

# Coastal Protection Project Glen Isla Dune, Waihi Beach



## Construction Methodology Statement

**October 2024**

**Job Ref: 23028**

Rev A



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**for**

**Glen Isla Protection Society**

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## Table of Contents

<b>1.0</b>	Introduction .....	7
<b>2.0</b>	Proposal .....	7
<b>3.0</b>	Construction Access .....	8
<b>4.0</b>	Erosion and Sediment Control .....	9
<b>5.0</b>	Vegetation Clearance .....	10
<b>6.0</b>	Rock Supply and Delivery .....	11
<b>7.0</b>	Wall Construction Methodology .....	11
	<i>7.1 Construction Sequence Southern End</i>	
	<i>7.2 Construction Sequence Northern End</i>	
<b>8.0</b>	Tidal Work .....	16
<b>9.0</b>	Monitoring .....	16
<b>10.0</b>	Work Hours and Project Duration .....	16
<b>11.0</b>	Equipment Storage and Refuelling .....	16



## 1.0 Introduction

A Construction Methodology has been prepared to detail the likely scope and extent of permanent works required to achieve the proposed buried coastal protection structure. It is intended to assist in understanding the potential effect of the works so these can be assessed for consideration of the Resource Consent application.

## 2.0 Proposal

It is proposed that a buried revetment be constructed along approximately 200m of the coastline at the site, located immediately south of Three Mile Creek, Waihi Beach. The revetment is continuous over the frontage of seven beach front properties from 12 Glen Isla Place to number 9 Glen Isla Place. It is proposed that the structure is located in the Three Mile Creek Reserve which is vested in the Western Bay of Plenty Council's Reserve (Figure 2.0a).

The southern end of the revetment is seaward of 12 Glen Isla Place, with the rear of the revetment proposed 5m from the private property boundary. The structure is continuous to the north parallel to the boundary until a change of direction of the boundary midway through 16 Glen Isla Place. From this point the wall extends north to become 7.6m from the boundary at the existing large Norfolk Pine near the boundary of 11 and 13 Glen Isla Place. The 7.6m is the distance recommended by the Arborist to ensure the proposed construction would not endanger the Norfolk Pine. From this point the wall extends further north angling closer into the boundary, such that the wall is 6.5m from the boundary at the northern end of 9 Glen Isla Place.



Figure 2.0a: Layout Plan of rock wall

Detailed Design of the revetment has not been completed however the structure will be designed in accordance with accepted design guidelines (CIRIA C683), comprising a:

- Slope no steeper than 1:1.5
- Double armour layer
- Double underlayer
- Crest width minimum of three primary armour stone widths

In addition, the crest level is to be approximately RL 3.5 to ensure the structure is buried beneath approximately 0.5m of sand (Figure 2.0b). Footing depth will be confirmed at Detailed Design but is likely to be approximately RL 0.0 or below

