FW:LGOIMA - Eastern Bays Shared Path

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On Wed, Apr 13, 2022 at 04:03 PM susan.sales@huttcity.govt.nz wrote:
Kia ora Matthew

Please find attached Hutt City Council's response to your recent request for information about the Eastern Bays Shared Path.

Regards, Susan

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DETAILED BUSINESS CASE

EASTERN BAYS SHARED PATH

PREPARED FOR HUTT CITY COUNCIL

October 2017

Stantec

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QUALITY STATEMENT

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REVISION SCHEDULE

Rev No.	Date	Description	Signature or Typed Name (documentation on file)			
			Prepared by	Checked by	Reviewed by	Approved by
1	12/09/17	Draft DBC	s7(2)(a) [redacted]			
2	13/10/17	Updated DBC				
3	17/10/17	Post client review				

Executive Summary

The completion of an Eastern Bays Shared Path has been an aspiration for Hutt City Council and its residents for many years. While previous reports and concept designs have been developed for sections of the Eastern Bays, the most recent designs were dependant on the replacement of most seawalls. Many of the walls have over 20 years of remaining life making it difficult to financially justify their replacement.

This Detailed Business Case (DBC) assesses the feasibility of options that do not rely on the full replacement of the existing seawalls. Complete seawall replacements are not required, nor are economically justified, which enhances the feasibility of the project and enables the path to be delivered within a practical timeframe.

The Eastern Bays Detailed Business Case (DBC) aims to make the community's aspirations for this project a reality. A key driver for this project is to develop a safe and connected walking and cycling facility to connect communities along Hutt City's Eastern Bays, and to provide links to other parts of the network for commuting and recreation. The project forms a key part of the Te Aranui o Pōneke (the Great Harbour Way), a walking and cycling route around Wellington Harbour.

The main outcomes of the project are to improve pedestrian and cyclist safety and to increase the number of these users on Marine Drive. Stakeholders identified the additional benefit of reducing the incidences of road closures and improve the resilience of the corridor. Opportunities to enhance tourism as an outcome of the project was also recognised.

The options development process undertaken during the Indicative Business Case phase identified two factors that principally dictate the form of the proposed shared path along the Eastern Bays foreshore; facility width and seawall type. Through the multi-criteria analysis process, stakeholders agreed on a preferred width of 2.5 metres or 3.5 metres (dependent on key constraints), and the following preferred treatments at beach and non-beach locations:

- Beach location: Double curved seawall, dwarf wall, mass concrete wall,
- Non-beach location: Double curved seawall, dwarf wall, placed rock revetment

Using these preferences, the project team agreed on options for discrete sections of the corridor that optimised the outcomes sought. These options were used as a platform for consultation with the local community.

A bay by bay approach to consultation was adopted, enabling the community to attend dedicated sessions for individual bays. A community-wide open day was also organised for all members of the community to review plans and discuss options with the project team. This was followed by a final 'bay by bay' meeting where key representatives from each bay were invited to provide a collated view on vital design preferences and an agreed way forward.

The recommended design aims to provide a facility that will achieve all of the desired outcomes, while minimising and mitigating the key constraints and challenges. Where possible, a 3.5 metre shared path will be constructed, enabling pedestrians and cyclists to share the space safely. At some locations, the width has been reduced to 2.5 metres to minimise the encroachment of beaches or to accommodate obstacles such as boat sheds. However the new path will provide a substantial improvement on the current facility, and will provide a valued community asset.

The cost of the shared path is expected to be between $10 and $15 million, and will be refined as the detailed design is developed. The project BCR is expected to be in the range of 1.8-2.0. Detailed design and consenting costs are expected to be an additional $350,000 - $450,000. Approximately $9 million of funding has been allocated by Hutt City Council to deliver this project over the next six years. Subsidies are anticipated from the NZ Transport Agency and through the Urban Cycleway Fund that will also contribute to the construction of the shared path.

Hutt City Council

Eastern Bays Shared Path

CONTENTS

LIST OF TABLES

LIST OF FIGURES

APPENDICES

Part A – The case for the project

1. Background

The completion of an Eastern Bays Shared Path has been an aspiration for Hutt City Council and its residents for many years. The shared path has featured in past strategies and is a key project in providing a safe and integrated network for commuting and recreational purposes under the current strategy "Walk and Cycle the Hutt 2014 – 2019".

The project forms a key part of the Te Aranui o Pōneke (the Great Harbour Way), a walking and cycling route around Te Whanganui-a-tara, the harbour of Wellington. The proposed route links Fitzroy Bay in the east to Sinclair Head in the west.

Previous reports and concept designs have been developed for sections of the Eastern Bays. These designs were dependant on the replacement of nearly the entire length of seawalls with a modern fit-for-purpose structure proposed on the basis of resilience. In addition to providing more space to accommodate a shared path, a key outcome of the previous designs was to reflect wave energy and reduce incidents of overtopping during storm events.

However more recent seawall structural assessments have indicated that complete replacements are not economically justified, as many sections still have over 20 years' residual life. Some sections, however, are considered to have less than 5 years' life; these will be prioritised for replacement and reinstated with a modern fit-for-purpose structure.

This Detailed Business Case explores and assesses the feasibility of various shared path options that do not rely as heavily on the full replacement of the existing seawalls via resilience funding, and instead considers alternative options and funding mechanisms. This will enhance the feasibility of the project and ensure that the path can be delivered within a practical timeframe.

1.1 Project Area

The project focuses on improving the safety for pedestrians and cyclists on Marine Drive between:

- Point Howard and the northern end of Days Bay
- The southern end of Days Bay (Windy Point) to Eastbourne (Muritai Road / Marine Parade intersection)

Marine Drive is classified as a primary collector under the One Network Road Classification (ONRC) with traffic volumes of between 6,000 to 8000 vehicles per day. It is a coastal road that winds its way around headlands and bays between Point Howard and Eastbourne. The corridor provides very few safe facilities for pedestrians. Cyclists are generally not provided for and for the most part are expected to use the very narrow road shoulder or share the traffic lane. At a small number of locations, short sections of shared paths are available on the seaward side. These shared paths are predominantly located in areas where new seawalls have been constructed therefore allowing provision of this facility, or where considerable width already exists.

Days Bay is not included as part of the scope of this project as it currently provides a lower speed limit, some safe facilities for pedestrians and increased widths for on-road cyclists.

2. Problems, Opportunities and Constraints

A facilitated stakeholder workshop was held on 8 September 2016 to identify the problems, constraints and opportunities associated with providing for cycling on the Eastern Bay corridor, and the objectives and benefits of investing in the route. Representatives at the workshop included the core project team, client representatives, NZ Transport Agency representatives, as well as community group representatives. The key outputs from the workshop are provided below.

2.1 Problems and Opportunities

The project team and stakeholder representatives identified and agreed on the following two key problems and one opportunity for the corridor:

- **Problem 1:** Safety of current path and lack of separation prevents walking and cycling and the subsequent health, environmental and economic effects.
- **Problem 2:** Current facility is at increasing risk of closure and damage from storms and sea level rise and there is no alternative route.
- **Opportunity 1:** The upgrade of the Eastern Bays Shared Path has the opportunity to reinvigorate and enhance the Eastern Bays tourist economy by attracting visitors including long distance cyclists.

The evidence to support each of these statements was provided in the original Indicative Business Case, which was prepared in December 2016. There have been no changes since the IBC report was developed to influence the problems and opportunities, therefore they remain current and valid.

The NZ Transport Agency has made changes to investment decision making however, and now require a gap assessment of Customer Levels of Service (CLoS). The CLoS defines the expectations for what the customer will experience when using the transport system for their journey. The CLoS benchmark measures are applied using the One Network Road Classification (ONRC). A gap assessment of the performance of the corridor against key CLoS criteria has been developed for Marine Drive, a primary collector route, and is provided in Table 2-1 below.

Table 2-1: ONRC Customer Levels of Service (CLoS) Gap Assessment

Criteria		Level of Service Benchmark –Primary Collector	Assessment (Significant gap / Identified gap / Achieved)
Mobility	**Travel time reliability**	Generally road users experience consistent travel times except where affected by other road users (all modes) or weather conditions	Reliability is generally consistent, however weather conditions including storm surge incidents can result in road closures, damage or obstructions impacting on travel time reliability.
	Resilience	Route is nearly always available except in major weather events or emergency event and alternatives may exist. Clearance of incidents affecting road users will have a moderate priority, Road users may be advised of issues and incidents	Route is not available for all roads users. Sections of the corridor require pedestrians and cyclists to walk/ride on the carriageway or within a narrow shoulder. In addition, major weather events may result in road closure or damage. No alternative route is available for access to these coastal communities.
	Optimal speeds	Travel speeds depend on assessed level of risk and recognise mixed use, schools, shopping strips and concentration of active road users	Pedestrians and cyclists must share the road along the sections of the corridor, meaning there is a substantial speed difference between road users. Mixed use of the road corridor increases the safety risk to vulnerable road users.
Safety		Variable road standards and alignment. Lower speeds and greater driver vigilance required on some roads/ sections particularly depending on topography, access, density and user. Active road users should expect mixed use environments with some variability in the road environment, including vehicle speed. Road user safety guidance provided at high risk locations.	Walking and cycling on Marine Drive is perceived as unsafe or very unsafe by the community. While the crash data does not demonstrate a substantial safety risk, the current standard of infrastructure on the corridor is considered a deterrent to use.
Amenity		Moderate level of comfort, occasional areas of roughness. Aesthetics of adjacent road environment reflects journey experience needs of all roads users and adjacent land use. Urban collectors reflect urban fabric and contribute to local character. Specific provision where active road users present. Clean, safe and secure.	The adjacent coastal road environment has high amenity value, however inconsistent provisions are made for pedestrians and cyclists on Marine Drive. For sections of the corridor, no pedestrian or cycle facilities are available, and these users must use the shoulder or share traffic lanes for access.
Accessibility		Active road users should expect mixed use environments with some variability in the road environment, including vehicle speed. Parking for all modes and facilities for mobility impaired at activity centres.	Pedestrians and cyclists must share the road for sections of the route. This is unsuitable for pedestrians and many cyclists.

A significant gap is defined by a level of service that is significantly underperforming in at least one key aspect, resulting in a performance lower than its classification. The assessment provided in Table 2-1 demonstrates four significant gaps in the Customer Level of Service for a Primary Collector road. These gaps are primarily a result of the inconsistent provision for pedestrians and cyclists. However Marine Drive also experiences occasional road closures and delays as a result of storm surges and overtopping. The resilience of the corridor is poor given that there are no alternative access routes in the event of a road closure.

2.2 Issues and Constraints

The key driver for this project is to develop a safe and connected walking and cycling facility to connect communities along Hutt City's Eastern Bays, and to provide links to other parts of the network for commuting and recreation. Currently, pedestrians and cyclists are especially vulnerable as there are few dedicated facilities for walking or cycling. For the most part, cyclists and pedestrians must use the shoulder, which is very narrow or non-existent in sections. Small sections of shared paths have been created in areas where new seawalls have been constructed, or where considerable width already exists such as at headlands.

The road and shoulder width varies significantly over the corridor. Where additional width is provided, the space is often allocated to parking, which is often highly valued and can be challenging to remove.

Marine Drive is a primary collector road that carries up to 8,000 vehicles per day. The coastal road winds its way around several headlands and bays between Point Howard and Eastbourne, and provides the only road access to the residential eastern bay suburbs. The speed limit on the route varies between 50km/h to 70km/h. The corridor also supports a frequent bus route, providing a service between Eastbourne, Petone and Wellington.

The function, character and demand placed by various road users on this corridor poses challenges and constrains the feasibility of various options. This is exacerbated by further issues as identified below including environmental and amenity concerns, resource management requirements, and storm water and geotechnical constraints. Therefore a solution that seeks an optimum outcome in light of the numerous and often competing constraints will require some compromises.

2.2.1 Economic

Potential economic losses to the community may be associated with the loss of parking in some areas. However the construction of a connected shared path is also seen as an economic opportunity that is likely to attract visitors and enhance the area. New walls also offer improved protection against overtopping and storm surges, providing economic benefits as a result of reduced road closures and reduced maintenance and damage.

The costs of constructing the shared path and new seawalls also incurs direct costs. The residual life of the existing seawalls varies between >5 years to >80 years; replacing sections that have limited remaining life is more cost-effective (and may already be included within projected capital works upgrades) than replacing sections that do not currently require it. Maintenance costs of a newer asset are also likely to be less than the ongoing maintenance of the existing older assets.

While some sections of seawall have significant remaining life, the available carriageway width is insufficient to provide dedicated walking and cycling facilities. These sections may need to be rebuilt to accommodate the shared path. The amount of funding available means that the construction of the shared path will need to be staged over a number of years. Prioritising areas of delivery will consider the age of the seawall, as well as other factors including safety (or perceived safety), coherence and connectivity.

2.2.2 Social

The shared path provides mostly positive social outcomes, and are considered benefits of the project, rather than constraints. The path is expected to enhance community cohesion, provide amenity benefits, transport choices and improve access to local facilities along the corridor. However residents have expressed concern regarding the loss of beaches and street trees, which are highly valued by the community. Mitigation and minimisation of these losses form a key component of option development and selection.

Loss of parking to provide the facility will also have an adverse social impact to those that use the provision currently. Parking loss will be minimised or mitigated wherever possible during the design process.

2.2.3 Environmental

Sections of the coastal area along the foreshore provide a rich habitat for aquatic and terrestrial flora and fauna. A survey of little penguin nesting sites on the seaward side was completed in November 2016; a landward survey is due to be completed in October 2017. Treatment options that retain access for penguins will be determined through the detailed design and Assessment of Environmental Effects processes. Overhanging walls such as single and double curve walls pose a barrier to penguins, whereas rock revetment is suitable for penguins, but less suitable for inter-tidal flora and fauna. However revetment results in greater habitat displacement, including the loss of beaches and wading zones for other avifauna.

Trees form an iconic part of the landscape and are often a highly valued natural asset. There are few trees on the seaward side of Marine Drive, and preferred options seek to avoid the removal of most street trees. The "Atkinson Tree" is located on the seaward side of York Bay and has local importance. Any trees that do require removal will need to justified and replacement planting is likely.

2.2.4 Resource management

The encroachment of the shared path within the coastal environment, as well as other construction activities will trigger consenting approvals, as required under the Resource Management Act and other related legislation. The project will need to be assessed against the rules and requirements of key policy statements and plans that generate consent requirements including:

- New Zealand Coastal Policy Statement
- Regional Policy Statement for the Wellington Region
- Regional Coastal Plan
- Proposed Natural Resources Plan
- Hutt City District Plan
- National Environmental Standard for assessing and Managing Contaminants in Soil to Protect Human Health.

2.2.5 Sea level rise

Marine Drive provides the only access to coastal communities on the Eastern Bays. It is low lying and the road can be inundated by storm surges and wave overtopping. The community has expressed concern about the resilience of the corridor in light of expected sea level rises and increased storm intensity and frequency. While the focus of this project is to provide a shared walking and cycling path, the multi-criteria analysis process considered the future proofing and resilience benefits of each option. The proposed seawall treatments offer some storm surge and flood defence benefits and the preferred designs enable future upgrades (by allowing walls that can be increased in height and sea levels rise in future).

However, it is important to note that this project is not intended or designed to be a solution for sea level rise for the Eastern Bays. The proposed seawall treatments would have some flood defence benefits and the design would enable future upgrades. However, the overall issue of resilience and sea level rise is a wider, much larger conversation for which Hutt City Council has developed the Environmental Sustainability Strategy 2015 – 2045. This Strategy is currently being developed further with the intention being to translate the Strategy into a programme of works for future years.

2.2.6 Maintenance

No reseals are planned in 2017/18 on Marine Drive, and the programme for future years is yet to be developed.

2.2.7 Storm water

The construction of the shared path will have minimal impact on storm water flows. Overland storm water will continue to flow across the corridor and drain into the sea. The additional width will likely feature the same cross fall as the road corridor, and separators between the shared path and carriageway will feature breaks between them.

Underground storm water pipes will require extensions where seawall treatments are proposed to create additional corridor width. The locations of the storm water pipes have been identified as part of the topographical survey; during detailed design cross sections will be developed to accommodate the pipe extension within the seawall treatment.

2.2.8 Geotechnical

Excavation within the tidal zone is necessary where the toe of a seawall is to be embedded into the substrate; this is a requirement for the construction of double curve walls, boardwalks, and dwarf walls. The base of revetment treatments may also need to be buried, requiring some excavation of the surface.

A complete analysis and review of the surface and substrate geological conditions has been undertaken (refer to Appendix A). From this report, design parameters have been developed based on the geological conditions and substrate at each location. These parameters will be standard for each wall type based upon the underlying bearing capacity.

Working within the tidal zone poses constraints on construction zones and concrete pours. Shoring will be required at some locations to enable construction to take place in a timely and environmentally acceptable manner. The location, type and depth of shoring to be used will be determined by the consent condition and construction methodology. Alternatively, pre-cast structural elements could be considered, although these are not expected to be as practical for construction in this environment given the lack of uniformity in the type of profile of the existing seawall.

2.2.9 Services and utilities

Multiple services and utilities are located within or adjacent to the Marine Drive road corridor including:

- Water, waste water and stormwater services (Hutt City Council)
- Telecommunications (Chorus, Spark and Vodafone)
- Gas (PowerCo)
- Electricity (Wellington Electricity)

Street lighting columns and power poles are located along the corridor. Mahina Bay and Sunshine Bay feature power or lighting poles located on the seaward side of the road. Street lighting columns may be shifted to the opposite side of the road, however power may need to be relocated or undergrounded.

The location and depths of each service will be identified through the detailed design phase to confirm the services that will be impacted by the shared path work, including those that need to be relocated. However, it is not anticipated that many services, beyond the aforementioned power poles and lighting columns, will require any works as part of this project.

