

Figure 23 Scheme 2, Precinct 1: Profiles - Chainages 20 and 120m

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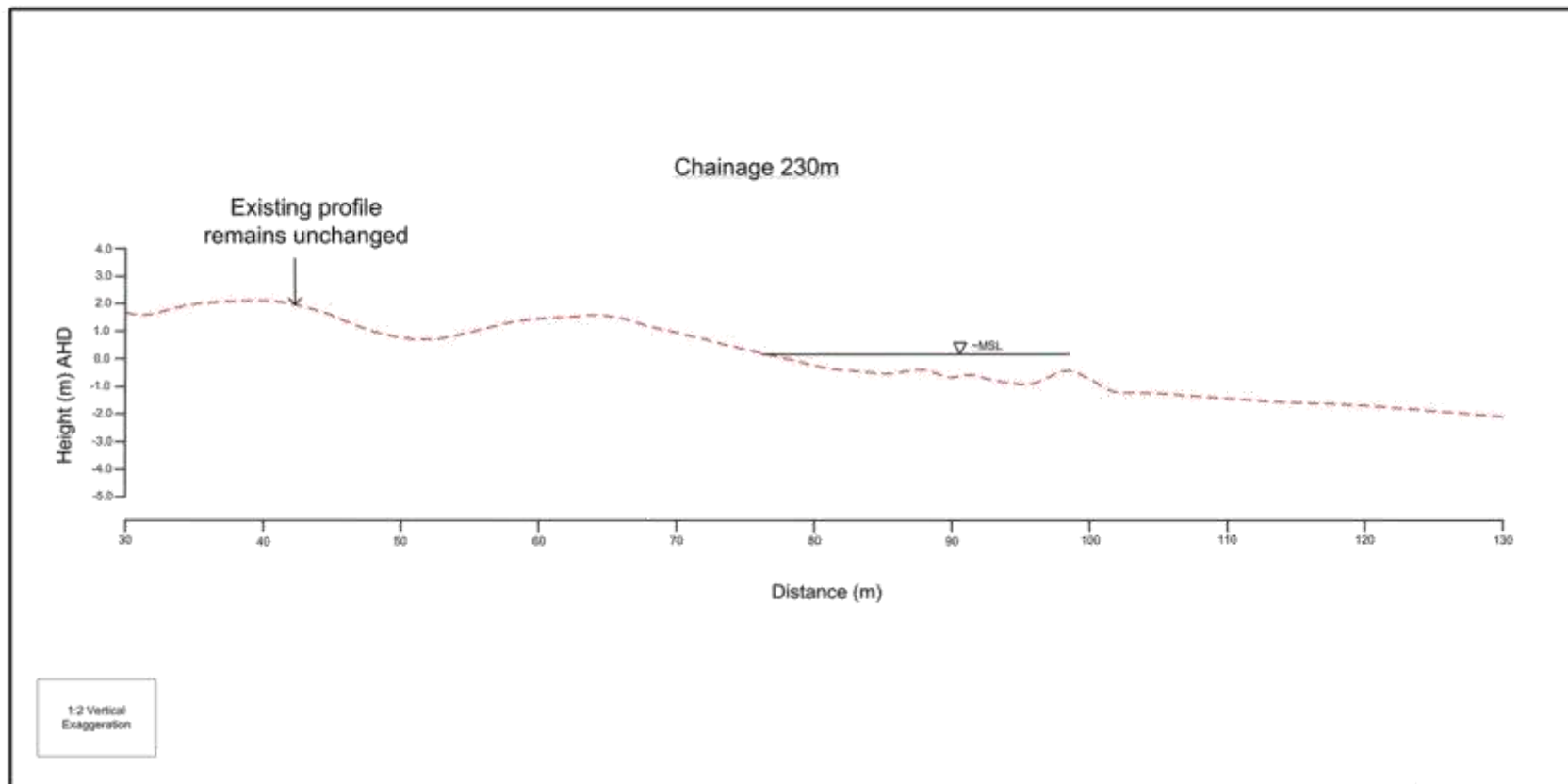


Figure 24 Scheme 2, Precinct 1: Profiles - Chainage 230m

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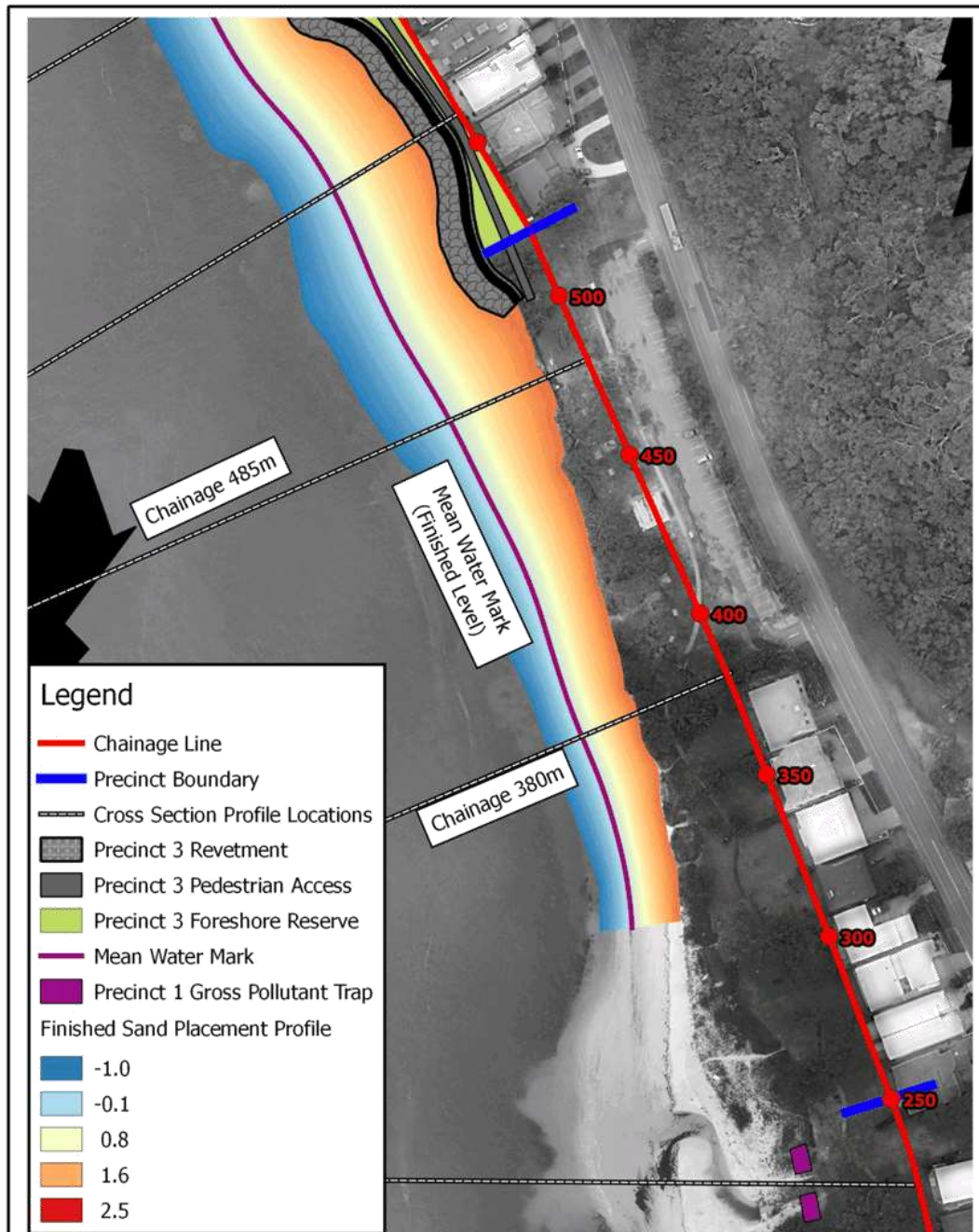
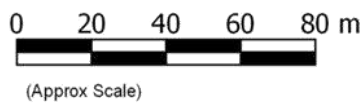


Figure 25 Scheme 2, Precinct 2: Plan

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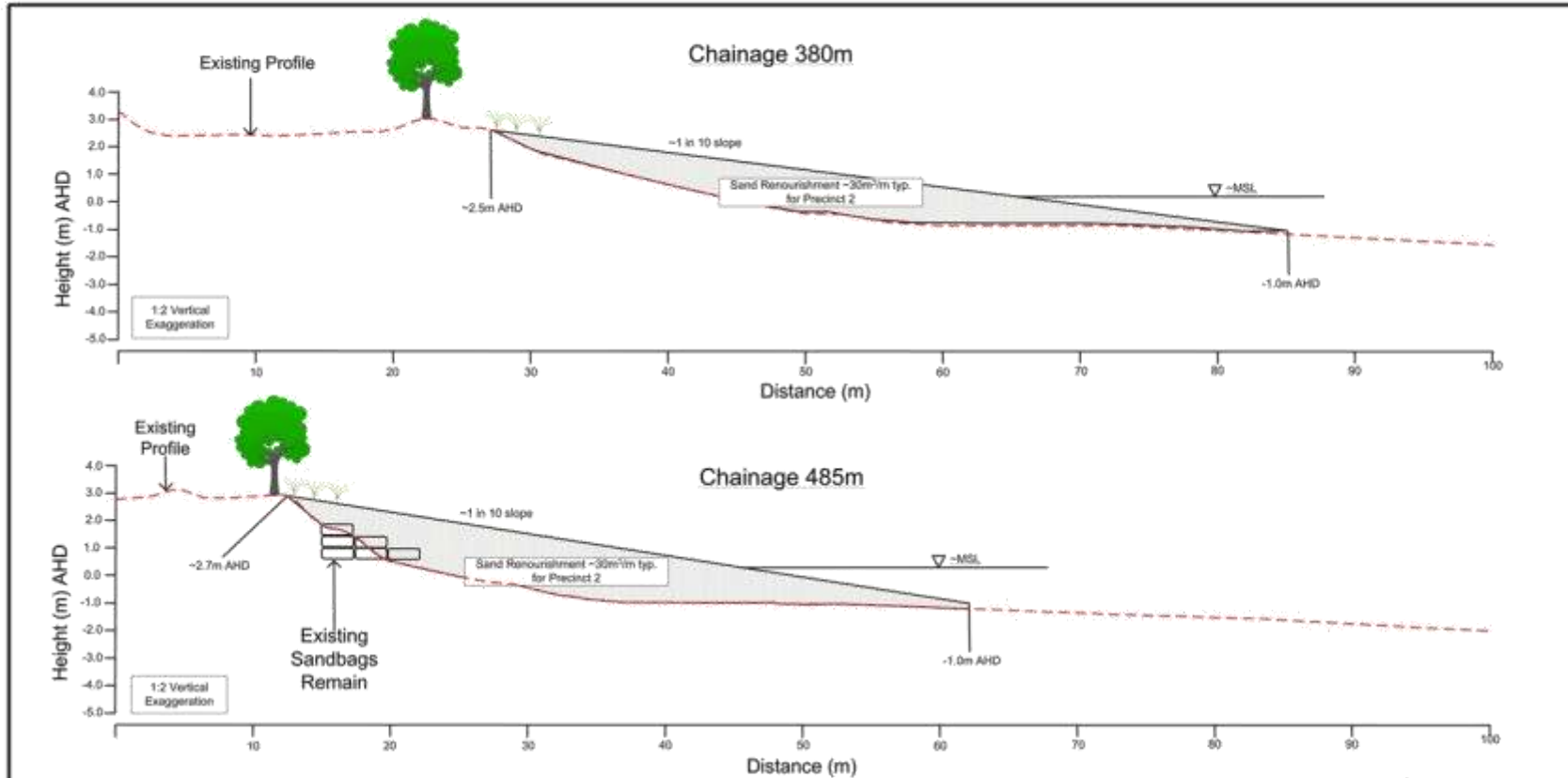


Figure 26 Scheme 2, Precinct 2: Profiles - Chainages 380 and 485m

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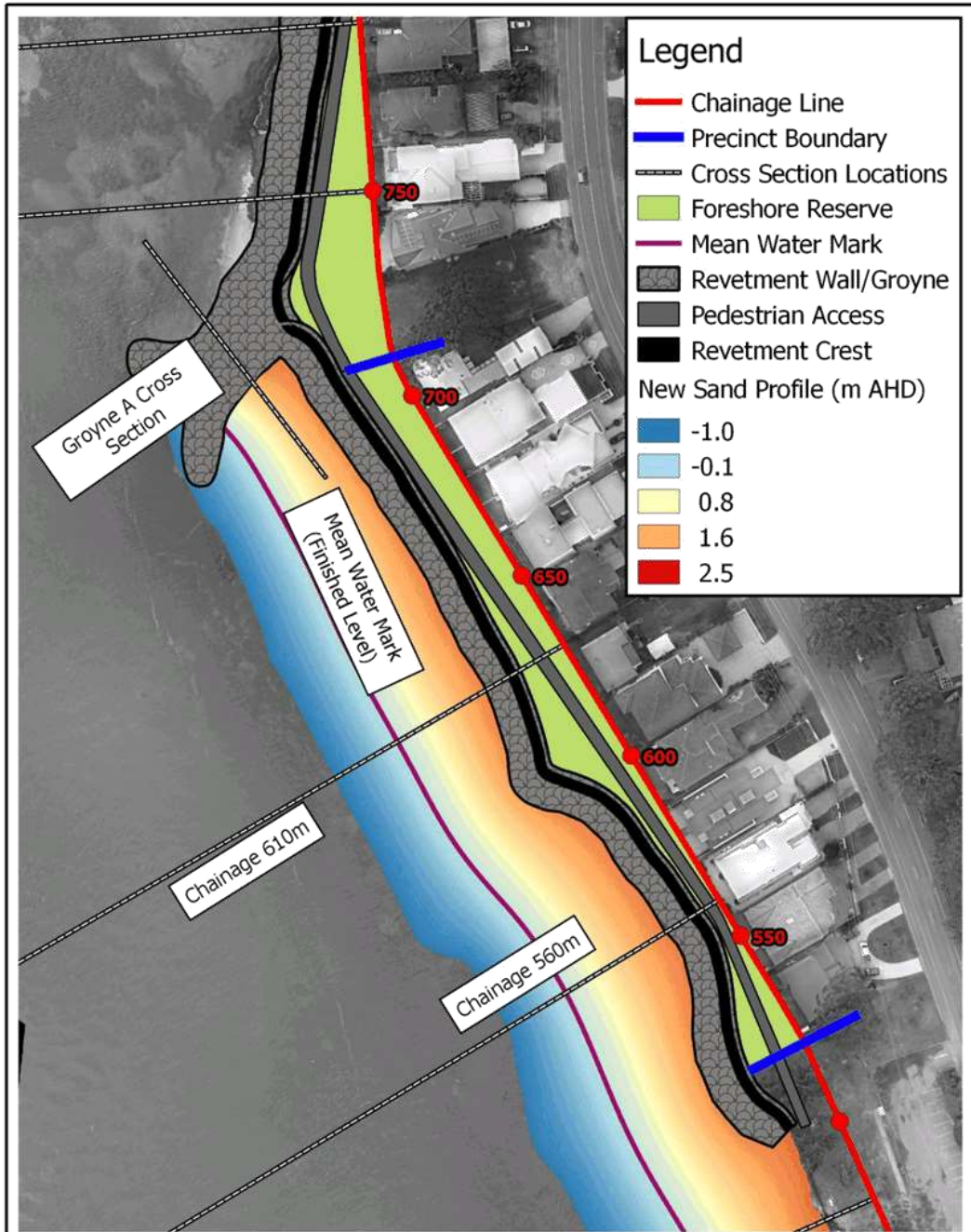
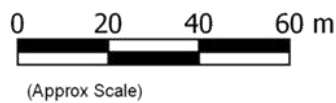


Figure 27 Scheme 2, Precinct 3: Plan

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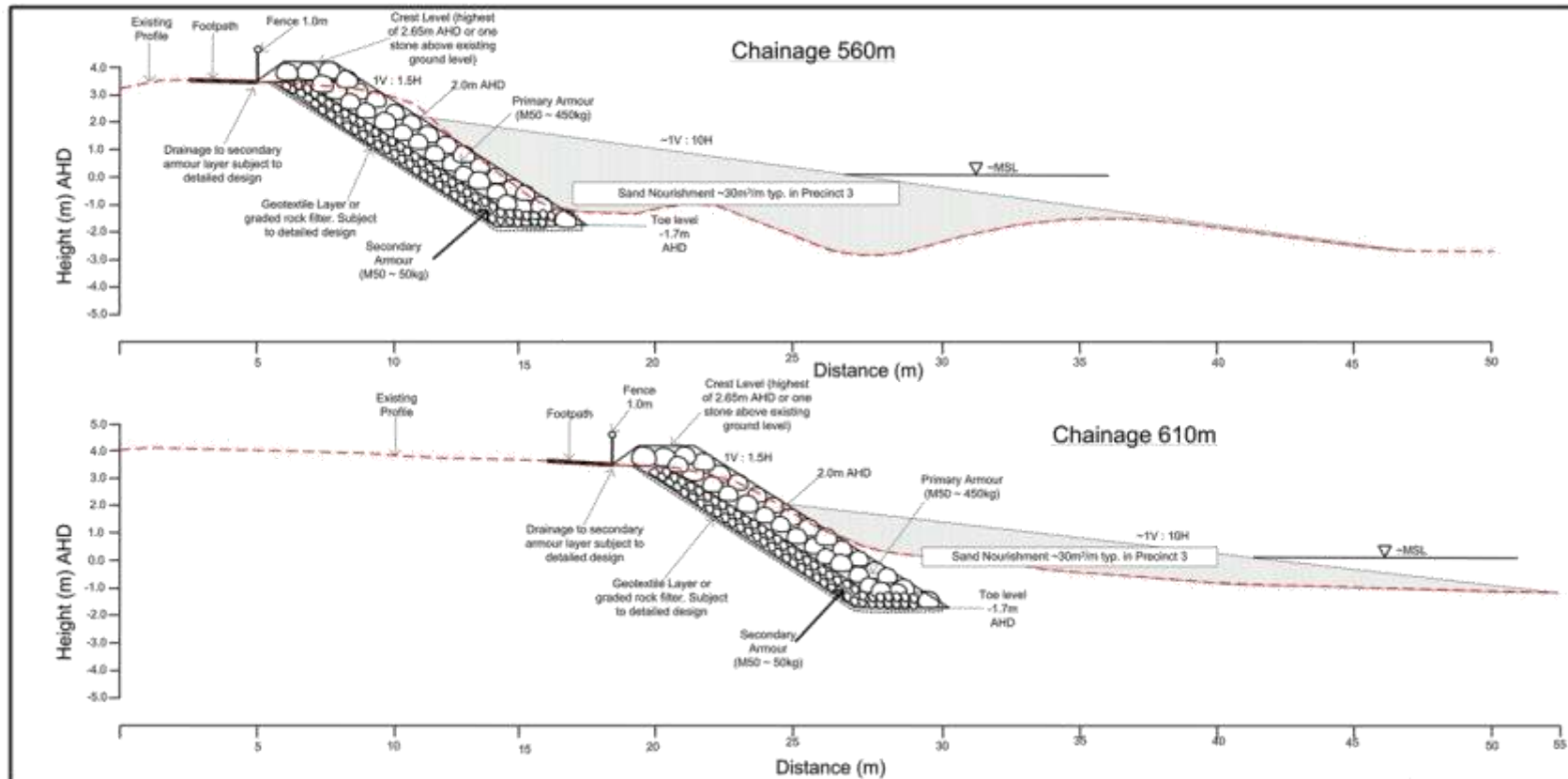


