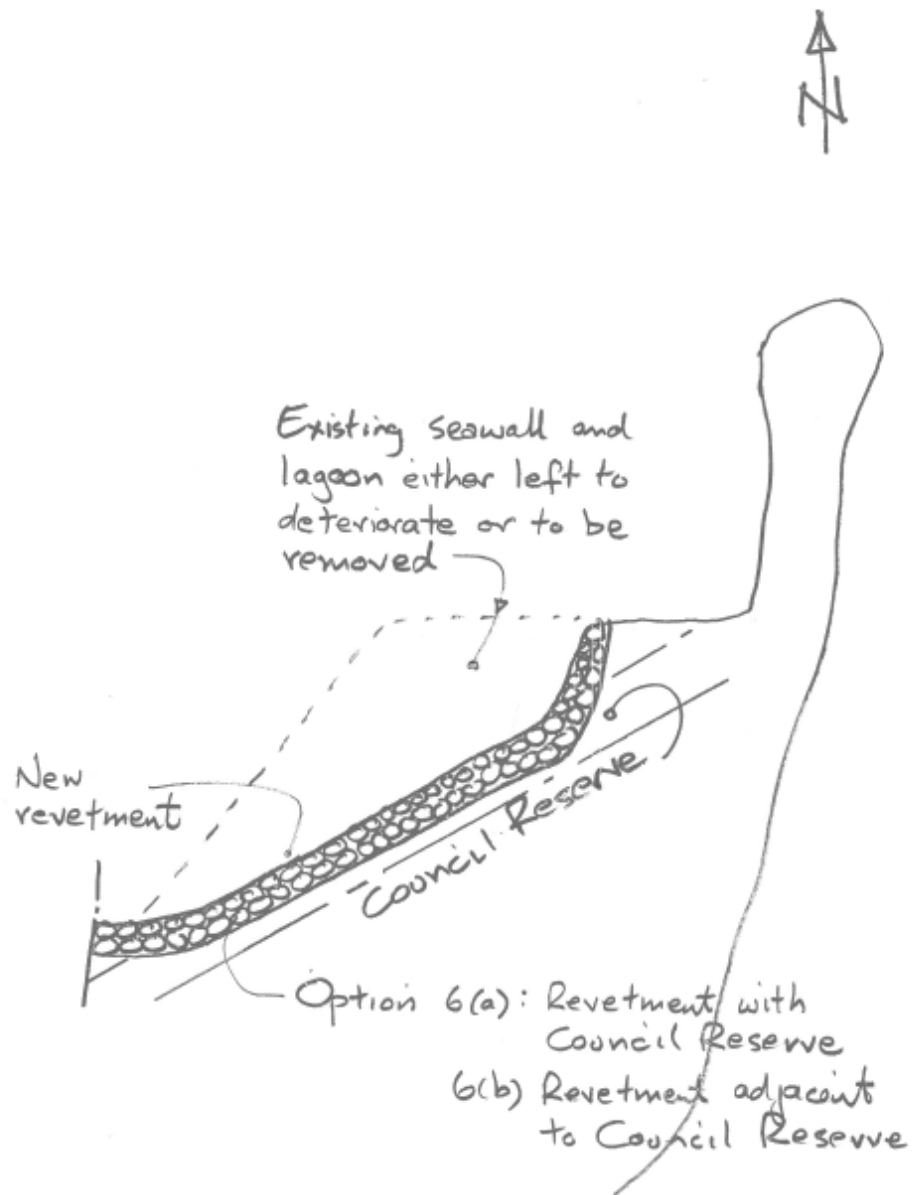


FIGURE 5
 OPTION 6

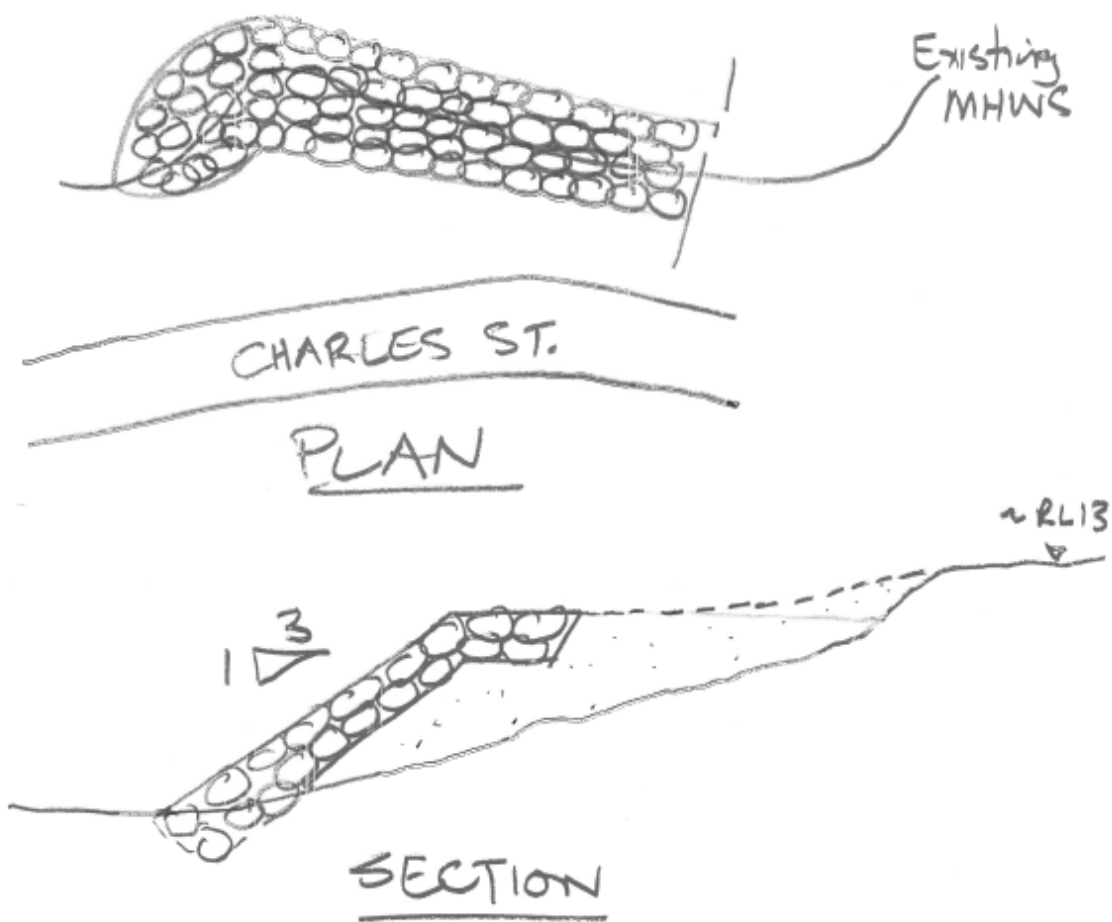