3. Project Outcomes

The investment objectives developed at the Indicative Business Case stage define the desired outcomes of this project. The investment objectives have been derived from the benefit statements that were developed by stakeholders at the initial project workshop. Table 3-1 below provides a summary of the agreed benefits, as well as the parameters that define the investment objectives. These investment objectives formed part of the multi-criteria analysis to assess each of the potential design options

Table 3-1: Project benefits and investment objectives

Benefit	Investment Objective			
	Measure	Baseline	Target	By When
To improve safety for pedestrians and cyclists	By increasing the perception of safety, as measured by the community survey	From 34% in 2014	To 50%	By 2019

Benefit	Investment Objective			
	Measure	Baseline	Target	By When
To increase the numbers of pedestrians and cyclists	Increasing numbers of pedestrians and cyclists, as measured by daily counts	From approx. 125[1] per day in 2015	To 250 per day	By 2019
To increase the availability of the route	By reducing the total number of hours the road is swept (response / emergency sweeping only)	From 81 hours (5 year average, per year)	To 70 hours per year (average)	By 2021 (3 year rolling average, per year)

4. Options Development

The options development process undertaken during the Indicative Business Case identified two factors that principally dictate the form of the shared path along the Eastern Bays foreshore. The first factor was the preferred facility width that would accommodate pedestrians and cyclists along the route. The second factor was the types of seawalls and reclamation methods that could be used to gain width where there is currently insufficient width. A description of the process and recommended options are summarised below.

4.1 Facility width

A key output of the Indicative Business Case was to identify the most suitable width for the shared path. From this the specific treatments options to achieve this width can be considered. The IBC identified five potential options:

- Option 1 – Only replace seawall with less than 5 years remaining life. This is the 'do-minimum' option and is considered as a baseline for assessment only.
- Option 2 – 1.5 metre wide facility. This is considered as the lowest standard facility and an 'absolute minimum' option.
- Option 3 – 2.0 metre wide facility. This option is slightly wider than the minimum consideration but still less than providing the ideal level of service for users.
- Option 4 – 2.5 metre wide facility. Achieves the minimum standard for a shared path.
- Option 5 – 3.5 metre wide facility. A wider path that achieves the desirable minimum requirement for a recreational shared path

A multi-criteria analysis process was used to assess the five options, where options were scored against a number of factors including safety, resilience, upgrade potential, consentability and beach impact. Options 4 and 5 were favoured through this process. Feedback through community consultation and alignment to the investment objectives also reinforced the two preferred options.

While it is desirable to only assess one option through a DBC, there was no clear distinction between the two options. As a result, both options have been considered, allowing a combination of widths to be applied. Constructing a path of consistent width along the corridor is generally preferred, however the two options provide the opportunity to alter the width of the path at beaches and sensitive locations, or where there are expected to be higher number of pedestrians.

4.2 Treatment Options

A team of engineers and designers identified 12 potential seawall options that would provide additional corridor width to accommodate a shared path. Four of these options were rejected during the assessment, mostly due to limited scope for application along the corridor or lacking durability within a coastal environment. The eight remaining feasible options for further consideration were:

[1] AM peak period cycling volumes have been input to the NZTA formula which gives an estimation of cyclist AADT being 77. Peak period pedestrian counts (17 users) have also been used to give an approximate existing use of a total of 125 cyclist and pedestrian users per day.

- Carriageway Reallocation[2]
- Placed Rock Revetment
- Double Curved Seawall
- Single Curved Seawall
- Vertical Cantilevered Concrete Wall
- No Fines Concrete Blocks
- Mass Concrete to Existing Pitched Seawall
- Dwarf Mass Concrete Wall

5. Preferred Project Option

Assessment of the eight remaining options was undertaken through workshops with specialists and stakeholders on 22 June and 6 July, 2017. Workshop participants developed and agreed on the criteria and weighting of the criteria to assess each of the options. These criteria included factors that related to the RMA, as well as the social, environmental, cultural and economic impacts of the project. It was agreed that assessments be undertaken separately for beach and non-beach locations, as the preferred treatment options for the two locations are likely to differ. Through the multi-criteria analysis of treatment options (refer to Appendix B), the following scores were allocated to the wall type options (with a score of 1 being best / least problematic and 5 being worst / most problematic):

Table 5-1: MCA Scoring: Wall types for BEACH

	Consentability	Cultural	Visual	Effect on Natural Character	Upgrade Potential	Terrestrial and Avifauna Ecology	Penguins	Intertidal ecology	Urban Design opportunities	Coastal Processes	Durability	Cost
Revetment	FATAL FLAW											
Vertical Cantilever	3	3	4	4	2	3	5	3	2	3	2	3
Mass Block	3	3	3	3	2	3	5	3	3	3	2	3
Dwarf Wall	3	3	2	2	2	3	5	3	2	3	2	2
Mass Concrete	3	3	3	3	4	3	5	3	3	3	3	2
Curve (Single or Double)	3	3	2	2	2	3	5	3	1	3	2	3
Boardwalk	2	3	2	2	5	3	5	2	3	3	4	3
Boardwalk & Revetment	FATAL FLAW											

[2] Carriageway reallocation has been deemed unsuitable as a major treatment strategy due to there not being sufficient road width / space available in many locations. Reallocation will still be considered for localised sections where there is sufficient width to do so, provided that it does not result in unacceptable consequences (such as the tightening of road curvature or creating driveway access difficulties for residents).

Table 5-2: MCA Scoring: Wall types for NON-BEACH

	Consentability	Cultural	Visual	Effect on Natural Character	Upgrade Potential	Terrestrial and Avifauna Ecology	Penguins	Intertidal ecology	Urban Design opportunities	Coastal Processes	Durability	Cost
Revetment	3	3	3	2	3	4	1	3	3	3	2	1
Vertical Cantilever	3	3	3	4	2	3	5	3	2	3	2	3
Mass Block	3	3	3	3	2	3	5	3	3	3	2	3
Dwarf Wall	3	3	2	2	2	3	5	3	2	3	2	2
Mass Concrete	3	3	3	4	4	3	5	3	3	3	3	2
Curve (Single or Double)	3	3	2	2	2	3	5	3	1	3	2	3
Boardwalk	3	3	3	3	5	3	5	2	3	3	4	3
Boardwalk & Revetment	3	3	4	4	5	4	2	2	4	4	4	2

Once scoring was completed by the group and agreed, a number of different weighting systems for the different criteria were applied which resulted in the following preferred treatments being identified for beach and non-beach locations:

- Beach location: Curved seawall, dwarf wall[3], mass concrete wall
- Non-beach location: Curved seawall, dwarf wall, placed rock revetment

It was also noted that in some specific locations carriageway re-allocation could still be used in conjunction with the above treatments to reduce encroachment into beach areas.

More detail on the MCA scoring and outcomes can be found within Appendix B.

Using the preferred treatment options and recommended facility widths, the project team systematically worked through each section of the corridor, as a group in a workshop environment, and agreed on an option that optimised the outcomes sought whilst minimising impacts.

This was an organic process that was undertaken through group discussion with the client and design team, the expert advisor group and community group representatives.

The selected wall type for each location and notes from the group during the wall placement workshop process is contained within Appendix B. It should be noted that this was not a 'final' decision, but the suggested wall type (or types) and widths that should be consulted on given the site conditions at that location and opinion of the expert group.

[3] Note the dwarf wall option is only appropriate for locations where there is minimal height difference between the road and beach/rock platform.

At several locations, more than one option was developed for the shared path as it was determined that multiple options would be possible and community feedback could help decide which as preferred.

For all locations it was agreed that it would be essential to seek input from the local community and potential path users before any decision was made; however it was deemed appropriate to go to the community with options to help stimulate the engagement process and also to rule out clearly inappropriate solutions early.

Alternatives included several different solutions to manage challenges or constraints along the corridor; or where multiple options achieve the same outcome, but with varying benefits or costs. The project option design maps (including areas highlighting multiple different option variants) that formed part of the public consultation process are provided in Appendix C.

6. Community Consultation

A detailed description of the community consultation process, results and feedback received is provided in Appendix D, "Consultation Report – Eastern Bays Shared Path". A summary of the consultation activities that were undertaken, as well as key themes, results and outcomes is provided below.

6.1 Process

A series of meetings were held in August 2017 to obtain input from the community on the two path width options (2.5 metres and 3.5 metres). Feedback on seawall options and treatments for more sensitive areas around beaches was also sought. The consultation process adopted a 'bay-by-bay' approach, with dedicated sessions for individual bays, focussing on the key issues faced by each bay along the corridor.

A community-wide open day was also organised to provide an opportunity for all members of the community to review plans, provide feedback and meet with members of the project team to discuss the shared path project. This was followed by a final 'bay by bay' feedback meeting to allow representatives from each bay to provide feedback to the project team. Representatives from each bay attended and stated the general consensus of the preferred treatment and key design details for each bay.

Table 6-1: Community consultation activities

Meeting	Venue	Date and time
Lowry Bay	Eastbourne Library	8 August 2017
York Bay	Eastbourne Library	10 August 2017
Point Howard	Point Howard Tennis Club	15 August 2017
Mahina and Sunshine Bay	502 Marine Drive	16 August 2017
Days Bay and Windy Point	The Pavilion	17 August 2017
Open Day	Eastbourne Library	26 August 2017
Bay Feedback Meeting	Eastbourne Library	28 August 2017

The community was also invited to submit written feedback, and an online survey was developed and made available on the Hutt City Council website. The survey and summary of results is provided in the consultation report provided in Appendix D.

6.2 Issues and key themes.

Meetings were held with each bay community to meet and discuss issues specific to the respective bay. The meetings also provided an opportunity for the project team to update people about the project and give an overview of the current situation. Attendees were invited to highlight their views and preferences onto maps and plans. A summary of the key themes and issues discussed at the community meetings is provided in Table 6-2.

Table 6-2: Key themes from bay meetings

Meeting	No. attendees	General Themes
Lowry Bay	15	Speed limit Beach Access Wider 3.5m option Concern toward Boardwalk Sea level rise
York Bay	29	Beach encroachment Narrower 2.5m option Beach access Penguins Bus stop/Atkinson tree
Point Howard	18	Parking facilities Sea level rise Beach access Safety guardrail Road speed Variable widths
Mahina & Sunshine Bay	8	Beach access
Days Bay/Windy Point	25	Beach movement/erosion Beach encroachment Linked walkways Beach access Penguins Integration of path between bay Safety hazards
Open Day	70	2.5m width for beaches 3.5m width for non-beach areas Beach encroachment Beach access Penguins Safety guardrail/barriers

6.3 Feedback Meeting

A follow up meeting held by the Eastbourne Community Board was conducted to enable each bay representative to present a collated view on vital design preferences. The purpose of this meeting was to provide an agreed and firm position on the preferred way forward, rather than a multitude of different or conflicting views. The project team specifically sought a clear direction on the following design aspects:

- Wall type
- Path width
- Barrier
- Beach access
- Trees
- Bus stops

A summary of preferred design responses for each bay is provided in Table 6-3.

Table 6-3: Preferred design response for each Eastern Bay community

	Wall Type	Path width	Barrier	Beach Access	Trees	Bus stops	Other
Point Howard	No preference	2.5m at beach 3.5 non-beach area	Bollards	Retain access, but improve ramp gradient	n/a	No change	Path between beach and car parks
Lowry Bay	Dwarf mass concrete preferred Support revetment	2.5m at beach 3.5 non-beach area		Retain access and place additional accesses to align with adjoining roads	n/a	No change	Build asap
York Bay	Double curve north of bus stop Single curve or dwarf wall to the south	2.5m or less Widening to remain with footprint of existing wall		Dwarf wall may improve beach access	Conflicting views on Atkinson tree. Preference to lose tree rather than encroach beach	Can be moved	Boat ramp can be moved Urban design important Uncertainty of groyne benefits
Mahina/ Sunshine Bay	Support for proposed wall (double or single curve)	2.5 m	Can remove crash barrier	Retain access	Retain	Support moving shelter, but for structure to be reused	
Days Bay/ Windy Point	Curved wall preferred	No preference	Prefer no fence or barrier	Retain ramp/ slipway for penguin access	n/a	n/a	

6.4 Outcomes

Many of the issues raised through the feedback process have been taken on board and incorporated into the preliminary design. Similarly, the vast majority of the 'bay by bay' feedback received has been included in the design.

Residents will be provided with an additional opportunity to submit or comment on the detailed proposal through the resource consent process instigated by Hutt City Council and Greater Wellington Regional Council. Further, there is a clear commitment by the client and project team to maintain the high levels of engagement and community involvement through the detailed design process to ensure a high quality outcome that satisfies the community's requirements.

7. Recommended Option - Assessment

Through the assessment and shortlisting of preferred options, and consultation with stakeholders and the community, a recommended option has been determined. This option meets the intended outcomes and project benefits sought, while aiming to address and mitigate some of the key challenges and constraints that were identified during option development and consultation. Refer to Appendix E for the recommended option concept plans.

The final preferred option following public engagement is as follows:

Table 7-1: Recommended option details

Station	Bay Location	Wall Type	Width	Comments
520-610		No wall works	3.5m	Path to connect to existing shared path
610-650	Point Howard	No wall works	3.5m	Retain car parking
650-700	Point Howard	Revetment	3.5m	Retain parking and bus stop
700-820	Point Howard	Curve	2.5m	Beach
820-1000	Point Howard	Curve	3.5m	
1000-1070	Sorrento Bay	Curve	2.5m	Beach
1070-1120		No wall work	2.5m	
1120-1140		Curve		
1140-1160		No works		
1160-1300	Lowry Bay	Revetment	3.5m	Major storm surge impact
1300-1360	Lowry Bay	Curve	3.5m	
1360-1550	Lowry Bay	Curve	2.5m	Beach
1550-1750	Lowry Bay	Dwarf	2.5m	Beach
1750-1800	Lowry Bay	Curve	2.5m	Beach
1800-1960		Curve plus revetment	3.5m	

Station	Bay Location	Wall Type	Width	Comments
1960-2190		No wall works	3.5m	Whiorau Reserve
2190-2240		Revetment, or single curve plus revetment	3.5m	
2240-2400	York Bay	Curve	3.5m	
2400-2560	York Bay	Curve	2.5m	Further assessment of realigning road needed
2560-2870	York Bay	No wall works	3.0-3.5m	Existing section of new path / curved seawall
2870-2910		No wall works	3.5m	
2910-3020	Mahina Bay	Revetment	3.5m	Major storm surge impact
3020-3340	Mahina Bay	Curve	2.5m	Beach
3340-3400	Mahina Bay	Curve	3.5m	
3400-3440		Revetment	3.5m	
3440-3470		No wall works	3.5m	
3470-3680		Curve	3.5m	
3680-3910	Sunshine Bay	Curve	2.5m	Beach
3910-4000	Sunshine Bay	Revetment	3.5m	Replacement of existing 'temporary' revetment
4000-5000	Days Bay	No wall works	N/A – no path through Days Bay	
5000-5500		Curve	3.5m	

The preferred option detailed above has been amended and refined in a number of locations from the option that was consulted upon due to community feedback. The above table can be compared to the information contained in Appendix B to provide a detailed understanding of the changes that have been made following consultation. Broadly, the key changes are that generally the path is proposed to only be 2.5m wide through any beach locations, some additional areas of revetment have been added and there was almost no support from the community for a boardwalk solution anywhere along the corridor (hence removal).

7.1 Outcomes

The key outcomes of the project are to improve pedestrian and cyclist safety and to increase the number of these users on the corridor. Stakeholders identified the additional benefit of reducing the incidences of road closures and improve the resilience of the corridor. Opportunities to enhance tourism as an outcome of the project was also recognised.

The recommended project option aims to provide a facility that will achieve all of the desired outcomes, while minimising and mitigating the key constraints and challenges outlined in Section 2.2. Where possible, a 3.5 metre shared path will be constructed, enabling pedestrians and cyclists to share the space safely. At some locations, this width has been reduced to 2.5 metre to minimise the encroachment of beaches or to accommodate obstacles such as boat sheds. However the new path will provide a substantial improvement on the current facility, and will provide a valued community asset. The outcomes of the project are expected to be achieved as there is strong community support for the project; a 2014 community survey identified completion of the shared path was the most important issue for Eastbourne residents.

Table 7-2: Recommended option performance against investment objectives

Benefit	Investment Objective		
	Measure	Baseline & Target	Expected Outcome
To improve safety for pedestrians and cyclists	By increasing the perception of safety, as measured by the community survey	From 34% to 50%	Achievement of continuous separated shared path facility for extent is expected to at least achieve target in safety perceptions (of respondents stating the facility is safe or very safe)
To increase the numbers of pedestrians and cyclists	Increasing numbers of pedestrians and cyclists, as measured by daily counts	125 to 250 per day	Economic evaluation has calculated an additional 200 new users.
To increase the availability of the route	By reducing the total number of hours the road is swept (response / emergency sweeping only)	From 81 hours to 70 hours per year	Currently only 14% (700m) of the seawall is redirective. With proposed solution, around 3km will be redirective or revetment, both of which will reduce incidence of material being deposited on the road, and the extent / duration of sweeping

7.2 Implementability

This section considers the mechanics of delivery, and complexity of the project. It considers whether the project is deliverable from a technical and operations perspective, and whether statutory requirements can be achieved.

7.2.1 Statutory requirements

The construction and coastal encroachment of the Eastern Bays Shared Path involves several components that may trigger the need for a consent, including:

- The construction of new seawalls
- The addition to or alteration of the existing seawalls
- The placement of rock riprap to protect the seaward side of the seawalls
- Encroachment onto the foreshore
- Occupation of land or foreshore/seabed by the shared path and its various support structures
- Potential disturbance of or damage to sites and features of ecological, heritage or archaeological value
- Earthworks, including the disturbance of the foreshore, to enable the construction of the seawalls and other support structures
- Ancillary discharges associated with the construction of the seawalls.

Due to the scale and complexity of this project, a separate consenting strategy has been developed; refer to Appendix F: Eastern Bays Shared Path – Consenting Scope. The purpose of the consenting strategy is to ensure:

- The purpose, relevant principles and requirements of the Resource Management Act 1991 (RMA), are achieved, with a focus on the Regional Coastal Plan for the Wellington Region and the Proposed Natural Resources Plan;
- The project's environmental effects are properly scoped, appropriately assessed and effectively managed;
- The consent processes are appropriately aligned with the future staging of the project;
- The consent applications are developed in a manner that takes into account that the consent outcomes need to:
  - Be practicable to implement; and
  - Provide for contractor flexibility and innovation.