Figure 28 Scheme 2, Precinct 3: Profiles - Chainages 560 and 610m

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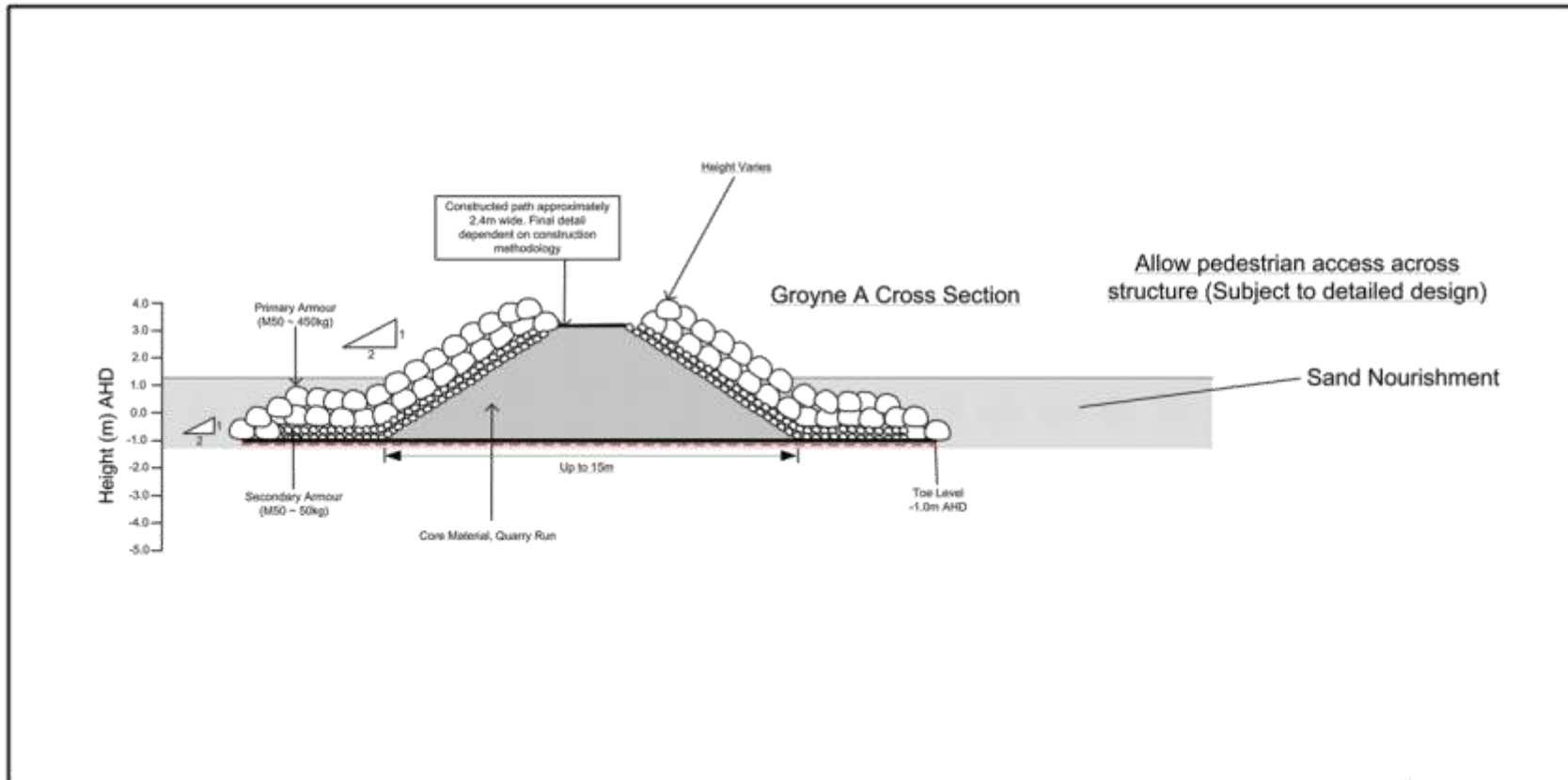


Figure 29 Scheme 2, Precinct 3: Profiles – Groyne A

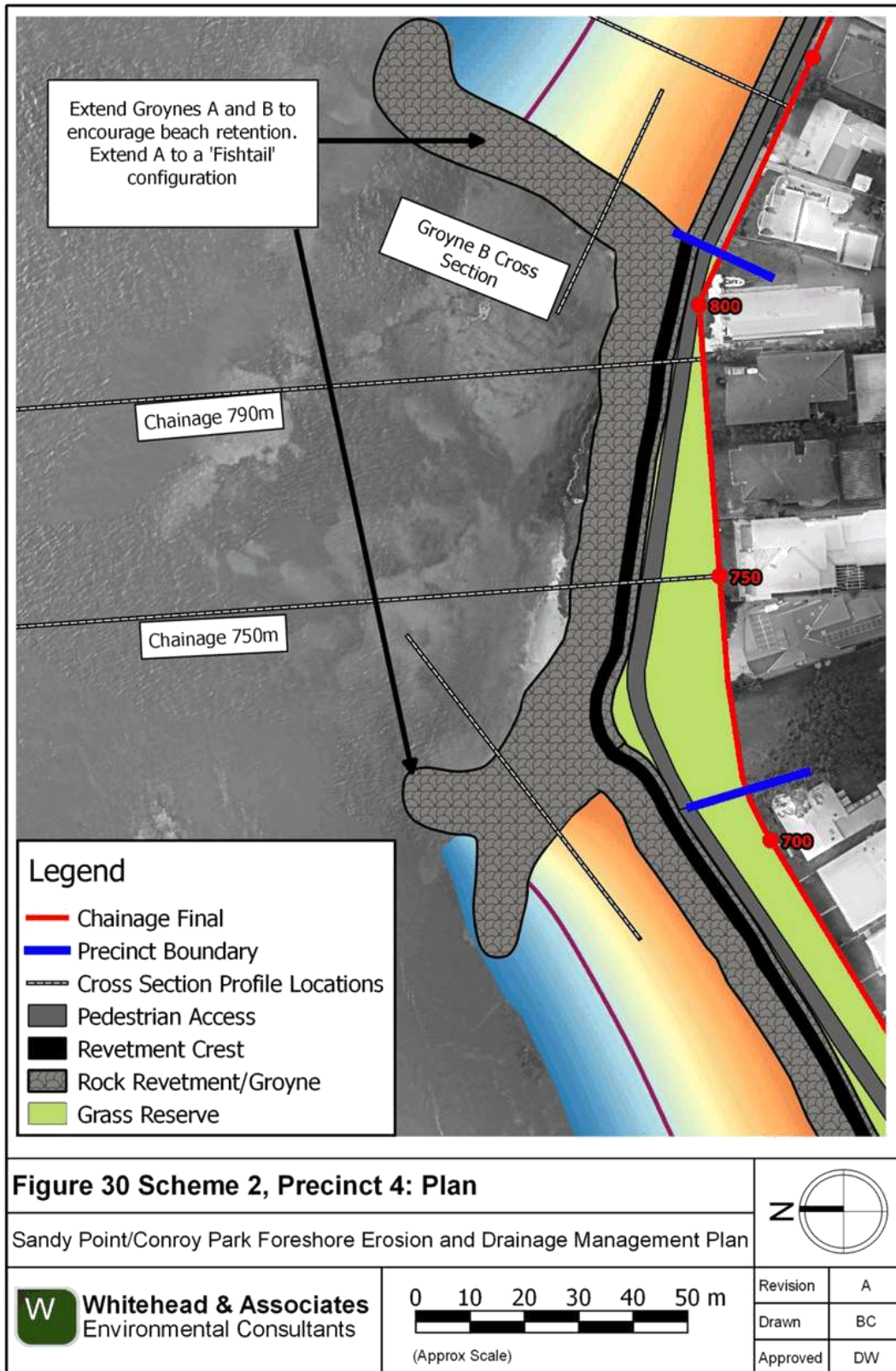
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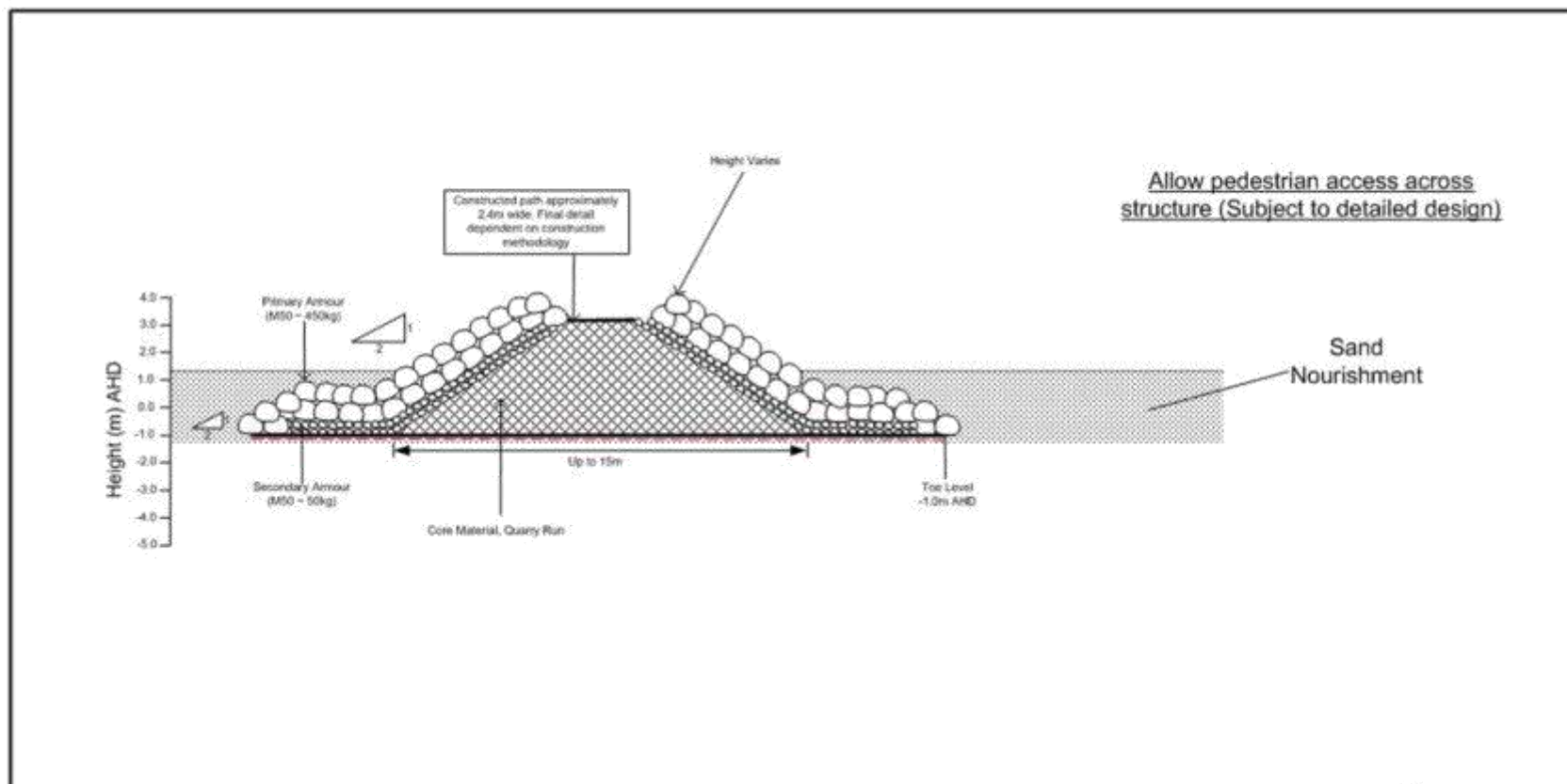


Figure 31 Scheme 2, Precinct 4: Cross Section – Groyne B

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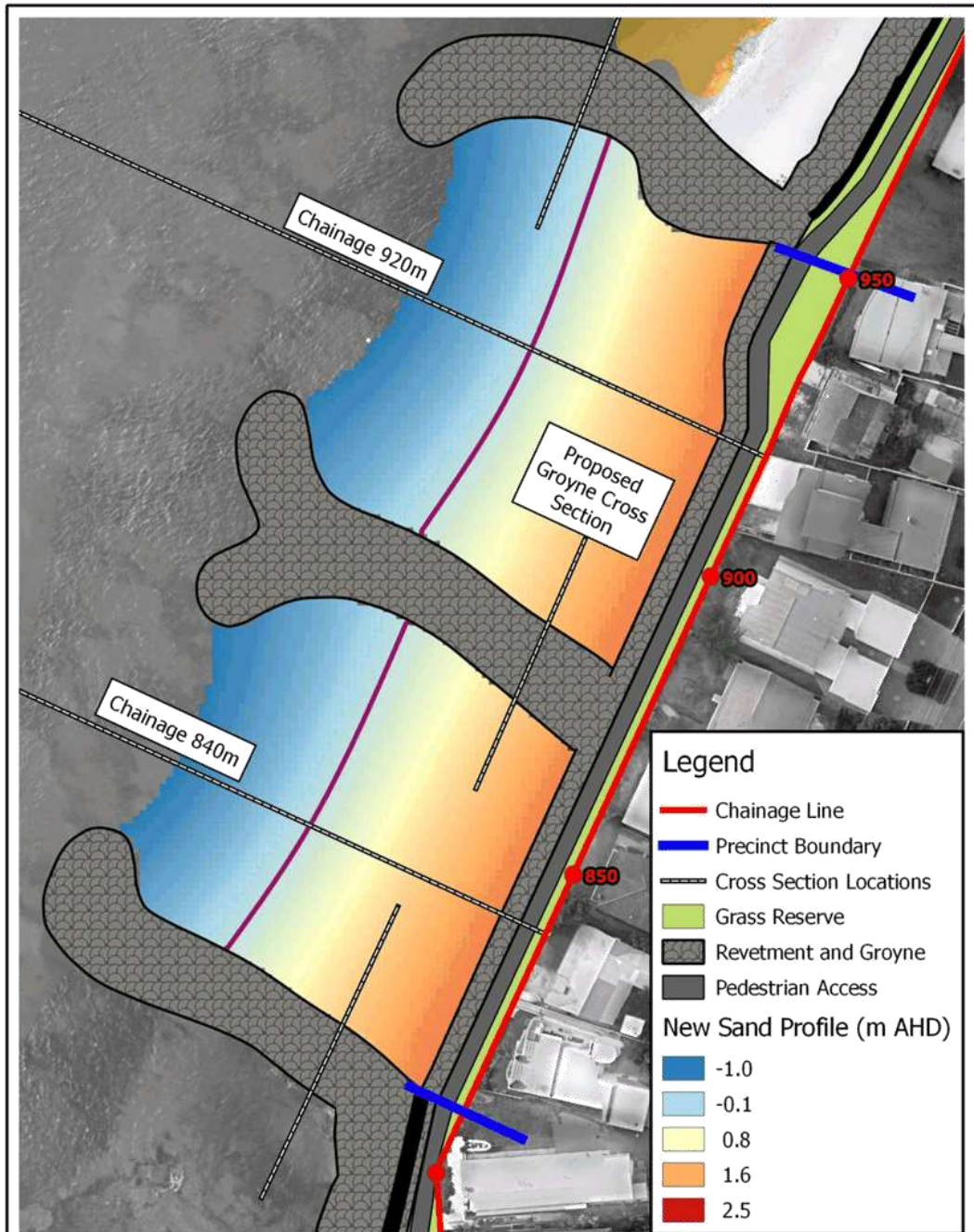
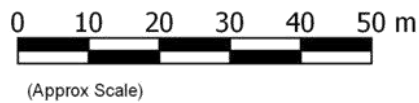


Figure 32 Scheme 2, Precinct 5: Plan

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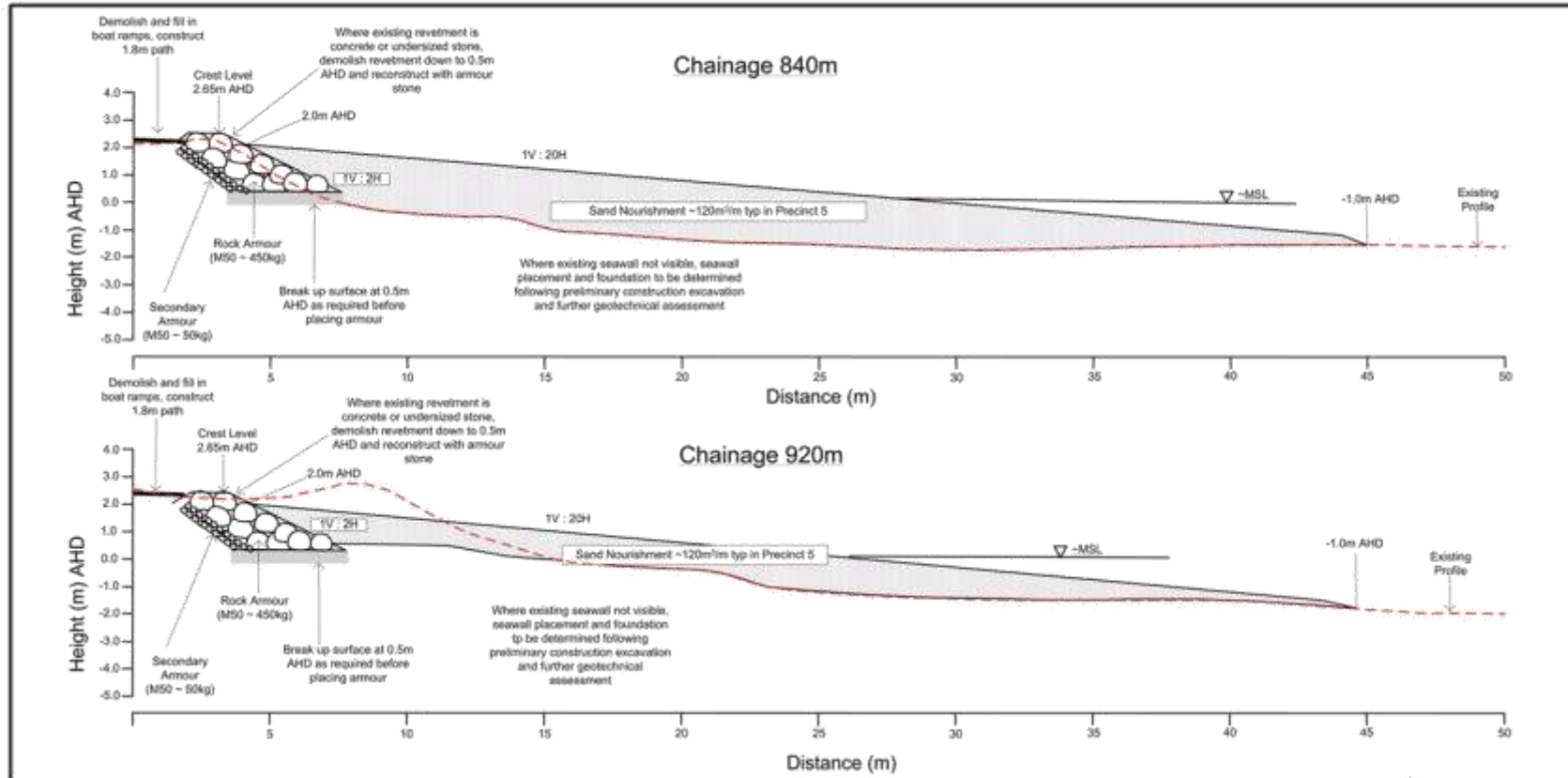


