

Appendix E

4Sight Seawall Feasibility Letter



1 August 18

Simon Cave, Annabel Reynolds, Adrian Cave and Dick Calcott
2, 4, 6 and 8 Tuahine Crescent
Wainui Beach
Gisborne

By e-mail: simon.cave@gisborne.net.nz

Dear Simon, Annabel, Adrian and Dick,

Re: Tuahine Seawall

The letter below explains our findings through the initial investigations and design phase. Three design options have been developed in-conjunction with LDE. The estimated cost of construction of both structures is provided and discussion given around the planning restraints for each option.

An outline of the next stages is also given with estimated costs and timelines to enable the group to make an informed decision about the desired course of action.

INTRODUCTION

The subject area is located at the southern end of Wainui Beach and encompasses 4 private properties, within the vicinity of the public stairs and reserve providing access to the beach from Tuahine Crescent (**Figure 1**). The existing coastal protection structure is approximately 50 years old, and the longevity of the structure is uncertain. This area was highlighted as being at risk from progressive erosion and that existing infrastructure (i.e. seawall) should be replaced under the Wainui Beach Erosion Management Strategy.



Figure 1: Location of subject area with the extent of the affected shoreline indicated by the red dashed arrows.

The Gisborne District Council (GDC) compiled a design and resource consent application for a seawall at the southern end of Wainui Beach which after a hearing in early February 2018 was declined in late February 2018. The replacement design presented through the application and hearing process was considerably larger than the existing structure with a crest height approximately 2-2.5m¹ above the existing structure and extended an additional 3-3.5m seaward. In general, the increase in structure size was considered necessary to meet modern coastal engineering design parameters.

In the hearing decision the size of the structure was a consistent theme and contributed to discussion around the potential impacts upon the landscape amenity and natural character. The seaward advance of the structure also meant the proposed structure extended into reserve land within the Coastal Marine Area (CMA) and into the Common Marine and Coastal Area (CMCA)². This raised issues around the potential impacts upon public access along the foreshore, and issues around being able to define the extent of potential end effects from the structure and the impact upon adjoining public and private land.

From a technical perspective this also meant that parts of the regional coastal plan where relevant to the application, and therefore aspects of the NZ Coastal Policy Statement (NZCPS) needed to be considered. The decision focused on Polices 25 and 27 of the NZCPS, which (*in part*) discuss the appropriateness of hard protection structures in the coastal environment. Based on the above, it is my interpretation of the decision that because the proposed structure extended beyond the footprint of the existing structure and into public land, a more critical eye was cast upon the proposal, and in particular the potential effects to arise from its large scale on potential end effects and landscape and visual elements.

DESIGN OPTIONS

Based on information contained within the hearing decision a key design criterion was to keep the new designs within the footprint of the existing structure and within the private property boundaries. This would need to be placed with attaining a sufficient crest height for the structure to avoid the impact of overtopping. This places a control on the horizontal limit on the seaward face and a vertical control at the landward limit of the structure. To achieve this a hybrid solution incorporating vertical components was required as opposed to the more traditional and conservative rip-rap design utilized within the GDC application. Further, the crest height was lowered by approximately 800mm to reduce the scale of the structure in comparison to the existing situation. While the crest height is still ~800mm above the static 1%AEP storm surge³ combined with 1m sea-level rise water level, this does raise the risk to the structure from wave overtopping during extreme events. However, to counter act this it is suggested that suitable salt tolerant planting be incorporated to help stabilize the land above and dampen the impact of any overtopping of the structure.

Other design components such as rock size and concrete strength were determined by LDE using standard engineering design methodologies.

The three design options are described briefly below with greater detail provided in the drawing set contained in **Appendix A**. Broadly speaking the design options presented are:

¹ The design was revised during the hearing process. The original design crest was approximately 3m above the existing structure.

² The distinction between the CMA and CMCA is basically that the CMA is defined by the position of Mean High Water Springs (MHWS) and CMCA refers to public lands within the CMA but without title. In essence, it means that a piece of land above MHWS is situated within the CMA but not necessarily in the CMCA.

³ 1% AEP = 1 in 100-year event. The 1%AEP level includes storm surge from barometric pressure, wave setup and peak high tide levels.

Option A- Vertical Concrete/Rip-Rap Hybrid is similar to the existing structure in that there and is a vertical control along the seaward face. This allows for a reduction in the toe width whilst still achieving a slope of 1.5/1 for the rip-rap component behind the concrete bund. The height of the concrete bund is approximately 500mm lower than the rail-iron posts. Whilst the bund will provide some dissipative action from wave approach its main purpose is to retain the toe rock in position in order to achieve the design slope in front of the cliff face. Therefore, the 2m height is considered sufficient to achieve this.

Option B- Rip-Rap Toe/Backshore Retaining has focused on achieving the design objectives by essentially reducing the footprint of the rip-rap by reducing its crest height. This is achieved by utilizing precast concrete blocks as vertical retaining at the rear of the structure to achieve the final crest height. The crest of the rip-rap component is largely dictated by design slope of 1.5/1 and the seaward limit of the existing wall. However, this crest height is still above the 1%AEP storm tide level with an allowance for sea-level rise over the next 50 years.

Option C- Timber Pile/Rip -Rap Hybrid is similar to Option A in that a vertical structure is located in the front of the wall to restrict the toe and allow for the rip-rap behind the wall to be built up to design heights. The timber piles are prescribed at Ø300mm would be spaced at 900mm centers to avoid loss of rock between individual piles. The larger rock would be placed along the seaward face and along the top of the rip-rap wall.