Note that the consenting strategy relates to those approvals required under resource management and other related legislation; it does not address Building Act requirements or engineering approvals which may be required at a later stage in the project.

7.2.2 Geotechnical investigation

A geotechnical investigation was undertaken to provide preliminary geotechnical guidance for the proposed sea wall foundations. The report titled, "Eastern Bay Shared Path – Geotechnical Factual and Interpretive Report" was prepared by Stantec, and is provided as an Appendix to this DBC (Appendix A). The purpose of the report was to:

- Characterise the subsurface geological, geotechnical and hydrogeological conditions in the area of Eastern Bays; and
- Identify, describe and investigate geotechnical hazards relevant to the project elements.

Geotechnical field investigations comprised of bore holes and cone penetration tests to determine the underlying ground conditions and potential geotechnical risks. Laboratory testing of bore hole samples was also undertaken; results from these tests are provided in the aforementioned geotechnical report.

The construction of the shared path relies on a seawall that can be founded in a substrate that provides adequate bearing capacity and avoids scouring. Given the varying geology and base material along the foreshore, the report identifies key design parameters that should be adopted based on the anticipated material types exposed during construction.

The design parameters have been established to define the recommended depth of foundation required for seawall construction along the length of the route, based on an appropriate bearing capacity for a shared path facility in this environment (and subject to potential accidental motor vehicle loading).

7.2.3 Structural design

An assessment of the various types of seawall treatments was undertaken prior to consultation, resulting in three seawall types considered appropriate for beach locations and non-beach locations (refer to Section 4.2). A boardwalk option was also consulted on in two locations as a possible option but was not favoured by the community and ultimately discarded.

Standard cross sections for each of the five proposed wall types have been developed, as shown in Figure 7-1 below. These will be developed further during the detailed design stage and align with the features and dimensions of the construction location, together with specific design where required (for example with revetment to respond to the particular wave climate in a specific location).

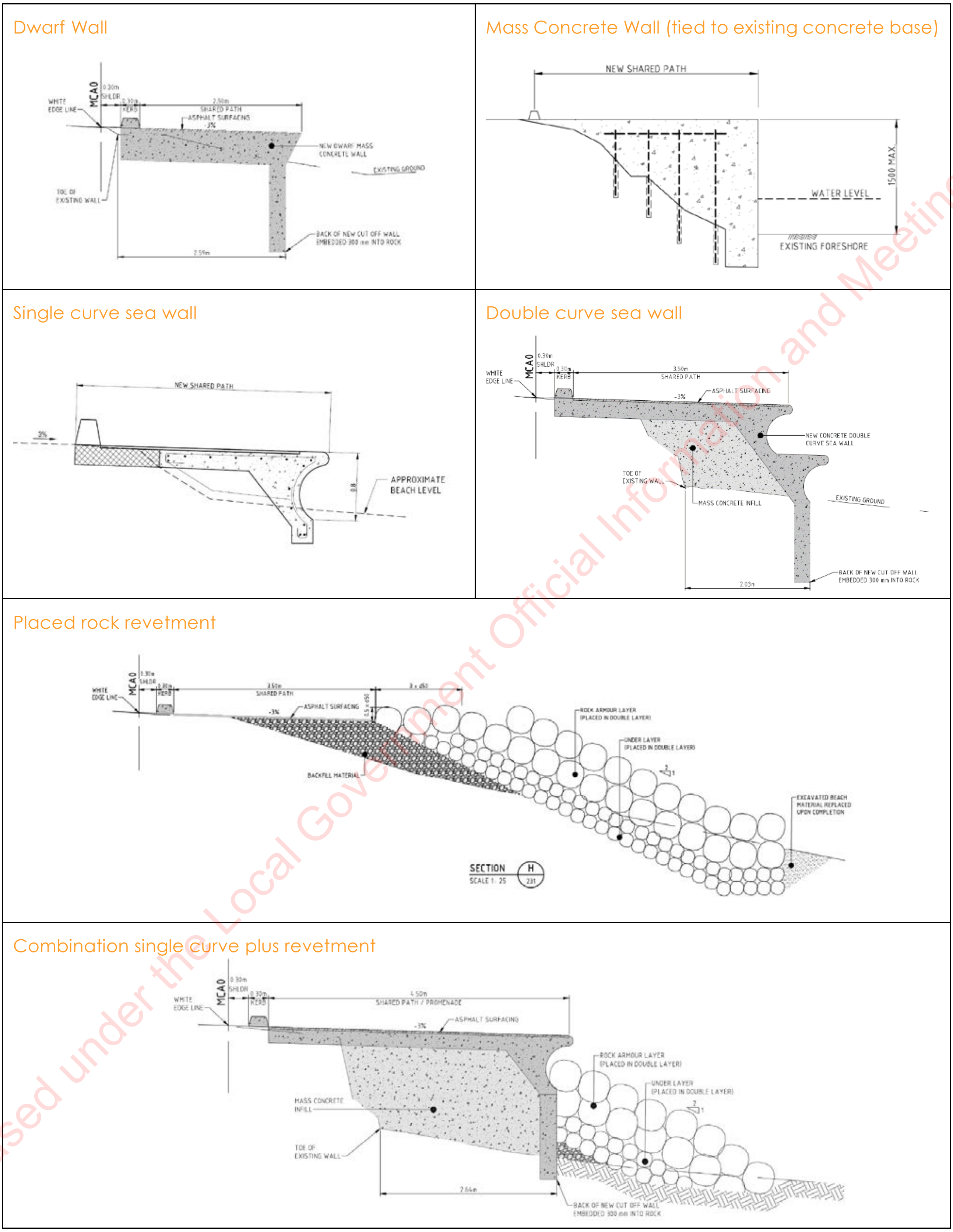

Figure 7-1: Typical cross section for each type of seawall treatment option[4]

[4] Note that a mass concrete wall cross section has not been prepared, as there are no sites where this seawall type is considered as the preferred option.

7.3 Constructability

Disruption during the construction of the shared path will be inevitable, as temporary traffic management and lane closures will be necessary to construct the seawalls and shared path. Providing access for construction vehicles, and minimising the impact for all road users and the community will be imperative. A traffic management plan (TMP) will be developed identifying how temporary access for all modes will be provided, which will require approval from Hutt City Council. A widespread media campaign will also be developed to ensure the changes and anticipated delays during construction are communicated with the community.

An assessment of the benefits of using pre-cast slabs for seawall construction versus casting concrete insitu was assessed, and concluded that an insitu solution was preferred. Insitu concrete offers a better solution from a constructability perspective, particularly in respect to the length of the project and the horizontal and vertical construction challenges associated with this site, given a lack of uniformity. Insitu concrete was used for the York Bay seawall and has performed well. While there are benefits associated with a precast solution, they are generally focussed on speed of construction and surface finishes. For a project that has the potential to present significant challenges during construction a highly adaptable method of construction is of paramount importance. This flexibility is only achieved with insitu construction.

Given the scope of works proposed and expected budget availability, completion of the shared path is expected to take several years. Construction will therefore be staged, however the delivery schedule has not yet been determined. Once the detailed design is finalised, the cost of the works and annual funding allocations can be determined, which will subsequently drive the programme of works. However the prioritisation for programme delivery is expected to consider safety, residual life of any existing seawalls, frequency of overtopping, as well as coherence and connectivity.

7.4 Operability

Minor changes to the operation of Marine Drive are inevitable following the construction of the shared path. The key changes include parking supply, bus stop locations and provision for on-road cyclists.

7.4.1 Crossings

The separators between the shared path and traffic lane (the form of which has yet to be determined) will feature regular gaps, providing space for pedestrians and cyclists to cross to the landward side. At the southern extent of the path, a transition point will be provided for southbound cyclists to cross the carriageway and continue their journey, albeit on the traffic lane and shoulder. Pedestrians have access to a board walk along the shoreline at Days Bay.

At the northern extent of the works, an existing shared path currently terminates at the Seaview Terminal at Point Howard on the seaward side. The new shared path will be integrated into the existing path, and pedestrians and cyclists will not need to cross the carriageway.

An existing zebra crossing at Point Howard provides the only formal crossing point within the scope of works. No additional formal crossing points are proposed for this project.

7.4.2 Refuse collection

There are no residential or commercial properties on the seaward side of Marine Drive within the scope of this project, hence refuse truck access is not required.

7.4.3 Parking

A number of informal parking bays have been established where there is additional shoulder width available. In some locations, this shoulder width will be reallocated to provide for the shared path, reducing the extent of beach reclamation and minimising changes to the shoreline. Some seaward parking spaces will be lost, however improvements to the remaining parking areas are proposed. Parking areas will be formalised and perpendicular spaces will be reoriented to parallel parking, providing safety benefits for road users, and maximising the parking space numbers in the available space.

7.4.4 Bus operation

Marine Drive is serviced by bus routes 81, 83 and 85, linking Eastbourne to Wellington CBD via Petone (route 85 also services Lower Hutt). Each weekday there are 95 bus movements on the corridor, with buses operating between 6am and 11pm. No changes to the bus route or frequency of buses will be required, however minor modifications or relocations to some bus stop locations are proposed. For example, it is proposed to move the bus stop at Mahina Bay fifty metres south, to avoid further encroaching onto the useable beach space at this bay.

Potential conflicts of shared path users at bus stops will need to be managed. Treatment types vary at each bus shelter; ideally the shared path will be diverted behind the bus shelters, however this is not possible at all locations. Linemarking and signage will be used to highlight areas of potential conflict to minimise the safety risk. However the proposed shared path along the foreshore will substantially improve pedestrian safety and access to and from the bus stops along the route for visitors and local residents.

Any movement of bus stops, or redesign of shelters will need to be approved by Greater Wellington Regional Council.

7.4.5 On-road cyclists

While the aim of this project is to provide a safe and connected walking and cycling facility, it is inevitable some cyclists will continue to ride on Marine Drive. Given the challenges and constraints in obtaining the additional width for the shared path, it is not feasible to provide further width for on-road cycling. As such, more confident cyclists will need to use the traffic lane or the shared path, which is not considered to be an issue.

7.4.6 Side friction

Most intersections linking to Marine Drive are located on the landward side of the corridor, minimising the conflict between turning vehicles and shared path users. However there are a few isolated locations where vehicles will need to cross the shared path. These include:

- Lowry Bay - parking area and boat ramp at the Whiorau Reserve at the southern end of Lowry Bay
- Point Howard – cyclists must cross both legs of a loop road access to Point Howard terminal. Sightlines may be compromised by a large rocky outcrop adjacent to Marine Drive.

Options to address these conflicts will be considered during the detailed design stage.

7.4.7 Property impacts

The original scope of the project identified that the shared path was to be delivered within the existing road corridor, or by gaining additional width through the construction of seawalls and reclamation. Purchase of property was undesirable and not supported. However the shared path does impact on the boat sheds and bus stops on the route, and these interactions are being managed. A number of bus shelters need to be relocated[5]; approval for these new sites will be confirmed with Greater Wellington Regional Council. Skerretts Boat shed at Lowry Bay is heritage listed and would be difficult to alter or relocate; a pinch point will be formed here, however there are good sight lines in both directions minimising the conflict risk.

During community consultation it was discovered that part of Mahina Beach is privately owned. However the landowner has indicated initial support for the shared path proposal, and work is ongoing between HCC and the owner to ensure the path can be delivered. From discussions to date this is considered low risk because the owner is supportive and has allowed full public access to the beach as they consider this a community asset.

7.4.8 Asset Management

The main implication for ongoing maintenance is the clearing and cleaning of storm debris from the path and along the shared path separator. However constructing seawalls that reflect wave energy (such as single and double curve walls), as well as options that provide additional height will reduce incidences of overtopping during storm events and high tides.

Resurfacing of a carriageway with an adjoining separated shared path is more complicated due to the separator that forms an obstruction. However the lifespan of a shared path is longer than the adjacent traffic lanes due to reduced loading, and will require resurfacing less often. Increased road marking (including green paint across accesses), signage and barrier maintenance will add increased asset management costs for this corridor.

[5] Bus shelters at Point Howard, York Bay and Mahina Bay may be relocated either to maximise space for the shared path or to avoid additional beach encroachment.

As stated earlier, the intention is to avoid impacting services as far as possible and for the most part no service relocation or protection works are anticipated, other than some localised power pole and street lighting relocation. However, we will work with other service providers to use the construction of the shared path as an opportunity for other services to be maintained, laid or future-proofed.

7.4.9 Environmental and Social Impacts

An Environmental and Social Responsibility Screen was undertaken to identify opportunities and risks, and assess potential mitigation options for the project. The full screening document is provided in Appendix G, however key impacts associated with this project are summarised below:

- Natural Environment – reclamation impacts on coastal marine habitats (including penguin nesting sites); construction impacts to the natural environment
- Cultural and historic heritage – Maori occupied kāinga in the bays and pā on the headlands; the listed historic Skerrett Boatshed (1906) at Lowry Bay must be retained; excavation may unearth archaeological artefacts
- Human health – mostly positive health outcomes of active transport, however additional pedestrians and cyclists may increase conflict at accesses and driveways
- Social – road safety improvements and increased travel choices; recreational and tourism opportunities; reduced CO_2 emissions.
- Urban and landscape design – creation of promenade on the foreshore enhances harbour views and adds opportunities for urban design elements

8. Recommended Option - Economic Analysis

A complete economic assessment of the preferred option, including key assumption and methodology is provided in Appendix H. A summary of some key results and findings is presented in this section.

8.1 Initial Economic Summary of Both Width Options

The costs to deliver both project options has been calculated. The expected estimate to deliver a 2.5 m path (Option 4) is $10.5 million, while a 3.5 m path (Option 5) is expected to cost $13.1 million.

The economic benefits of the project include travel time benefits, safety benefits and facility benefits; these are summarised in Table 8-1. The BCR of Option 4 is 1.8, whereas Option 5 provides a higher benefit return on investment, with a BCR of 2.0.

Table 8-1: Cost-Benefit Appraisal

	Option 4 - 2.5m	Option 5 - 3.5m
Facility Benefits	$11.5M	$16.5M
Travel Time Benefits	$1.5M	$1.9M
Safety Benefits	$0.6M	$0.8M
Net Present Value (NPV) Total Benefits	$13.6M	$19.1M
Net Present Value (NPV) Costs	$7.6M	$9.7M
BCR	**1.8**	**2.0**
First Year Rate of Return (FYRR)	7%	7%

8.2 Comparison with Earlier Stages

The results from the economic evaluation provided in the IBC were provided for each path width option. The DBC only determined the economic benefits for Options 4 and 5, as the other options were rejected through the multi-criteria analysis process. A comparison of the anticipated benefits and costs, and subsequent benefit-cost ratio (BCR) at the IBC and DBC stages is provided in Table 8-2 below. Note that while the benefits of each option are expected to be smaller than previously anticipated, the costs to deliver the project are also less than originally estimated at the IBC stage. In reality, the cost of delivering the project is also expected to be between the cost estimate for Option 4 and 5 – as a consistent 3.5 metre path is not feasible due to community feedback and numerous constraints and challenges.

Table 8-2: Economic evaluation summary as supplied in the IBC

	IBC estimates		DBC estimates	
	Option 4	Option 5	Option 4	Option 5
NPV Total Benefits	$20.8M	$28.2M	$13.6M	$19.1M
NPV Costs	$8.1M	$11.3M	$7.6M	$9.7M
BCR	**2.6**	**2.5**	**1.8**	**2.0**

8.3 Analysis of Recommended Option

The recommended option for this project is primarily the Option of 3.5 m but with 2.5 m provided at the beach locations. Now that this has been confirmed a more detailed cost estimate was developed which now feeds back into this final analysis of the option. The new estimated cost of Option 3.5 m has changed the BCR and FYRR from the prior analysis, due to the change in construction cost.

Table 8-3: Recommended Final Option Assessment

	Facility Benefits	Travel Time Benefits	Safety Benefits	NPV Total Benefits	NPV Costs	BCR	FYRR
Option 3.5m (2.5m beaches)	$16.5M	$1.9M	$0.8M	$19.1M	$10.7M	1.8	6%

The new estimated cost of the project has risen from $13.1M to $14.3M after a more detailed assessment. This in turn has reduced the BCR from 2.0 in the initial assessment to 1.8. The FYRR has also reduced from 7% to 6%.

8.4 Sensitivity Analysis

Numerous assumptions and estimates are used when forecasting future project costs and benefits. A sensitivity analysis tests a range of scenarios using upper and lower bounds of key variables. The analysis also adds rigour to the economic analysis and tests the validity of the results. A range of sensitivity tests has been undertaken for a number of assumptions for the recommended option only, with the results outlined in Table 8-4 below.

Table 8-4: Sensitivity testing of Option 5

Option 3.5m Sensitivity	Sensitivity - Low		Base BCR		Sensitivity - High	
	Low BCR	Note	Base BCR	Note	High BCR	Note
Capital Costs	1.4	Expected Estimate + 25% ($17.9)	1.8	Expected Estimate ($14.3M)	2.4	Base Estimate ($11.3m)
Cyclist Volumes	0.7	80 new users: assume 100% are local users and no wider attraction	1.8	201 new users: assume 40% local and 60% wider recreational users	2.8	321 new users: assume 25% local and 75% wider recreational users
Cyclist Growth	1.3	2.1% (NZ growth 2006-2013)	1.8	9.2% (0-15yr) 4.5% (15-30) 2.1% (30+)	2.2	9.2% (as per RR340)
Construction Time / Staged Implementation	1.7	48 months	1.8	24 months	1.8	12 months
Pedestrian Growth	1.8	0%	1.8	1%	1.8	2%
Pedestrian Volumes	1.7	+20 new peds	1.8	60 new peds	2.2	200 new peds
Travel Time Benefits (Cyclist Speed)	1.8	13 km/h (do-min)	1.8	18 km/h	1.8	20 km/h
Resilience – Storm recurrence interval	1.8	15 year recurrence	1.8	10 year recurrence	1.9	5 year recurrence

8.5 Assessment Factors

The NZ Transport Agency requires projects to be assessed using a results alignment and a cost-benefit appraisal to ensure the recommended option provides value for money.