Figure 33(a) Scheme 2, Precinct 5: Profiles - Chainages 840 and 920m

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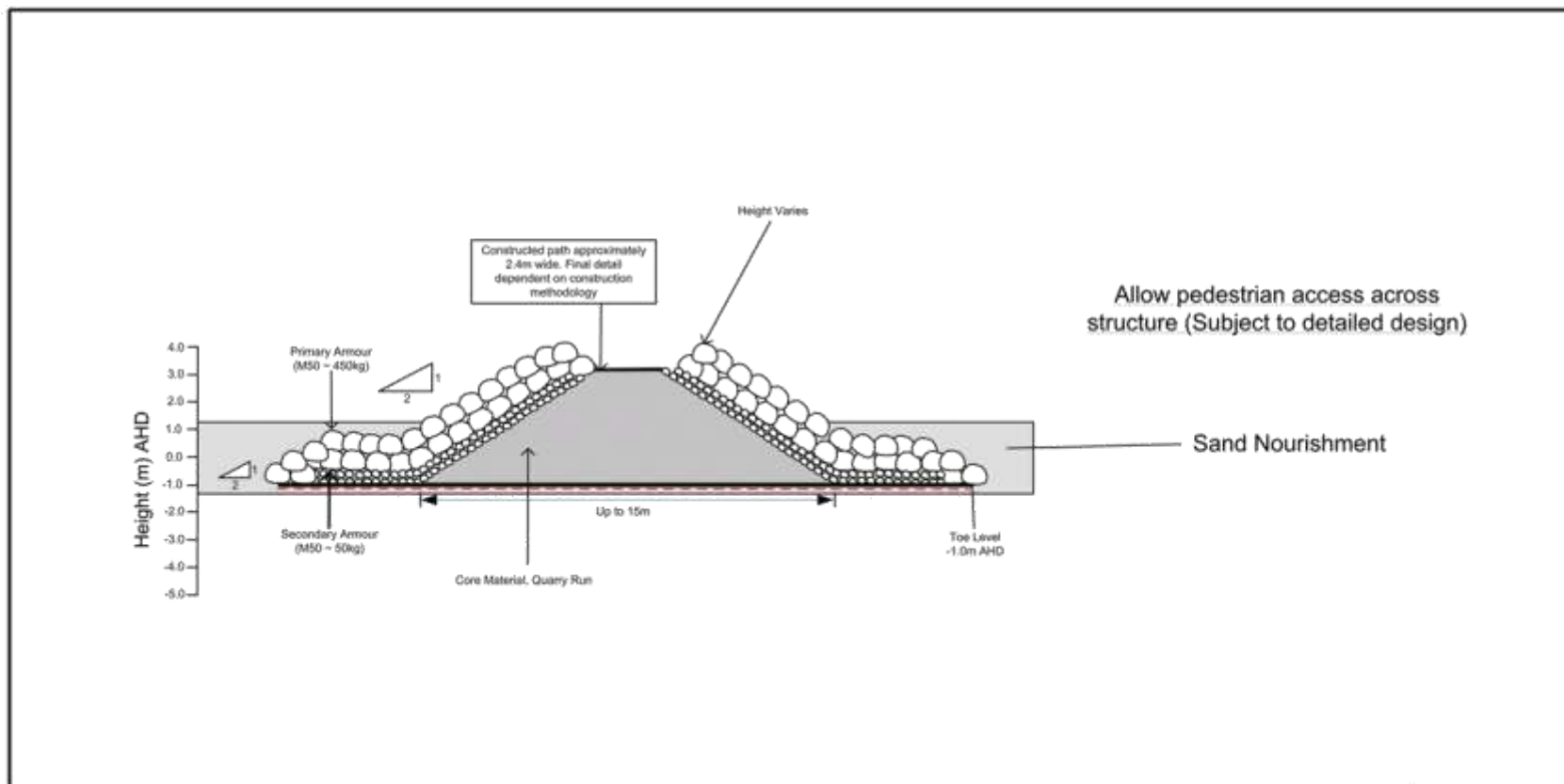


Figure 33(b) Scheme 2, Precinct 5: Cross Section – Proposed Groyne

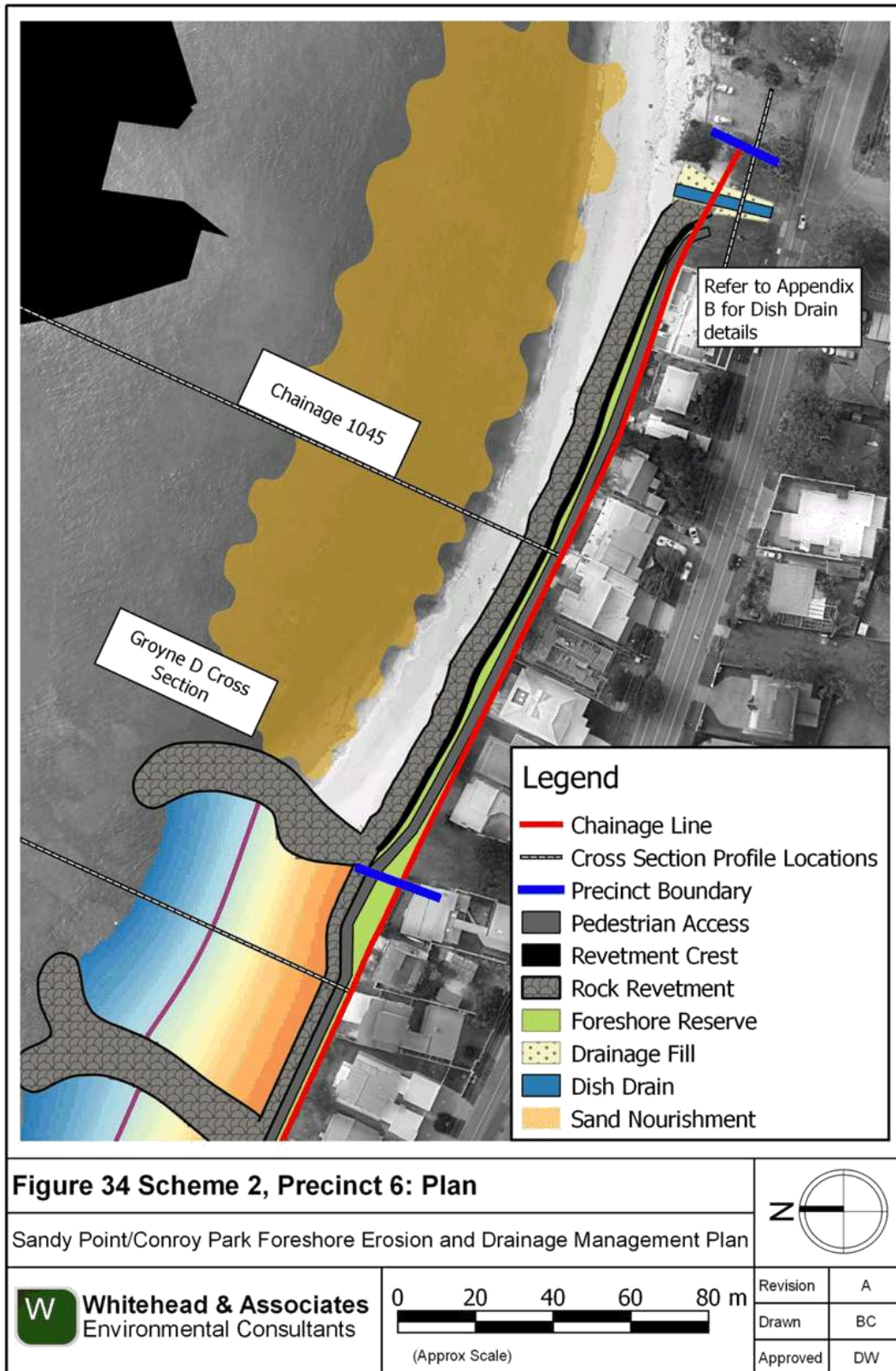
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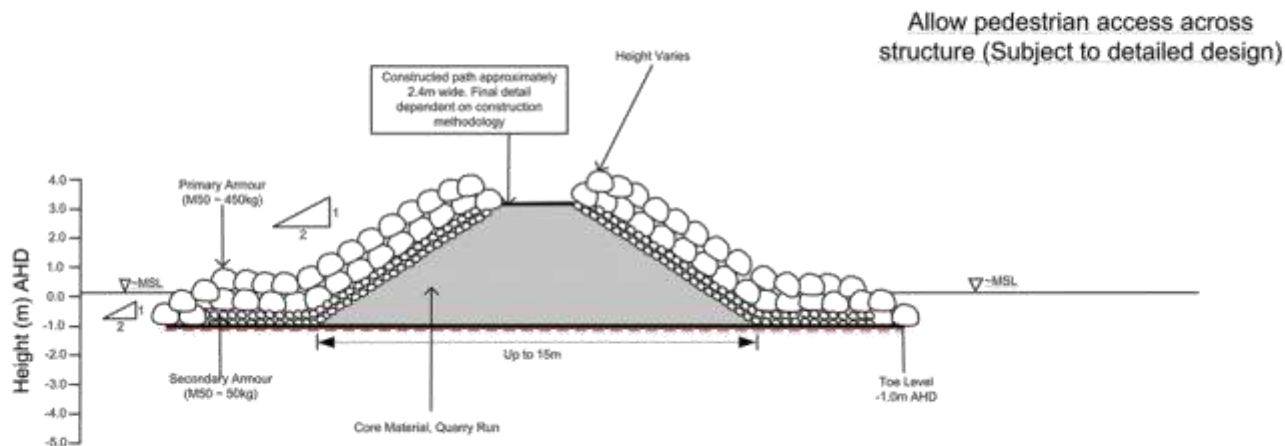


Figure 35 Scheme 2, Precinct 6: Profiles – Groyne D

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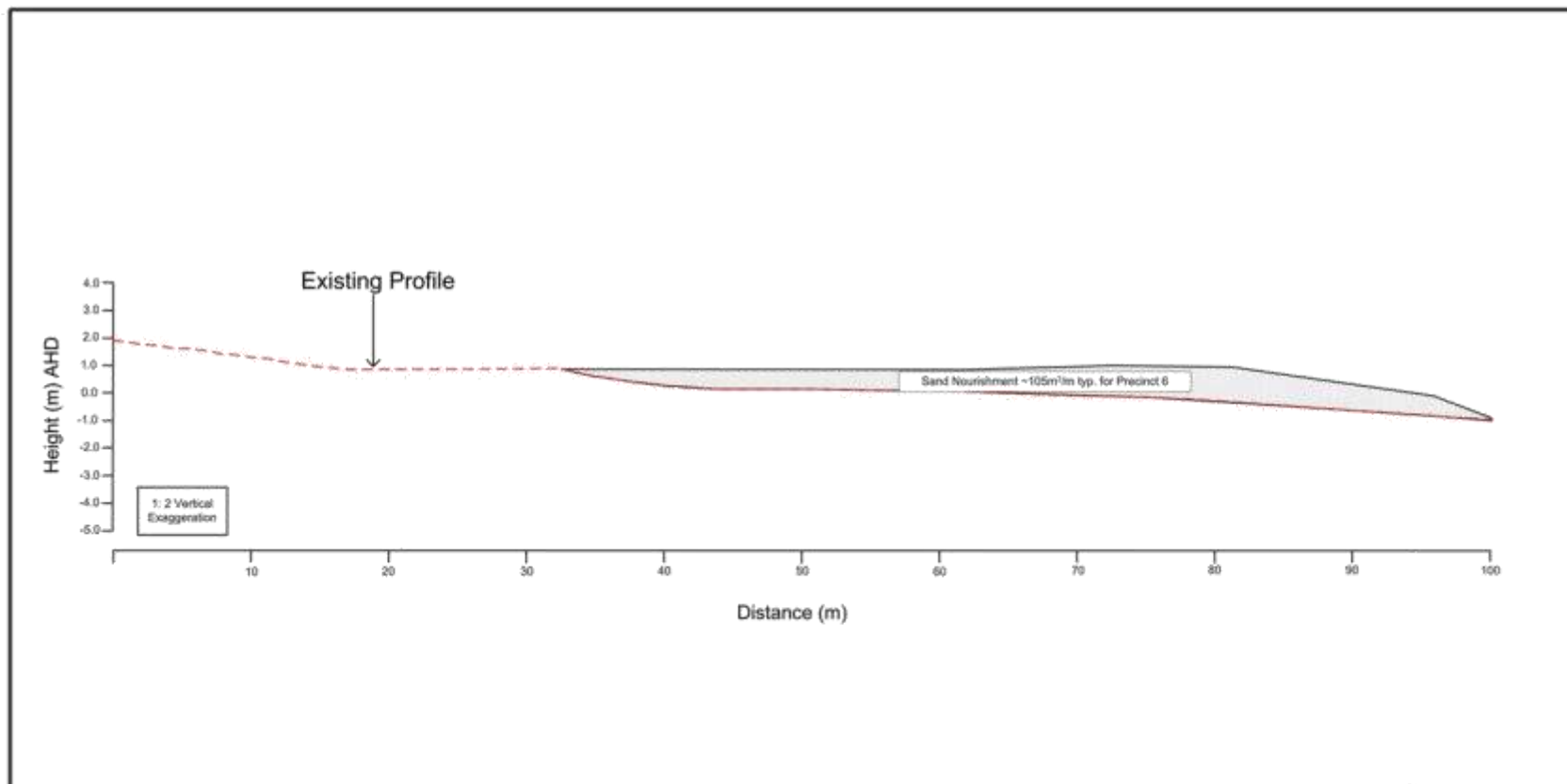


Figure 36 Scheme 2, Precinct 6: Profile 1045m

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6.2.3 Scheme 3

Table 7 Scheme 3 Presentation

Scheme 3		
Precinct and Details	Figures	Notes
Precinct 1: Plan	Figure 37	Sand is retained within Precinct 1. A 60m groyne is constructed across the beach in the vicinity of the existing stormwater discharge. This groyne serves two purposes, to convey the stormwater line from the back beach area to deeper water, so that stormwater flows are less likely to scour sand from the beach and to help maintain beach width along the eastern end of Corlette Beach (fronting Conroy Park). However, this groyne will not be sufficient to completely stabilise the beach fronting Conroy Park and periodic maintenance of the beach sand to the east would be required. Two gross pollutant traps are included in this option.
Precinct 1: Profiles	Figure 38 Figure 39	The beach profiles remain as they are. However, construction of the groyne will cause some re-alignment of the beach. In the absence of the stormwater outfalls next to The Anchorage being extended, periodic maintenance to ensure they remain clear would be required.
Precinct 2: Plan	Figure 40	Here the desired beach profile is achieved through importing sand. Comparison of costs between dredging the flood tide delta and trucking sand in from a local quarry indicates that dredging is around 3 times as cost effective. However, there is uncertainty as to whether such dredging would be allowed. Dredging is physically achievable, and was previously undertaken to form the platform for The Anchorage in the early 1990's. The proposed nourishment would increase beach width at mid-tide from zero at the present time, to around 30-35 metres when fully nourished. Nourishment activities would normally occur every 5-10 years or more frequently depending on weather conditions.
Precinct 2: Profiles	Figure 41	The desired beach profiles are identical to those for the other two schemes.

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Scheme 3		
Precinct and Details	Figures	Notes
Precinct 3: Plan	Figure 42	This Precinct 3 option is similar to that for Scheme 2, with addition of two artificial headlands, or “fishtail groynes” which would aim to retain two pocket beaches. The groynes extend to the existing seagrass edge to avoid the smothering of seagrasses during construction. The fishtail ends act to help anchor the beach on both the upstream and downstream sides of the structure. It is expected that some additional habitat suitable for seagrass could be created within the bays. However, with the existing seagrass constraint adopted, it is unlikely that the headlands/groynes (as shown) will completely stabilise the beaches. Period renourishment would still be required.
Precinct 3: Profiles	Figure 43 Figure 44	Sand nourishment profiles would be identical to those for the other two schemes. The groyne and headland cross section is similar to that provided in Precinct 1, except that the side slopes are set at 1 in 2, to account for the additional wave exposure in this location.
Precinct 4: Plan	Figure 45	Precinct 4 is effectively the same as for Scheme 2, except that nourishment sand is placed between Groynes A and B.
Precinct 4: Profiles	Figure 46	The nourished profile extends from 2.0m AHD down to -1.0m AHD at a placement slope of around 1 in 10.
Precinct 5: Plan	Figure 47	The option for Precinct 5 is most similar to that proposed for Scheme 1, except that reclamation is minimised and the revetment follows the existing alignment reasonably closely. Instead of having a footpath behind the crest, a piered footbridge is carried around the front of the revetment.
Precinct 5: Profiles	Figure 48	The profiles are very similar to those for Scheme 1, with the exception that filling is minimised and a footbridge is provided around the front of the structure. All boat ramps would need to be demolished.
Precinct 6: Plan	Figure 49	This option for precinct 6 is very similar to that for Scheme 1, with existing revetment and boat ramps demolished and reconstructed on (almost) the existing alignment to an engineered standard. The eastern stormwater crossing is to be formalised by filling and construction of a dish drain with an infiltration trench.

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Scheme 3		
Precinct and Details	Figures	Notes
Precinct 6: Profiles	Figure 50	Provision is made for installation of a wave deflecting barrier in future (as opposed to raising the revetment). The difference is minor in upfront capital expenditure, but affects the location of the public access way and visual impact of the option in future.

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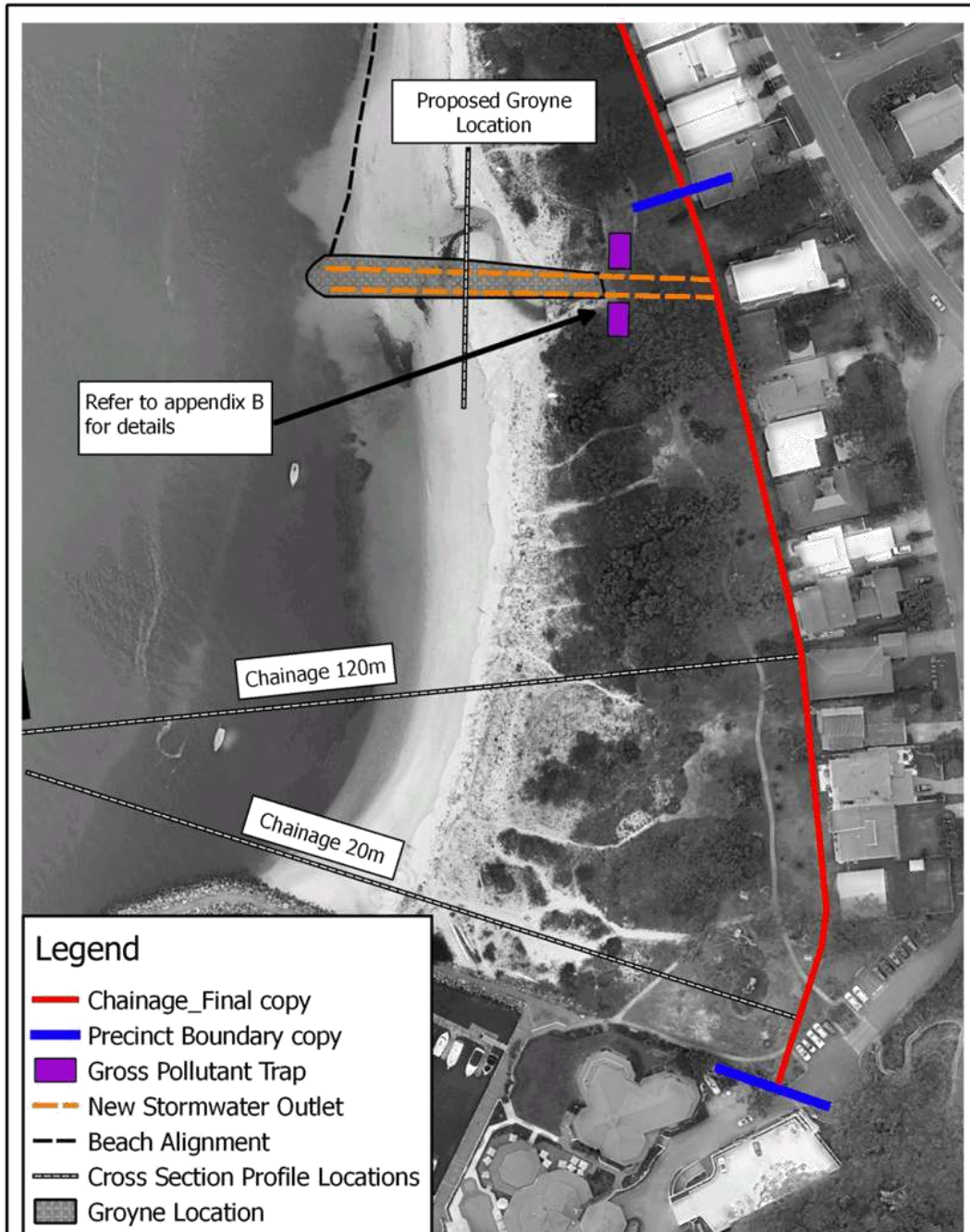
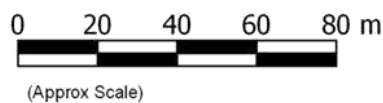