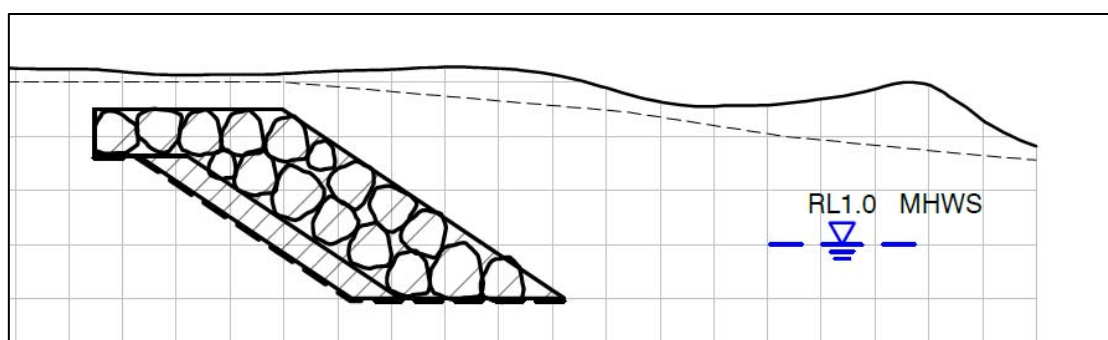


Figure 2.0b: Typical section through buried backstop wall

### 3.0 Construction Access

The primary construction access for delivery of machinery and rock spalls will be through the Council Reserve at 100 Seaforth Road, on the northern side of Three Mile Creek. Rock delivery by rubber tyred trailer will track through the Reserve and along the beach seaward of the groynes. (Figure 3.0a). The road frontage has a wide and open entrance off the road (Figure 3.0b) and provides a ready point of access to the foreshore. Access will be required around the seaward side of the groynes that are either side of the creek outlet and will be tidally limited.

Delivery of the excavator will occur through this access at the start of the project. It will then be left on site for the duration of the project, outside the CMA, within the Construction footprint.



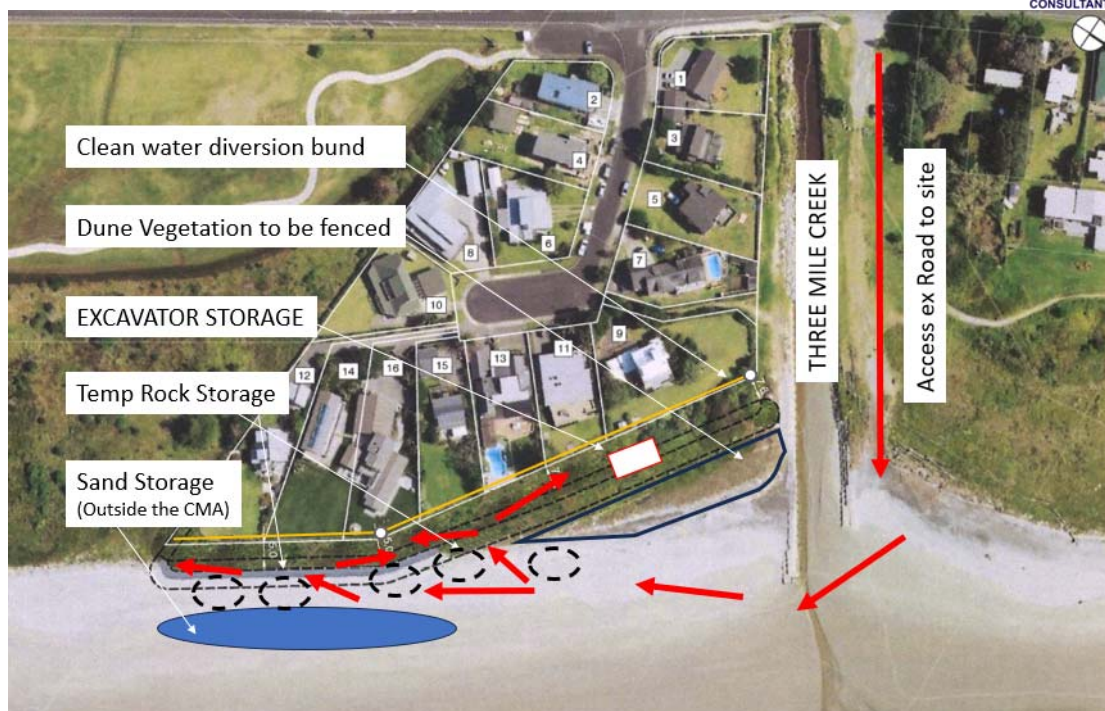


Figure 3.0a: Indicative access through Reserve and excavator storage



Figure 3.0b: Seaforth Road Reserve access

#### 4.0 Erosion and Sediment Control

The site is atypical with regards earthworks and typical silt control measures. All material being excavated will be beach sand so that management of fines run off will not be an issue. The downhill part of the site is bounded by sandy beach and the tide. Silt fences are not practicable as they get washed away and/or prevent public access outside work hours. Uphill side of the site is well vegetated with contour generally flat but falling back from the mounded dune crest. A continuous uphill clean water diversion bund will be formed incorporating the impervious boundary walls to some sites (shown on Figure 3.0a above). No other sediment controls will be provided.