8.5.1 Results Alignment

A results alignment has been undertaken using the NZ Transport Agency's Investment Assessment Framework. The purpose of this process is to assess the significance of the problem relative to the goals and outcomes of the Government Policy Statement on Land Transport (GPS). The assessment is provided in Table 8-5 below and demonstrates a High results alignment.

Table 8-5: Results alignment assessment

ONRC Classification	**Primary Collector route**	
Problem Outcome Class	**Network Performance**	
Treatment	**Intervention**	**Customer Levels of Service (CLOS)**
Outcome	Provide access to economic and social opportunities, particularly for those with limited access to a private motor vehicle	Matching capacity and demand, resilience

Journey	n/a	Access to economic and social opportunities, tourism
Gap	n/a	Four significant gaps were identified in the CLoS gap assessment (refer to Table 2-1). Safety, amenity and accessibility gaps were a result of poor and inconsistent facilities for pedestrians and cyclists. A significant gap for resilience was also established due to lack of alternative route.
Results Alignment	High	High

8.6 Cost-benefit appraisal

An assessment of the whole-of-life benefits and costs based on the Economic Evaluation Manual is 1.8 for Option 4, and 2.0 for Option 5. For improvement activities, this provides a low rating (BCR of between 1 and 2.9).

9. Financial Case

The Financial Case focuses on project affordability, timing and funding arrangements.

9.1 Project Delivery Costs

The delivery of the Eastern Bays Shared Path project is expected to incur costs for design, construction and resource consent approvals. The estimated costs for each of these elements is provided below:

- Design costs – Detailed design are anticipated to cost approximately $250,000 - $300,000.
- Construction costs - cost estimates for the shared path options range from $10M – $15M. The preliminary cost variation is based on considering the two width options together with limited levels of design and information and are subject to significant change and refinement as the detailed design is developed.
- Statutory costs – costs to apply for resource consents are expected to be approximately $90,000 - $140,000. This covers lodgement costs, council assessment fees, specialist inputs and technical assessments. If the project approval is escalated to the Environment Court, statutory costs will increase.

No property purchase or disposal is required to deliver the project. While one section of the beach is privately owned the landowner considers the beach a community asset and currently permits full public access.

9.2 Project Timing

The construction of the first stage of the project will commence in 2018. No firm decisions have been made on what the initial section would be or how the works will be programmed or staged over a period of time. This will be based on a number of factors including remaining seawall life, constructability, safety, continuity, funding availability and agreements between Hutt City Council and NZ Transport Agency.

9.3 Ongoing Maintenance Costs

Current maintenance costs average $3,500 per year for emergency seawall damage and replacement works. A further $8,000 per year is incurred from emergency sweeping due to storms (based on 5 year average). With substantial new sections of seawall in place, much of which reflects wave energy, it is reasonable to expect reductions in both of these costs (damage and sweeping works triggered by storm events). However the scheduled sweeping regime may need to be increased to remove debris from shared path due to increased risk of trip or puncture hazards (e.g. broken shells on path)

9.4 Project Revenue

This project offers no provision for revenue sourcing.

9.5 Funding Options

Approximately $9 million of funding has been allocated by Hutt City Council to deliver this project over the next six years (funding is assigned within their Long Term Plan). Subsidies from the NZ Transport Agency and the Urban Cycleway Fund will also contribute to the construction of the shared path.

9.6 Financial Risk

There are funding uncertainties as the scope has changed from the initial concept. At this stage, it is unclear what subsidies will be received from the NZ Transport Agency and Urban Cycleway Programme until a final option is chosen. Note that a requirement of the Urban Cycleway Programme is that funds must be fully committed by June 2018. Delays incurred in delivering the project may impact on the available funding and ultimately the phasing and delivery timeframe of this project.

Part B – Readiness and Assurance

10. Commercial Analysis

10.1 Introduction

The implementation of the project is directly linked to the funds available. Options to front load the project or deliver multiple portions separately will be explored to fast-track the delivery of the project. However it is anticipated that local and external funds will still need to be spread over a number of years.

10.2 Implementation Strategy

Following completion of the detailed design of the entire project, the allocation of the first tranche of funding will be confirmed. This will enable a section of works to be tendered, which will most likely be via the open market, or possibly as an invited tender.

A full implementation strategy will be developed once the funding for the first tranche of works is finalised. Construction works will be prioritised based on a number of factors including road user safety (and perceived safety), seawall residual life, path coherence and connectivity as well as public feedback.

10.3 Sourcing Options

Physical works will be sourced via open market tender or invited tender to ensure price competition and suitability of the preferred supplier. The tender is anticipated to have a reasonable non-price attribute weighting (and not be very heavily price weighted) due to the specialised nature of these seawall works beyond standard civil construction.

10.4 Payment Mechanisms

Payment for implementation is expected to be on a Measure & Value basis.

10.5 Schedule

A detailed design programme will be provided during negotiations of each phase of work. However a current agreed programme for the preliminary design forms part of this DBC, and extends through to commencement of construction to ensure a coordinated approach beyond phases.

11. Management Case

11.1 Project Roles

The pre-implementation project team will comprise of the following staff:

Table 11-1: Pre-implementation project team

Role	Name
Project Sponsor - Hutt City Council	John Gloag
Client Project Leader - Hutt City Council	Simon Cager
Project Manager - Stantec	s7(2)(a) [redacted]
Design Manager - Stantec	
Structural Designer - Stantec	
Roading Designer - Stantec	
Geotechnical Engineer - Stantec	
Consenting and Consultation - Stantec	

11.2 Governance Structure

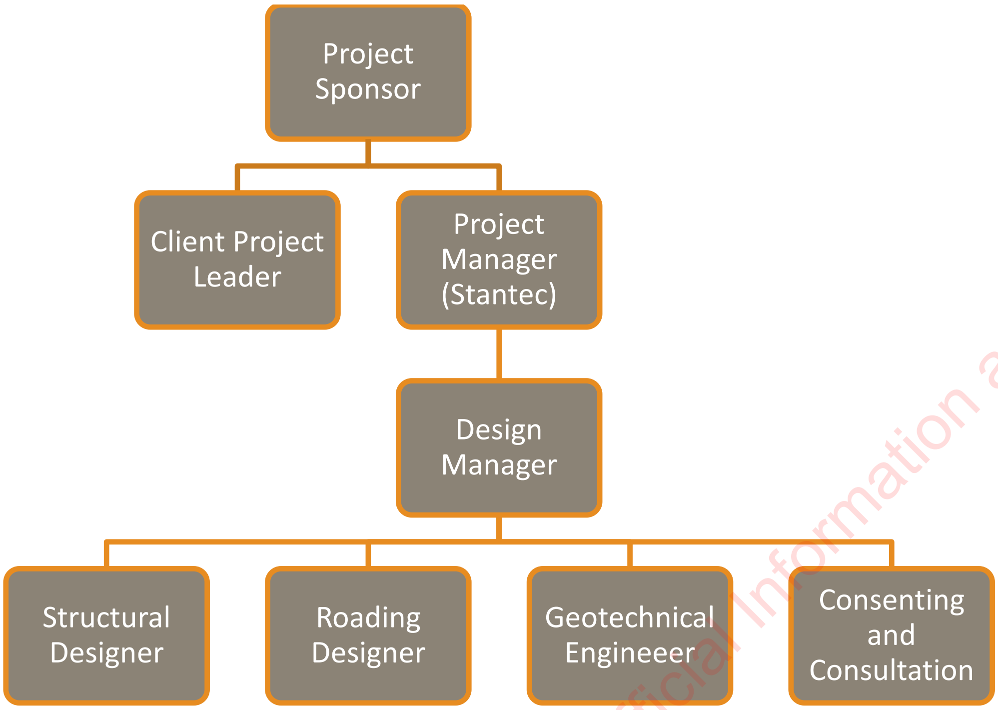

Figure 11-1: Governance Structure

11.3 Assurance and Acceptance

Road safety audits will be externally commissioned at the preliminary and final detailed design stages of the project. A peer review of the economic assessment will also be performed.

11.4 Change Control

Changes to the project scope, outcomes or budget will be controlled by the Project Manager and escalated to the Project Sponsor when necessary. However, initiatives to reduce the incidents and scope of these changes include:

- Not scoping or agreeing on tasks or price for the detailed design until the preliminary design is substantially complete and accepted
- Providing a comprehensive proposal of what is and is not included in detailed design lump sum fee
- Treating project phases or tasks that are difficult to quantify as Time Charge (hourly rate) to avoid unnecessary risk premiums. Such items will be estimated carefully to assist with client budgeting and will be capped.

Other areas of risk will also be highlighted to the client such as York Bay[6] where further assessment and topographical survey is required prior to forming a decision on the final preferred option. The team will agree with the client early how best to manage these locations to give budget and scope certainty

11.5 Cost Management

Costs will be managed by the Project Manager, and the budget will be reviewed and updated weekly. The project will adopt stringent variation regime, where no out-of-scope work will be undertaken prior to client signoffs. Substantial deviations in budget tracking will be escalated to the Project Sponsor.

[6] The additional survey will be undertaken in parallel with finalising the preliminary design and DBC, and then further optioneering at this location will be tied into the Detailed Design Scope.

11.6 Issues Management

Issues will be managed through a documented issues log. The close working relationship with the client will be maintained through the detailed design & consenting phase. This will consist of frequent contact (at least weekly meetings and/or phone calls) to minimise the risk of issues arising or escalating.

Appendices

Appendix A Geotechnical Report

Appendix B Design Philosophy & Multi-Criteria Analysis – Seawall treatment options

DETAILED BUSINESS CASE

EASTERN BAYS SHARED PATH

PREPARED FOR HUTT CITY COUNCIL

October 2017

Stantec

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REVISION SCHEDULE

Rev No.	Date	Description	Signature or Typed Name (documentation on file)			
			Prepared by	Checked by	Reviewed by	Approved by
1	12/09/17	Draft DBC	s7(2)(a) [redacted]			
2	13/10/17	Updated DBC				
3	17/10/17	Post client review				

Executive Summary

The completion of an Eastern Bays Shared Path has been an aspiration for Hutt City Council and its residents for many years. While previous reports and concept designs have been developed for sections of the Eastern Bays, the most recent designs were dependant on the replacement of most seawalls. Many of the walls have over 20 years of remaining life making it difficult to financially justify their replacement.

This Detailed Business Case (DBC) assesses the feasibility of options that do not rely on the full replacement of the existing seawalls. Complete seawall replacements are not required, nor are economically justified, which enhances the feasibility of the project and enables the path to be delivered within a practical timeframe.

The Eastern Bays Detailed Business Case (DBC) aims to make the community's aspirations for this project a reality. A key driver for this project is to develop a safe and connected walking and cycling facility to connect communities along Hutt City's Eastern Bays, and to provide links to other parts of the network for commuting and recreation. The project forms a key part of the Te Aranui o Pōneke (the Great Harbour Way), a walking and cycling route around Wellington Harbour.

The main outcomes of the project are to improve pedestrian and cyclist safety and to increase the number of these users on Marine Drive. Stakeholders identified the additional benefit of reducing the incidences of road closures and improve the resilience of the corridor. Opportunities to enhance tourism as an outcome of the project was also recognised.

The options development process undertaken during the Indicative Business Case phase identified two factors that principally dictate the form of the proposed shared path along the Eastern Bays foreshore; facility width and seawall type. Through the multi-criteria analysis process, stakeholders agreed on a preferred width of 2.5 metres or 3.5 metres (dependent on key constraints), and the following preferred treatments at beach and non-beach locations:

- Beach location: Double curved seawall, dwarf wall, mass concrete wall,
- Non-beach location: Double curved seawall, dwarf wall, placed rock revetment

Using these preferences, the project team agreed on options for discrete sections of the corridor that optimised the outcomes sought. These options were used as a platform for consultation with the local community.

A bay by bay approach to consultation was adopted, enabling the community to attend dedicated sessions for individual bays. A community-wide open day was also organised for all members of the community to review plans and discuss options with the project team. This was followed by a final 'bay by bay' meeting where key representatives from each bay were invited to provide a collated view on vital design preferences and an agreed way forward.

The recommended design aims to provide a facility that will achieve all of the desired outcomes, while minimising and mitigating the key constraints and challenges. Where possible, a 3.5 metre shared path will be constructed, enabling pedestrians and cyclists to share the space safely. At some locations, the width has been reduced to 2.5 metres to minimise the encroachment of beaches or to accommodate obstacles such as boat sheds. However the new path will provide a substantial improvement on the current facility, and will provide a valued community asset.

The cost of the shared path is expected to be between $10 and $15 million, and will be refined as the detailed design is developed. The project BCR is expected to be in the range of 1.8-2.0. Detailed design and consenting costs are expected to be an additional $350,000 - $450,000. Approximately $9 million of funding has been allocated by Hutt City Council to deliver this project over the next six years. Subsidies are anticipated from the NZ Transport Agency and through the Urban Cycleway Fund that will also contribute to the construction of the shared path.

Hutt City Council

Eastern Bays Shared Path

CONTENTS

LIST OF TABLES

LIST OF FIGURES

APPENDICES

Part A – The case for the project

1. Background

The completion of an Eastern Bays Shared Path has been an aspiration for Hutt City Council and its residents for many years. The shared path has featured in past strategies and is a key project in providing a safe and integrated network for commuting and recreational purposes under the current strategy "Walk and Cycle the Hutt 2014 – 2019".

The project forms a key part of the Te Aranui o Pōneke (the Great Harbour Way), a walking and cycling route around Te Whanganui-a-tara, the harbour of Wellington. The proposed route links Fitzroy Bay in the east to Sinclair Head in the west.

Previous reports and concept designs have been developed for sections of the Eastern Bays. These designs were dependant on the replacement of nearly the entire length of seawalls with a modern fit-for-purpose structure proposed on the basis of resilience. In addition to providing more space to accommodate a shared path, a key outcome of the previous designs was to reflect wave energy and reduce incidents of overtopping during storm events.

However more recent seawall structural assessments have indicated that complete replacements are not economically justified, as many sections still have over 20 years' residual life. Some sections, however, are considered to have less than 5 years' life; these will be prioritised for replacement and reinstated with a modern fit-for-purpose structure.

This Detailed Business Case explores and assesses the feasibility of various shared path options that do not rely as heavily on the full replacement of the existing seawalls via resilience funding, and instead considers alternative options and funding mechanisms. This will enhance the feasibility of the project and ensure that the path can be delivered within a practical timeframe.

1.1 Project Area

The project focuses on improving the safety for pedestrians and cyclists on Marine Drive between:

- Point Howard and the northern end of Days Bay
- The southern end of Days Bay (Windy Point) to Eastbourne (Muritai Road / Marine Parade intersection)

Marine Drive is classified as a primary collector under the One Network Road Classification (ONRC) with traffic volumes of between 6,000 to 8000 vehicles per day. It is a coastal road that winds its way around headlands and bays between Point Howard and Eastbourne. The corridor provides very few safe facilities for pedestrians. Cyclists are generally not provided for and for the most part are expected to use the very narrow road shoulder or share the traffic lane. At a small number of locations, short sections of shared paths are available on the seaward side. These shared paths are predominantly located in areas where new seawalls have been constructed therefore allowing provision of this facility, or where considerable width already exists.

Days Bay is not included as part of the scope of this project as it currently provides a lower speed limit, some safe facilities for pedestrians and increased widths for on-road cyclists.

2. Problems, Opportunities and Constraints

A facilitated stakeholder workshop was held on 8 September 2016 to identify the problems, constraints and opportunities associated with providing for cycling on the Eastern Bay corridor, and the objectives and benefits of investing in the route. Representatives at the workshop included the core project team, client representatives, NZ Transport Agency representatives, as well as community group representatives. The key outputs from the workshop are provided below.

2.1 Problems and Opportunities

The project team and stakeholder representatives identified and agreed on the following two key problems and one opportunity for the corridor:

- **Problem 1:** Safety of current path and lack of separation prevents walking and cycling and the subsequent health, environmental and economic effects.
- **Problem 2:** Current facility is at increasing risk of closure and damage from storms and sea level rise and there is no alternative route.
- **Opportunity 1:** The upgrade of the Eastern Bays Shared Path has the opportunity to reinvigorate and enhance the Eastern Bays tourist economy by attracting visitors including long distance cyclists.

The evidence to support each of these statements was provided in the original Indicative Business Case, which was prepared in December 2016. There have been no changes since the IBC report was developed to influence the problems and opportunities, therefore they remain current and valid.

The NZ Transport Agency has made changes to investment decision making however, and now require a gap assessment of Customer Levels of Service (CLoS). The CLoS defines the expectations for what the customer will experience when using the transport system for their journey. The CLoS benchmark measures are applied using the One Network Road Classification (ONRC). A gap assessment of the performance of the corridor against key CLoS criteria has been developed for Marine Drive, a primary collector route, and is provided in Table 2-1 below.

Table 2-1: ONRC Customer Levels of Service (CLoS) Gap Assessment

Criteria		Level of Service Benchmark –Primary Collector	Assessment
			Significant gap Identified gap Achieved
Mobility	**Travel time reliability**	Generally road users experience consistent travel times except where affected by other road users (all modes) or weather conditions	Reliability is generally consistent, however weather conditions including storm surge incidents can result in road closures, damage or obstructions impacting on travel time reliability.
	Resilience	Route is nearly always available except in major weather events or emergency event and alternatives may exist. Clearance of incidents affecting road users will have a moderate priority, Road users may be advised of issues and incidents	Route is not available for all roads users. Sections of the corridor require pedestrians and cyclists to walk/ride on the carriageway or within a narrow shoulder. In addition, major weather events may result in road closure or damage. No alternative route is available for access to these coastal communities.
	Optimal speeds	Travel speeds depend on assessed level of risk and recognise mixed use, schools, shopping strips and concentration of active road users	Pedestrians and cyclists must share the road along the sections of the corridor, meaning there is a substantial speed difference between road users. Mixed use of the road corridor increases the safety risk to vulnerable road users.
Safety		Variable road standards and alignment. Lower speeds and greater driver vigilance required on some roads/ sections particularly depending on topography, access, density and user. Active road users should expect mixed use environments with some variability in the road environment, including vehicle speed. Road user safety guidance provided at high risk locations.	Walking and cycling on Marine Drive is perceived as unsafe or very unsafe by the community. While the crash data does not demonstrate a substantial safety risk, the current standard of infrastructure on the corridor is considered a deterrent to use.
Amenity		Moderate level of comfort, occasional areas of roughness. Aesthetics of adjacent road environment reflects journey experience needs of all roads users and adjacent land use. Urban collectors reflect urban fabric and contribute to local character. Specific provision where active road users present. Clean, safe and secure.	The adjacent coastal road environment has high amenity value, however inconsistent provisions are made for pedestrians and cyclists on Marine Drive. For sections of the corridor, no pedestrian or cycle facilities are available, and these users must use the shoulder or share traffic lanes for access.
Accessibility		Active road users should expect mixed use environments with some variability in the road environment, including vehicle speed. Parking for all modes and facilities for mobility impaired at activity centres.	Pedestrians and cyclists must share the road for sections of the route. This is unsuitable for pedestrians and many cyclists.