FIGURE 6
OPTION A

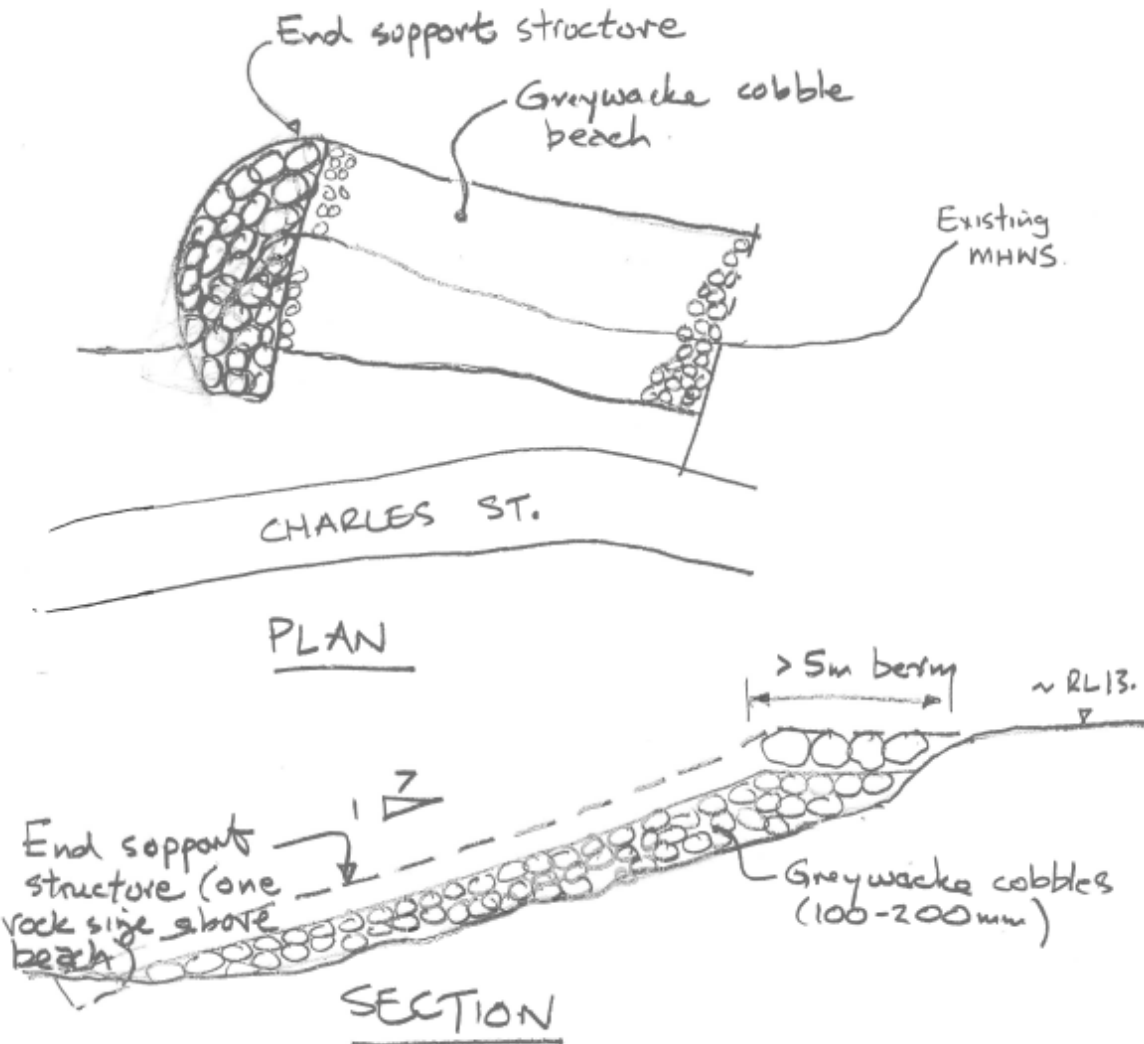


FIGURE 7

OPTION B