CONSTRUCTION COSTS

LDE have provided an estimate of construction costs and these are detailed in **Appendix B**. These costings are reliant on the existing rock being used in the new structure. The ability to use this material will need to be confirmed by GDC staff as we go through the process. In summary the costs are:

Option A= \$179,000

Option B= \$191,000

Option C= \$161,000

PLANNING ASSESSMENT

The likely reasons for consent are presented below, which are generally the same for each of the options. These are based upon the design parameters discussed above and assuming the designs largely remain unchanged.

Likely reasons for consent:

DD1 Residential zones

- The construction of a seawall is not provided for in residential zones, and therefore is a non-complying activity under DD1.6.1(32)

DD5 Reserve Zones

- The construction of a seawall is not provided for in reserves zones, and therefore is a non-complying activity under DD5.6.1(38)

C3 Coastal Management

- Vegetation clearance, land disturbance and structures (seawall) within 200m of MHWS in the Coastal Environment Overlay is a discretionary activity under C3.1.4.3(13)

C8 Natural Hazards

- Installation of a seawall to mitigate the effects of coastal hazards in the Coastal Hazard 1 Overlay is a discretionary activity under C8.5.7(1)
- Earthworks which alter the natural dune land form in the Coastal Hazard 1 Overlay is a discretionary activity under C8.5.7(3)

C9 Natural Heritage

- Earthworks in the Outstanding Landscape Area Overlay is a restricted discretionary activity under C9.1.6(41).

C7 Land Management

- Earthworks in the Land Overlay 3 is a restricted discretionary activity under C7.1.6(29).

Overall it appears the structure will be considered to be a **Non-complying** activity.

Further the area has highlighted as a Statutory Acknowledgement Area for both Ngati Porou and Rongowhakaata, so consultation with those groups will need to be undertaken to avoid full notification.

NEXT STAGES

A resource consent application will need to be drafted and then consent applied for. This will likely need to included comment on the potential effects on local coastal processes and the beach in general. It would also be useful to include an assessment of landscape and natural character effects. The costs associated with this would be:

Table 1: Fee Estimate

Task	Description	Fee Estimate
1	Assessment of Environmental Effects and Planning Assessment	\$8,500
2	Coastal Processes Impact Assessment	\$1,500
3	Landscape, Natural Character and Visual Assessment	\$3,500
4	Consultation with Iwi	\$500
TOTAL PROJECT FEE ESTIMATE		\$14,000

Processing costs from GDC are difficult to ascertain at this stage but I would allow for **\$10,000** as I suspect GDC will engage specialists to review the application. This will determine if the application will need to be notified or not.

If notified there will potentially a hearing undertaken and the costs of that are typically the responsibility of the Applicant. This cost could be in the order of **\$10,000-15,000**.

Note we would try to compile an argument that the effects are no more than minor and there is no need for full notification. This would negate the need for a hearing and the associated costs.

Therefore, I estimate that the costs to obtain a resource consent are between **\$24,000 and \$40,000** depending on how GDC view the application.

CONCLUSION

Despite the **Non-complying** nature of the proposal it is our opinion that either of the designs presented have a good chance of obtaining resource consent. This is due to the reduced scale of the structure and restricting the footprint to match the existing. This enables a comparison to the existing situation for an assessment of environment effects. This also helps to negate discussion around potential end effects and public access in particular, both of which contributed to the negative hearing decision for the previous proposal.

It also reduces a focus on the policies and objectives of the NZCPS as the proposed solutions are contained within private property and outside of the CMA. The exception to this is the area of reserve between 2 and 4 Tuahine Cres where the structure will be situated on public reserve land. However, I am confident that an argument can be built to say this section of wall is having a positive public benefit by retaining access at this point.

Overall, I am of the opinion that **Option A and Option C** will be seen more favourably by the regulatory authority as it provides a fixed point where the wall terminates. **Option B** maybe seen to be requiring more maintenance in the future with the potential of rock migration down the beach. However, this issue is not considered to be insurmountable. **Option C** may also be able to be argued as a more environmentally sympathetic structure with the ability to more easily altered in the future should the management regime at Wainui Beach change.

I suggest that I arrange a discussion with GDC resource consenting staff in order to ascertain their feedback on the revised designs and our interpretation of the issues above. I would also appreciate their views on notification and Iwi consultation.

I would also like to get you feedback on the designs and associated costs of construction and consenting.

Should you have any further questions please don't hesitate to contact me.

Kind Regards,

A handwritten signature in black ink, appearing to read 'Sam Morgan', written in a cursive style.