A significant gap is defined by a level of service that is significantly underperforming in at least one key aspect, resulting in a performance lower than its classification. The assessment provided in Table 2-1 demonstrates four significant gaps in the Customer Level of Service for a Primary Collector road. These gaps are primarily a result of the inconsistent provision for pedestrians and cyclists. However Marine Drive also experiences occasional road closures and delays as a result of storm surges and overtopping. The resilience of the corridor is poor given that there are no alternative access routes in the event of a road closure.

2.2 Issues and Constraints

The key driver for this project is to develop a safe and connected walking and cycling facility to connect communities along Hutt City's Eastern Bays, and to provide links to other parts of the network for commuting and recreation. Currently, pedestrians and cyclists are especially vulnerable as there are few dedicated facilities for walking or cycling. For the most part, cyclists and pedestrians must use the shoulder, which is very narrow or non-existent in sections. Small sections of shared paths have been created in areas where new seawalls have been constructed, or where considerable width already exists such as at headlands.

The road and shoulder width varies significantly over the corridor. Where additional width is provided, the space is often allocated to parking, which is often highly valued and can be challenging to remove.

Marine Drive is a primary collector road that carries up to 8,000 vehicles per day. The coastal road winds its way around several headlands and bays between Point Howard and Eastbourne, and provides the only road access to the residential eastern bay suburbs. The speed limit on the route varies between 50km/h to 70km/h. The corridor also supports a frequent bus route, providing a service between Eastbourne, Petone and Wellington.

The function, character and demand placed by various road users on this corridor poses challenges and constrains the feasibility of various options. This is exacerbated by further issues as identified below including environmental and amenity concerns, resource management requirements, and storm water and geotechnical constraints. Therefore a solution that seeks an optimum outcome in light of the numerous and often competing constraints will require some compromises.

2.2.1 Economic

Potential economic losses to the community may be associated with the loss of parking in some areas. However the construction of a connected shared path is also seen as an economic opportunity that is likely to attract visitors and enhance the area. New walls also offer improved protection against overtopping and storm surges, providing economic benefits as a result of reduced road closures and reduced maintenance and damage.

The costs of constructing the shared path and new seawalls also incurs direct costs. The residual life of the existing seawalls varies between >5 years to >80 years; replacing sections that have limited remaining life is more cost-effective (and may already be included within projected capital works upgrades) than replacing sections that do not currently require it. Maintenance costs of a newer asset are also likely to be less than the ongoing maintenance of the existing older assets.

While some sections of seawall have significant remaining life, the available carriageway width is insufficient to provide dedicated walking and cycling facilities. These sections may need to be rebuilt to accommodate the shared path. The amount of funding available means that the construction of the shared path will need to be staged over a number of years. Prioritising areas of delivery will consider the age of the seawall, as well as other factors including safety (or perceived safety), coherence and connectivity.

2.2.2 Social

The shared path provides mostly positive social outcomes, and are considered benefits of the project, rather than constraints. The path is expected to enhance community cohesion, provide amenity benefits, transport choices and improve access to local facilities along the corridor. However residents have expressed concern regarding the loss of beaches and street trees, which are highly valued by the community. Mitigation and minimisation of these losses form a key component of option development and selection.

Loss of parking to provide the facility will also have an adverse social impact to those that use the provision currently. Parking loss will be minimised or mitigated wherever possible during the design process.

2.2.3 Environmental

Sections of the coastal area along the foreshore provide a rich habitat for aquatic and terrestrial flora and fauna. A survey of little penguin nesting sites on the seaward side was completed in November 2016; a landward survey is due to be completed in October 2017. Treatment options that retain access for penguins will be determined through the detailed design and Assessment of Environmental Effects processes. Overhanging walls such as single and double curve walls pose a barrier to penguins, whereas rock revetment is suitable for penguins, but less suitable for inter-tidal flora and fauna. However revetment results in greater habitat displacement, including the loss of beaches and wading zones for other avifauna.

Trees form an iconic part of the landscape and are often a highly valued natural asset. There are few trees on the seaward side of Marine Drive, and preferred options seek to avoid the removal of most street trees. The "Atkinson Tree" is located on the seaward side of York Bay and has local importance. Any trees that do require removal will need to justified and replacement planting is likely.

2.2.4 Resource management

The encroachment of the shared path within the coastal environment, as well as other construction activities will trigger consenting approvals, as required under the Resource Management Act and other related legislation. The project will need to be assessed against the rules and requirements of key policy statements and plans that generate consent requirements including:

- New Zealand Coastal Policy Statement
- Regional Policy Statement for the Wellington Region
- Regional Coastal Plan
- Proposed Natural Resources Plan
- Hutt City District Plan
- National Environmental Standard for assessing and Managing Contaminants in Soil to Protect Human Health.

2.2.5 Sea level rise

Marine Drive provides the only access to coastal communities on the Eastern Bays. It is low lying and the road can be inundated by storm surges and wave overtopping. The community has expressed concern about the resilience of the corridor in light of expected sea level rises and increased storm intensity and frequency. While the focus of this project is to provide a shared walking and cycling path, the multi-criteria analysis process considered the future proofing and resilience benefits of each option. The proposed seawall treatments offer some storm surge and flood defence benefits and the preferred designs enable future upgrades (by allowing walls that can be increased in height and sea levels rise in future).

However, it is important to note that this project is not intended or designed to be a solution for sea level rise for the Eastern Bays. The proposed seawall treatments would have some flood defence benefits and the design would enable future upgrades. However, the overall issue of resilience and sea level rise is a wider, much larger conversation for which Hutt City Council has developed the Environmental Sustainability Strategy 2015 – 2045. This Strategy is currently being developed further with the intention being to translate the Strategy into a programme of works for future years.

2.2.6 Maintenance

No reseals are planned in 2017/18 on Marine Drive, and the programme for future years is yet to be developed.

2.2.7 Storm water

The construction of the shared path will have minimal impact on storm water flows. Overland storm water will continue to flow across the corridor and drain into the sea. The additional width will likely feature the same cross fall as the road corridor, and separators between the shared path and carriageway will feature breaks between them.

Underground storm water pipes will require extensions where seawall treatments are proposed to create additional corridor width. The locations of the storm water pipes have been identified as part of the topographical survey; during detailed design cross sections will be developed to accommodate the pipe extension within the seawall treatment.

2.2.8 Geotechnical

Excavation within the tidal zone is necessary where the toe of a seawall is to be embedded into the substrate; this is a requirement for the construction of double curve walls, boardwalks, and dwarf walls. The base of revetment treatments may also need to be buried, requiring some excavation of the surface.

A complete analysis and review of the surface and substrate geological conditions has been undertaken (refer to Appendix A). From this report, design parameters have been developed based on the geological conditions and substrate at each location. These parameters will be standard for each wall type based upon the underlying bearing capacity.

Working within the tidal zone poses constraints on construction zones and concrete pours. Shoring will be required at some locations to enable construction to take place in a timely and environmentally acceptable manner. The location, type and depth of shoring to be used will be determined by the consent condition and construction methodology. Alternatively, pre-cast structural elements could be considered, although these are not expected to be as practical for construction in this environment given the lack of uniformity in the type of profile of the existing seawall.

2.2.9 Services and utilities

Multiple services and utilities are located within or adjacent to the Marine Drive road corridor including:

- Water, waste water and stormwater services (Hutt City Council)
- Telecommunications (Chorus, Spark and Vodafone)
- Gas (PowerCo)
- Electricity (Wellington Electricity)

Street lighting columns and power poles are located along the corridor. Mahina Bay and Sunshine Bay feature power or lighting poles located on the seaward side of the road. Street lighting columns may be shifted to the opposite side of the road, however power may need to be relocated or undergrounded.

The location and depths of each service will be identified through the detailed design phase to confirm the services that will be impacted by the shared path work, including those that need to be relocated. However, it is not anticipated that many services, beyond the aforementioned power poles and lighting columns, will require any works as part of this project.

3. Project Outcomes

The investment objectives developed at the Indicative Business Case stage define the desired outcomes of this project. The investment objectives have been derived from the benefit statements that were developed by stakeholders at the initial project workshop. Table 3-1 below provides a summary of the agreed benefits, as well as the parameters that define the investment objectives. These investment objectives formed part of the multi-criteria analysis to assess each of the potential design options

Table 3-1: Project benefits and investment objectives

Benefit	Investment Objective			
	Measure	Baseline	Target	By When
To improve safety for pedestrians and cyclists	By increasing the perception of safety, as measured by the community survey	From 34% in 2014	To 50%	By 2019

Benefit	Investment Objective			
	Measure	Baseline	Target	By When
To increase the numbers of pedestrians and cyclists	Increasing numbers of pedestrians and cyclists, as measured by daily counts	From approx. 125[1] per day in 2015	To 250 per day	By 2019
To increase the availability of the route	By reducing the total number of hours the road is swept (response / emergency sweeping only)	From 81 hours (5 year average, per year)	To 70 hours per year (average)	By 2021 (3 year rolling average, per year)

4. Options Development

The options development process undertaken during the Indicative Business Case identified two factors that principally dictate the form of the shared path along the Eastern Bays foreshore. The first factor was the preferred facility width that would accommodate pedestrians and cyclists along the route. The second factor was the types of seawalls and reclamation methods that could be used to gain width where there is currently insufficient width. A description of the process and recommended options are summarised below.

4.1 Facility width

A key output of the Indicative Business Case was to identify the most suitable width for the shared path. From this the specific treatments options to achieve this width can be considered. The IBC identified five potential options:

- Option 1 – Only replace seawall with less than 5 years remaining life. This is the ‘do-minimum’ option and is considered as a baseline for assessment only.
- Option 2 – 1.5 metre wide facility. This is considered as the lowest standard facility and an ‘absolute minimum’ option.
- Option 3 – 2.0 metre wide facility. This option is slightly wider than the minimum consideration but still less than providing the ideal level of service for users.
- Option 4 – 2.5 metre wide facility. Achieves the minimum standard for a shared path.
- Option 5 – 3.5 metre wide facility. A wider path that achieves the desirable minimum requirement for a recreational shared path

A multi-criteria analysis process was used to assess the five options, where options were scored against a number of factors including safety, resilience, upgrade potential, consentability and beach impact. Options 4 and 5 were favoured through this process. Feedback through community consultation and alignment to the investment objectives also reinforced the two preferred options.

While it is desirable to only assess one option through a DBC, there was no clear distinction between the two options. As a result, both options have been considered, allowing a combination of widths to be applied. Constructing a path of consistent width along the corridor is generally preferred, however the two options provide the opportunity to alter the width of the path at beaches and sensitive locations, or where there are expected to be higher number of pedestrians.

4.2 Treatment Options

A team of engineers and designers identified 12 potential seawall options that would provide additional corridor width to accommodate a shared path. Four of these options were rejected during the assessment, mostly due to limited scope for application along the corridor or lacking durability within a coastal environment. The eight remaining feasible options for further consideration were:

[1] AM peak period cycling volumes have been input to the NZTA formula which gives an estimation of cyclist AADT being 77. Peak period pedestrian counts (17 users) have also been used to give an approximate existing use of a total of 125 cyclist and pedestrian users per day.

- Carriageway Reallocation[2]
- Placed Rock Revetment
- Double Curved Seawall
- Single Curved Seawall
- Vertical Cantilevered Concrete Wall
- No Fines Concrete Blocks
- Mass Concrete to Existing Pitched Seawall
- Dwarf Mass Concrete Wall

5. Preferred Project Option

Assessment of the eight remaining options was undertaken through workshops with specialists and stakeholders on 22 June and 6 July, 2017. Workshop participants developed and agreed on the criteria and weighting of the criteria to assess each of the options. These criteria included factors that related to the RMA, as well as the social, environmental, cultural and economic impacts of the project. It was agreed that assessments be undertaken separately for beach and non-beach locations, as the preferred treatment options for the two locations are likely to differ. Through the multi-criteria analysis of treatment options (refer to Appendix B), the following scores were allocated to the wall type options (with a score of 1 being best / least problematic and 5 being worst / most problematic):

Table 5-1: MCA Scoring: Wall types for BEACH

	Consentability	Cultural	Visual	Effect on Natural Character	Upgrade Potential	Terrestrial and Avifauna Ecology	Penguins	Intertidal ecology	Urban Design opportunities	Coastal Processes	Durability	Cost
Revetment	FATAL FLAW											
Vertical Cantilever	3	3	4	4	2	3	5	3	2	3	2	3
Mass Block	3	3	3	3	2	3	5	3	3	3	2	3
Dwarf Wall	3	3	2	2	2	3	5	3	2	3	2	2
Mass Concrete	3	3	3	3	4	3	5	3	3	3	3	2
Curve (Single or Double)	3	3	2	2	2	3	5	3	1	3	2	3
Boardwalk	2	3	2	2	5	3	5	2	3	3	4	3
Boardwalk & Revetment	FATAL FLAW											

[2] Carriageway reallocation has been deemed unsuitable as a major treatment strategy due to there not being sufficient road width / space available in many locations. Reallocation will still be considered for localised sections where there is sufficient width to do so, provided that it does not result in unacceptable consequences (such as the tightening of road curvature or creating driveway access difficulties for residents).

Table 5-2: MCA Scoring: Wall types for NON-BEACH

	Consentability	Cultural	Visual	Effect on Natural Character	Upgrade Potential	Terrestrial and Avifauna Ecology	Penguins	Intertidal ecology	Urban Design opportunities	Coastal Processes	Durability	Cost
Revetment	3	3	3	2	3	4	1	3	3	3	2	1
Vertical Cantilever	3	3	3	4	2	3	5	3	2	3	2	3
Mass Block	3	3	3	3	2	3	5	3	3	3	2	3
Dwarf Wall	3	3	2	2	2	3	5	3	2	3	2	2
Mass Concrete	3	3	3	4	4	3	5	3	3	3	3	2
Curve (Single or Double)	3	3	2	2	2	3	5	3	1	3	2	3
Boardwalk	3	3	3	3	5	3	5	2	3	3	4	3
Boardwalk & Revetment	3	3	4	4	5	4	2	2	4	4	4	2

Once scoring was completed by the group and agreed, a number of different weighting systems for the different criteria were applied which resulted in the following preferred treatments being identified for beach and non-beach locations:

- Beach location: Curved seawall, dwarf wall[3], mass concrete wall
- Non-beach location: Curved seawall, dwarf wall, placed rock revetment

It was also noted that in some specific locations carriageway re-allocation could still be used in conjunction with the above treatments to reduce encroachment into beach areas.

More detail on the MCA scoring and outcomes can be found within Appendix B.

Using the preferred treatment options and recommended facility widths, the project team systematically worked through each section of the corridor, as a group in a workshop environment, and agreed on an option that optimised the outcomes sought whilst minimising impacts.

This was an organic process that was undertaken through group discussion with the client and design team, the expert advisor group and community group representatives.

The selected wall type for each location and notes from the group during the wall placement workshop process is contained within Appendix B. It should be noted that this was not a 'final' decision, but the suggested wall type (or types) and widths that should be consulted on given the site conditions at that location and opinion of the expert group.

[3] Note the dwarf wall option is only appropriate for locations where there is minimal height difference between the road and beach/rock platform.

At several locations, more than one option was developed for the shared path as it was determined that multiple options would be possible and community feedback could help decide which as preferred.

For all locations it was agreed that it would be essential to seek input from the local community and potential path users before any decision was made; however it was deemed appropriate to go to the community with options to help stimulate the engagement process and also to rule out clearly inappropriate solutions early.

Alternatives included several different solutions to manage challenges or constraints along the corridor; or where multiple options achieve the same outcome, but with varying benefits or costs. The project option design maps (including areas highlighting multiple different option variants) that formed part of the public consultation process are provided in Appendix C.

6. Community Consultation

A detailed description of the community consultation process, results and feedback received is provided in Appendix D, "Consultation Report – Eastern Bays Shared Path". A summary of the consultation activities that were undertaken, as well as key themes, results and outcomes is provided below.

6.1 Process

A series of meetings were held in August 2017 to obtain input from the community on the two path width options (2.5 metres and 3.5 metres). Feedback on seawall options and treatments for more sensitive areas around beaches was also sought. The consultation process adopted a 'bay-by-bay' approach, with dedicated sessions for individual bays, focussing on the key issues faced by each bay along the corridor.

A community-wide open day was also organised to provide an opportunity for all members of the community to review plans, provide feedback and meet with members of the project team to discuss the shared path project. This was followed by a final 'bay by bay' feedback meeting to allow representatives from each bay to provide feedback to the project team. Representatives from each bay attended and stated the general consensus of the preferred treatment and key design details for each bay.

Table 6-1: Community consultation activities

Meeting	Venue	Date and time
Lowry Bay	Eastbourne Library	8 August 2017
York Bay	Eastbourne Library	10 August 2017
Point Howard	Point Howard Tennis Club	15 August 2017
Mahina and Sunshine Bay	502 Marine Drive	16 August 2017
Days Bay and Windy Point	The Pavilion	17 August 2017
Open Day	Eastbourne Library	26 August 2017
Bay Feedback Meeting	Eastbourne Library	28 August 2017

The community was also invited to submit written feedback, and an online survey was developed and made available on the Hutt City Council website. The survey and summary of results is provided in the consultation report provided in Appendix D.