## 5.0 Vegetation Clearance

The extent of existing vegetation that requires clearance will be limited as much as practicable. In principle, the area of disturbance will comprise the footprint of the wall plus any sloping sides to the trench where that area is currently vegetated. An indicative area has been highlighted below (Figure 5.0a). There is a northern area of incipient and foredune with high quality Spinifex and Pingao vegetation. This area will be marked out and fenced off prior to work commencing

The southern extent of wall, seaward of 12-16 Glen Isla Place, has a limited extent of existing vegetation requiring removal. The indicative area allows for 1m landward of the rear of the wall to batter existing sand to a stable gradient.

The northern extent of wall, seaward of 9-15 Glen Isla Place, requires a greater width of clearance. This is due to the excavation for the wall placement being deeper below existing ground level. An approximate width of 13m has been defined by extending the batter above the rear of the wall near vertically to meet ground level, and forming a steep temporary batter (45°) from the wall toe to ground level on the seaward face (Figure 5.0b)



Figure 5.0a: Indicative area of vegetation requiring removal

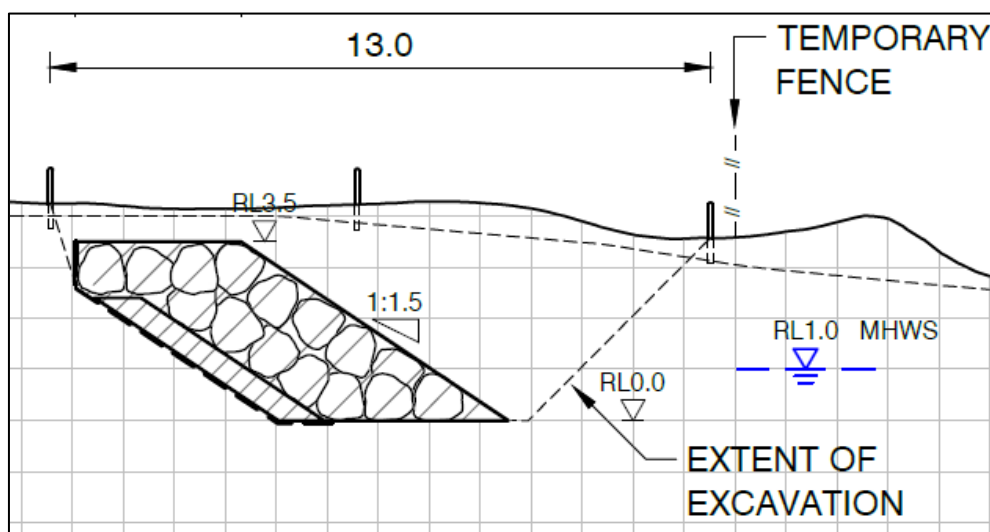


Figure 5.0b: Indicative excavation to place wall

## **6.0 Rock Supply and Delivery**

Rock is to be supplied from the Waihi Beach quarry. It will be graded at the quarry and stock piles of suitable rock size will be established there. The engineer will agree 4-6 representative rocks for each size grade providing examples of the upper and lower bounds of the grade. These rocks will be marked and kept at the quarry adjacent to stockpile areas throughout the project. Suitable size rock will be stockpiled ahead of being required onsite and the engineer shall approve all stockpiled rock before delivery to site.

Rock will be loaded into a road legal, pneumatic tyred tractor and tipping trailer unit. It will travel directly from the quarry to the 100 Seaforth Road access point and then along the beach to the active work site. Rock will be delivered in the required grades to site on an “as required” basis, as much as is practicable, such that stockpiling on site is minimised. There may be temporary piles in order to maintain efficient construction operation, but it is anticipated that these piles will be almost completely removed daily.