Sam Morgan
Senior Coastal Consultant
4Sight Consulting Ltd



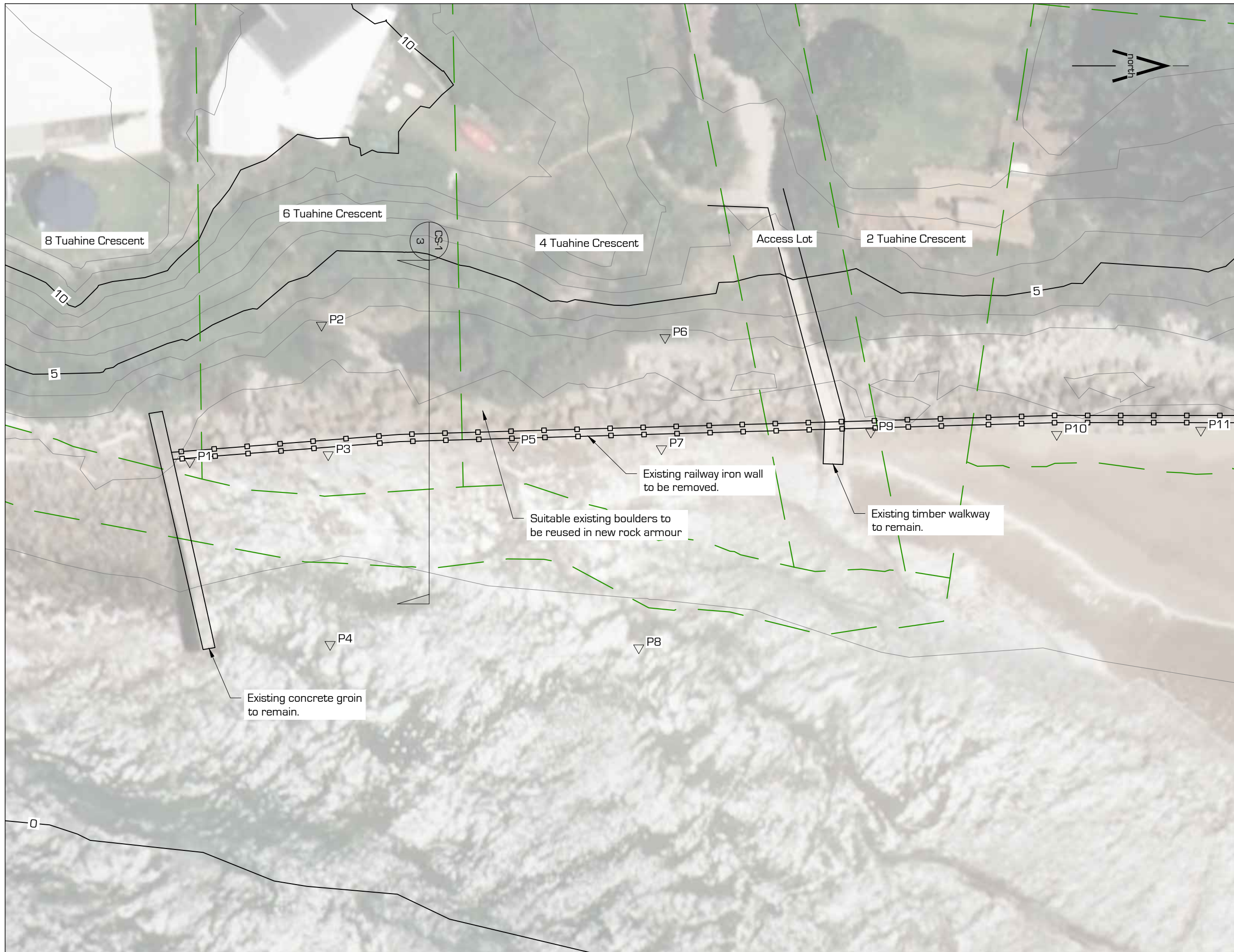
Appendix A

Design Drawings



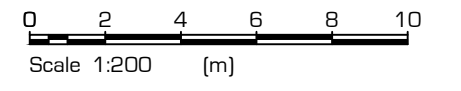
Seawall Renewal
2-8 Tuahine Crescent, Wainui Beach, Gisborne
Resource Consent Drawings

CONTENTS				
SHEET	DESCRIPTION	ISSUE DATE	STATUS	REVISION
1	Existing Site Plan & Geotechnical Test Locations	17/07/2015	Resource Consent	0
2	Option A - Design Site Plan	17/07/2015	Resource Consent	0
3	Option A - Existing & Design Cross Sections	17/07/2015	Resource Consent	0
4	Option B - Design Site Plan	17/07/2015	Resource Consent	0
5	Option B - Existing & Design Cross Sections	17/07/2015	Resource Consent	0



- Legend:
- Lot boundary
 - 10 — 5m contour
 - 1m contour
 - ▽ P1 Penetrometer test

Notes:



Contractor shall check all dimensions on site prior to work commencing ©

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 4sight Consulting Ltd
 201 Victoria Street West
 Auckland 1010