Figure 37 Scheme 3, Precinct 1: Plan

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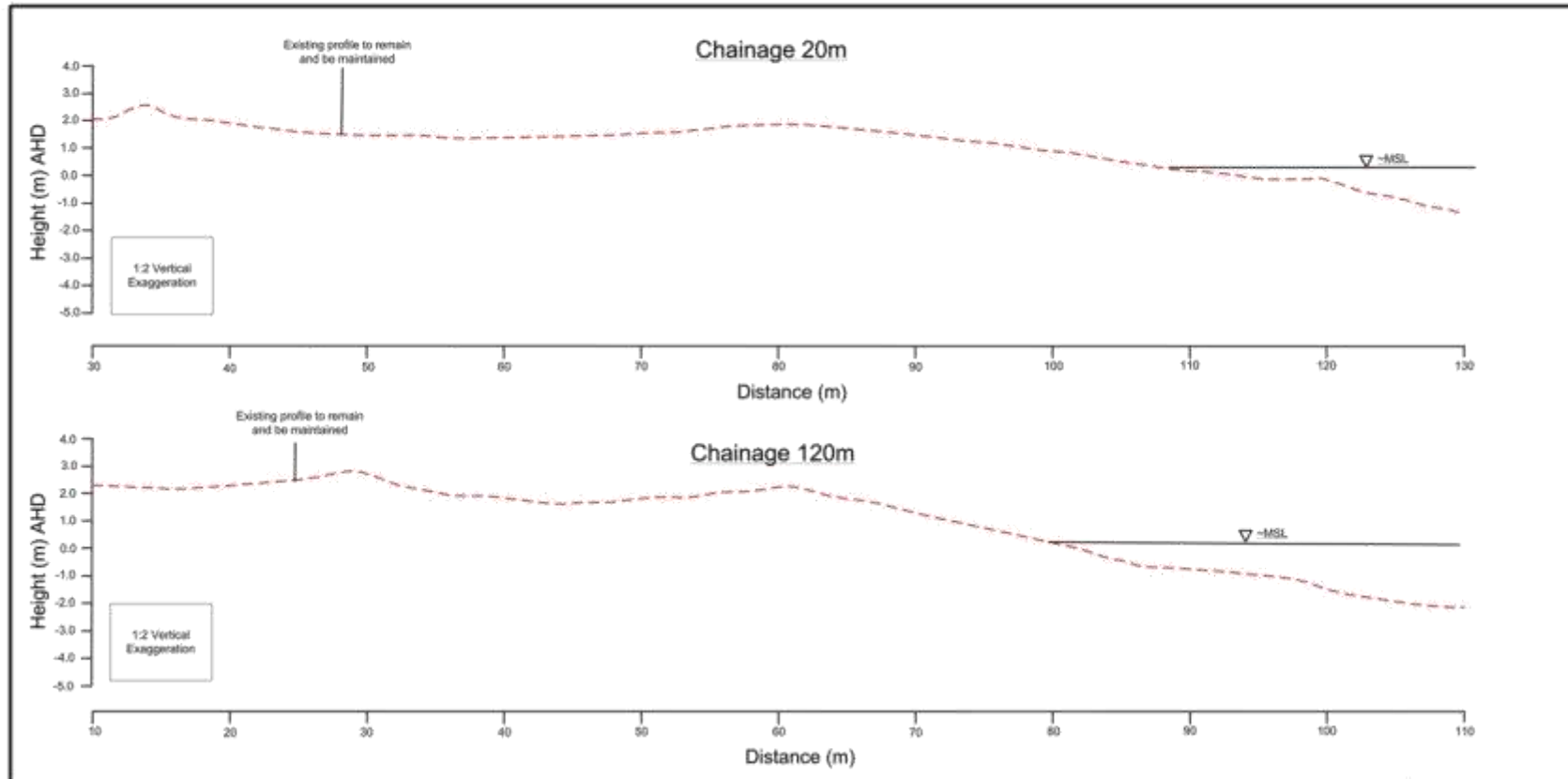


Figure 38 Scheme 3, Precinct 1: Profiles - Chainages 20 and 120m

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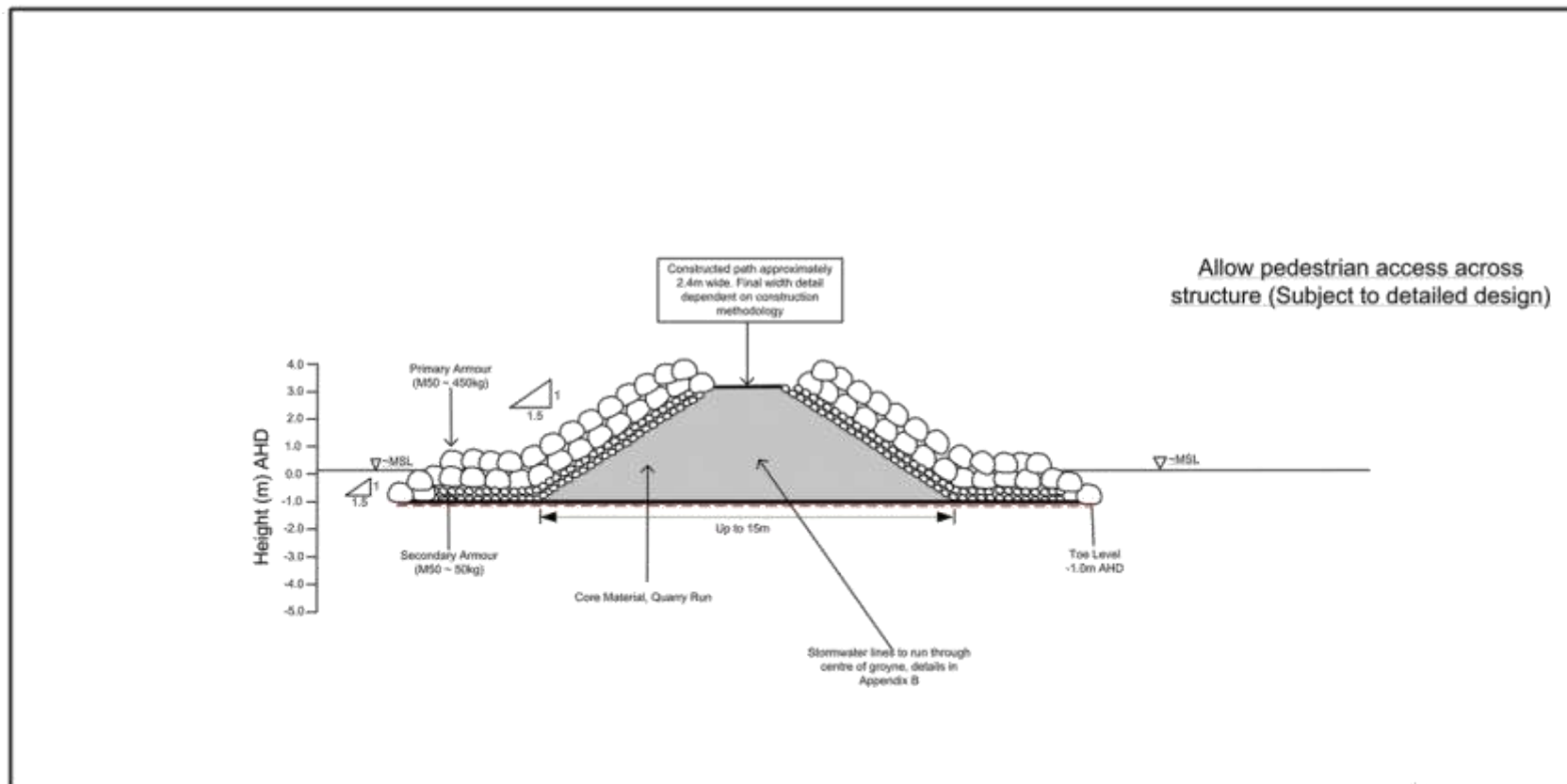


Figure 39 Scheme 3, Precinct 1: Proposed Groyne Cross Section

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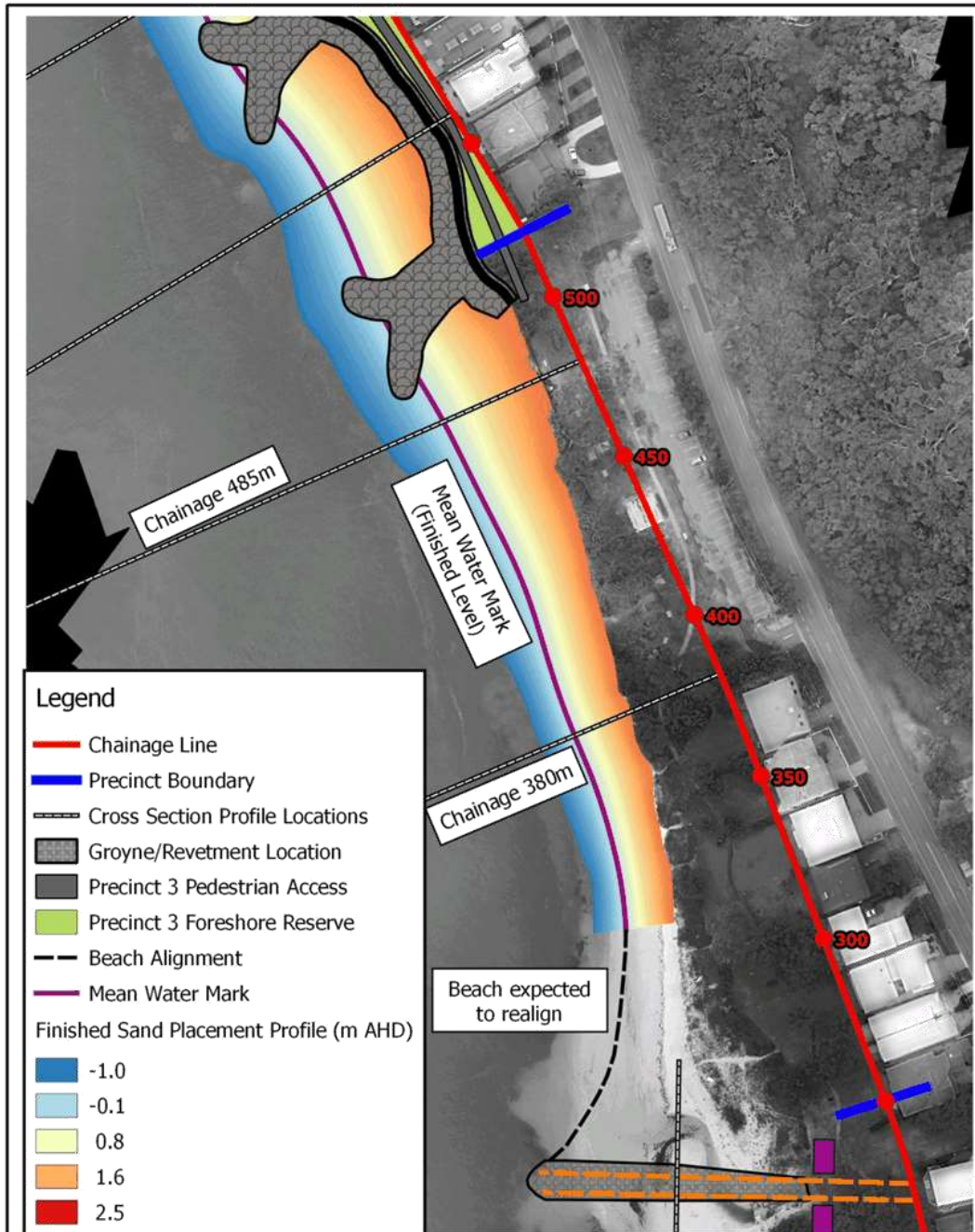
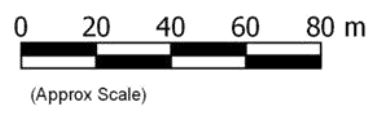


Figure 40 Scheme 3, Precinct 2: Plan

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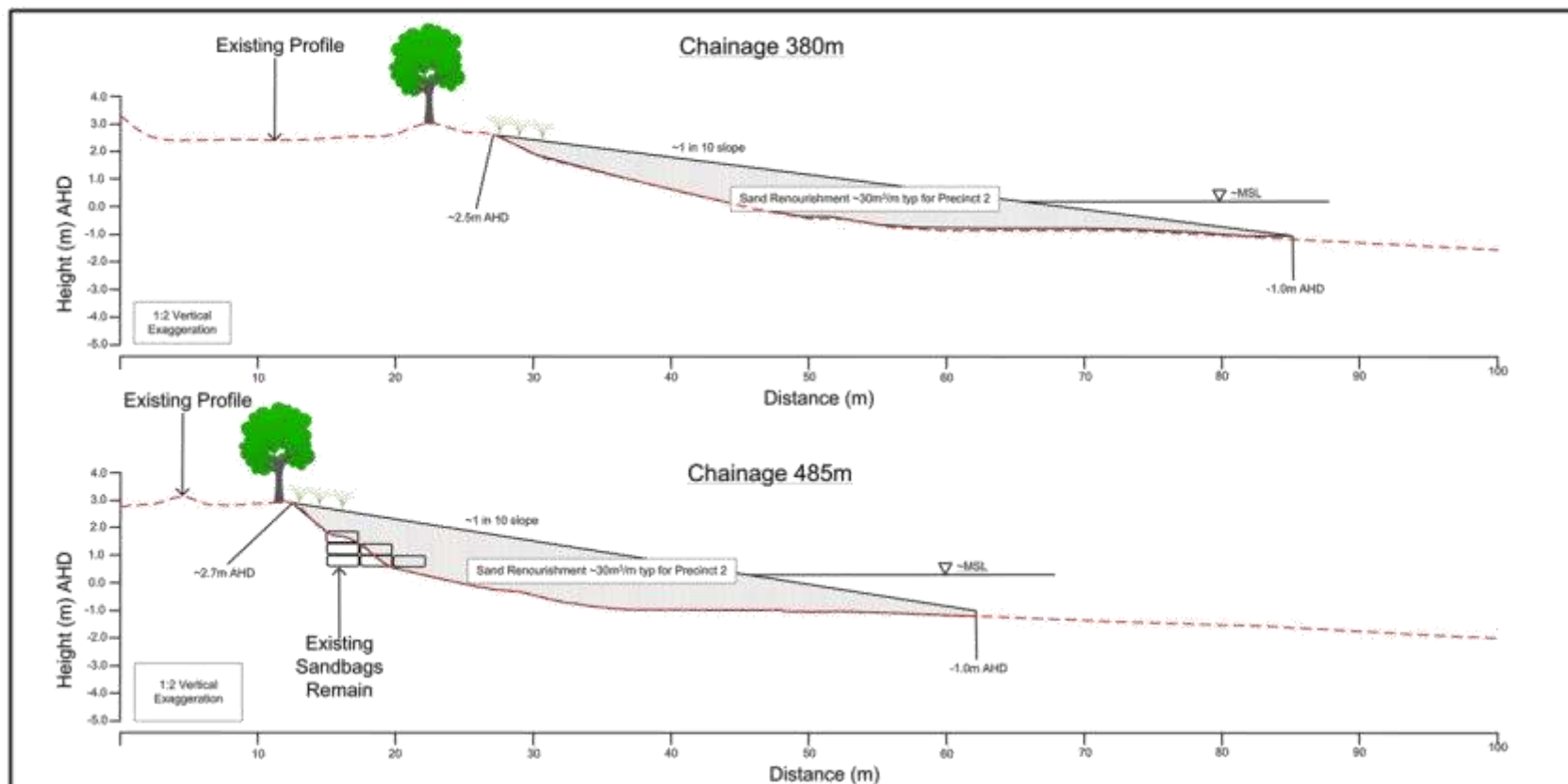


Figure 41 Scheme 3, Precinct 2: Profiles – Chainages 380 and 485

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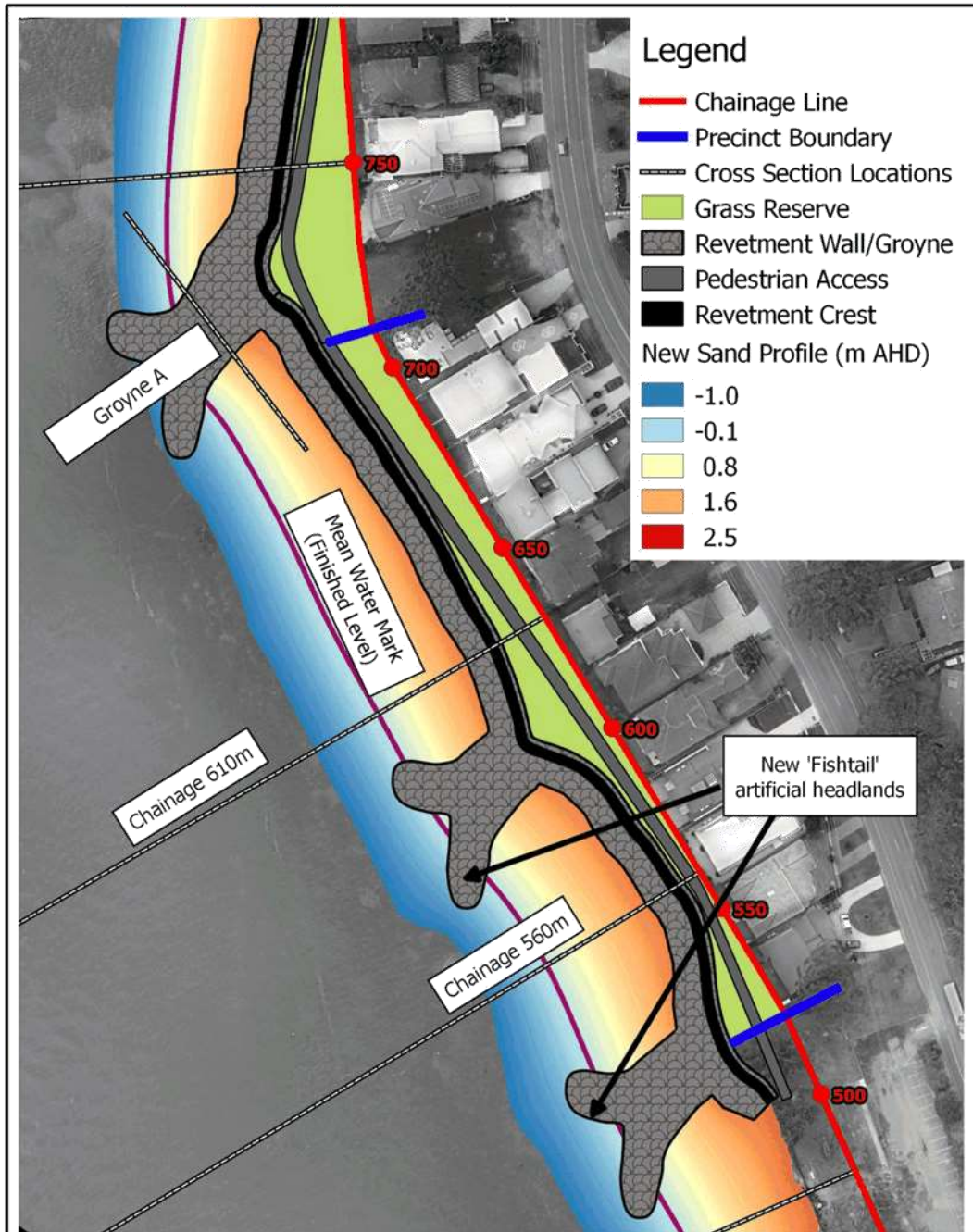
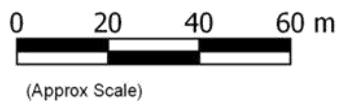