Rocks will be dumped off the trailer from the minimum height practicable to minimise vibration. The dumping methodology is to be agreed with the Engineer prior to rock delivery. Areas where rock is temporarily stockpiled on site will have a heavy gauge geotextile placed before rock delivery and this will be held in place by suitably sized rocks. Following completion of rock delivery to any temporary stockpile location the geotextile under that location and all rock chips and fragments on the beach shall be removed and disposed of off-site.

During Rock placement for wall construction access to the southern section will be directly from the beach. The excavator will sit seaward of the working face and place rock. Access to the northern section shall only be along the approved wall alignment. The contractor shall maintain fencing along this alignment to ensure no damage to vegetation occurs outside the agreed access way.

## **7.0 Wall Construction Methodology**

The proposed construction methodologies are slightly different for the two wall sections highlighted below (Figure 7.0). The southern section is to be built at and slightly landward of the existing dune face. Less excavation is required and access is available seaward of dune. The **northern wall** section, will be constructed entirely within the existing dune and seaward vegetation is to be retained. Work will generally be along the wall foot print.

For the **southern wall section**, less excavation is required and access is available seaward of dune. The construction sequence following vegetation clearance is detailed below. However, in general terms, an excavator will work from the beach placing excavated sand seaward of its work site but outside the CMA. Lengths (approximately 20-30m) of the wall foot print will be lowered to RL 2.0 to form a work platform and then shorter lengths (say 10m) excavated to target depth with the rear trench face at design batter. The geotextile, underlayer of small rock and then armour layers of rock will be progressively placed. This is likely to be in two lifts, lift 1 to RL2.0 and lift 2 to RL 3.5 (crest level). Ground level in front of the wall will be raised again to approximately RL2.0 to meet current beach level and the wall above this covered with sand full height. Wind fences will be placed before planting of the dune is undertaken.





Figure 7.0: Wall sections

### 7.1 Construction Sequence Southern End

1. Work will commence from the southern end, with the excavator seaward of wall. Excavation will be undertaken on the wall foot print to approximately RL2 for the wall end detail and along approximately 20m of the wall length.
2. A length of footing able to be backfilled with (at a minimum) geotextile and first underlayer in a single tidal cycle, likely to be approximately 10m will be excavated to design level
3. Sand excavated from footing can be placed in a wind row seaward of the active work site to slightly extend the working window. All sand will be placed above MHWS, outside the CMA.
4. Rear wall batter will be shaped to 1:2, this is critical as it determines final face slope
5. The batter slope seaward of wall toe will be as steep as temporarily stable, likely approximately 45°
6. Geotextile will be laid in the excavated trench including below toe of wall – ideally single 6m wide roll of geotextile used extending to full crest height and as far under wall as these reaches
7. The underlayer of smaller rock will be placed on geotextile to design batter, starting from the toe and working upwards to approximately RL 2.0, Approximately 1m clear geotextile will be left uncovered at ends (and top if required) for lapping with the subsequent section
8. This is the minimum works that need to be completed in a single tidal cycle to save re-work the following day. If this is unachievable, the excavated length or height should be reconsidered.
9. Armour rock layers are then to be placed on underlayer to just below RL 2.0 such that completion of the underlayer can be readily undertaken.
10. Excavate next (10m) section and repeat steps 1-9 above.
11. On the second lift, much longer sections (50m) of wall can be completed as this construction is above ground and outside tidal and ground water effects.
12. The second lift of geotextile and rock underlayer will be placed. This will then be covered by the armour rock before the upper wall is buried in sand.