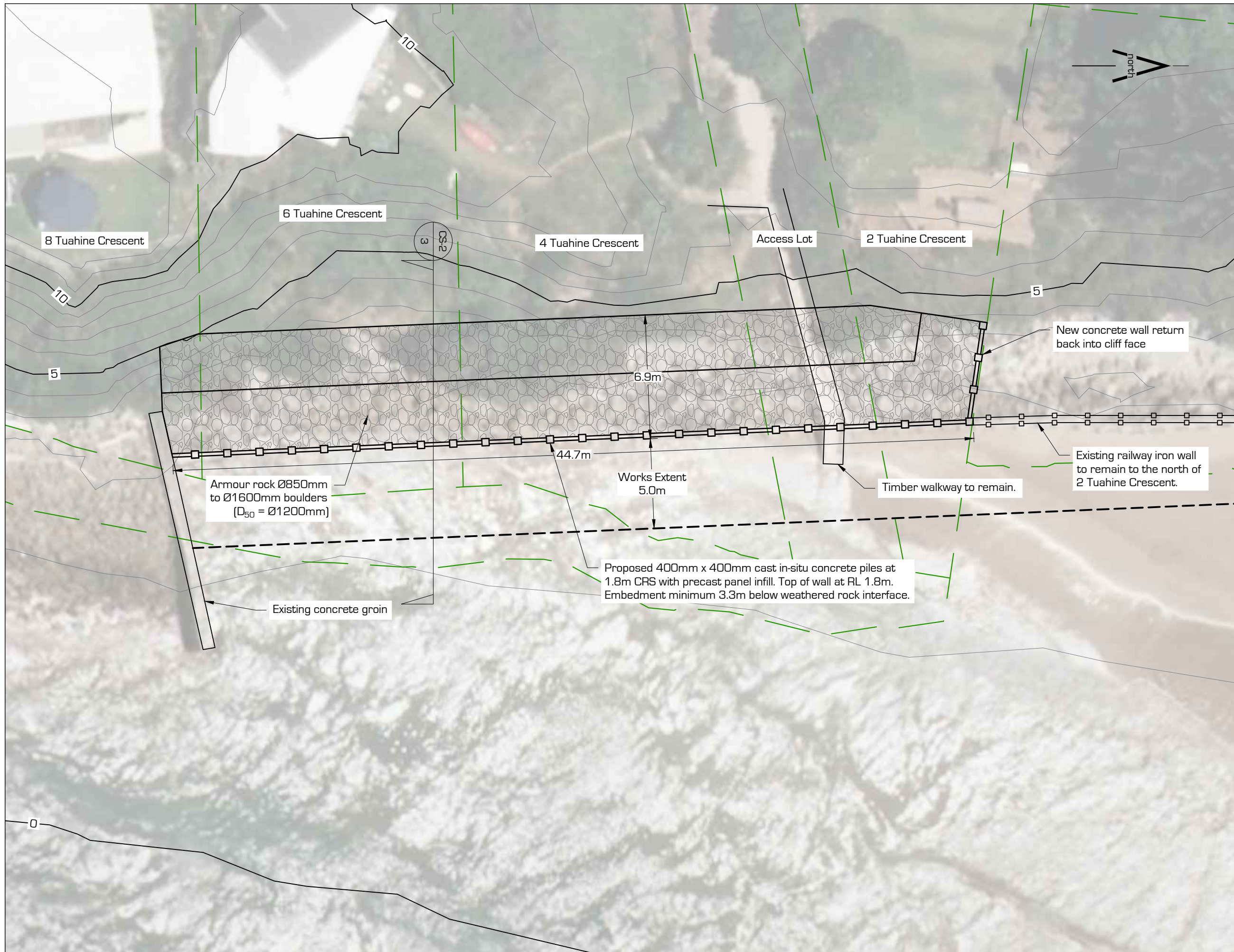
PROJECT
 Tuahine Crescent Seawall
 Wainui Beach
 Gisborne

DRAWING TITLE
 Existing Site Plan & Geotechnical
 Test Locations



DESIGN:	JS
DRAWN:	JS
DATE:	17.07.18
CHECKED:	AH
SCALE A3:	1:200

PROJECT STATUS:	Resource Consent	
PROJECT:	14608	SHEET: 1 of 5
DRAWING No:	14608-C01	REV: 0



- Legend:**
- Lot boundary
 - 10 — 5m contour
 - 1m contour
 - Proposed wall
 - Proposed rock armour
 - Works extent

Notes:

Armour rock Ø850mm to Ø1600mm boulders (D₅₀ = Ø1200mm)

Proposed 400mm x 400mm cast in-situ concrete piles at 1.8m CRS with precast panel infill. Top of wall at RL 1.8m. Embedment minimum 3.3m below weathered rock interface.

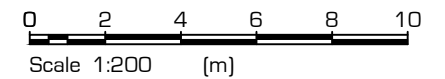
New concrete wall return back into cliff face

Existing railway iron wall to remain to the north of 2 Tuahine Crescent.

Timber walkway to remain.