Figure 42 Scheme 3, Precinct 3: Plan

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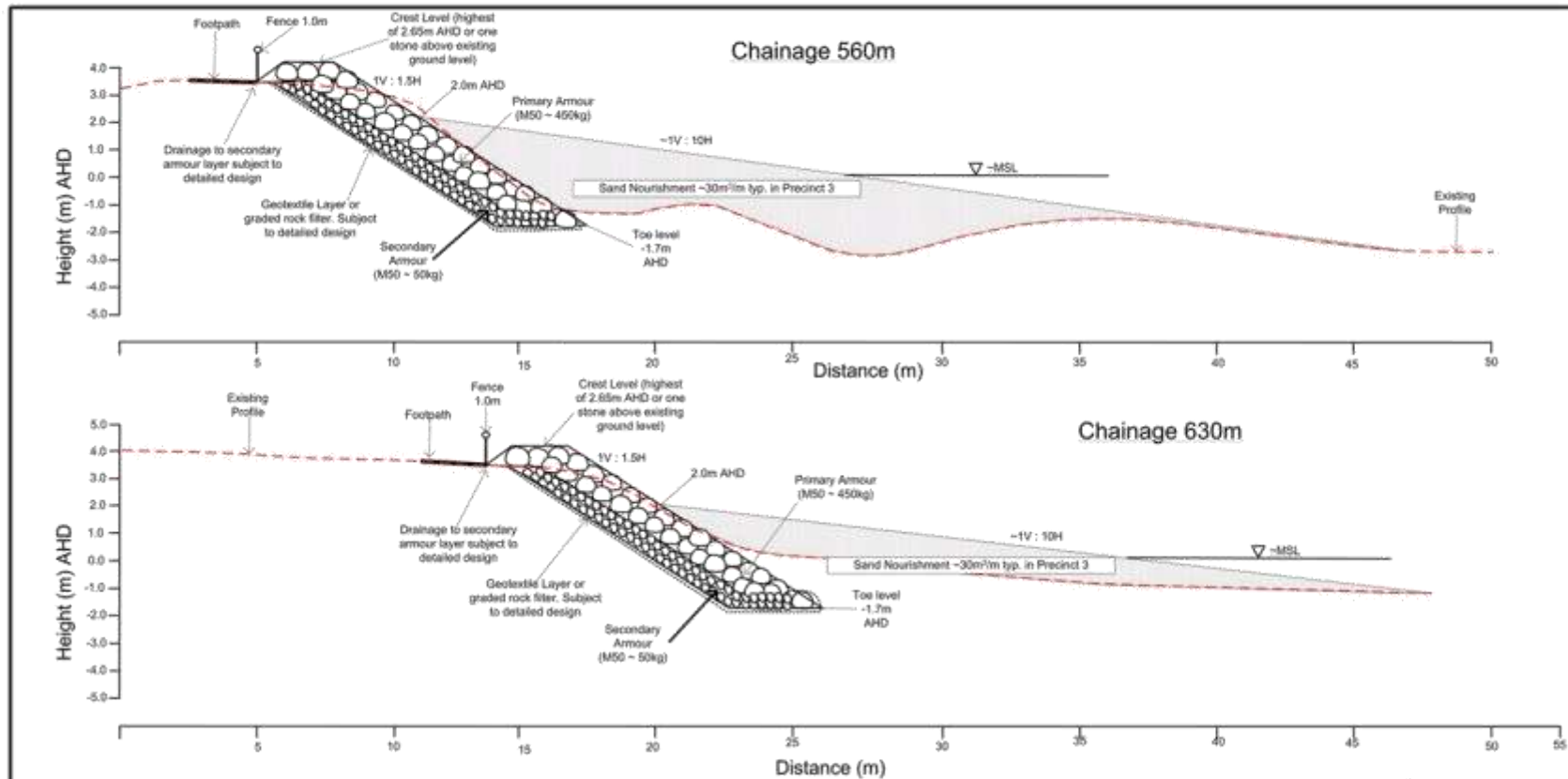


Figure 43 Scheme 3, Precinct 3: Profiles - Chainages 560 and 630m

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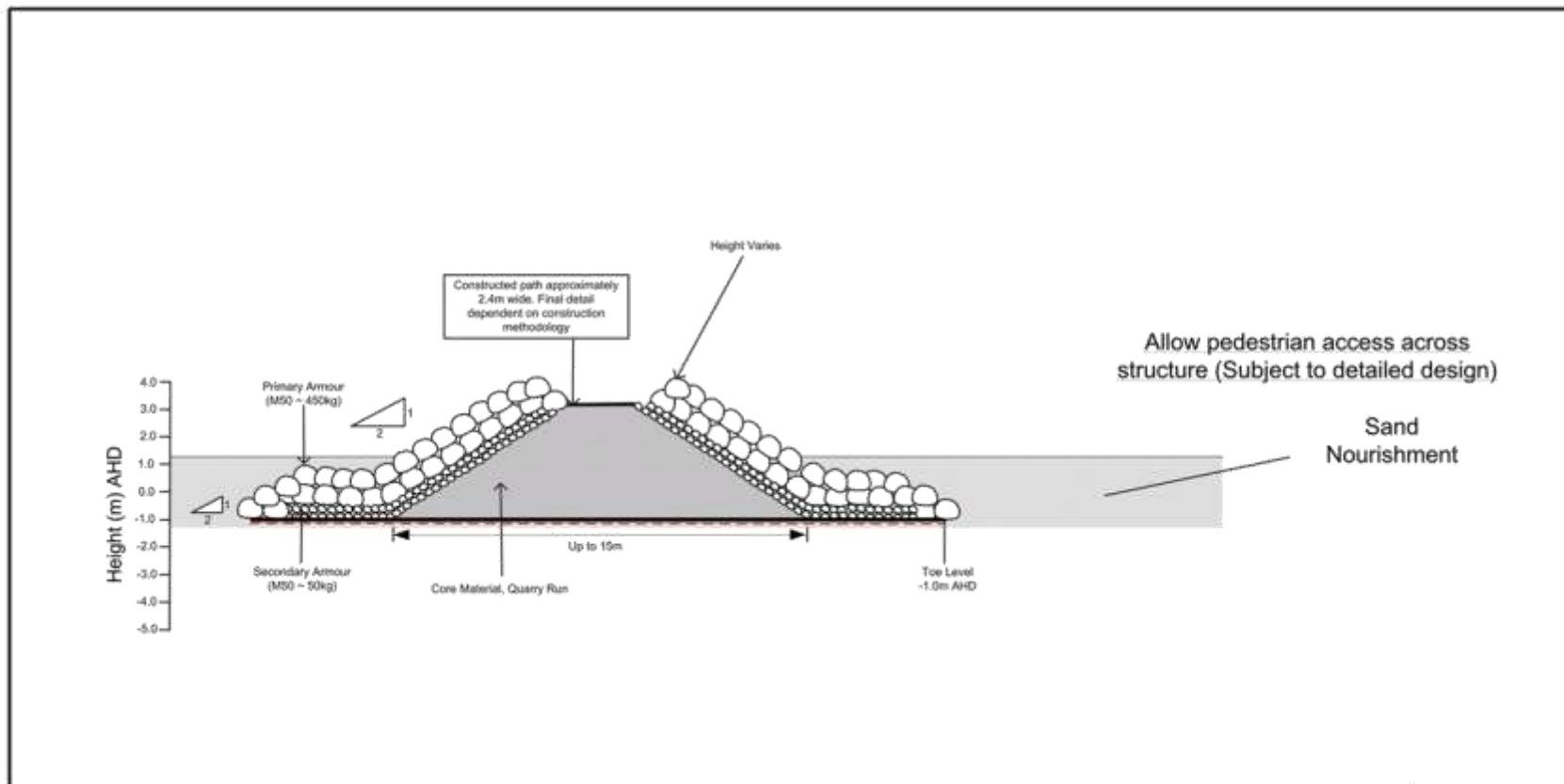


Figure 44 Scheme 3, Precinct 3: Cross Section – Groyne A

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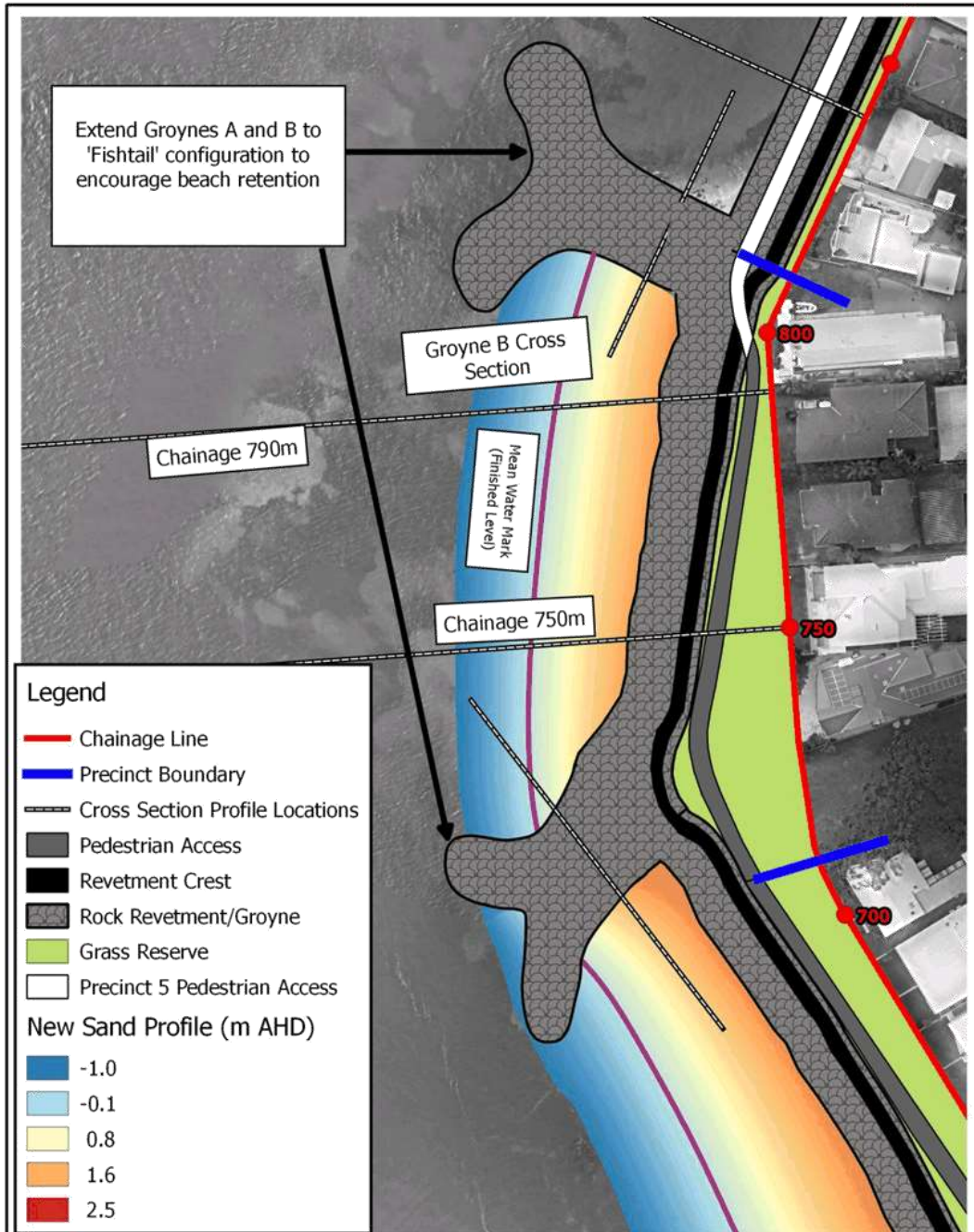
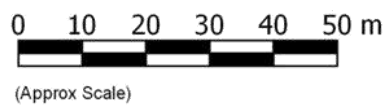


Figure 45 Scheme 3, Precinct 4: Plan

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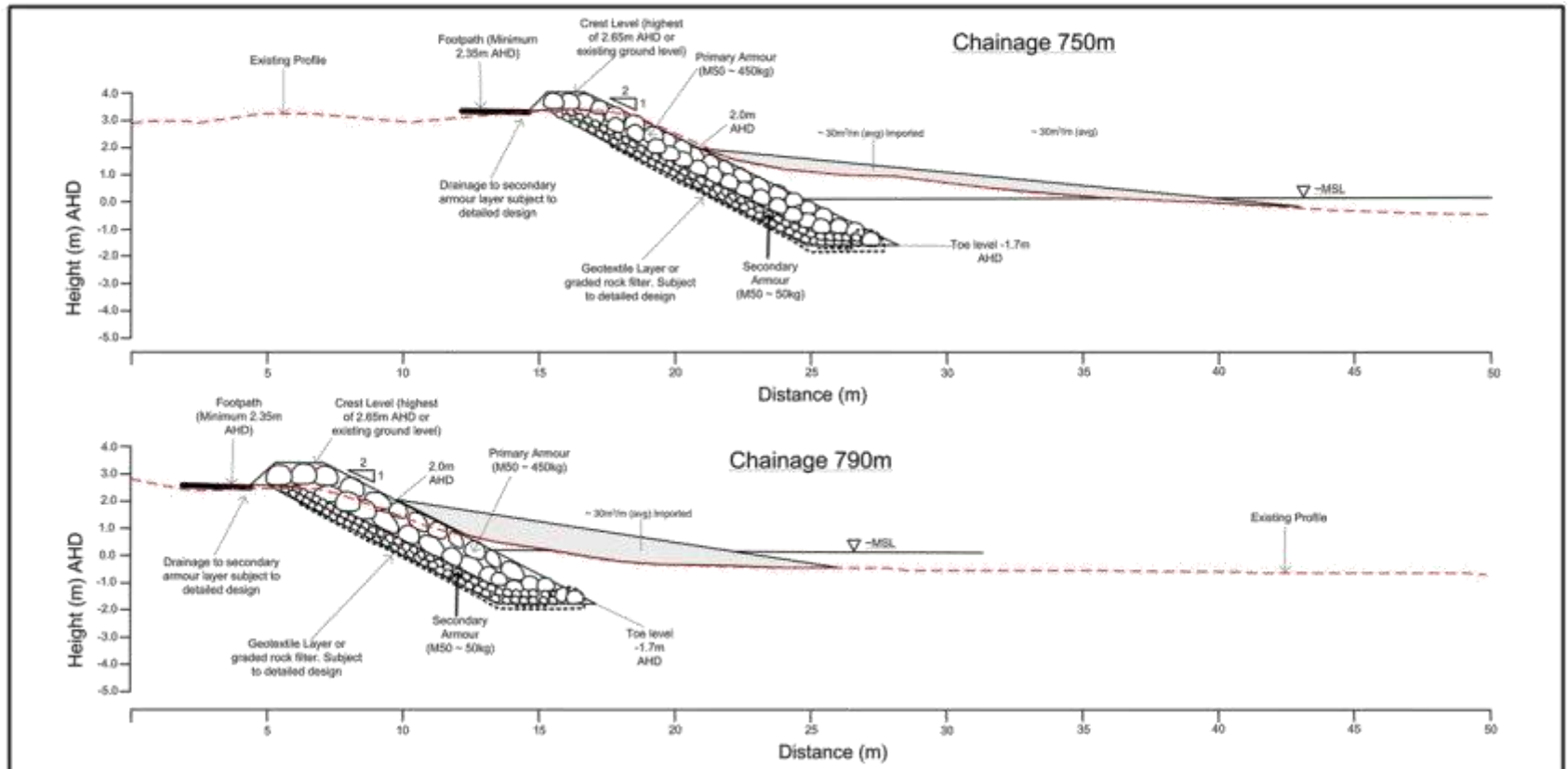


Figure 46 Scheme 3, Precinct 4: Profiles - Chainages 750 and 790m

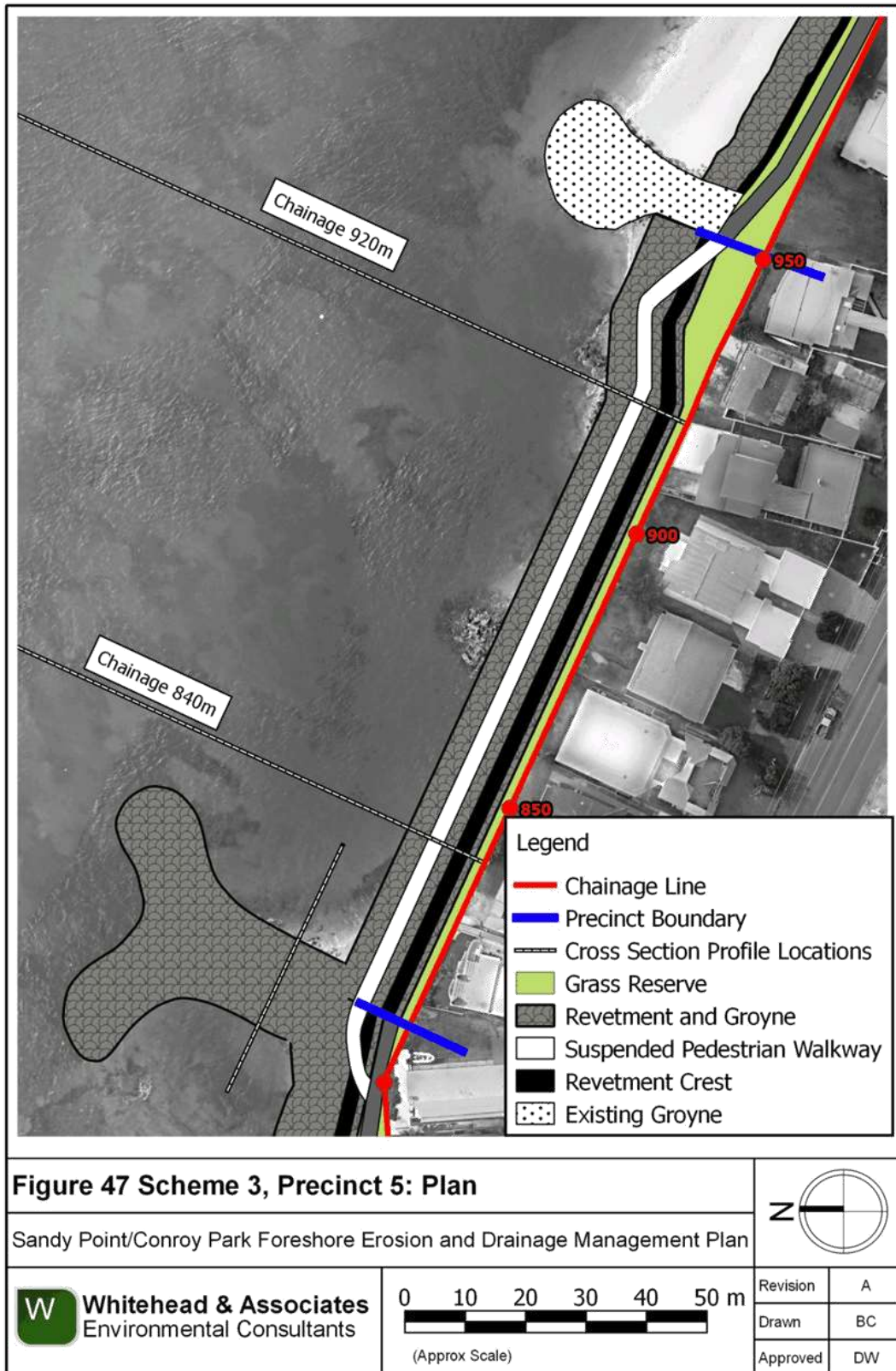
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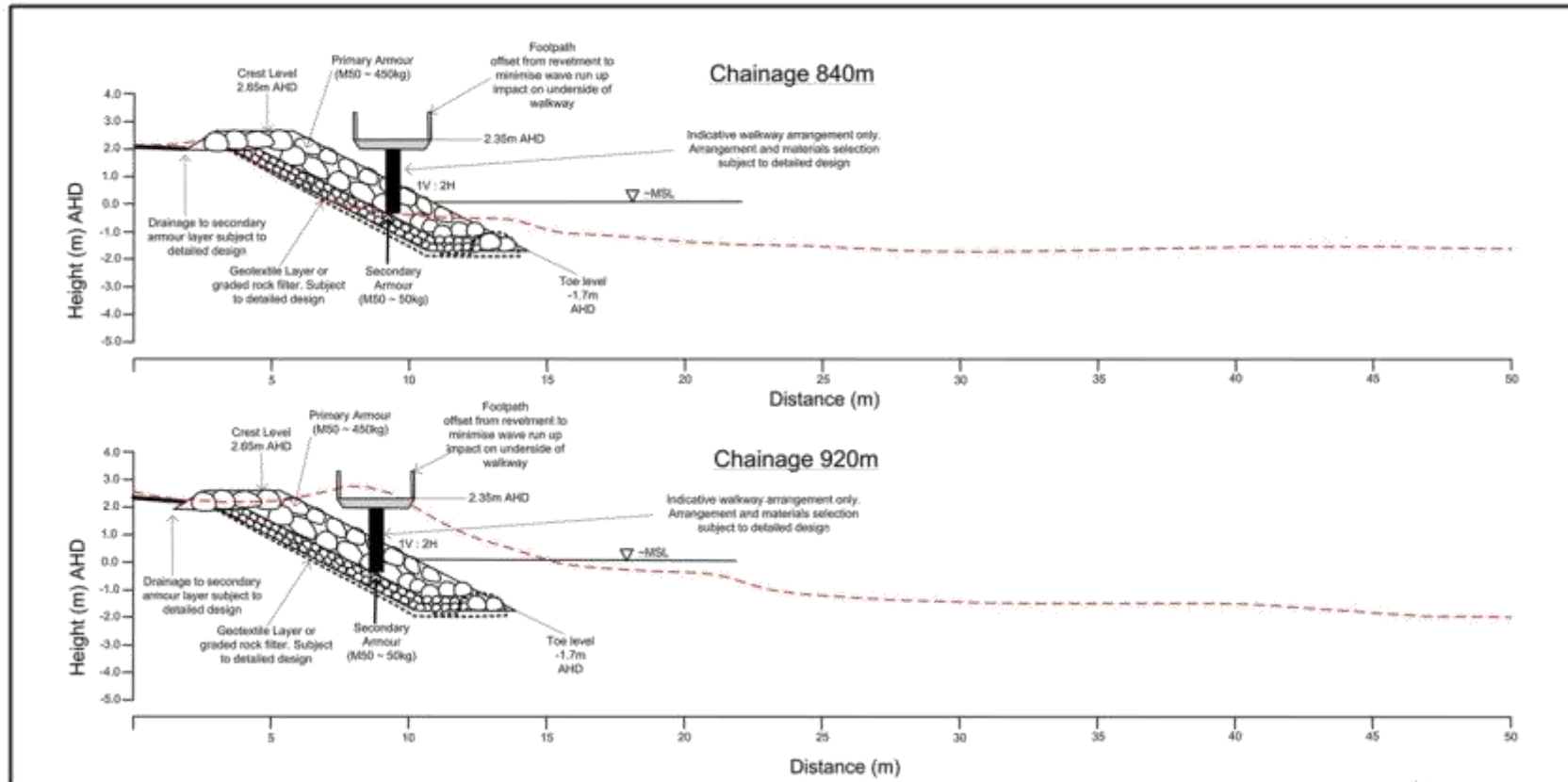