6.2 Issues and key themes.

Meetings were held with each bay community to meet and discuss issues specific to the respective bay. The meetings also provided an opportunity for the project team to update people about the project and give an overview of the current situation. Attendees were invited to highlight their views and preferences onto maps and plans. A summary of the key themes and issues discussed at the community meetings is provided in Table 6-2.

Table 6-2: Key themes from bay meetings

Meeting	No. attendees	General Themes
Lowry Bay	15	Speed limit Beach Access Wider 3.5m option Concern toward Boardwalk Sea level rise
York Bay	29	Beach encroachment Narrower 2.5m option Beach access Penguins Bus stop/Atkinson tree
Point Howard	18	Parking facilities Sea level rise Beach access Safety guardrail Road speed Variable widths
Mahina & Sunshine Bay	8	Beach access
Days Bay/Windy Point	25	Beach movement/erosion Beach encroachment Linked walkways Beach access Penguins Integration of path between bay Safety hazards
Open Day	70	2.5m width for beaches 3.5m width for non-beach areas Beach encroachment Beach access Penguins Safety guardrail/barriers

6.3 Feedback Meeting

A follow up meeting held by the Eastbourne Community Board was conducted to enable each bay representative to present a collated view on vital design preferences. The purpose of this meeting was to provide an agreed and firm position on the preferred way forward, rather than a multitude of different or conflicting views. The project team specifically sought a clear direction on the following design aspects:

- Wall type
- Path width
- Barrier
- Beach access
- Trees
- Bus stops

A summary of preferred design responses for each bay is provided in Table 6-3.

Table 6-3: Preferred design response for each Eastern Bay community

	Wall Type	Path width	Barrier	Beach Access	Trees	Bus stops	Other
Point Howard	No preference	2.5m at beach 3.5 non-beach area	Bollards	Retain access, but improve ramp gradient	n/a	No change	Path between beach and car parks
Lowry Bay	Dwarf mass concrete preferred Support revetment	2.5m at beach 3.5 non-beach area		Retain access and place additional accesses to align with adjoining roads	n/a	No change	Build asap
York Bay	Double curve north of bus stop Single curve or dwarf wall to the south	2.5m or less Widening to remain with footprint of existing wall		Dwarf wall may improve beach access	Conflicting views on Atkinson tree. Preference to lose tree rather than encroach beach	Can be moved	Boat ramp can be moved Urban design important Uncertainty of groyne benefits
Mahina/ Sunshine Bay	Support for proposed wall (double or single curve)	2.5 m	Can remove crash barrier	Retain access	Retain	Support moving shelter, but for structure to be reused	
Days Bay/ Windy Point	Curved wall preferred	No preference	Prefer no fence or barrier	Retain ramp/ slipway for penguin access	n/a	n/a	

6.4 Outcomes

Many of the issues raised through the feedback process have been taken on board and incorporated into the preliminary design. Similarly, the vast majority of the 'bay by bay' feedback received has been included in the design.

Residents will be provided with an additional opportunity to submit or comment on the detailed proposal through the resource consent process instigated by Hutt City Council and Greater Wellington Regional Council. Further, there is a clear commitment by the client and project team to maintain the high levels of engagement and community involvement through the detailed design process to ensure a high quality outcome that satisfies the community's requirements.

7. Recommended Option - Assessment

Through the assessment and shortlisting of preferred options, and consultation with stakeholders and the community, a recommended option has been determined. This option meets the intended outcomes and project benefits sought, while aiming to address and mitigate some of the key challenges and constraints that were identified during option development and consultation. Refer to Appendix E for the recommended option concept plans.

The final preferred option following public engagement is as follows:

Table 7-1: Recommended option details

Station	Bay Location	Wall Type	Width	Comments
520-610		No wall works	3.5m	Path to connect to existing shared path
610-650	Point Howard	No wall works	3.5m	Retain car parking
650-700	Point Howard	Revetment	3.5m	Retain parking and bus stop
700-820	Point Howard	Curve	2.5m	Beach
820-1000	Point Howard	Curve	3.5m	
1000-1070	Sorrento Bay	Curve	2.5m	Beach
1070-1120		No wall work	2.5m	
1120-1140		Curve		
1140-1160		No works		
1160-1300	Lowry Bay	Revetment	3.5m	Major storm surge impact
1300-1360	Lowry Bay	Curve	3.5m	
1360-1550	Lowry Bay	Curve	2.5m	Beach
1550-1750	Lowry Bay	Dwarf	2.5m	Beach
1750-1800	Lowry Bay	Curve	2.5m	Beach
1800-1960		Curve plus revetment	3.5m	

Station	Bay Location	Wall Type	Width	Comments
1960-2190		No wall works	3.5m	Whiorau Reserve
2190-2240		Revetment, or single curve plus revetment	3.5m	
2240-2400	York Bay	Curve	3.5m	
2400-2560	York Bay	Curve	2.5m	Further assessment of realigning road needed
2560-2870	York Bay	No wall works	3.0-3.5m	Existing section of new path / curved seawall
2870-2910		No wall works	3.5m	
2910-3020	Mahina Bay	Revetment	3.5m	Major storm surge impact
3020-3340	Mahina Bay	Curve	2.5m	Beach
3340-3400	Mahina Bay	Curve	3.5m	
3400-3440		Revetment	3.5m	
3440-3470		No wall works	3.5m	
3470-3680		Curve	3.5m	
3680-3910	Sunshine Bay	Curve	2.5m	Beach
3910-4000	Sunshine Bay	Revetment	3.5m	Replacement of existing 'temporary' revetment
4000-5000	Days Bay	No wall works	N/A – no path through Days Bay	
5000-5500		Curve	3.5m	

The preferred option detailed above has been amended and refined in a number of locations from the option that was consulted upon due to community feedback. The above table can be compared to the information contained in Appendix B to provide a detailed understanding of the changes that have been made following consultation. Broadly, the key changes are that generally the path is proposed to only be 2.5m wide through any beach locations, some additional areas of revetment have been added and there was almost no support from the community for a boardwalk solution anywhere along the corridor (hence removal).

7.1 Outcomes

The key outcomes of the project are to improve pedestrian and cyclist safety and to increase the number of these users on the corridor. Stakeholders identified the additional benefit of reducing the incidences of road closures and improve the resilience of the corridor. Opportunities to enhance tourism as an outcome of the project was also recognised.

The recommended project option aims to provide a facility that will achieve all of the desired outcomes, while minimising and mitigating the key constraints and challenges outlined in Section 2.2. Where possible, a 3.5 metre shared path will be constructed, enabling pedestrians and cyclists to share the space safely. At some locations, this width has been reduced to 2.5 metre to minimise the encroachment of beaches or to accommodate obstacles such as boat sheds. However the new path will provide a substantial improvement on the current facility, and will provide a valued community asset. The outcomes of the project are expected to be achieved as there is strong community support for the project; a 2014 community survey identified completion of the shared path was the most important issue for Eastbourne residents.

Table 7-2: Recommended option performance against investment objectives

Benefit	Investment Objective		
	Measure	Baseline & Target	Expected Outcome
To improve safety for pedestrians and cyclists	By increasing the perception of safety, as measured by the community survey	From 34% to 50%	Achievement of continuous separated shared path facility for extent is expected to at least achieve target in safety perceptions (of respondents stating the facility is safe or very safe)
To increase the numbers of pedestrians and cyclists	Increasing numbers of pedestrians and cyclists, as measured by daily counts	125 to 250 per day	Economic evaluation has calculated an additional 200 new users.
To increase the availability of the route	By reducing the total number of hours the road is swept (response / emergency sweeping only)	From 81 hours to 70 hours per year	Currently only 14% (700m) of the seawall is redirective. With proposed solution, around 3km will be redirective or revetment, both of which will reduce incidence of material being deposited on the road, and the extent / duration of sweeping

7.2 Implementability

This section considers the mechanics of delivery, and complexity of the project. It considers whether the project is deliverable from a technical and operations perspective, and whether statutory requirements can be achieved.

7.2.1 Statutory requirements

The construction and coastal encroachment of the Eastern Bays Shared Path involves several components that may trigger the need for a consent, including:

- The construction of new seawalls
- The addition to or alteration of the existing seawalls
- The placement of rock riprap to protect the seaward side of the seawalls
- Encroachment onto the foreshore
- Occupation of land or foreshore/seabed by the shared path and its various support structures
- Potential disturbance of or damage to sites and features of ecological, heritage or archaeological value
- Earthworks, including the disturbance of the foreshore, to enable the construction of the seawalls and other support structures
- Ancillary discharges associated with the construction of the seawalls.

Due to the scale and complexity of this project, a separate consenting strategy has been developed; refer to Appendix F: Eastern Bays Shared Path – Consenting Scope. The purpose of the consenting strategy is to ensure:

- The purpose, relevant principles and requirements of the Resource Management Act 1991 (RMA), are achieved, with a focus on the Regional Coastal Plan for the Wellington Region and the Proposed Natural Resources Plan;
- The project's environmental effects are properly scoped, appropriately assessed and effectively managed;
- The consent processes are appropriately aligned with the future staging of the project;
- The consent applications are developed in a manner that takes into account that the consent outcomes need to:
  - Be practicable to implement; and
  - Provide for contractor flexibility and innovation.

Note that the consenting strategy relates to those approvals required under resource management and other related legislation; it does not address Building Act requirements or engineering approvals which may be required at a later stage in the project.

7.2.2 Geotechnical investigation

A geotechnical investigation was undertaken to provide preliminary geotechnical guidance for the proposed sea wall foundations. The report titled, "Eastern Bay Shared Path – Geotechnical Factual and Interpretive Report" was prepared by Stantec, and is provided as an Appendix to this DBC (Appendix A). The purpose of the report was to:

- Characterise the subsurface geological, geotechnical and hydrogeological conditions in the area of Eastern Bays; and
- Identify, describe and investigate geotechnical hazards relevant to the project elements.

Geotechnical field investigations comprised of bore holes and cone penetration tests to determine the underlying ground conditions and potential geotechnical risks. Laboratory testing of bore hole samples was also undertaken; results from these tests are provided in the aforementioned geotechnical report.

The construction of the shared path relies on a seawall that can be founded in a substrate that provides adequate bearing capacity and avoids scouring. Given the varying geology and base material along the foreshore, the report identifies key design parameters that should be adopted based on the anticipated material types exposed during construction.

The design parameters have been established to define the recommended depth of foundation required for seawall construction along the length of the route, based on an appropriate bearing capacity for a shared path facility in this environment (and subject to potential accidental motor vehicle loading).

7.2.3 Structural design

An assessment of the various types of seawall treatments was undertaken prior to consultation, resulting in three seawall types considered appropriate for beach locations and non-beach locations (refer to Section 4.2). A boardwalk option was also consulted on in two locations as a possible option but was not favoured by the community and ultimately discarded.

Standard cross sections for each of the five proposed wall types have been developed, as shown in Figure 7-1 below. These will be developed further during the detailed design stage and align with the features and dimensions of the construction location, together with specific design where required (for example with revetment to respond to the particular wave climate in a specific location).

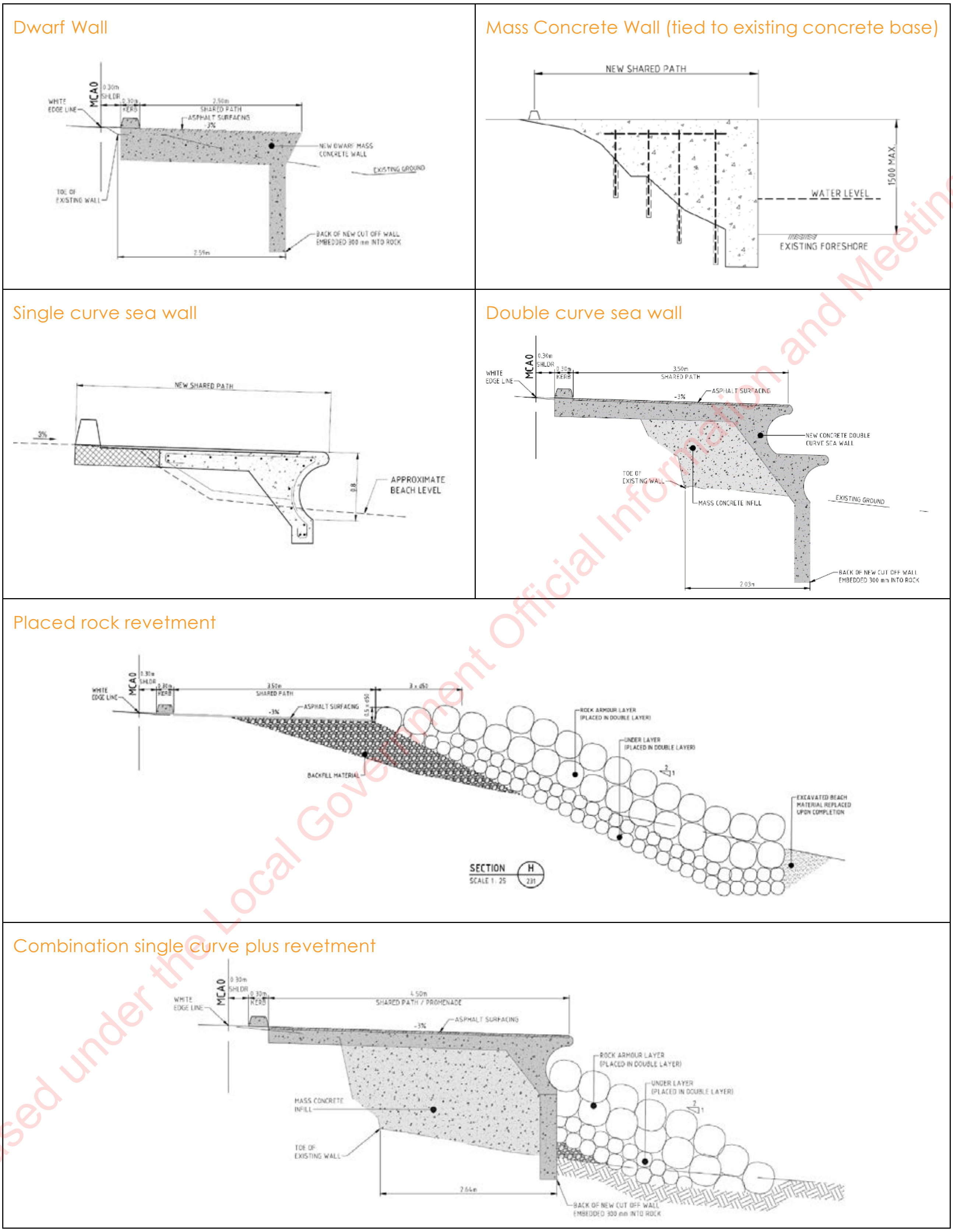

Figure 7-1: Typical cross section for each type of seawall treatment option[4]

[4] Note that a mass concrete wall cross section has not been prepared, as there are no sites where this seawall type is considered as the preferred option.

7.3 Constructability

Disruption during the construction of the shared path will be inevitable, as temporary traffic management and lane closures will be necessary to construct the seawalls and shared path. Providing access for construction vehicles, and minimising the impact for all road users and the community will be imperative. A traffic management plan (TMP) will be developed identifying how temporary access for all modes will be provided, which will require approval from Hutt City Council. A widespread media campaign will also be developed to ensure the changes and anticipated delays during construction are communicated with the community.

An assessment of the benefits of using pre-cast slabs for seawall construction versus casting concrete insitu was assessed, and concluded that an insitu solution was preferred. Insitu concrete offers a better solution from a constructability perspective, particularly in respect to the length of the project and the horizontal and vertical construction challenges associated with this site, given a lack of uniformity. Insitu concrete was used for the York Bay seawall and has performed well. While there are benefits associated with a precast solution, they are generally focussed on speed of construction and surface finishes. For a project that has the potential to present significant challenges during construction a highly adaptable method of construction is of paramount importance. This flexibility is only achieved with insitu construction.

Given the scope of works proposed and expected budget availability, completion of the shared path is expected to take several years. Construction will therefore be staged, however the delivery schedule has not yet been determined. Once the detailed design is finalised, the cost of the works and annual funding allocations can be determined, which will subsequently drive the programme of works. However the prioritisation for programme delivery is expected to consider safety, residual life of any existing seawalls, frequency of overtopping, as well as coherence and connectivity.

7.4 Operability

Minor changes to the operation of Marine Drive are inevitable following the construction of the shared path. The key changes include parking supply, bus stop locations and provision for on-road cyclists.

7.4.1 Crossings

The separators between the shared path and traffic lane (the form of which has yet to be determined) will feature regular gaps, providing space for pedestrians and cyclists to cross to the landward side. At the southern extent of the path, a transition point will be provided for southbound cyclists to cross the carriageway and continue their journey, albeit on the traffic lane and shoulder. Pedestrians have access to a board walk along the shoreline at Days Bay.

At the northern extent of the works, an existing shared path currently terminates at the Seaview Terminal at Point Howard on the seaward side. The new shared path will be integrated into the existing path, and pedestrians and cyclists will not need to cross the carriageway.

An existing zebra crossing at Point Howard provides the only formal crossing point within the scope of works. No additional formal crossing points are proposed for this project.

7.4.2 Refuse collection

There are no residential or commercial properties on the seaward side of Marine Drive within the scope of this project, hence refuse truck access is not required.

7.4.3 Parking

A number of informal parking bays have been established where there is additional shoulder width available. In some locations, this shoulder width will be reallocated to provide for the shared path, reducing the extent of beach reclamation and minimising changes to the shoreline. Some seaward parking spaces will be lost, however improvements to the remaining parking areas are proposed. Parking areas will be formalised and perpendicular spaces will be reoriented to parallel parking, providing safety benefits for road users, and maximising the parking space numbers in the available space.