Existing concrete groin

Works Extent 5.0m



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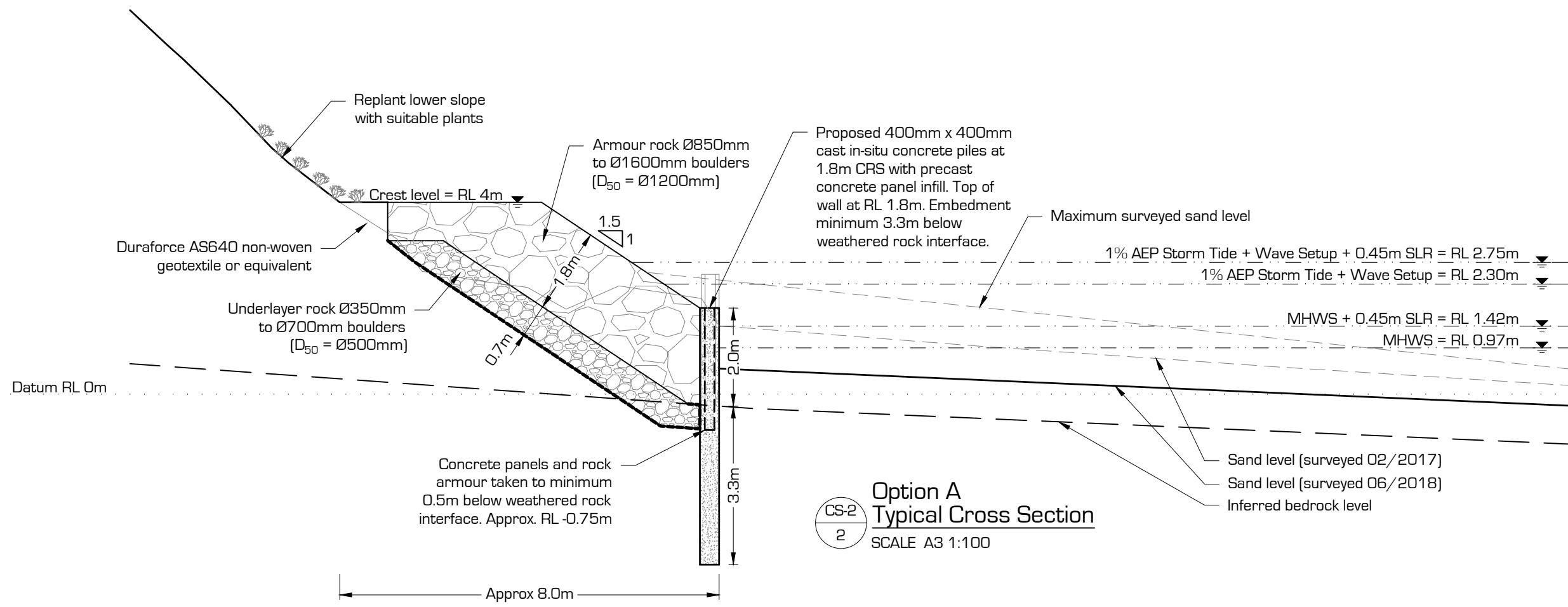
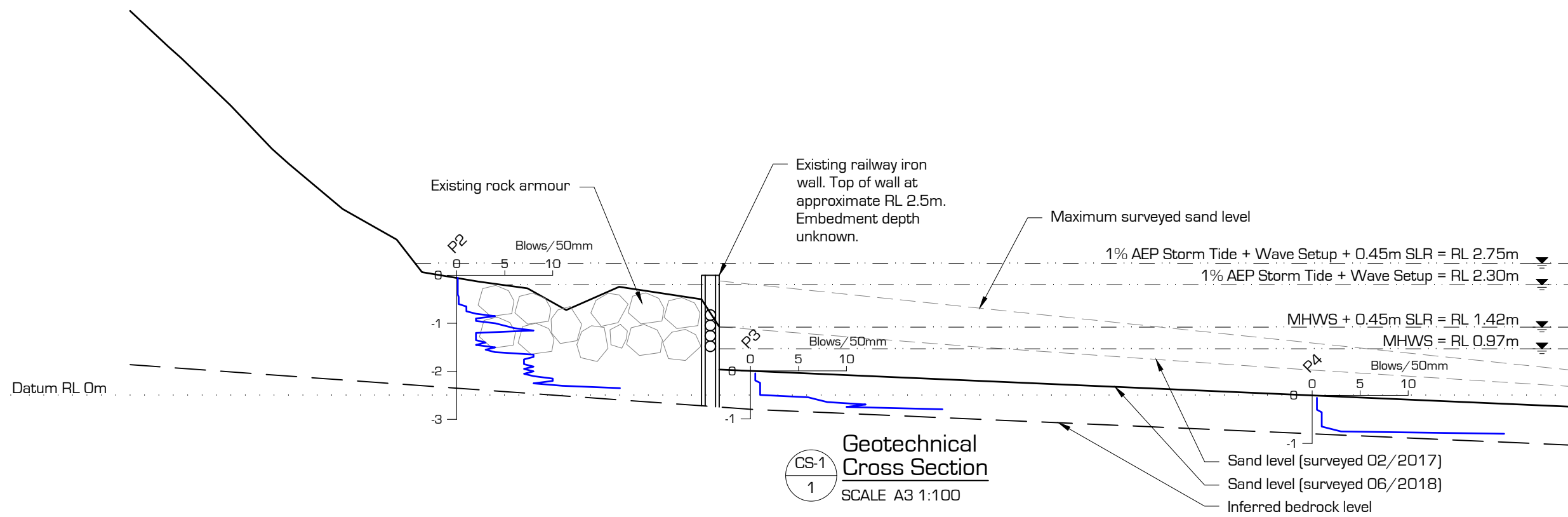
PROJECT
Tuahine Crescent Seawall
Wainui Beach
Gisborne

DRAWING TITLE
Option A
Design Site Plan



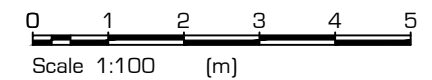
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CHECKED:	AH
SCALE A3:	1:200

PROJECT STATUS:	Resource Consent	
PROJECT:	14608	SHEET: 2 of 5
DRAWING No:	14608-C01	REV: 0



- Legend:**
- Blows/50mm
 - Scala penetrometer test results (Blows/50mm)
 - Existing surface profile
 - Inferred boundary layer

Notes:



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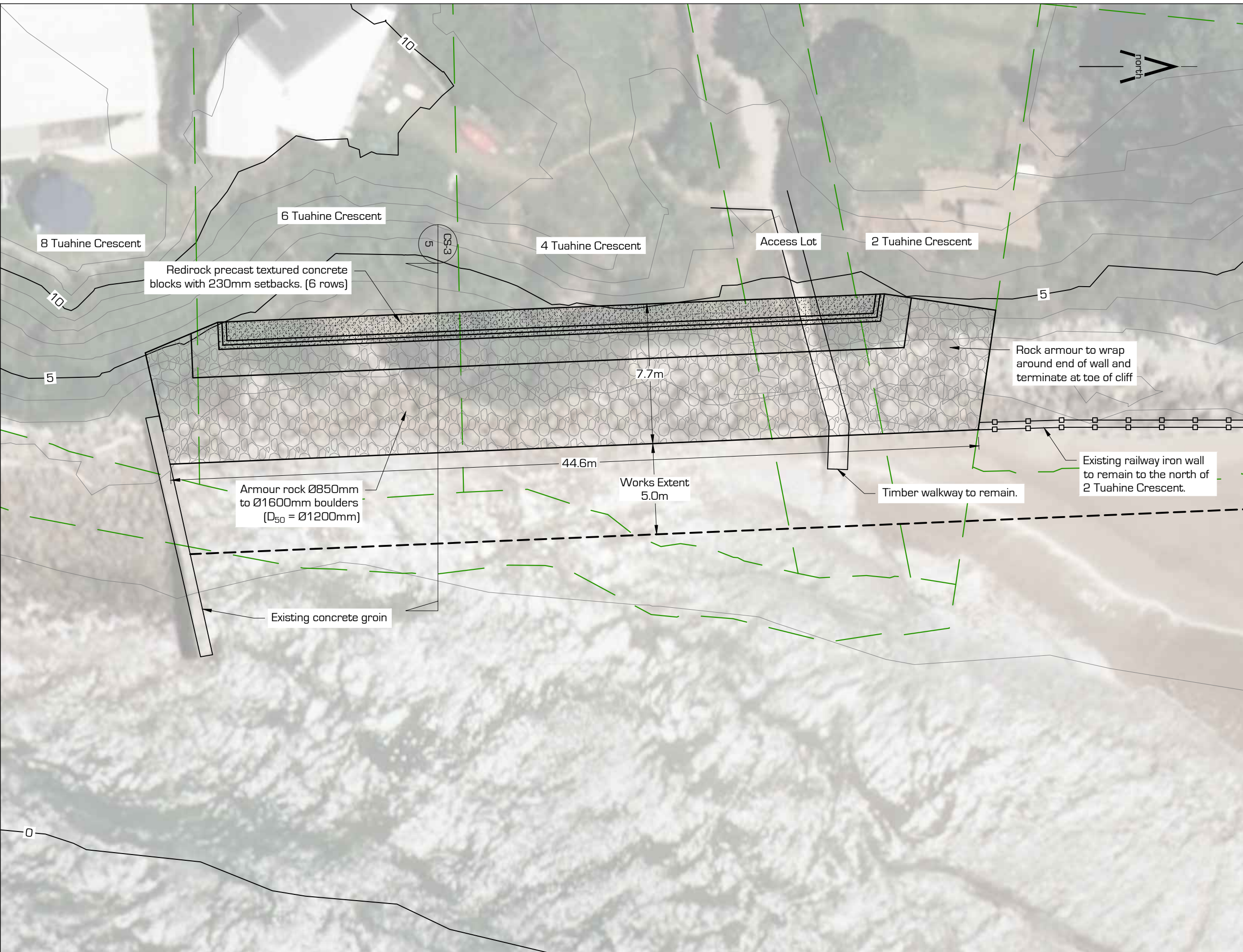
PROJECT
Tuahine Crescent Seawall
Wainui Beach
Gisborne

DRAWING TITLE
Option A
Existing & Design Cross Section



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DRAWN:	JS	PROJECT:	14608
DATE:	17.07.18	SHEET:	3 of 5
CHECKED:	AH	DRAWING No.:	14608-C01
SCALE A3:	1:100	REV:	0

ISSUED TO:	ISSUED BY:	ISSUED DATE:	REVISION:
0	JS	17.07.18	



- Legend:**
- Lot boundary
 - 10m contour
 - 5m contour
 - 1m contour
 - Proposed Redirock precast blocks
 - Proposed rock armour
 - - - Works extent

Notes:



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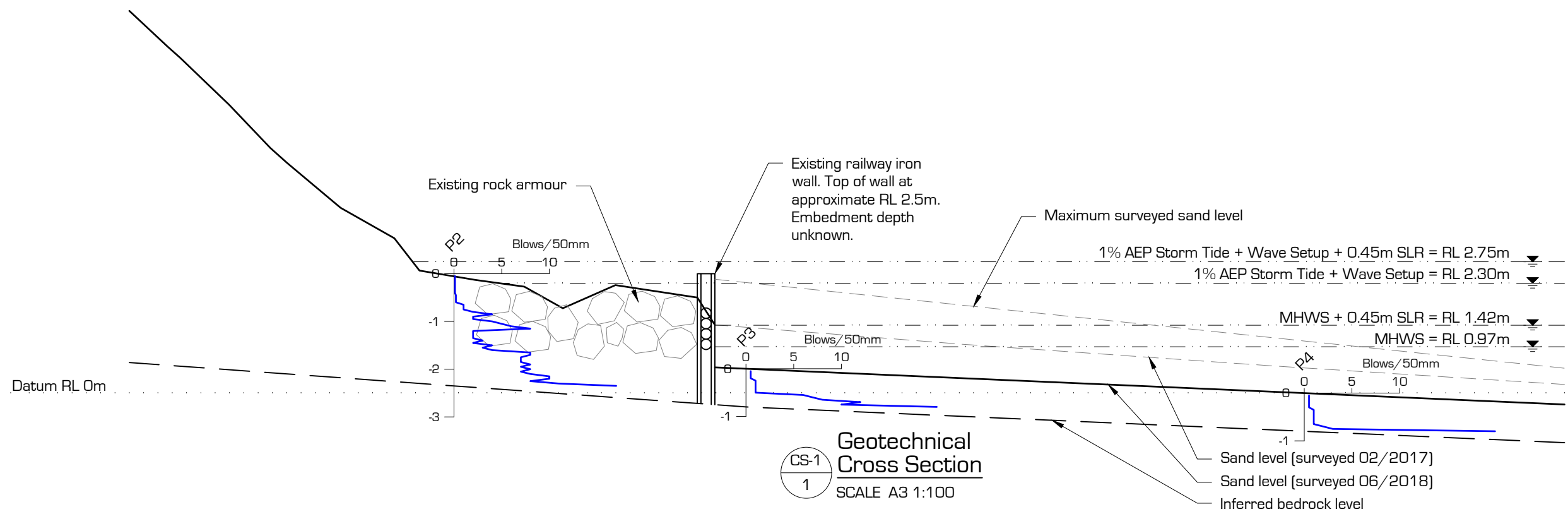
PROJECT
Tuahine Crescent Seawall
Wainui Beach
Gisborne