Figure 48 Scheme 3, Precinct 5: Profiles - Chainages 840 and 920m

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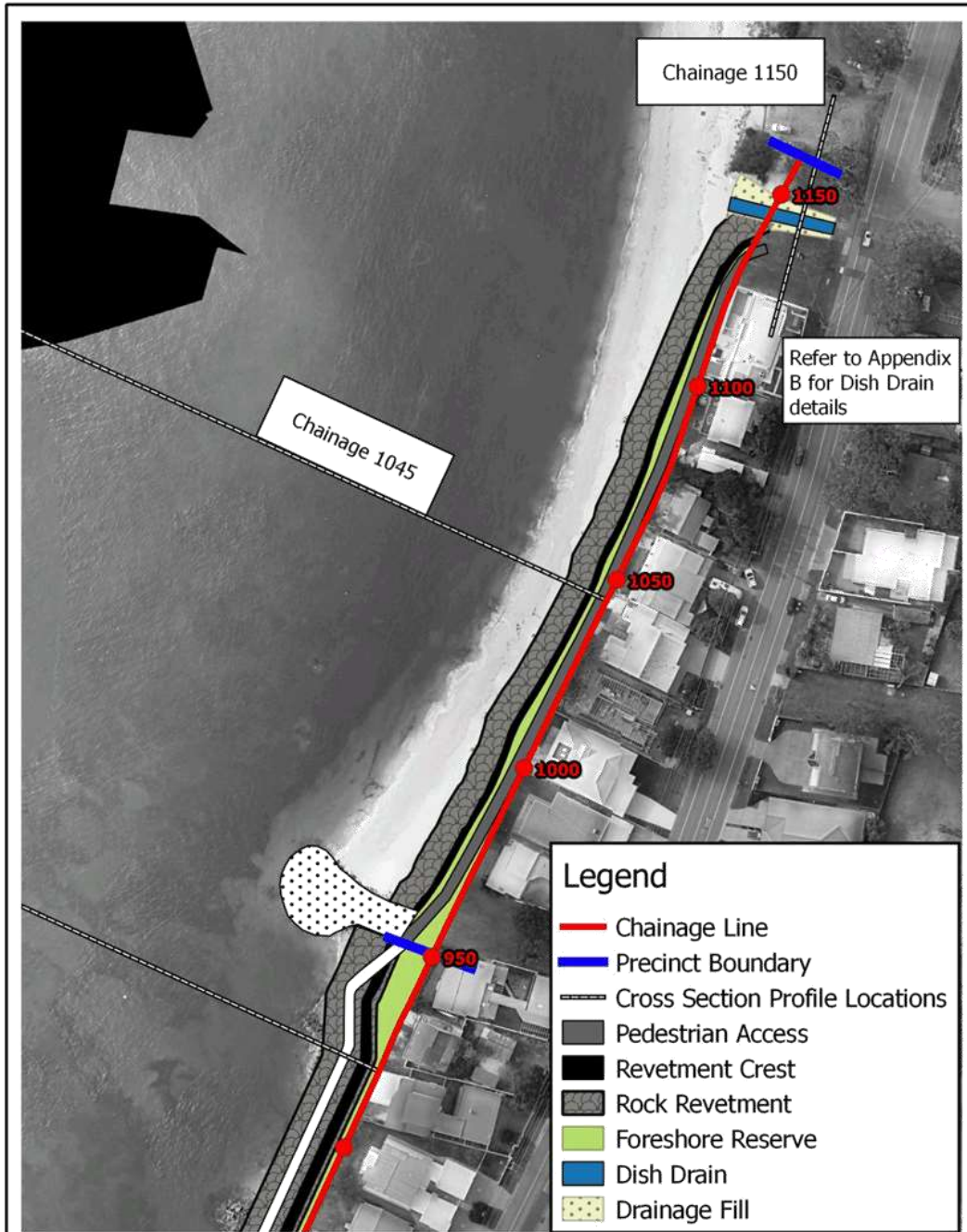
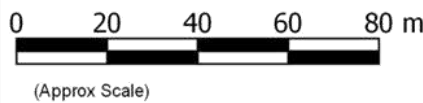


Figure 49 Scheme 3, Precinct 6: Plan

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6.3 Cost Estimates for Presented Options

Cost estimates for the conceptual designs have been prepared. Details are provided in Appendix H, but a summary is provided in Table 8. The base estimated values have been adjusted upwards by a contingency amount of 20% and for inflation to place the estimates at the end of 2015. The methods used to estimate quantities are based on conceptual cross sections and modifications at detailed design stage, and changes to the economic situation prior to construction means that these estimates must be considered as preliminary, but reasonably indicative. The cost for additional investigation, detailed design and environmental impact assessment activities has not been included in these estimates, although a common rule of thumb would place these activities at somewhere around 10% of the capital cost.

Table 8 Preliminary Cost Estimates.
(Annualised Maintenance Cost Estimate in Brackets)

Location	Scheme 1	Scheme 2	Scheme 3
Precinct 1	\$0.085M (\$8,500)	\$0.38M (\$11,000)	\$1.3M (\$6,300)
Precinct 2	\$0.51M (\$500)	\$0.26M (\$21,000)	\$0.26M (\$21,000)
Precinct 3	\$1.1M (\$1,100)	\$1.65M (\$9,000)	\$2.7M (\$10,000)
Precinct 4	\$0.43M (\$430)	\$0.91M (\$1,000)	\$0.94M (\$4,300)
Precinct 5	1.3M (\$1300)	\$2.23M (\$9,500)	\$1.53M (\$1,500)
Precinct 6	0.81M (\$850)	\$0.85M (\$31,000)	\$0.82M (\$800)

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7 Recommended Management Plan for Sandy Point / Conroy Park

7.1 Study Exhibition

The preceding chapters of this report were placed on public exhibition. Initially, the exhibition period was to be from 16th September to 15th October, 2015. Following requests from the community, this was extended by 3 weeks, and closed on 6th November. The community were invited to make formal, written submissions to Council during the exhibition period.

A public meeting was held at Corlette Hall in the evening of 23rd September. The meeting was well attended, by an estimated 60 community members. At the meeting, a presentation was made on the exhibited report and management options being considered, including a discussion of background processes and coastal engineering aspects of the design concepts. Following the presentation, questions were invited from the floor and answered by study team members and Council staff. Similarly, at the close of formal proceedings, attendees were free to clarify any remaining issues in a less formal, face to face manner.

7.2 Outcomes of Public Exhibition

The written submissions were collated and reviewed by Council staff. This was necessary, as many of the issues raised by the community dealt with administrative and/or legal issues relating to the implementation of different options. Specific comments on the technical content of the exhibited report were referred through to the study team.

A summary report discussing the community feedback has been prepared by Council staff. An early draft of the summary report was reviewed by the study team and contains our response to issues raised on the contents of the exhibited report. Necessary changes have been made to preceding chapters and appendices to this report, although none of the changes impact significantly on the findings of the report.

While reviewing the public exhibition outcomes, we have discussed preferred strategies with Council staff. The desires of the community, likely funding constraints and other practicalities have been considered in selecting the preferred strategy for each precinct outlined below.

7.3 Discussion of Preferred Strategy by Precinct

7.3.1 Precincts 1 and 2.

The preferred option involved removing sand from Precinct 1, including sand offshore of the main stormwater outlet, and relocating it to Conroy Park. The final intended beach plan alignment would be achieved by removing around half of the beach width that has accumulated adjacent to the Anchorage since its construction in the early 1990's.

Since the construction of The Anchorage, as predicted a wide beach accreted adjacent to the eastern breakwater. While conditions of consent for that development allowed for the periodic removal of sand from this area, it is clear that there is strong support from the public in retaining the beach amenity that has formed there.

However, the volume of sand accretion in this area is now affecting the operation of stormwater outlets adjacent to the eastern breakwater and if not addressed may result in increasing siltation within the harbour entrance.

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A balanced approach which seeks to relocate around half of this sand is prudent. This will both clear the stormwater lines adjacent to the breakwall and retain some of the beach width that has accreted there. However, this will have the following impact on the original design intent for nourishment works fronting Conroy Park:

- Around 10,000 – 15,000 m³ of sand would need to be moved (instead of 20,000 - 25,000m³)
- The designed nourished dry beach width at mid-tide would reduce from around 30-35m (at present) to around 15-20 metres adjacent to The Anchorage harbour wall following sand removal;
- The expected frequency of re-nourishment required in front of Conroy Park would approximately double (i.e. from around once every 7 to 10 years, to around once every 3 to 5 years, although the expected volume requiring relocation would be approximately halved; and
- There would be less of a buffer for the beach at Conroy Park to withstand extreme storms, increasing the likelihood of full erosion of the beach (i.e. back to its present location) during stormy conditions.

There is a significant positive benefit arising from placing smaller nourishment volumes more frequently. The placement of a larger volume of sand on existing seagrass beds would directly smother the present landward margins of the seagrass. We expect that any direct loss of seagrass would be offset eventually by the colonisation of areas deepened by the removal of sand from next to The Anchorage and from the deposition fan immediately offshore of stormwater Outlet 3.

Detailed design will need to consider how placement of the smaller volume could be optimised both from a practical point of view and to minimise direct seagrass loss. For example, placing the bulk of the sand in front of Precinct 3 at a steeper slope may be advantageous, providing maximum benefit to Conroy Park over the medium term while reducing direct impacts on nearby seagrass beds.

The carriage of the stormwater line (Outlet 3) across Corlette Beach and construction of gross pollutant traps is recommended. However, there is a desire to minimise the scale of the construction to avoid impacts on seagrasses and to reduce costs and visual impact. The primary purpose of any groyne would be for conveyance of stormwater while preventing the wash out of sand from the beach face into the nearshore zone. To do this the groyne has to extend to a suitable depth.

We recommend that design and construction of this outlet extension be delayed for a number of years while initial nourishment activities are undertaken, and the response of the beach is monitored to verify the expected behaviour and optimise subsequent design. We recommend that beach survey be undertaken on a 3 monthly basis, with particular focus on the area near the outlet to determine the active water depth in this location. The depth to which the groyne should be extended may then be determined

A secondary benefit arising from the construction of the groyne would be the retention of sand at a location closer to Conroy Park. While it is not expected that the groyne would markedly affect present day erosion rates in front of Conroy Park, sand relocation activities would, at least in part, access sand from the groyne location eastwards to Conroy Park.

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Depending on the length of the groyne finally determined, it is possible that circulation patterns and beach alignment between the groyne and The Anchorage would be modified. Eventually, this is likely to evolve into a Beach shape similar to that at present, although some enhanced erosion on the down drift side of the groyne would be expected. Some minor nourishment to rectify this erosion, as required, may be desirable. We expect that the east to west transport of seagrass wrack would continue in a manner similar to that with the present beach alignment adjacent to the Anchorage and that the frequency of seagrass wrack accumulation along this beach would not change significantly.

7.3.2 Precinct 3

The treatment outlined under Scheme 1 is recommended, including nourishment using sand from adjacent to the Anchorage (see preceding section), battering back of the foreshore and construction of a foreshore revetment to coastal engineering standards along with a shared pathway.

It appears likely that construction/upgrade of the revetment may be delayed, due to the cost associated with it. However, public safety in this area has been highlighted previously, and we recommend that an appropriate fence and signage be constructed to separate pedestrian activity away from the crest of the foreshore, which is steep, high and prone to collapse in some areas. Minor repairs (maintenance) may be considered from time to time before a properly engineered solution can be implemented.

7.3.3 Precinct 4

The treatment under Scheme 1 is recommended, involving revetment reconstruction. Briefly, this would involve the construction of a new revetment along the present alignment, with the exception of the eastern end, where some reclamation may be required to allow the space needed for construction of a shared pathway.

Existing foreshore access points are to be consolidated, and the construction of public stair accesses across the revetment to the beach should be considered as part of investigations and consultation undertaken with the community during the detailed design stage.

7.3.4 Precinct 5

The treatment under Scheme 1 is recommended, namely the reconstruction of a robust revetment with some realignment. This will require reclamation in some areas. All unauthorised access ways and boat ramps should be removed from this area to ensure integrity of the revetment, minimising overtopping by waves and inundation/damage to properties. No work is proposed for the existing groynes, and twin gross pollutant traps are recommended for Outlet 2. Public space seaward of the development in this area is at a premium, and the width of pathway provided will affect the costs associated with any reclamation works. The design here allows for a 2.4m wide path, although paths of 2.5m or wider may be considered more appropriate if a shared pathway is to be provided.

7.3.5 Precinct 6

The treatment under Scheme 1 is recommended. This involves removal of unauthorised boat ramps and access points, and consolidation of foreshore access. A low revetment crest is proposed, with capacity to be raised in future to accommodate sea level rise. No work is proposed to the existing groyne. However, this strategy differs from Scheme 1 in that an infiltration trench at Outlet 1 is to be considered further, and could potentially be implemented separately to the remainder of works proposed for this precinct.

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It appears likely that Precinct 6 works will have the lowest priority, based on existing conditions. However, existing unauthorised access ways and boat ramps do hinder the movement of less able pedestrians through this area. Temporary works to demolish those structures and fill the depressions formed by boat ramp construction could be considered as a preliminary measure, although this would involve extra costs. The existing structures could be broken up and stockpiled for re-use as secondary armour in a temporary structure. The low points along the foreshore could then be filled and compacted with clean, imported fill. Primary armour of the size recommended for the final structure could then be used to line the seaward face to fill the gaps in the revetment. The reserve could then be grassed. This temporary approach would have the following benefits:

- Primary and secondary armour could be reused in the final structure, once it is constructed;
- The foreshore would remain accessible and would provide better service than at present; and
- The area would become more accessible and safer for the general public.

This preliminary work would not be wasted, as most of it is required for implementation of the preferred strategy. However, the foreshore would still not provide the full protection of a properly engineered structure and monitoring is recommended to assess performance and the need for ongoing repairs/maintenance.

7.4 Recommended Staging and Expected Costs

The recommended time frame for completion and expected costs for detailed design (including detailed design, contract preparation and administration) and construction are outlined in Table 9. Nourishment in front of Conroy Park is prioritised first due to the benefit in protecting the park and relatively low costs. Priorities 2 and 3, dealing with Precincts 5 and 3 respectively, are also considered critical with regards to public safety and the protection of property.

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Table 9 Recommended Staging and Expected Costs⁶

Priority	Works	Design Timing	Detailed Design Costs	Construction Timing	Construction Costs	Maintenance Cost (/annum)
1	Precinct 1 & 2 (Nourishment)	Early 2016	\$15,000	Mid 2016	\$0.06M	\$10,000
<i>Description:</i> Move sand from Precinct 1 (around 15,000m ³) and place in front of Precincts 2 (and 3). Restores beach width fronting Conroy Park and allows proper operation of Outlets 4 and 5 (adjacent to The Anchorage)						
2	Precinct 5	2016	\$60,000	2017-2018 ⁷	\$1.65M	\$1,500
<i>Description:</i> Construct robust revetment with some realignment to enable construction of a shared pathway. Install twin gross pollutant traps to Outlet 2. Determine foreshore access requirements in consultation with community.						
3	Precinct 3 (Make Safe)	2016	\$5,000	2016	\$0.06M	\$5,000
<i>Description:</i> Construct pathway and fence to divert pedestrians from the unsafe foreshore. Monitoring and maintenance required until full option is adopted (see below).						
4	Precinct 4	2019	\$50,000	2020 or later	\$0.43M	\$1,000
<i>Description:</i> Demolish foreshore protection and reconstruct revetment. Some reclamation required at eastern end (adjacent to Precinct 5). Consolidate foreshore accesses in consultation with community.						
5	Precinct 1 (Stormwater)	2019	\$30,000	2020 (or later)	\$1.35M	\$1,500
<i>Description:</i> Construct Twin Gross Pollutant Traps and carry stormwater line across Corlette Beach, but minimise the scale of the groyne wherever possible.						
6	Precinct 3 (Revetment)	2019	\$100,000	2020 (or later)	\$1.00M	\$1,000
<i>Description:</i> Demolish existing structures, batter back foreshore and construct new revetment. Note that path and fencing will have been constructed as part of Priority 3.						
7	Precinct 6 ⁸	As Required	\$50,000	As Required	\$0.83M	\$1,000
<i>Description:</i> Demolish existing structures and construct continuous revetment with appropriate pedestrian crossings. Construct dish drain and infiltration trench to outlet 1. Note that the dish drain is relatively cheap and could be constructed as a separable piece of work.						

⁶ Costs are approximate and based on the detailed estimates provided for the three schemes exhibited. Costs exclude GST but include a contingency of 20%. Costs relevant to late 2015/early 2016 and an allowance for inflation needs to be applied to future costs.

⁷ Subject to identification of suitable funding source.

⁸ Note that preliminary works to remove existing weak points (boat ramps, foreshore crossings) from this precinct could be undertaken initially, possibly in conjunction with the Precinct 5 construction. Refer to text.

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8 References

- CERC, 1984. Shore protection manual, 4th ed. U.S. Army Coastal Engineering Research Center, Corps of Engineers, Washington, D.C.
- Goda, Y., 2000. Random seas and design of maritime structures, 2nd Edition. ed, Advanced Series on Ocean Engineering; v15. World Scientific, Singapore.
- Hsu, J.R.-C., Yu, M.-J., Lee, F.-C., Benedet, L., 2010. Static bay beach concept for scientists and engineers: a review. *Coast. Eng.* 57, 76–91.
- Nielsen, A.F., Lord, D.B., Poulos, H.G., 1992. Dune Stability Considerations for Building Foundations. *Civ. Eng. Trans. Inst. Eng. Aust.* CE34, 167–173.
- Pilkey, O.H., Young, R.S., Riggs, S.R., Smith, A.W.S., Wu, H., Pilkey, W.D., 1993. The concept of shoreface profile of equilibrium: a critical review. *J. Coast. Res.* 255–278.
- Pullen, T., Allsop, N., Bruce, T., Kortenhuis, A., Schüttrumpf, H., Van der Meer, J., 2007. EurOtop wave overtopping of sea defences and related structures: assessment manual. Standards Australia, 2005. AS4997-2005 Australian Standard Guidelines for the design of maritime structures.
- US Army Corps of Engineers, 2014. Coastal Engineering Manual.
- Van Rijn, L., 2005. Principles of Sedimentation and Erosion Engineering in Rivers Estuaries and Coastal Seas.
- WMA Water, 2010. Port Stephens Design Flood Levels Climate Change Review (Final). Prepared for Port Stephens and Great Lakes Councils.



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**Sandy Point / Conroy Park Foreshore Erosion & Drainage Management Plan
Stage 2 Community Consultation Summary**

Consultation Objective

The primary focus of this exhibition was to gather community feedback on the proposed foreshore protection/management options presented within the *Draft: Sandy Point / Conroy Park Foreshore Erosion and Drainage Management Plan*. It was not councils expectation to gain endorsement for overall scheme but to identify what aspects of each scheme that either caused concern or appealed plus any aspects that would require further consideration in the detailed design stage.