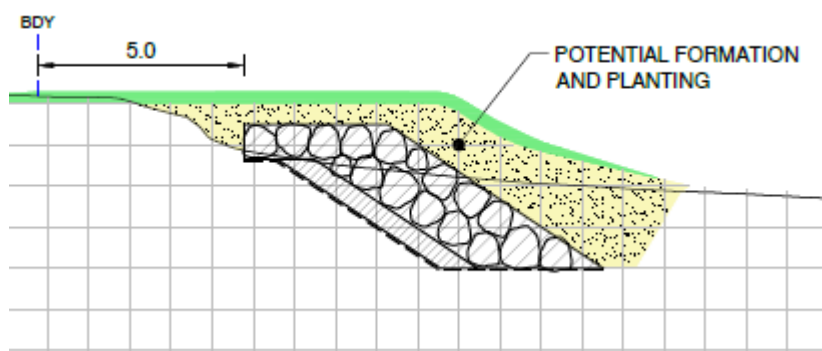


Figure 7.1: Completed Southern Wall section

For the **northern wall**, where the wall is to be entirely within the existing dune and seaward vegetation is to be retained, machinery, trucks and tracked “marooka” delivering wall materials will access along the alignment of the wall. The excavator will sit within the wall foot print and move longitudinally along the alignment.

The construction sequence following vegetation clearance is detailed below. However, in general terms, an excavator will work from within the alignment. The entire foot print will be lowered to RL 2.0 to form a work platform. Then working from the northern end, short lengths (approximately 10m) will be excavated to target depth with the rear trench face at design batter. The excavator will be within the trench and may require the temporary shoring of the seaward face of the lower trench. It is likely to need to partly fill the trench between placing the lower and upper armour layers and it may be useful to extend the lower armour layer across the base of trench.

The construction can be considered as comprised of three lifts, lift 1 to RL2.0 including first armour layer, lift 2 to RL2 including second armour layer and lift 2 to RL 3.5 (crest level). Ground level will be raised again to RL2.0 at the foot of the wall and the wall face covered with sand full height. On completion, dune planting will be established.

## 7.2 Construction Sequence Northern End (see Figure 7.2a)

1. Work from northern end (A), with excavator on wall alignment excavate wall foot print to approximately RL 2.0 for length of wall trucking sand to beach (B) and depositing in front of 12-16 Glen Isla Place above high tide (outside the CMA).
2. Excavate to design level a length of footing able to be backfilled with (at a minimum) geotextile and first underlayer in a single tidal cycle, likely to be approximately 10m
3. Sand excavated from first excavation would be also be deposited on front of 12-16 above high tide. However, sand excavated from subsequent sections will be used to backfill and cover completed section.
4. The rear wall batter will be shaped to 1:1.5, this is critical as it determines final face slope
5. The seaward slope of wall toe will be battered as steep as temporarily stable, likely approximately 45°. The lower part of the toe is likely to be shored up to make safe and practicable for digger operation within trench(C).

6. Lay geotextile in excavated trench including below toe of wall – ideally single 6m wide rolls of geotextile will be used extending to full crest height and as far under wall as these reach.
7. The small rock underlayer will be placed on the geotextile to design batter, starting from the toe and working upwards to RL2.0, leaving approximately 1m clear geotextile at end (and top if required) for lapping with the subsequent section.
8. This is the minimum works that need to be completed in a single tidal cycle to save re-work the following day. If this is unachievable, the excavated length or height should be reconsidered.
9. Place first rock armour layer on the underlayer working from northern end back towards south (D).
10. Remove shoring and cover the lower rock with sand to raise excavator so that a wider trench is accessible (E) to place the second rock armour layer to just below RL 2.0. The armour layer should be kept low enough such that completion of the underlayer can be readily undertaken (F).
11. Excavate next (10m) section and repeat steps 2-10.
12. On the third lift much longer sections (50m) of wall can be completed as this construction is in a wider trench and outside tidal and ground water effects.
13. The third lift of geotextile and underlayer rock will be placed. This will then be covered by the armour rock before the upper wall is buried in sand.