DRAWING TITLE
Option B
Design Site Plan

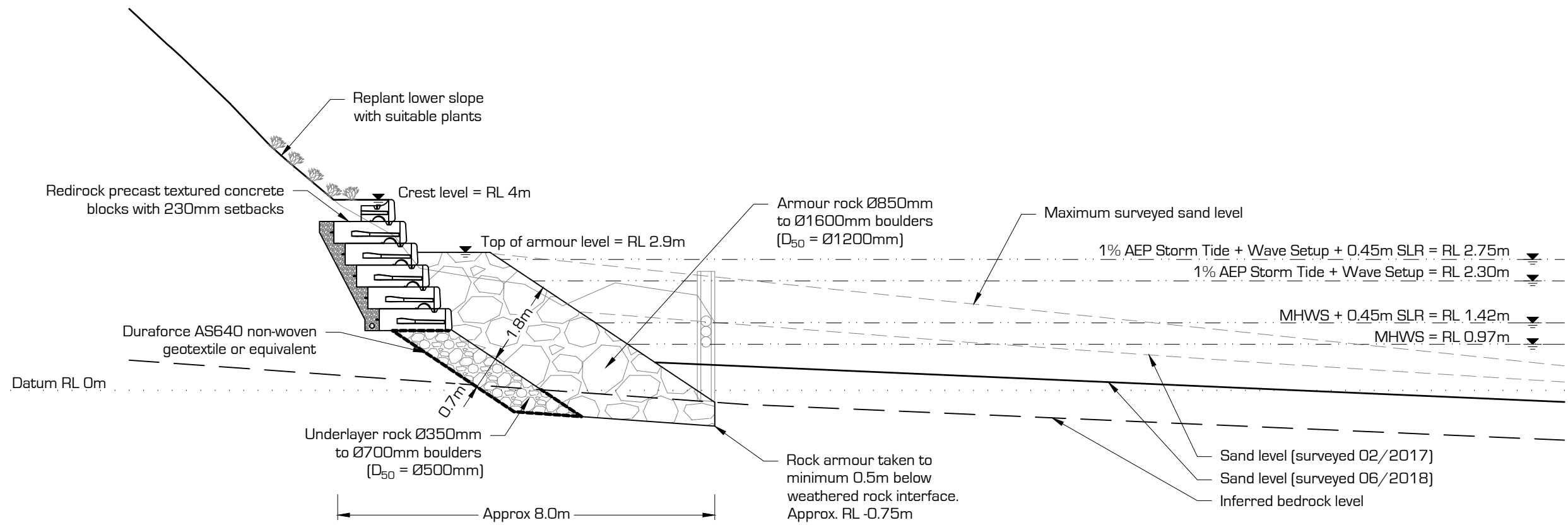


DESIGN:	JS	PROJECT STATUS:	Resource Consent
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DATE:	17.07.18	SHEET:	4 of 5
CHECKED:	AH	DRAWING No.:	14608-C01
SCALE A3:	1:200	REV:	0

DESIGN:	JS	PROJECT STATUS:	Resource Consent
DRAWN:	JS	PROJECT:	14608
DATE:	17.07.18	SHEET:	4 of 5
CHECKED:	AH	DRAWING No.:	14608-C01
SCALE A3:	1:200	REV:	0



Geotechnical Cross Section
 CS-1
 1
 SCALE A3 1:100

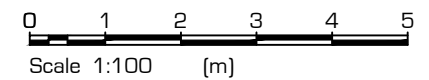


Option B Typical Cross Section
 CS-3
 4
 SCALE A3 1:100

Legend:

- Blows/50mm Scala penetrometer test results (Blows/50mm)
- Existing surface profile
- Inferred boundary layer

Notes:



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PROJECT
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 Wainui Beach
 Gisborne

DRAWING TITLE
 Option B
 Existing & Design Cross Section



DESIGN:	JS	PROJECT STATUS:	Resource Consent
DRAWN:	JS	PROJECT:	14608
DATE:	17.07.18	SHEET:	5 of 5
CHECKED:	AH	DRAWING No.:	14608-C01
SCALE A3:	Shown	REV:	0

DESIGN:	JS	PROJECT STATUS:	Resource Consent
DRAWN:	JS	PROJECT:	14608
DATE:	17.07.18	SHEET:	5 of 5
CHECKED:	AH	DRAWING No.:	14608-C01
SCALE A3:	Shown	REV:	0



Appendix B

Cost Estimates

Seawall Renewal: Option A - Concrete Piles and Revetment

Client 4sight Consulting Ltd
Project Tuahine Crescent Seawall, Wainui Beach
Location Southern End, Wainui Beach, Gisborne