7.4.4 Bus operation

Marine Drive is serviced by bus routes 81, 83 and 85, linking Eastbourne to Wellington CBD via Petone (route 85 also services Lower Hutt). Each weekday there are 95 bus movements on the corridor, with buses operating between 6am and 11pm. No changes to the bus route or frequency of buses will be required, however minor modifications or relocations to some bus stop locations are proposed. For example, it is proposed to move the bus stop at Mahina Bay fifty metres south, to avoid further encroaching onto the useable beach space at this bay.

Potential conflicts of shared path users at bus stops will need to be managed. Treatment types vary at each bus shelter; ideally the shared path will be diverted behind the bus shelters, however this is not possible at all locations. Linemarking and signage will be used to highlight areas of potential conflict to minimise the safety risk. However the proposed shared path along the foreshore will substantially improve pedestrian safety and access to and from the bus stops along the route for visitors and local residents.

Any movement of bus stops, or redesign of shelters will need to be approved by Greater Wellington Regional Council.

7.4.5 On-road cyclists

While the aim of this project is to provide a safe and connected walking and cycling facility, it is inevitable some cyclists will continue to ride on Marine Drive. Given the challenges and constraints in obtaining the additional width for the shared path, it is not feasible to provide further width for on-road cycling. As such, more confident cyclists will need to use the traffic lane or the shared path, which is not considered to be an issue.

7.4.6 Side friction

Most intersections linking to Marine Drive are located on the landward side of the corridor, minimising the conflict between turning vehicles and shared path users. However there are a few isolated locations where vehicles will need to cross the shared path. These include:

- Lowry Bay - parking area and boat ramp at the Whiorau Reserve at the southern end of Lowry Bay
- Point Howard – cyclists must cross both legs of a loop road access to Point Howard terminal. Sightlines may be compromised by a large rocky outcrop adjacent to Marine Drive.

Options to address these conflicts will be considered during the detailed design stage.

7.4.7 Property impacts

The original scope of the project identified that the shared path was to be delivered within the existing road corridor, or by gaining additional width through the construction of seawalls and reclamation. Purchase of property was undesirable and not supported. However the shared path does impact on the boat sheds and bus stops on the route, and these interactions are being managed. A number of bus shelters need to be relocated[5]; approval for these new sites will be confirmed with Greater Wellington Regional Council. Skerretts Boat shed at Lowry Bay is heritage listed and would be difficult to alter or relocate; a pinch point will be formed here, however there are good sight lines in both directions minimising the conflict risk.

During community consultation it was discovered that part of Mahina Beach is privately owned. However the landowner has indicated initial support for the shared path proposal, and work is ongoing between HCC and the owner to ensure the path can be delivered. From discussions to date this is considered low risk because the owner is supportive and has allowed full public access to the beach as they consider this a community asset.

7.4.8 Asset Management

The main implication for ongoing maintenance is the clearing and cleaning of storm debris from the path and along the shared path separator. However constructing seawalls that reflect wave energy (such as single and double curve walls), as well as options that provide additional height will reduce incidences of overtopping during storm events and high tides.

Resurfacing of a carriageway with an adjoining separated shared path is more complicated due to the separator that forms an obstruction. However the lifespan of a shared path is longer than the adjacent traffic lanes due to reduced loading, and will require resurfacing less often. Increased road marking (including green paint across accesses), signage and barrier maintenance will add increased asset management costs for this corridor.

[5] Bus shelters at Point Howard, York Bay and Mahina Bay may be relocated either to maximise space for the shared path or to avoid additional beach encroachment.

As stated earlier, the intention is to avoid impacting services as far as possible and for the most part no service relocation or protection works are anticipated, other than some localised power pole and street lighting relocation. However, we will work with other service providers to use the construction of the shared path as an opportunity for other services to be maintained, laid or future-proofed.

7.4.9 Environmental and Social Impacts

An Environmental and Social Responsibility Screen was undertaken to identify opportunities and risks, and assess potential mitigation options for the project. The full screening document is provided in Appendix G, however key impacts associated with this project are summarised below:

- Natural Environment – reclamation impacts on coastal marine habitats (including penguin nesting sites); construction impacts to the natural environment
- Cultural and historic heritage – Maori occupied kāinga in the bays and pā on the headlands; the listed historic Skerrett Boatshed (1906) at Lowry Bay must be retained; excavation may unearth archaeological artefacts
- Human health – mostly positive health outcomes of active transport, however additional pedestrians and cyclists may increase conflict at accesses and driveways
- Social – road safety improvements and increased travel choices; recreational and tourism opportunities; reduced CO_2 emissions.
- Urban and landscape design – creation of promenade on the foreshore enhances harbour views and adds opportunities for urban design elements

8. Recommended Option - Economic Analysis

A complete economic assessment of the preferred option, including key assumption and methodology is provided in Appendix H. A summary of some key results and findings is presented in this section.

8.1 Initial Economic Summary of Both Width Options

The costs to deliver both project options has been calculated. The expected estimate to deliver a 2.5 m path (Option 4) is $10.5 million, while a 3.5 m path (Option 5) is expected to cost $13.1 million.

The economic benefits of the project include travel time benefits, safety benefits and facility benefits; these are summarised in Table 8-1. The BCR of Option 4 is 1.8, whereas Option 5 provides a higher benefit return on investment, with a BCR of 2.0.

Table 8-1: Cost-Benefit Appraisal

	Option 4 - 2.5m	Option 5 - 3.5m
Facility Benefits	$11.5M	$16.5M
Travel Time Benefits	$1.5M	$1.9M
Safety Benefits	$0.6M	$0.8M
Net Present Value (NPV) Total Benefits	$13.6M	$19.1M
Net Present Value (NPV) Costs	$7.6M	$9.7M
BCR	**1.8**	**2.0**
First Year Rate of Return (FYRR)	7%	7%

8.2 Comparison with Earlier Stages

The results from the economic evaluation provided in the IBC were provided for each path width option. The DBC only determined the economic benefits for Options 4 and 5, as the other options were rejected through the multi-criteria analysis process. A comparison of the anticipated benefits and costs, and subsequent benefit-cost ratio (BCR) at the IBC and DBC stages is provided in Table 8-2 below. Note that while the benefits of each option are expected to be smaller than previously anticipated, the costs to deliver the project are also less than originally estimated at the IBC stage. In reality, the cost of delivering the project is also expected to be between the cost estimate for Option 4 and 5 – as a consistent 3.5 metre path is not feasible due to community feedback and numerous constraints and challenges.

Table 8-2: Economic evaluation summary as supplied in the IBC

	IBC estimates		DBC estimates	
	Option 4	Option 5	Option 4	Option 5
NPV Total Benefits	$20.8M	$28.2M	$13.6M	$19.1M
NPV Costs	$8.1M	$11.3M	$7.6M	$9.7M
BCR	**2.6**	**2.5**	**1.8**	**2.0**

8.3 Analysis of Recommended Option

The recommended option for this project is primarily the Option of 3.5 m but with 2.5 m provided at the beach locations. Now that this has been confirmed a more detailed cost estimate was developed which now feeds back into this final analysis of the option. The new estimated cost of Option 3.5 m has changed the BCR and FYRR from the prior analysis, due to the change in construction cost.

Table 8-3: Recommended Final Option Assessment

	Facility Benefits	Travel Time Benefits	Safety Benefits	NPV Total Benefits	NPV Costs	BCR	FYRR
Option 3.5m (2.5m beaches)	$16.5M	$1.9M	$0.8M	$19.1M	$10.7M	1.8	6%

The new estimated cost of the project has risen from $13.1M to $14.3M after a more detailed assessment. This in turn has reduced the BCR from 2.0 in the initial assessment to 1.8. The FYRR has also reduced from 7% to 6%.

8.4 Sensitivity Analysis

Numerous assumptions and estimates are used when forecasting future project costs and benefits. A sensitivity analysis tests a range of scenarios using upper and lower bounds of key variables. The analysis also adds rigour to the economic analysis and tests the validity of the results. A range of sensitivity tests has been undertaken for a number of assumptions for the recommended option only, with the results outlined in Table 8-4 below.

Table 8-4: Sensitivity testing of Option 5

Option 3.5m Sensitivity	Sensitivity - Low		Base BCR		Sensitivity - High	
	Low BCR	Note	Base BCR	Note	High BCR	Note
Capital Costs	1.4	Expected Estimate + 25% ($17.9)	1.8	Expected Estimate ($14.3M)	2.4	Base Estimate ($11.3m)
Cyclist Volumes	0.7	80 new users: assume 100% are local users and no wider attraction	1.8	201 new users: assume 40% local and 60% wider recreational users	2.8	321 new users: assume 25% local and 75% wider recreational users
Cyclist Growth	1.3	2.1% (NZ growth 2006-2013)	1.8	9.2% (0-15yr) 4.5% (15-30) 2.1% (30+)	2.2	9.2% (as per RR340)
Construction Time / Staged Implementation	1.7	48 months	1.8	24 months	1.8	12 months
Pedestrian Growth	1.8	0%	1.8	1%	1.8	2%
Pedestrian Volumes	1.7	+20 new peds	1.8	60 new peds	2.2	200 new peds
Travel Time Benefits (Cyclist Speed)	1.8	13 km/h (do-min)	1.8	18 km/h	1.8	20 km/h
Resilience – Storm recurrence interval	1.8	15 year recurrence	1.8	10 year recurrence	1.9	5 year recurrence

8.5 Assessment Factors

The NZ Transport Agency requires projects to be assessed using a results alignment and a cost-benefit appraisal to ensure the recommended option provides value for money.

8.5.1 Results Alignment

A results alignment has been undertaken using the NZ Transport Agency's Investment Assessment Framework. The purpose of this process is to assess the significance of the problem relative to the goals and outcomes of the Government Policy Statement on Land Transport (GPS). The assessment is provided in Table 8-5 below and demonstrates a High results alignment.

Table 8-5: Results alignment assessment

ONRC Classification	**Primary Collector route**	
Problem Outcome Class	**Network Performance**	
Treatment	**Intervention**	**Customer Levels of Service (CLOS)**
Outcome	Provide access to economic and social opportunities, particularly for those with limited access to a private motor vehicle	Matching capacity and demand, resilience

Journey	n/a	Access to economic and social opportunities, tourism
Gap	n/a	Four significant gaps were identified in the CLoS gap assessment (refer to Table 2-1). Safety, amenity and accessibility gaps were a result of poor and inconsistent facilities for pedestrians and cyclists. A significant gap for resilience was also established due to lack of alternative route.
Results Alignment	High	High

8.6 Cost-benefit appraisal

An assessment of the whole-of-life benefits and costs based on the Economic Evaluation Manual is 1.8 for Option 4, and 2.0 for Option 5. For improvement activities, this provides a low rating (BCR of between 1 and 2.9).

9. Financial Case

The Financial Case focuses on project affordability, timing and funding arrangements.

9.1 Project Delivery Costs

The delivery of the Eastern Bays Shared Path project is expected to incur costs for design, construction and resource consent approvals. The estimated costs for each of these elements is provided below:

- Design costs – Detailed design are anticipated to cost approximately $250,000 - $300,000.
- Construction costs - cost estimates for the shared path options range from $10M – $15M. The preliminary cost variation is based on considering the two width options together with limited levels of design and information and are subject to significant change and refinement as the detailed design is developed.
- Statutory costs – costs to apply for resource consents are expected to be approximately $90,000 - $140,000. This covers lodgement costs, council assessment fees, specialist inputs and technical assessments. If the project approval is escalated to the Environment Court, statutory costs will increase.

No property purchase or disposal is required to deliver the project. While one section of the beach is privately owned the landowner considers the beach a community asset and currently permits full public access.

9.2 Project Timing

The construction of the first stage of the project will commence in 2018. No firm decisions have been made on what the initial section would be or how the works will be programmed or staged over a period of time. This will be based on a number of factors including remaining seawall life, constructability, safety, continuity, funding availability and agreements between Hutt City Council and NZ Transport Agency.

9.3 Ongoing Maintenance Costs

Current maintenance costs average $3,500 per year for emergency seawall damage and replacement works. A further $8,000 per year is incurred from emergency sweeping due to storms (based on 5 year average). With substantial new sections of seawall in place, much of which reflects wave energy, it is reasonable to expect reductions in both of these costs (damage and sweeping works triggered by storm events). However the scheduled sweeping regime may need to be increased to remove debris from shared path due to increased risk of trip or puncture hazards (e.g. broken shells on path)

9.4 Project Revenue

This project offers no provision for revenue sourcing.

9.5 Funding Options

Approximately $9 million of funding has been allocated by Hutt City Council to deliver this project over the next six years (funding is assigned within their Long Term Plan). Subsidies from the NZ Transport Agency and the Urban Cycleway Fund will also contribute to the construction of the shared path.

9.6 Financial Risk

There are funding uncertainties as the scope has changed from the initial concept. At this stage, it is unclear what subsidies will be received from the NZ Transport Agency and Urban Cycleway Programme until a final option is chosen. Note that a requirement of the Urban Cycleway Programme is that funds must be fully committed by June 2018. Delays incurred in delivering the project may impact on the available funding and ultimately the phasing and delivery timeframe of this project.

Part B – Readiness and Assurance

10. Commercial Analysis

10.1 Introduction

The implementation of the project is directly linked to the funds available. Options to front load the project or deliver multiple portions separately will be explored to fast-track the delivery of the project. However it is anticipated that local and external funds will still need to be spread over a number of years.

10.2 Implementation Strategy

Following completion of the detailed design of the entire project, the allocation of the first tranche of funding will be confirmed. This will enable a section of works to be tendered, which will most likely be via the open market, or possibly as an invited tender.

A full implementation strategy will be developed once the funding for the first tranche of works is finalised. Construction works will be prioritised based on a number of factors including road user safety (and perceived safety), seawall residual life, path coherence and connectivity as well as public feedback.

10.3 Sourcing Options

Physical works will be sourced via open market tender or invited tender to ensure price competition and suitability of the preferred supplier. The tender is anticipated to have a reasonable non-price attribute weighting (and not be very heavily price weighted) due to the specialised nature of these seawall works beyond standard civil construction.

10.4 Payment Mechanisms

Payment for implementation is expected to be on a Measure & Value basis.

10.5 Schedule

A detailed design programme will be provided during negotiations of each phase of work. However a current agreed programme for the preliminary design forms part of this DBC, and extends through to commencement of construction to ensure a coordinated approach beyond phases.

11. Management Case

11.1 Project Roles

The pre-implementation project team will comprise of the following staff:

Table 11-1: Pre-implementation project team

Role	Name
Project Sponsor - Hutt City Council	John Gloag
Client Project Leader - Hutt City Council	Simon Cager
Project Manager - Stantec	Phil Peet
Design Manager - Stantec	Jamie Povall
Structural Designer - Stantec	Jeremy Walters
Roading Designer - Stantec	Graeme Corin
Geotechnical Engineer - Stantec	Tim Kelly
Consenting and Consultation - Stantec	Caroline van Halderen

11.2 Governance Structure

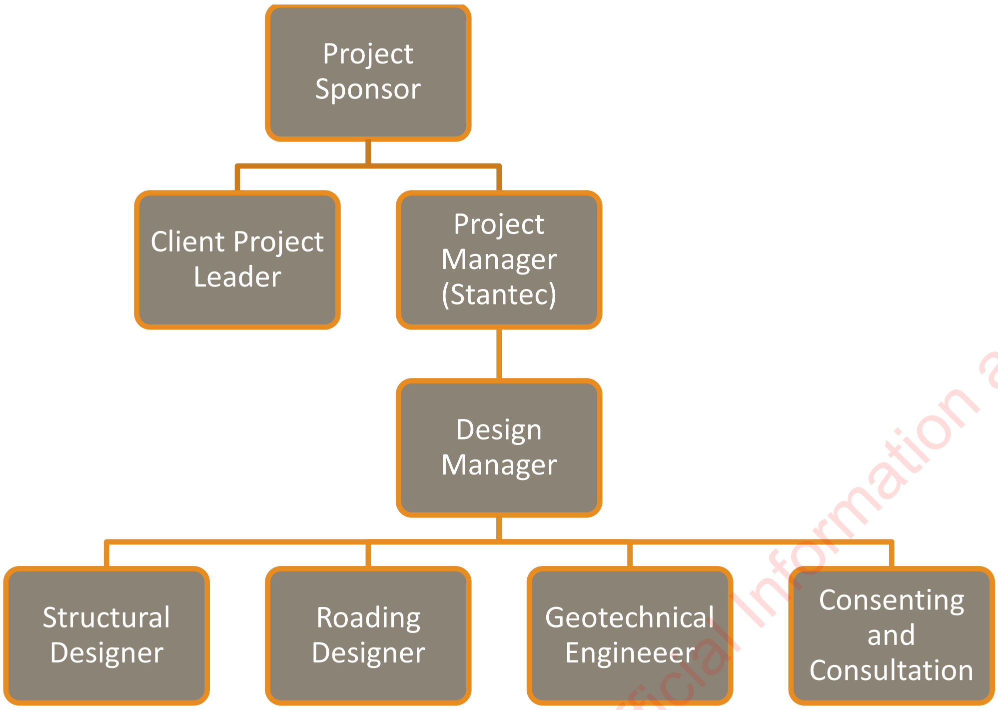

Figure 11-1: Governance Structure

11.3 Assurance and Acceptance

Road safety audits will be externally commissioned at the preliminary and final detailed design stages of the project. A peer review of the economic assessment will also be performed.

11.4 Change Control

Changes to the project scope, outcomes or budget will be controlled by the Project Manager and escalated to the Project Sponsor when necessary. However, initiatives to reduce the incidents and scope of these changes include:

- Not scoping or agreeing on tasks or price for the detailed design until the preliminary design is substantially complete and accepted
- Providing a comprehensive proposal of what is and is not included in detailed design lump sum fee
- Treating project phases or tasks that are difficult to quantify as Time Charge (hourly rate) to avoid unnecessary risk premiums. Such items will be estimated carefully to assist with client budgeting and will be capped.