Consultation Activities

The *Draft: Sandy Point / Conroy Park Foreshore Erosion and Drainage Management Plan* was circulated for public exhibition from the 17th of September to the 6th of November 2015. It was displayed at the Council's Administration Building, Tomaree Library and Council's website.

An information flier was also circulated through a direct mailout to both residents, absentee landholders and previous survey respondents, 322 in total. Information was also circulated through social media, the "The Examiner" and through signage at either end of the project site and Conroy Park.

An information night was held on Wednesday the 23rd of September at the Corlette Hall and was attended by over 60 people. Whitehead & Associates presented the different option and they and council representative answered questions.

Submissions Received

In total, 57 responses were collected. The majority of these were from individual community members, two from community organisations (State Emergency Service and Tomaree Residents & Ratepayers Association) and three from State Government Departments (Crown Lands, Dept of Primary Industries – Fisheries, & Dept of Primary Industries – Port Stephens –Great Lakes Marine Parks).

Most respondents chose not to support a singular option; rather comments were made on specific proposed aspects. Endorsement of one overall scheme was not council's expectation.

Numerous respondents expressed their approval that Council is seeking to properly address the erosion issue and the community has been given the opportunity to be involved. There is also a significant degree of scepticism that any works will ever be

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implemented and maintained. Most believe the issue of foreshore management and protection is of high importance and works should be commenced as soon as possible.

The main themes of the community consultation can be summarised as follows with further detail in the report below (a summary of each scheme is located in appendix 3);

1. Scheme 2 received significant support. This involved large scale sand nourishment through the entire project area, the extension of existing groynes and sand nourishment includes the preservation of sand at the western end of Corlette beach adjacent to the Anchorage breakwall
2. Scheme 1 was the second most supported option. This incorporated the movement of sand from the Anchorage breakwall to Conroy Park and the replacement of rock revetment through the remaining area.
3. Groynes between Conroy Park and the Anchorage were not supported.
4. Sand nourishment in front of Conroy Park was unanimously supported, with the majority of respondents believing it should be the top priority.
5. Opinion on the sand source for Conroy Park nourishment was roughly evenly split. Approximately 50% of respondents supported the movement of sand from the western end of Corlette Beach to Conroy Park. A significant proportion of those indicated this should be achieved by enforcement of the original conditions of consent imposed on the Anchorage. However approximately 50% of respondents were against the movement of sand from the western end, citing water quality issues and a reduction in amenity.
6. Significant support was received for the removal of boat ramps however this view is not shared by many of those residents who have boat ramps associated with their properties.
7. Concern priority works will be delayed due to contention surrounding the management of boat ramps.
8. Significant support was received for a waterfront pathway however numerous concerns were raised by foreshore residents.
9. Scheme 3 was generally not supported with primary opposition being directed to the suspended walkway.
10. Access to the water is an important issue.

State Government Response

Dept of Lands

Supportive of all options but advised that approvals will be required for works below mean high water mark, this includes sand nourishment and dredging.

Department of Primary Industries (DPI) – Fisheries NSW & Port Stephens – Great Lakes Marine Park

Highlighted the extensive *Posidonia australis* seagrass beds offshore of the project site; these are protected under the Environmental Protection and Biodiversity Conservation

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Act 1999, Fisheries Management Act 1994 and identified as a TYPE 1 – highly sensitive key fish habitat under the Policy & Guidelines for Fish Habitat Conservation and Management Update 2013. Fisheries NSW will generally not approve any new development or activities that harm TYPE 1 marine vegetation without adequate mitigation and compensation measures. It was requested that any renourishment proposal must be assessed to determine the ultimate fate of any transported sand and to prove it will not impact on the seagrass beds along the foreshore.

NSW DPI will generally only approve foreshore stabilisation works that follow the natural contour of the shoreline. Fisheries outline that the revetment should be constructed in a manner to allow for the development of public access along the foreshore and consider a pathway between the revetment and private residences as the most viable option. Port Stephens – Great Lakes Marine Park support a sloping revetment wall and reclamation of the foreshore where necessary, as long as an active buffer zone is catered for between the revetment wall and seagrasses. The revetment wall should be continuous for as much of its length as possible. They are supportive of water accessways through properly constructed stairs/paths provided they do not extend beyond the base of the revetment. NSW DPI supports the removal of all unauthorised structures, including boat ramps and slipways, retaining walls and stairs.

Fisheries NSW considers the environmental cost of the construction or extension of groynes will exceed their benefit and that alternatives should be considered. Port Stephens – Great Lakes Marine Park is unlikely to grant consent to the construction, extension or bolstering of groynes due to the likely perceived effect to the surrounding sea grass meadows, soft sponges and other marine vegetation. Furthermore, they consider that groynes are likely to further reshape an already altered shoreline. New groynes will also impede public access along the beach. The environmental cost will exceed their benefit.

Both sections of DPI question why an extension of the revetment wall along Conroy Park is not considered.

While recognising that assets along the Sandy Point and Conroy Park foreshore are at risk from natural processes and that foreshore works are necessary, they are concerned that environmental considerations and public benefit may be overridden by concern for real estate value and privatised gain.

Response / Considerations

Council will continue to liaise with all government departments as the preferred options progress to detailed design. All relevant approvals will be sort once designs have been confirmed.

The extension of rock revetment along Conroy Park is an option but if implemented in isolation will result in the loss of the sandy beach, restrict access and impact upon the amenity of the area. Feedback from the community consultation that the start of this process indicated that preservation of a sandy beach in this area was a high priority. The inclusion of groynes in some options was to explore alternatives to reduce the ongoing

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maintenance of sand nourishment. Without them more frequent nourishment is likely to be required.

Feedback Topics

Due to the volume and length of the submissions received, the following sections seek to summarise and respond to the feedback on a topic by topic basis. This allows a holistic view of the community viewpoint with regards to each issue.

Boat Ramps

The majority of the respondents are supportive of the removal of the boat ramps citing safety issues, examples of personal injuries and public access. One foreshore resident described how they removed their boat ramp due to property damage as a consequence of wave run up. Another suggested they could stay if a design could be achieved that protected the foreshores, could provide safe public access and costs were borne by the neighbouring owners. It is noted that the existing boat ramps are constructed, in the majority, outside the property boundaries and across public land.

Those respondents who have boat ramps associated with their properties do not want to see them removed as they do not perceive they are causing an issue. These respondents do not believe existing boat ramps are illegal and have cited examples of either advice from real estate agents, discussions with past council staff and past licenses with Dept of Lands. Details are provided below;

1. For one particular boat ramp, a Permissive Occupancy license was historically granted by the Dept of Lands. It is belief of the owner that the boat ramps fall within the existing use rights.
2. DA approval provided for a boat shed.
3. In 1972 particular property owners allege that they liaised with and were verbally directed by Council in the construction of their boat ramp.

No written evidence has been provided to support any of the above.

The issue of compensation to affected landholders was raised due to a perceived reduction in property prices. Numerous responses indicated that residents are seeking legal counsel.

Those with boat ramps, particularly in precincts 4 and 6, argued that these structures do not impede public access and allow access to the water. It was also argued that those in precinct 6 provide wheelchair access to the beach. There has been a large amount of private expenditure on establishing and maintaining these structures.

One respondent was concerned that there was no acknowledgement in the report of the boat ramps in precinct 6 trapping sand particularly during storms.

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It should be noted that numerous respondents who were supportive of the removal of boat ramps did acknowledge the delicate nature of this issue and did not want to see it delay implementation of works in other areas; believing every effort should be made to avoid legal action.

Response

The existing unauthorised boat ramps create gaps in the overall revetment structure which facilitate overtopping and subsequent damage to the public reserve and private property. In order to provide adequate foreshore protection they can not remain in their current form.

The existing boat ramps and access ways are not of suitable design or maintained to allow safe public access to the water. Installation of the new access points across the reconstructed revetment will be incorporated to allow safe pedestrian movement. The exact location and design of these structures will take place at the detained design stage.

It is acknowledged that boat ramps do catch a degree of sand, however this represents a very small proportion of the sand transported along the shoreline. The accumulation of sand in precinct 6 is largely due to the protection offered by the groyne at the western end.

Initial legal advice indicates that council could elect to remove unlawful structures this includes boat ramps and access ways.

Pathway / Access

There was a significant amount of support for the construction of a waterfront pathway with the current access described as an "unsafe obstacle course". There were also calls for consideration of cyclists, prams and disabled access along the foreshore. The suspended walkway only received one vote of support with the majority describing it as an "eyesore" that would decrease amenity and prevent access to the water.

The majority of opposition to the waterfront pathway came from waterfront residents, with particular reference to precinct 6.

The issues/concerns cited by waterfront residents included;

- Maintenance; concern council will not maintain the area.
- Reduced amenity with the pathway being on property boundaries
- Access is currently perceived as fine especially in precinct 6
- A continuous pathway would create a disconnect between properties and the water.
- Grassed areas should be preserved and is more in character with the area.
- Do not want to encourage cyclists

There was overwhelming support for access across the revetment to the marine park and concern regarding the lack of information regarding this issue wasn't included in the plan. Information was requested on location, number and cost of access points. Submissions

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described how access is currently supplied by boat ramps and privately constructed structures. It was requested that access should be designed in consultation with the community and be suitable for both the elderly and disabled. Consideration of improved access through Conroy Park will be incorporated into any planning, in addition to improved signage through the entire area.

Response

The foreshore (Lot 256 DP 27048) is public land owned by council. It must be managed in regard to the risk and rights of the community as a whole. The current access provided along the foreshore is not adequate and unsafe and must be addressed.

It is acknowledged that a formal pathway will create a level of disconnect between waterfront properties and the foreshore, however to create a safe access this is unavoidable. Where possible the design of any proposed pathway will be sympathetic to this issue. The suspended walkway was designed as a potential solution to this issue to address privacy and safety concerns however this has not been supported.

The exact details of the waterfront pathway and waterway access would be presented as part of the detailed design. This will be the subject of further consultation. Assessment of the appropriateness of disabled access would be made in the detailed design stage.

The Proposed Pathways Plan which was on public exhibition in late 2015 shows a shared path along the foreshore. Council has received funding as part of the 2015/16 Active Transport Program for the design of a shared path between Roy Wood Reserve and Conroy Park, extending to include the foreshore area from Conroy Park to Bagnall Beach Reserve to connect to the existing shared path. The provision of the width required to provide an shared pathway will involve a degree of reclamation seaward. The degree of reclamation is limited by the impact on adjacent seagrass beds and will be the subject of further investigations.

Water Quality / Stormwater Management

Numerous responses were received that were concerned with the impact of the stormwater outfall 3 (in the middle of Corlette Beach) and its impact on sand movement, sea grass and public safety. Submissions claim;

1. The current steep scarp around this outfall is unsafe.
2. The outfall has created a significant loss of water depth immediately offshore.
3. The pollution trap is not maintained and has only been cleaned out once.
4. Sand blow outs regularly particularly during storm events.
5. There is an impact on seagrass.
6. Many submissions also suggested combining this outfall with outfall 4/5 alongside the break wall.

It was described that, prior to the build up of sand in the western corner of the beach, this area historically suffered poor water quality. Other respondents claimed the opposite,

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describing the buildup of sand as a catalyst for poor water quality and adverse swimming conditions. Another respondent believed the water quality has dropped since the stormwater outflows have been blocked by sand.

Various questions were raised regarding the incorporation of the outfall 3 in a groyne;

- Could the stormwater groyne could only be exposed at low tide?
- Why can't the stormwater be extended without a groyne?
- Could a bridge be constructed over the groyne?

There was general support for an improvement of the treatment of stormwater in the form of pollution traps and retention ponds. There was also a request for the upgrade of the outlet at the western end of Bagnalls Beach to alleviate localised flooding.

Response

The primary purpose of the existing stormwater network is to direct stormwater to the Port reducing the potential of flooding. The proposed works will neither exacerbate nor alleviate the flooding in the area but simply focus on reducing the impact of these works on the foreshore and water quality. The hydrological study will be a useful resource to investigate this issue into the future but it is outside the scope of this study.

The loss of water depth immediately offshore of outlet 3 is a result of the beach sand being pushed into the near shore zone during significant rain events. The removal of this sand will be considered as a sand source for the nourishment of Conroy Park. The extension of the stormwater pipe through a groyne will alleviate this issue.

While it may be physically possible to lower the pipe so that it is only uncovered at low tide, instead of constructing a groyne, it would exacerbate some issues associated with the safety of swimmers at higher tide levels. Similarly, extending the stormwater without a groyne is also physically possible, although the concrete structure would need to be significant to withstand wave forces. The purpose of the groyne is to break up wave energy before it can impact and damage the pipes/culverts, meaning that less concrete work would be required. It is Whitehead & Associates advice to proceed with a groyne structure to protect the culvert. Furthermore, the groyne structure is flexible and able to adjust if damaged, whereas a purely concrete structure would be more susceptible to undermining. The extension of the stormwater in a groyne will prevent beach scour and the flow of stormwater across the beach while providing structure to slow the movement of nourished sand to east. The downside of extending the stormwater within a groyne is a question of aesthetics. The cumulative impact on seagrass will require further consideration but at this stage is considered to be negligible. It is proposed to investigate this option further.

Consideration has previously been given to discharging outlet 3 in the same location to outlets 4 and 5 however there is not enough hydraulic gradient to allow it to flow effectively.

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The installation of gross pollutant traps will be investigated to address the water quality issues.

Groyne

Numerous respondents indicated they were not in support of any new groynes. A large proportion of these made particular reference to the groynes proposed to precinct 1 and 2, due to the perceived negative impact on water quality, reduced amenity and their overall effectiveness.

A few submissions did propose alternative groyne arrangements such as the removal of groyne B, and the extension of the eastern fishtail of Groyne A to replenish the old Sandy Point area.

Response

The primary purpose of the proposed groynes were to re-establish a sandy beach which is a high priority as identified by the community. Without groynes the frequency and volume of nourishment required in areas like Conroy Park will be substantially increased. Whitehead and Associates have indicated that large groynes without nourishment of a suitable magnitude and frequency will exacerbate erosion on the downdrift side. It is also their opinion that pushing the current off shore will not provide much benefit as the primary driver of sand movement is longshore transport by waves. The extension of Groyne A will encourage a beach to accrete on the eastern side, however, it appears unlikely that this will be beneficial without nourishment to the east which at this stage is too cost prohibitive.

Council proposes to further investigate the impacts of establishing a groyne at stormwater outlet 3 for the joint purpose of stormwater management and maintenance of the sand nourishment program for Conroy Park.

Revetment

There was generally no opposition to improving the existing revetment work with one owner describing the ongoing financial burden of fixing private property damaged due to wave overtopping.

There were, however, numerous responses received outlining that there was not the erosion threat within precinct 6 to warrant expenditure or change to the current revetment protection.

Foreshore residents have traditionally looked after their own walkways, revetment and boat ramps and many have requested approval to continue to do so citing protection of their property as the main reason. However concern was also raised regarding the inconsistency of works if foreshore residents are allowed to continue to do their own work.

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The main aim of the proposed structural works is to bring the existing protection up to professionally accepted coastal engineering best practice standard.

Precinct 6 is less exposed to ocean swell and overtopping than areas to the west, however overtopping is visible during periods of large swell with the low points created by the existing boat ramps exacerbating this. The flood tide delta that affects the impact of swell on this section of the port is continually changing and the degree of exposure may increase in the future. The present lower level of risk in this area is reflected by the lower priority in the report.

Sand Nourishment

There was a large amount of community support for sand nourishment throughout the project area. Scheme 2 received the greatest level of support from within the community and reflects the desire to see nourishment in both the Conroy Park area and to the east of Sandy Point. It should be recognised that scheme 2 does not involve the removal of the sand build up next to the Anchorage breakwall. Numerous submissions made specific reference to the sand adjacent to the Anchorage remaining, citing maintenance of water quality and aesthetics as the reason. Other suggested sand sources for nourishment were the shoals in the middle of the port, Anchorage entrance, Morton Bank and the area in front of and surrounding the stormwater outfalls.

Conversely, there was also significant support for the implementation of the original conditions of consent for the Anchorage development to excavate built up sand from alongside the breakwall. There was also considerable frustration that this had not previously been enforced. This course of action received a similar number of submissions to that received in support of Scheme 2.

Other issues raised surrounding sand nourishment included;

- Nourishment at Conroy Park should be combined with terminal protection
- Concern regarding contaminants in the sand next to the Anchorage from the stormwater outfalls.
- Ongoing monitoring will be an important aspect .
- The importance of seagrass protection was highlighted.

Response

The perceived amenity benefit provided by the large-scale sand nourishment to the east of Sandy Point as outlined in Scheme 2 does not warrant the extra expenditure of council funds required. The priority for this section of foreshore is foreshore protection. This can be adequately provided, with significantly less expenditure, by straight rock revetment. A sandy beach is proposed for in front of Conroy Park to the west and is already in existence in front on Bagnall Beach to the east.

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It is proposed to further investigate the nourishment of the area surrounding Conroy Park (precincts 2 & 3). Council acknowledges the high community value placed on maintaining a wider beach against the Anchorage breakwall but also recognises that this area does represent the most cost effective sand source for the nourishment Conroy Park. The accumulation of sand in this area also impedes effective functioning of the stormwater outlets 4 and 5. It is proposed to investigate a smaller scale removal of sand from the western end to be relocated to Conroy Park. This is reflected in the report and will result in a reduction in the end beach width in front of Conroy Park. The sand surrounding the stormwater will be tested for contaminants although based on its location is likely to be relatively clean.

This compromise will maintain the amenity of the beach at the western end while improving that of the east, however the smaller initial volume of sand will result in more frequent renourishment requirements. It is expect that this will form part of a maintenance program of moving sand from one end of the beach to the other, weather dependant. Port Stephens Council has received legal advice as to the implementation of the original conditions of consent for the Anchorage development.

The purpose of the groyne at the western end of Conroy Park was to provide some degree of protection to the sand nourishment. It is proposed to investigate further the construction of a groyne to extend stormwater outlet 3. This will not provide the same stability potential as the Conroy Park groyne however it may provide some degree of protection in addition to the dual benefit of improving stormwater management. Monitoring of the behaviour of the proposed sand nourishment will assist in determining the suitability of this structure.

It is likely previous poor water quality adjacent to the existing breakwall is a result of the accumulation of seagrass wrack. In the past, this would have been exacerbated by the sharp change of direction in the foreshore at the base of the breakwater, causing seagrass to accumulate. The planning of sand removal will take the shape of the final shoreline into consideration. It is expected that the accumulation of seagrass wrack would not change significantly. However, the concentration of litter will be reduced through the installation of gross pollutant traps.

In the implementation of the works every effort will be made to minimise the impact on the surrounding seagrass beds. A Review of Environmental Factors will be completed which will encompass how all environmental considerations will be addressed. Further discussion will be undertaken with Marine Parks through the detailed design phase.

Funding

There is a large degree of concern that there are no allocated funds for implementation. A few respondents expressed support for a special levy, however they believed those immediately on the foreshore should pay more due to the improved protection afforded to their properties. There was also a relatively equal number of responses against a special levy.

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Concern was raised regarding the ability for Council to fund ongoing protection and sand nourishment works; and the balance between public and private benefit. It was raised that consideration should be given to how much Council is willing to spend on this issue into the future, and council should not fund the preservation of private assets or the implementation of the works outlined in the original Anchorage condition of consent.

One respondent described that many of the schemes trade-off capital cost against ongoing maintenance and nourishment costs. In addition to the report being silent on the expected break-even point for such a trade-off, the same respondent expressed concerns the cost had been underestimated and no provisions had been made for environmental controls.

Response

There is currently no allocated budget in Council's 10 year work program. This was understood at the commencement of the project as primary focus was to scope feasible options that could then be used as the basis for financial modelling and pursuing internal and external funding.

The cost estimates utilised by Whitehead & Associates have been developed using procedures typically used by the coastal engineering industry for preliminary cost estimates including a contingency percentage. Costs will be re-evaluated at the detailed design stage. Whitehead & Associates used the following methods to determine the rates used in the cost estimates;

- a) Rock and sand supply were determined by contact with local quarries and sand mines
- b) Rates for Dredging were taken from the standard cost estimation reference "Rawlinsons – Australian Construction Handbook" (2015). Rates to transport to site were also taken from Rawlinsons, and calculated based on the distance to site from the source.
- c) Where particular pieces of work were not covered by standard rates from the above sources or by calling local suppliers, the rates were determined from first principles utilising information from the most recent Caterpillar Handbook to determine likely production rates and hence the number of plant-days required to complete the work, multiplying by typical hire rates.
- d) An allowance for environmental controls is incorporated into Item 1.1 of each cost estimate. It is not envisaged that environmental controls will be onerous or unusual thus creating an additional cost.