Following placement of the rock wall, rehabilitation of the site and installation of planting will be undertaken. This will comprise:

- A minimum of 0.5m of sand will be spread over the upper wall crest and battered down at approximately 1:2 to 1:3 to meet existing ground level over the full length of the southern section.
- Sand will be reestablished within the northern section to meet the adjacent contours along the entire length of the section.
- Disturbed dune areas will be re-vegetated with appropriate mix of indigenous fore-and back-dune species, as defined in the planting plan by the Ecologist, to effectively bind the disturbed sand and re-build the dune following works. Foredunes will be planted predominantly with Spinifex with pockets of Pingao.
- Wind fencing will be established along face of new planting and at dune crest to minimise wind-blown sand to back dune area and protect plants while they are establishing
- Planting timed for spring or autumn as practicable.

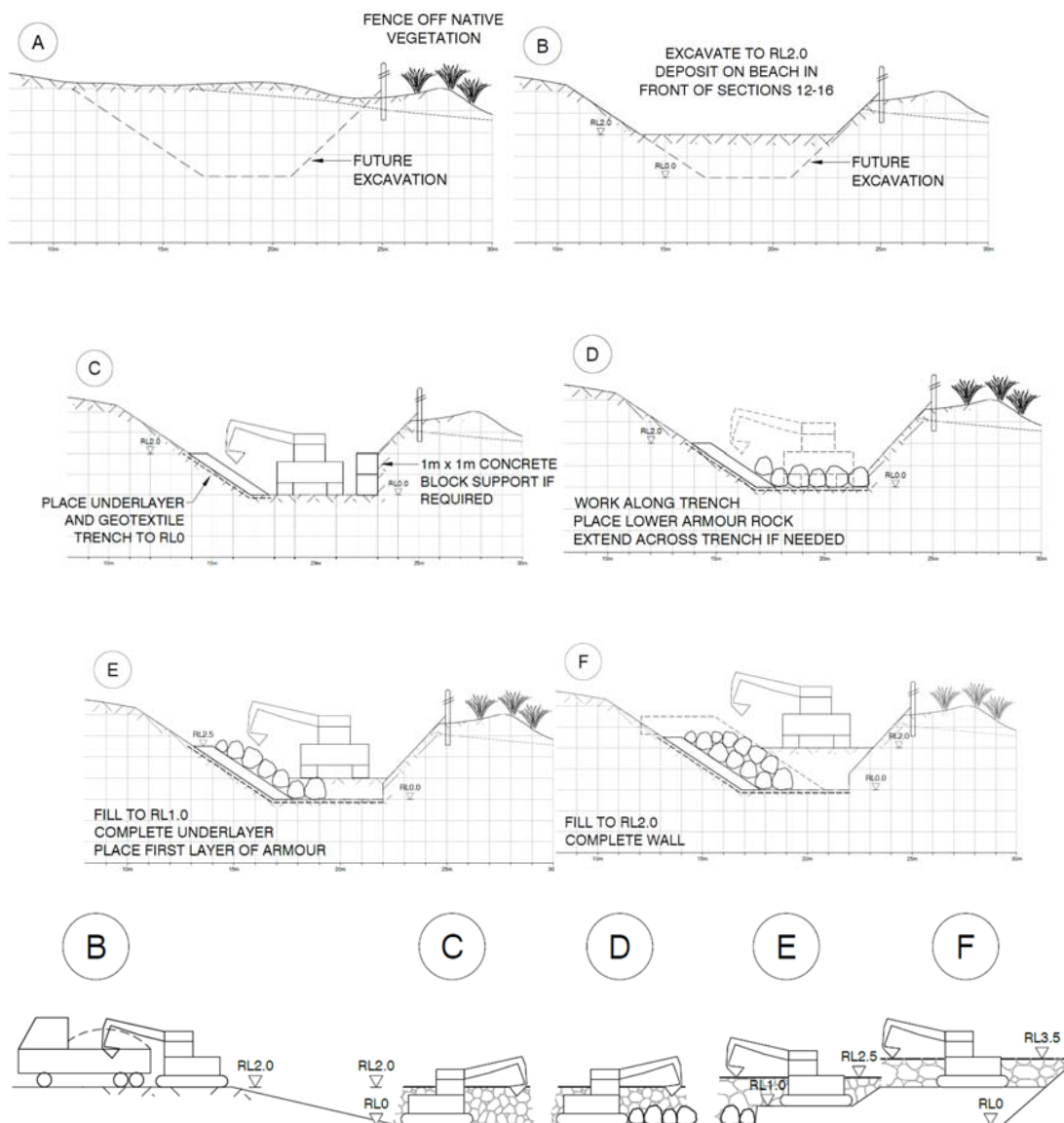


Figure 7.2a: Methodology Diagrams

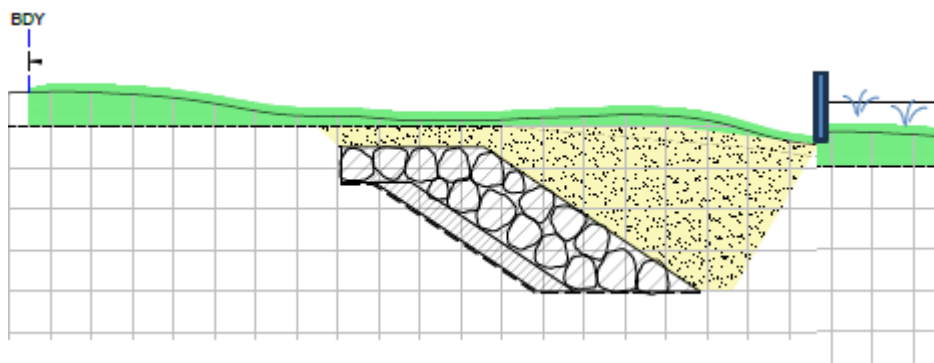


Figure 7.2b: Completed Northern Wall section

## **8.0 Tidal Work**

To the extent practicable, all work and material delivery shall take place above high tide. Three Mile Creek will need to be crossed where it discharges onto the foreshore for material and plant delivery. Vehicle movements will be managed to minimise time below high tide and avoid contamination of the tidal area as practicable and so that disturbance is restored by natural processes in 7 days. Machinery will be clean to the extent practicable and free from any leakage of petrochemicals.

Where strong onshore conditions, storms or extreme tides threaten, the site will be made safe and works would cease while there is a threat of tidal interaction with the works.