Item	Description	Units	Qty	Rate	COST
1.0	Preliminary and General				
1.1	Establishment and disestablishment	LS	100%	\$10,000.00	\$10,000.00
1.2	Site clearance, remove and dispose of existing railway iron wall.	LS	100%	\$10,000.00	\$10,000.00
1.3	Excavation of beach sand down to bedrock, stockpile and respread after completion.	LS	100%	\$2,500.00	\$2,500.00
1.4	Quality control testing, reporting, preparation of as-built drawings including producer statements.	LS	100%	\$2,500.00	\$2,500.00
Total 1					\$25,000.00
2.0	Concrete Pile Wall				
2.1	Supply, transport and installation of 400mm x 400mm cast in-situ 5.3m long concrete columns @ 1.8m CRS with 0.2m thick precast concrete panel infill. Includes boring of Ø400mm holes 3m into underlying bedrock, placement of reinforcement, placement of panels, formwork and pouring of concrete.	m	50	\$1,200.00	\$60,000.00
Total 2					\$60,000.00
3.0	Revetment				
3.1	Supply, transport, and installation of rock boulders as armour layer. Boulders ranging from Ø1200mm to Ø1600mm.	m ³	220	\$220.00	\$48,400.00
3.2	Remove, stockpile and replacement of existing rock boulders as armour layer. Boulders ranging from Ø850mm to Ø1200mm.	m ³	270	\$50.00	\$13,500.00
3.3	Remove, stockpile and replacement of existing rock boulders as filter layer. Boulders ranging from Ø350-700mm (D50=Ø500mm). Includes preparation of subgrade and placement of geotextile.	m ³	220	\$50.00	\$11,000.00
Total 3					\$72,900.00
4.0	Miscellaneous				
4.1	Replant lower bank with suitable plants including turf reinforcement.	LS	1	\$5,000.00	\$5,000.00
Total 4					\$5,000.00
Total Cost					\$162,900.00
			Contingency of Engineers Estimate	10%	\$16,290.00
Total Cost Estimate					\$179,190.00

Seawall Renewal: Option B - Concrete Mass Blocks and Revetment
Client 4sight Consulting Ltd
Project Tuahine Crescent Seawall, Wainui Beach
Location Southern End, Wainui Beach, Gisborne



Item	Description	Units	Qty	Rate	COST
1.0	Preliminary and General				
1.1	Establishment and disestablishment	LS	100%	\$10,000.00	\$10,000.00
1.2	Site clearance, remove and dispose of existing railway iron wall.	LS	100%	\$10,000.00	\$10,000.00
1.3	Excavation of beach sand down to bedrock, stockpile and respread after completion.	LS	100%	\$2,500.00	\$2,500.00
1.4	Quality control testing, reporting, preparation of as-built drawings including producer statements.	LS	100%	\$2,500.00	\$2,500.00
	Total 1				\$25,000.00
2.0	Concrete Mass Blocks				
2.1	Supply, transport and installation of precast textured concrete blocks with 230mm setbacks. Includes preparation of subbase.	m ²	132	\$600.00	\$79,200.00
	Total 2				\$79,200.00
3.0	Revetment				
3.1	Excavate and key rock armour 0.5m into underlying bedrock. Excavated material to be compacted as fill beneath armour layer.	m ³	110	\$30.00	\$3,300.00
3.2	Supply, transport, and installation of rock boulders as armour layer. Boulders ranging from Ø1200mm to Ø1600mm.	m ³	200	\$220.00	\$44,000.00
3.3	Remove, stockpile and replacement of existing rock boulders as armour layer. Boulders ranging from Ø850mm to Ø1200mm.	m ³	250	\$50.00	\$12,500.00
3.4	Remove, stockpile and replacement of existing rock boulders as filter layer. Boulders ranging from Ø350-700mm (D50=Ø500mm). Includes preparation of subgrade and placement of geotextile.	m ³	100	\$50.00	\$5,000.00
	Total 3				\$64,800.00
4.0	Miscellaneous				
4.1	Replant lower bank with suitable plants including turf reinforcement.	LS	1	\$5,000.00	\$5,000.00
	Total 4				\$5,000.00
	Total Cost				\$174,000.00
	Contingency of Engineers Estimate		10%		\$17,400.00
	Total Cost Estimate				\$191,400.00

Seawall Renewal: Option C - Timber Piles and Revetment
Client 4sight Consulting Ltd
Project Tuahine Crescent Seawall, Wainui Beach
Location Southern End, Wainui Beach, Gisborne



Item	Description	Units	Qty	Rate	COST
1.0	Preliminary and General				
1.1	Establishment and disestablishment	LS	100%	\$10,000.00	\$10,000.00
1.2	Site clearance, remove and dispose of existing railway iron wall.	LS	100%	\$10,000.00	\$10,000.00
1.3	Excavation of beach sand down to bedrock, stockpile and respread after completion.	LS	100%	\$2,500.00	\$2,500.00
1.4	Quality control testing, reporting, preparation of as-built drawings including producer statements.	LS	100%	\$2,500.00	\$2,500.00
	Total 1				\$25,000.00
2.0	Timber Piles				
2.1	Supply, transport and installation of Ø300mm SED 5.3m long timber piles @ 0.9m CRS. Includes boring of Ø500mm holes 3m into underlying bedrock and pouring of concrete.	m	50	\$870.00	\$43,500.00
	Total 2				\$43,500.00
3.0	Revetment				
3.1	Supply, transport, and installation of rock boulders as armour layer. Boulders ranging from Ø1200mm to Ø1600mm.	m ³	220	\$220.00	\$48,400.00
3.2	Remove, stockpile and replacement of existing rock boulders as armour layer. Boulders ranging from Ø850mm to Ø1200mm.	m ³	270	\$50.00	\$13,500.00
3.3	Remove, stockpile and replacement of existing rock boulders as filter layer. Boulders ranging from Ø350-700mm (D50=Ø500mm). Includes preparation of subgrade and placement of geotextile.	m ³	220	\$50.00	\$11,000.00
	Total 3				\$72,900.00
4.0	Miscellaneous				
4.1	Replant lower bank with suitable plants including turf reinforcement.	LS	1	\$5,000.00	\$5,000.00
	Total 4				\$5,000.00
	Total Cost				\$146,400.00
	Contingency of Engineers Estimate		10%		\$14,640.00
	Total Cost Estimate				\$161,040.00