Nourishment schemes do tend to have a higher ongoing maintenance requirement than structural options. The capital and annual maintenance estimates have been provided for all options.

A "Triple Bottom Line" analysis of options was undertaken as part of the process. The societal and environmental bottom lines were incorporated into the short-listing outlined in Chapters 4 and 5. In addition, a qualitative, experience based assessment of order of magnitude costs was incorporated at this stage to reflect the impact of potential

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expenditure on the broader community and use of public funds . These resulting “scores” (Chapter 5 of report) remain relevant in making a balanced decision. However given that a dollar value has not been determined for social and/or environmental benefits and costs, it is not possible to calculate a point where costs outweigh benefits. Council will continue to exercise its experience and judgement as to ongoing expenditure on this project.

Terrestrial Vegetation

Numerous individual comments were made regarding vegetation management along the foreshore. These comments itemised that coral trees within Conroy Park and existing trees along the foreshore should be retained, and more shade trees provided. There was support for further revegetation with one submission suggesting works should be up to 50m wide.

Response

It is the intention to retain all trees where possible. Revegetation will be considered as part of the detailed design stage in appropriate locations.

Artificial Reefs

The question was posed why the potential for an artificial reef to protect the area from swell had not been considered.

Response

An artificial reef is not deemed appropriate for the area please see appendix 1 for the justification as provide by Whitehead & Associates.

Sand movement

The following queries were raised by respondents regarding the technical information provided in the report.

1. Aeolian effects have been neglected. Some respondents assert that the westerly wind have a significant effect on sand transport and that the development of the Anchorage has caused the erosion issue around Sandy Point citing the original EIS and the blocking of the westerly winds.
2. One respondent hypothesised that if the sand moves from east to west why did the beach in precinct 6 recede between 1990 and 2003 and has since recovered to the same extent as pre 1990. Another respondent described that Bagnall Beach has accreted northward approximately 20m retuning to 1960's levels without intervention.

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Response

Council believes that the technical information provided within *Sandy Point / Conroy Park Coastal Process Study* to be solid and well researched. Please see Appendix 2 for a direct response by Whitehead & Associates regarding the above issues.

Other

Other comments/questions received that did not fall under a specific topic are as follows;

Concern/Query	Response
Consideration should be given to planned retreat. The respondent assumed there would be a natural limit to the erosion and retreat may be the least costly.	There would be a natural limit to erosion. This was assessed as part of the background analyses when considering groynes in Precincts 1 and 2 and utilising the methods of Hsu et al (2010) (Section 6.1.7 of the report). Unfortunately, these analyses indicated that the “equilibrium” foreshore alignment extended right back to the hill adjacent to the southern edge of Sandy Point Road. If allowed to evolve indefinitely, and if all existing intervention was removed and no further measures taken, then the foreshore would eventually erode Conroy Park and the road. In developing the management strategies, we have aimed to maintain amenity of the Park and sandy beach area and to minimise the additional loss of trees.
Could additional private works be considered if they don't affect baseline protection works.	Council will not support private works on public land.
Sediment and erosion control will need to be considered in any works.	All necessary environmental controls will be itemised in the Review of Environmental Factors which will be prepared as part of the approvals process.
Sand bagging along Conroy Park is an eyesore and a safety issue.	The current sandbagging work in Conroy Park is temporary.
Concern the foreshore could not remain open during construction.	Sections of the foreshore will have to be closed while construction works are underway due to public safety.
The consultation period was not long enough for technical review.	Coastal management is a highly complex field hence why council employed industry experts to undertake its investigation and design. It was not council's expectation that the community undertake a technical review of the document, rather the aim of the consultation was to gain feedback into the options proposed in relation to how the foreshore is utilised.
Request for information on the link between this study and the recommendations of the Foreshore Management Study	This works directly links back to priority 1 management actions 105, 106 & 107 of the Port Stephens Foreshore Management Plan. Please refer to councils website for copies of the plan.

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<p>Why visualisations were only produced for Precincts 2 & 5? Can more be produced?</p>	<p>Precincts 2 and 5 were selected for visualisations as these were considered the areas under greatest threat and thus the likely focus of works. The generation of images in quite an expensive process and could not be undertaken for all locations. At this stage no further images will be produced</p>
<p>Older boat ramps and seawalls constructed using asbestos fibre cement sheet and subsurface will contain uncontrolled fill, building waste, bituminous local tars and blast furnace slag.</p>	<p>This will be considered as part of the Review of Environmental Factors</p>
<p>What is the Average Recurrence interval (ARI) for a April '15 storm?</p>	<p><i>Whitehead & Associates Response</i> - This is not an easy question to answer, as it is related to the joint probability of numerous variables, including:</p> <ul style="list-style-type: none"> • Wave Height; • Wave Direction; • Wave Period; • Tidal Anomaly; • Length of Storm; and • Stage of the Tide at different times during the storm. <p>Analysis from Shand et al. (2011) indicates the following peak offshore wave heights for different ARI's (10yr, 7.5m; 50yr, 8.6m; 100yr, 9.1m). Although the April storm had a peak offshore wave height of 8.05m, which would place it between 10 and 50 years based on wave height alone. However, there are peculiarities which made this event particularly large at the Sandy Point foreshore. Firstly, the significant wave period was particularly long (14.85s, compared to an expected value of 12.5s – see Callaghan et al (2008)) and the direction (from 147 degrees) gave a more direct approach to the entrance to Port Stephens than most storms off the central NSW coast (around 70% of storms come from a more southerly direction – also see Callaghan et al (2008)). Both of these affect the ability of waves to penetrate the Port, refracting to impact on the study foreshore. Our preliminary assessment of the April Storm was that it resulted in close to a 1 in 100yr wave condition near the study site.</p> <p>Callaghan, D.P., Nielsen, P., Short, A.D., Ranasinghe, R., 2008. Statistical simulation of wave climate and extreme beach erosion. Coastal Engineering 55, 375–390. doi:10.1016/j.coastaleng.2007.12.003</p> <p>Shand, T.D., Mole, M.A., Carley, J.T., Peirson, W.L., Cox, R.J., 2011. Coastal Storm Data Analysis:</p>

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	Provision of Extreme Wave Data for Adaptation Planning. Water Research Laboratory, University of New South Wales.
The Multi Criteria Analysis for Precinct 4 in Appendix E shows that the addition of Nourishing the Beach (going from Option 5 to 6) results in a significant reduction in the total score caused mostly by the reduction in the score (from 1.7 to 1.0) for the issues of public access, public safety, foreshore protection from erosion and foreshore protection from overtopping. It is not clear what is causing this decline in ranking. Even more difficult to understand is why both Options 5 and 6 score the same (0.7) on the issue of provision of sandy beach.	<i>Whitehead & Associates Response</i> - We accept that there are anomalies in the way in which different people have interpreted (or misinterpreted) the scores for the different issue/option combinations, resulting in overall results that are odd. Those outlined above are not the only examples of results that fit into this category. The shortcomings are discussed on page 25 and in Appendix E. For this reason, the process of selecting final options and formulating the final schemes did not rely exclusively on the multi criteria analysis results. Discussions with Council staff and among the study team were held to ensure that the most viable options would be considered. Note that, for the abnormalities outlined by the respondent, Options 5 and 6 were ranked 1 and 2. Attempts to review and change the scores by revisiting the issues with particular scorers would have only changed the order of these two options. We avoid doing this, however, as it tends to normalise everyone's scores when there are subjective issues that need to be considered.
Schemes 2 and 3 for Precinct 1 both retain the current build-up of sand and the report recommends that the two stormwater drains be properly cleaned-out. It is not clear if the annual maintenance included in Appendix H covers this activity.	Annual maintenance has now been included in these costings.
Scheme 2 for Precinct 5 includes a pathway along the new revetment but there appears to be no cost for this pathway in Appendix H	This has been fixed
Every page in Appendix A is numbered 98.	This has been fixed
Questions the validity of using the wind record at Williamtown is a good surrogate of the wind at Corlette.	<i>Whitehead & Associates Response</i> -The water is very open between Sandy Point and Jimmys Beach. I would be surprised if there is a significant difference in the wind climate between these two locations, except for those winds that blow offshore from Sandy Point and are not as important for locally generated wind waves at the location in question. Regardless, Williamtown remains the best data that is available

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	and we consider it perfectly reasonable to adopt that data for the purpose of this study.
In Appendix B Section 4.1.2 it is noted that the hydrological modelling has been done based on both the 5 and 100 ARI storms. The rainfall data is provided for these events but not the assumed duration of the storm.	The Tables on page 10 of appendix B include the "Overland Flow Peak Storm Duration". The design storm for different outlets have different durations (i.e. larger catchments tend to have longer design storm durations – resulting in the higher discharge at the outlet). The software which SEEC used (DRAINS) cycles through a number of different storm durations and determines which one gives the peak (or design) value.
I appreciated the commentary on the options for Precincts 1, 2 & most of 3 in Appendix E. It is not clear why there was no commentary on Options 7, 8 & 9 for Precinct 3 and none at all for Precincts 4, 5 & 6.	This has been fixed

The following issues are not within the scope of this project

1. Conroy Park itself is an eyesore.
2. Public park next to the Anchorage be extended over the extended dune area.
3. Consideration of the option of stopping swell from entering the Port
4. Retention basin adjacent to the SES building
5. Retention of locked white gates with accompanying reserved parking spaces

ITEM 3 - ATTACHMENT 3 STAGE 2 COMMUNITY CONSULTATION SUMMARY.**Appendix 1****Artificial Reefs**

Whitehead & Associates have provided the following response regarding artificial reefs.

There are broadly three types of “artificial reefs”/“offshore breakwaters”/“multi purpose reefs” which could be considered. These are:

1. Floating breakwaters: these can be ruled out immediately as they are only suitable for design wave climates with periods of around 3sec or less (wind seas). At this location, we are dealing with design waves with much longer periods (refracted swell)
2. Surface penetrating structures: effectively comprise of structures placed in deeper water, which would typically be much more expensive than the equivalent protecting structures on shore;
3. submerged or “multi purpose” reefs from preconstructed units, rock or sand filled geotextile bags.

The first two are not feasible for technical and price reasons respectively. With regards to submerged reefs over the past 10-15 years, we have witnessed significant changes to the perception of submerged multi-purpose, or “surfing” reefs among engineers in NSW. Initially, many claims were made about the potential multiple benefits from these types of structures. However, they were unproven at that stage and subsequent installation of numerous structures around the world has seen many performing very badly or not at all, extraordinary cost blow outs and structural failures. We are aware of at least one location where the structure has been removed following installation. We consider that the understanding of how these structures can be effectively designed for a given location is a science that is still in its infancy. We consider that implementation of this type of strategy for foreshore protection would constitute an unacceptable experiment regardless of where the funding comes from. Our experience is that artificial multi purpose reefs are not considered a feasible option for foreshore protection by NSW state government agencies at the present time. Coastal Environment Pty Ltd indicated that such a structure would provide little protection against wave impact and runup during storm events combined with high tide and storm surge.

For the reasons outlined above, the use of artificial reefs/offshore breakwaters was not considered remotely feasible by the engineers who compiled the original long list of options subjected to multi-criterial analysis within the study.

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SUMMARY.****Appendix 2****Sand Movement**

The following response has been provided by Whitehead & Associates with regards to sand movement.

From time to time we expect that strong westerly / north westerly winds will transport some sand from west to east along Corlette Beach. The effects of this may be notable following a significant wind event. However, we do not consider that this is at all significant when considered in the overall alongshore transport rate, which is dominated by refracted ocean swell.

We base our assessment on the following evidence:

- a) The shape of sand fillets in areas where the updrift side of the embayment is relatively unconstrained (next to eastern breakwater of the Anchorage, and in Precinct 6) demonstrate a pattern that could only be caused by a dominant east to west alongshore transport;
- b) There is no evidence of a significant sand fillet accumulating on the western side of the Anchorage Marina, which would result from west to east transport;
- c) The historic development of foreshore protection works has progressed, broadly, from east to west, commensurate with protection of one section resulting in outflanking at the downdrift (western) end, prompting extension of the protective works;
- d) Erosion fronting Conroy Park in recent years has continued this pattern of erosion, with outflanking at the western end of geotextile sand bags, this is completely inconsistent with west to east transport;
- e) In deeper water to the north of the Anchorage, measurements and records from Hunter Water presented in the submitted EIS (GHD, 1990, including appendices by Geomarine) show bedforms shape and behaviour which demonstrate that tidal sediment transport is to the West. This is supported by recent analysis of digital elevation models in Wainwright et al (2015).
- f) In shallower water adjacent to the northern and north eastern sides of the Anchorage breakwater, if significant alongshore transport was occurring from west to east, we would expect to see a line of bare sand caused by seagrasses being unable to establish and maintain a presence in this area. Instead, inspection from the breakwater readily reveals that the area is completely covered by dense seagrass beds. (This also suggests that the eastern Anchorage breakwater is the terminus for sand moving from east to west at the present time); and
- g) Wave modelling undertaken as part of the coastal processes study indicates that the refracted ocean swell wave environment (uniformly directed towards the west) has a much stronger averaged potential for alongshore sediment transport than the wind wave climate. Wind waves are generally less potent at moving sand, due to their shorter wave period but the direction of the waves is also variable, meaning that transport direction can go either way at times, with the net sand movement strongly east to west.

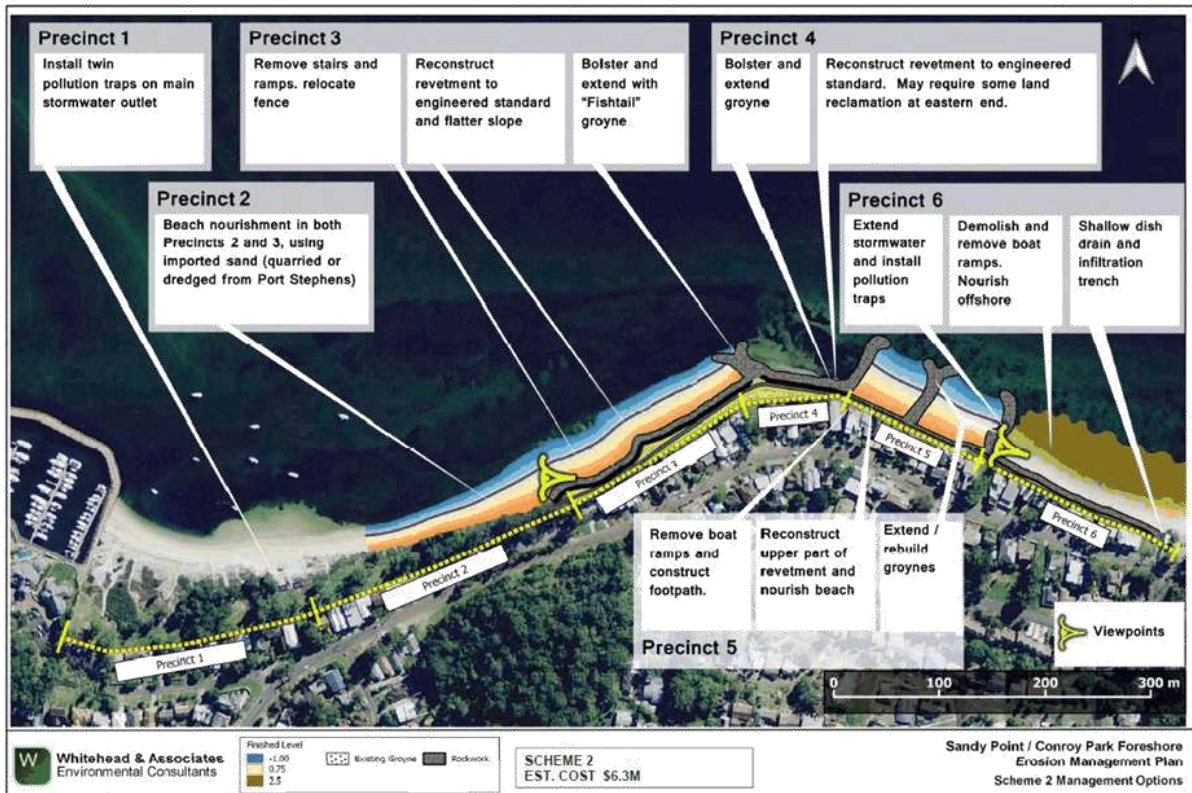
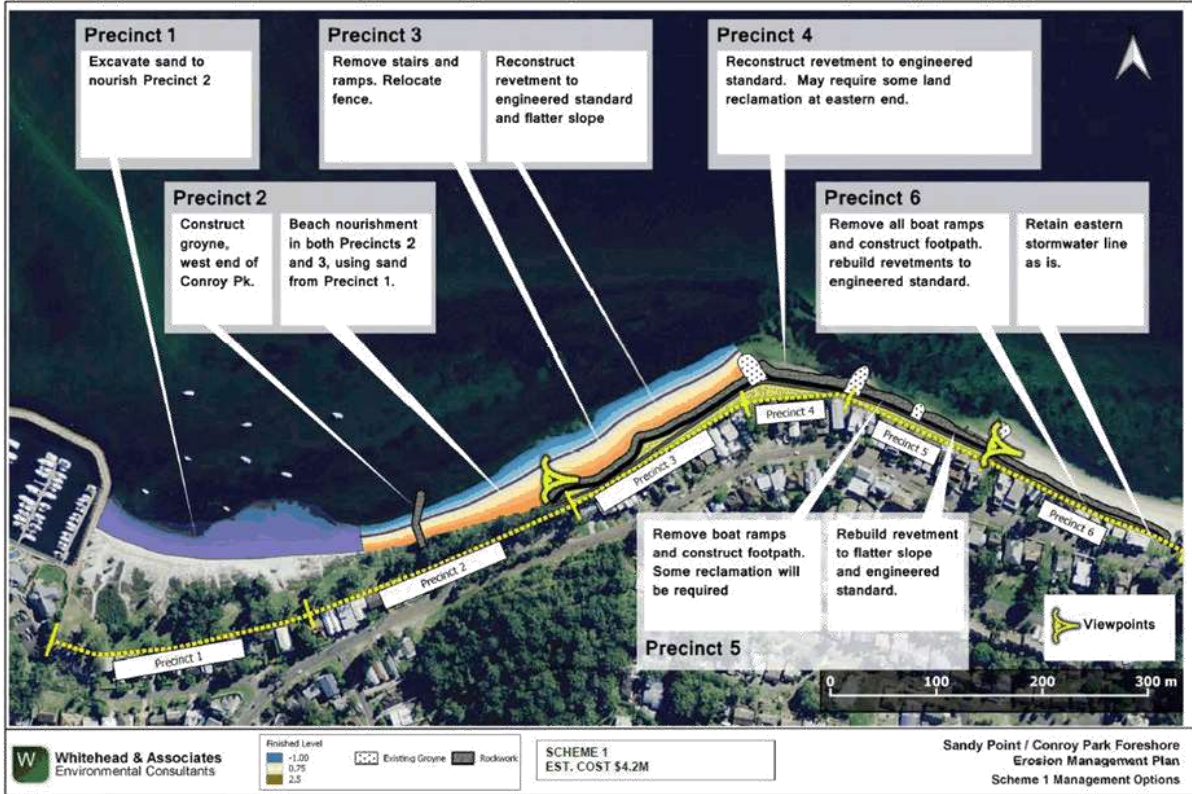
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Based on these multiple lines of evidence we stand by our assessment that transport is overwhelmingly dominated by east to west transport, particularly by swell waves. We understand that original, superseded versions of the Anchorage Marina EIS indicated that west to east transport was dominant. This was subsequently disproven following more detailed coastal processes analysis presented in the final EIS, tested rigorously through a legal process and subsequently validated by the performance of those works.

Lastly, a potential explanation for fluctuations seen in Precinct 6 is a variation in supply of sand from the updrift end of the study area (i.e. from the east). Sand does tend to progress in pulses along shorelines in these locations and it is entirely feasible that a lowered supply from updrift would result in a reduction in beach width (1990-2003) and a subsequent increase in updrift supply causing the beach in Precinct 6 to widen. Our study did not investigate conditions to the east of the study area in detail, but, based on the evidence outlined above, it is extremely unlikely that west to east transport is anywhere close to dominating the overall alongshore transport patterns throughout the study area.

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Appendix 3



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