## **9.0 Monitoring**

Vibration monitoring of the works will be undertaken while works being are established to quantify vibration at adjacent residential areas and confirm the acceptability of the methodology. Monitoring will be undertaken throughout the project as required to ensure vibration is to be kept within acceptable levels to the relevant code of practice. The construction methodology shall be amended if required by the monitoring.

## **10.0 Work Hours and Project Duration**

Work will be kept to within 7.00 am to 5.00pm Monday to Friday (working hours) to the extent practicable. Work will not be undertaken at night or once daylight becomes unsuitable. However, the work is tidally and storm dependent and work may continue outside working hours for up to three days a week every two weeks. This may include Saturday working outside school holiday periods. No work will take place before 6am or after 8pm.

The project is expected to be undertaken between the months of April 2025 and November 2025. It is anticipated that the entire project will be completed in 4 months. An allowance has been made for periods of inclement weather, possible slow working conditions where the construction is constrained along the wall alignment and other unforeseen issues such as rock availability at the quarry etc. On this basis a specified project duration of 6 months is proposed between the dates of April –November, inclusive. However, work will not be undertaken at Easter or other Public Holidays.

## **11.0 Equipment Storage and Refuelling**

All machinery and equipment shall be kept overnight on the wall alignment above RL3.0. All equipment will be kept in good condition, clean and free from any leaks. No refuelling will be undertaken within the CMA and only equipment that cannot readily leave site (excavators) will be refuelled on site. A spill kit will be present on site and an agreed refuelling plan is to be submitted by the contractor to the satisfaction of the engineer and Consent Authority.