Other areas of risk will also be highlighted to the client such as York Bay[6] where further assessment and topographical survey is required prior to forming a decision on the final preferred option. The team will agree with the client early how best to manage these locations to give budget and scope certainty

11.5 Cost Management

Costs will be managed by the Project Manager, and the budget will be reviewed and updated weekly. The project will adopt stringent variation regime, where no out-of-scope work will be undertaken prior to client signoffs. Substantial deviations in budget tracking will be escalated to the Project Sponsor.

[6] The additional survey will be undertaken in parallel with finalising the preliminary design and DBC, and then further optioneering at this location will be tied into the Detailed Design Scope.

11.6 Issues Management

Issues will be managed through a documented issues log. The close working relationship with the client will be maintained through the detailed design & consenting phase. This will consist of frequent contact (at least weekly meetings and/or phone calls) to minimise the risk of issues arising or escalating.

Appendices

Appendix A Geotechnical Report

EASTERN BAYS SHARED PATH GEOTECHNICAL FACTUAL AND INTERPRETIVE REPORT

GEOTECHNICAL FACTUAL AND INTERPRETIVE REPORT

PREPARED FOR HUTT CITY COUNCIL

31 August 2017

MWH now part of Stantec

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This disclaimer shall apply notwithstanding that the report may be made available to other persons for an application for permission or approval to fulfil a legal requirement.

QUALITY STATEMENT

PROJECT MANAGER

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.... 30/08/2017

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REVISION SCHEDULE

Rev No.	Date	Description	Signature or Typed Name (documentation on file)			
			Prepared by	Checked by	Reviewed by	Approved by
0	04/07/2017	Draft for Review	s7(2)(a) [redacted]			
1	11/07/2017	Final for Client Submission				
2	31/08/2017	Final				

Hutt City Council

Eastern Bays Shared Path
Geotechnical Factual and Interpretive Report

CONTENTS

LIST OF TABLES

LIST OF FIGURES

APPENDICES

1. Introduction

Stantec has been engaged by Hutt City Council to scope and undertake geotechnical site investigations and reporting for the Eastern Bays Shared Path project.

The Eastern Bays Shared Path project aims to provide a safe combined shared path facility for cycling and walking by modifying and widening the existing foot path on the seaward side and constructing a seawall such as the double curved wall arrangement currently in use.

This report presents the site investigation results and provides a preliminary geotechnical assessment of the ground conditions and foundation recommendations for the proposed seawall for this site.

2. Proposed Works

Hutt City Council (HCC) proposes to provide a shared pathway (pedestrian and cycle) on the seaward side of Marine Drive from Point Howard to Rona Bay. The pathway is assumed to be a concrete gravity wall embedded into beach sediments or founded within underlying greywacke rock. This report provides preliminary geotechnical guidance for the proposed sea wall foundations (noting the final wall type is TBC following further assessment by the project team and through community consultation).

3. Site Description

The project site is located near the Wellington suburb of Eastbourne and includes approximately 5 km of Marine Drive from Point Howard south to Rona Bay (excluding Days Bay) as indicated by the redline on Figure 1 below.

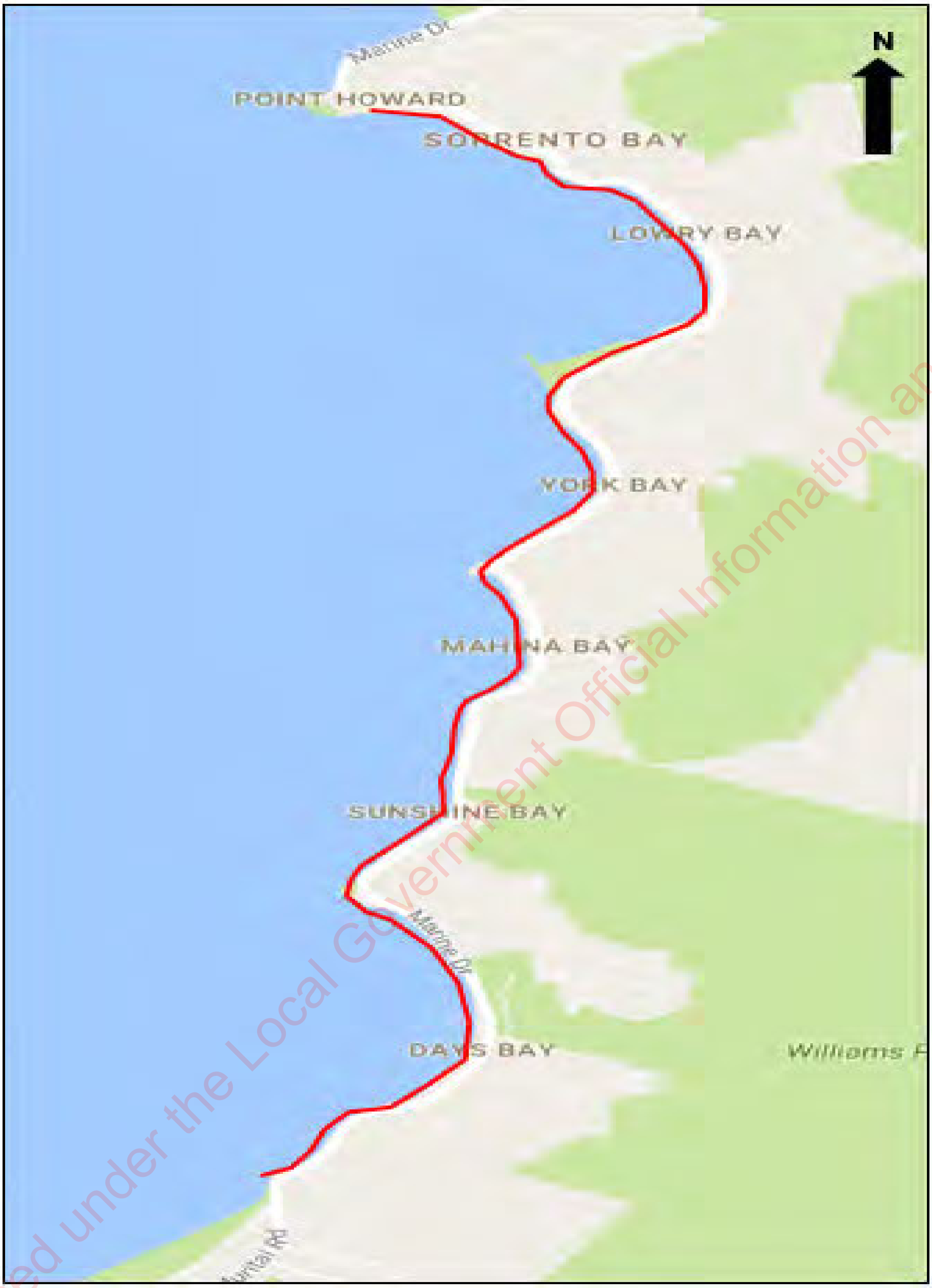

Figure 1: Project extents indicated by the red line for the Eastern Bays shared path

Marine Drive provides two way single lane access for all traffic to the Eastern Bays suburbs including the township of Eastbourne. Marine Drive is constructed on a narrow strip of land between steep greywacke slopes and bluffs and the Wellington Harbour (refer to Figure 2). The road runs adjacent to numerous greywacke and gravel dominated beaches and shallow embayments.

Figure 2: Typical photo of the Eastern Bays shoreline and the adjacent seawall and Marine Drive

4. Scope of this report

The scope of this report is outlined within the letter proposal dated 2nd February 2017 and includes:

- Preparation and submission of geotechnical site investigation access consents
- Undertaking preliminary site investigations along the proposed seawall locations including;
  - Advancing minimum of three geotechnical fully cored boreholes to retrieve rock and soil samples for laboratory testing and geotechnical logging
  - Undertake Cone Penetrometer Testing (CPT) at various sites to supplement boreholes in silts, sands and gravels
- Laboratory testing of borehole samples to determine strength parameters for wall design
- Geotechnical walkover and site mapping assessment of the exposures adjacent to the proposed cycleway
- Preparation of a combined geotechnical factual and interpretative reports suitable for a DBC level project assessment.

Fieldwork for the investigations comprised the following tasks:

- Procurement, mobilisation and demobilisation of all plant, personnel and equipment necessary for execution of the work, including the provision of access
- Advancing cone penetration tests using a specialized CPT rig to measure soil parameters within the bays
- Advancing geotechnical boreholes using a geotechnical drilling rig to characterise geological materials and to collect samples for testing and analysis
- Logging of soil and rock encountered to NZGS (2005) guidelines

- Laboratory testing to determine geotechnical properties of the soil/rock
- Photography of all recovered samples, including geotechnical site features.

4.1 Objectives

The objectives of the geotechnical investigation phase captured in this report include:

- To characterise subsurface geological, geotechnical and hydrogeological conditions in the area of Eastern Bays
- To identify, describe and investigate geotechnical risk and hazards relevant to the project elements.

Figure 3 below shows the location of site investigation locations on Google Earth map.

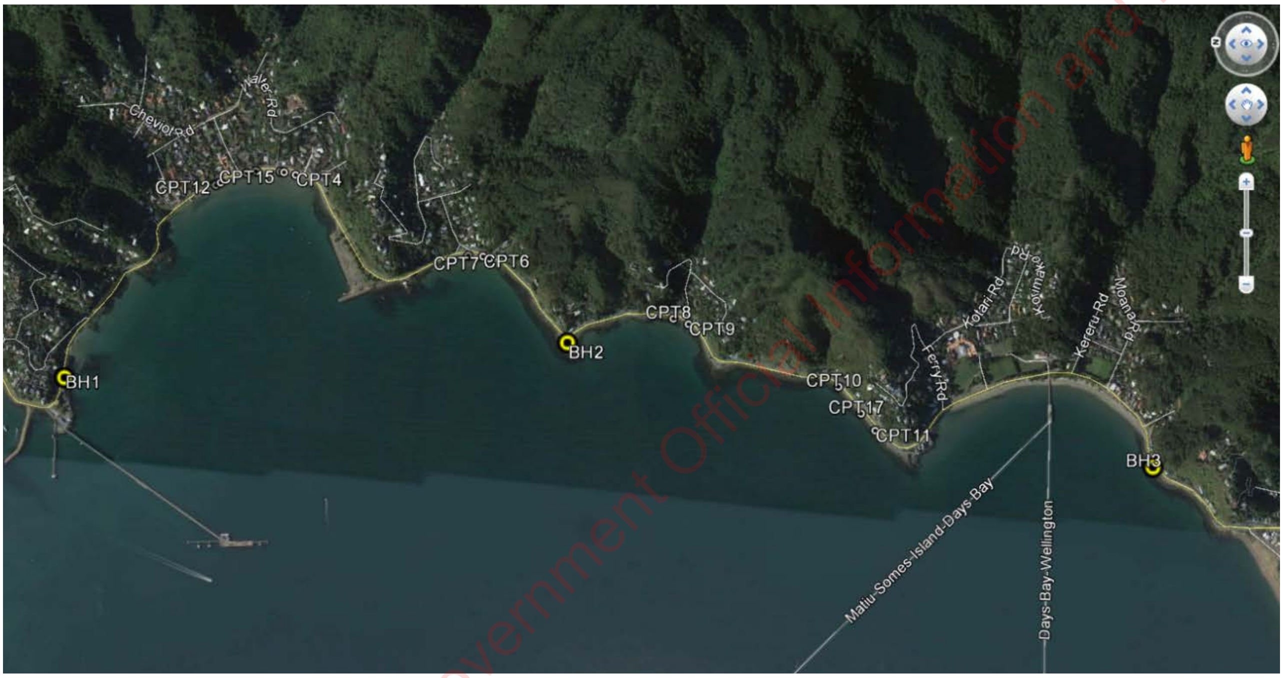

Figure 3: Location of BH's and CPT's on Google Earth

5. Desktop Study

5.1 Published Geology

We refer to the QMAP 1:250000: Geology of the Wellington Area published by the Institute of Geological & Nuclear Science 2000.

At the proposed seawall location, we anticipate resistant ridges of greywacke rock outcropping at the surface separated by beach deposits of variable thickness infilled with fine to coarse sand and gravels (Q1b on the map on Figure 4).

Figure 4: Extract from QMAP, Map 8 showing Q1b Beach deposit forming the flat embayment's, consisting of marine gravel with sand, mud and elevated terrain forming the steep bluff and ridges anticipated to be Greywacke

5.2 Existing Reports

GHD prepared a preliminary Geotechnical Ground Investigation in December 2015 entitled Eastern Bays Seawall Construction Project – Lowry and York Bays Geotechnical Ground Investigation and Assessment Report ref 51/33632. The findings are summarized below:

- Geotechnical observations were limited to Lowry and York Bays
- Greywacke rock is exposed on the foreshore to the north and south of the bays (similar geotechnical conditions) and fine sand to coarse gravel encountered between the rock exposures
- Three Scala tests on each beach showed depth to rock varies from 3.8 metres below ground level (m bgl) to 7.0 m bgl at Lowry Bay and from 1.4 m bgl to 8.0 m bgl at York Bay.
- The topography comprises typical ridges and gullies. Colluvium material washed down from steep slopes have been reworked by the sea and form beach deposits.

- At Lowry and York bays, the seawall can be founded either directly onto rock or onto dense sand with good bearing
- The report recommended that Reno mattress or gabion baskets could be utilized as dense founding material in deeper beach deposits.

6. Walkover Reconnaissance

This section provides a brief description of relevant observations made during site walkover carried out on the 3 February 2017:

- Site observations correspond to anticipated conditions derived from the published geological map
- Greywacke rock platforms are exposed at resistant headlands at ridges outcropping into the sea (Figure 5)
- Beach materials deposited between resistant headlands comprising fine sand to coarse gravel were encountered at bays along the alignment (Figure 6)
- Greywacke rock exposures outcrop along the alignment (Figure 7)

Figure 5: Greywacke outcropping

Figure 6: Sand and gravel beach

Figure 7: greywacke outcropping around the headlands

7. Site Investigation

A geotechnical site investigation was undertaken by Stantec to determine the ground conditions and geotechnical risks associated with the different geological materials on site, to recover materials for examination, logging, sampling and in-situ testing, as well as laboratory testing.

The advancement of geotechnical boreholes and CPTs were the primary methods employed during the site investigations. The boreholes and CPT testing were undertaken by Griffiths Drilling.

The Borehole investigations were targeted on rock to sample and confirm rock type and strength. A total of three boreholes (BH1, BH2 and BH3) were advanced using a PLG conventional coring rig under the direction of Stantec engineering geologist.

CPT testing was undertaken within the beach zone to determine beach deposits and the depth to rock head, to derive geotechnical parameters for use in design and to assess liquefaction hazard potential. Furthermore, because of the close correlation between CPT and a pile under vertical loading, CPT data may also be used directly in the design of foundations. For these reasons, CPT testing was chosen to support borehole investigations at the eastern bays site.

The methods and procedures undertaken during the ground investigation are outlined in following sections.

7.1 Geotechnical Boreholes and Core Penetration Testing

7.1.1 Geotechnical Boreholes

The boreholes were advanced at road level to depths ranging between 6 m and 8.5 m below ground using conventional coring technique (HQTT). Drilling was advance using 1.5 m length core runs which were reduced as necessary to achieve good core recovery.

In-situ testing within the boreholes comprised Standard Penetration Tests (SPT) undertaken at 1.5 m intervals. SPT samples were placed in plastic bags at the time of extraction. Soil and rock materials encountered in the boreholes were logged on site by our engineering geologist in accordance with the New Zealand Geotechnical Society (NZGS) Field Description of Soil and Rock (2005).

The cored material was collected, placed into boxes and are stored at the Griffiths Drilling facility. The borehole logs and core photos are presented in Appendix B. Table 1 presents a summary of the drilled boreholes.

Table 1: Borehole Location Summary

Borehole No.	RL m NZVD2016*	Penetration depth (m)	Chainage	Location		Date
				East	North	
BH1	1.686	8.5	650	324436	5431033	11/04/2017
BH2	1.890	7.5	2900	324674	5429480	18/04/2017
BH3	1.372	6.0	5180	324410	5427603	20/04/2017

*Note: derived from LINZ data service – wellington LiDAR 1m DEM (2013) accessed 22/08/2017.

A summary of the ground conditions encountered in the borehole testing is presented in Table 2.

Table 2: Summary of Borehole Subsurface conditions

Borehole No.	From (m)	To (m)	Material Description	SPT (Field N) range
BH1	**0**	**1.5**	Manmade fill - pavement	
	1.5	**2.2**	Silty sand fill - pavement	2
	2.2	**4.2**	highly to completely weathered, weak Greywacke	14
	4.2	**8.5**	moderately weathered, weak to moderately strong Greywacke	37
BH2	**0**	**1.5**	Manmade fill - pavement	
	1.5	**2.7**	highly weathered, weak to moderately strong Greywacke	
	2.7	**7.7**	moderately weathered, weak to moderately strong Greywacke	50
BH3	**0**	**1.5**	Manmade fill - pavement	
	1.5	**2.2**	highly weathered, weak to moderately strong Greywacke	
	2.2	**6.0**	moderately weathered, weak to moderately strong Greywacke	43

The soils described above were tested to determine their relative strengths, density and possible behaviour. Relative density of these soils was tested using Standard Penetration Testing (SPT) which uses a split spoon sampler to recover materials and a percussive hammer to advance the test.

Generally, at depths up to 4.2 m bgl SPT readings returned within the Greywacke indicated a moderately to highly weathered material with blow counts in the range 40 – 50 and therefore described as hard or dense within the geological logging.

7.2 Core Penetration Testing

The CPT locations were positioned at beach level (at the approximate level of the proposed seawall to confirm depth to rock head and to target beach deposits (sand and gravel).

A total of 16 static CPTs were completed by Griffiths Drilling in accordance with ASTM Standard D5778-12. These are known as CPT 1-15 and 17. Due to issues with anchoring within large cobbles and boulders at the northern end of the project, CPT 16 was cancelled and replaced with CPT17.

Appendix C presents the raw CPT data and Appendix D presents the CPT interpretative and derived parameters using CPT-IT.

Please refer to Table 3 for a summary of completed CPT locations.

Table 3: CPT Summary Table

CPT No.	Penetration depth (EOH m)	Chainage	Location		Date
			East	North	
CPT 1	3.2	1460	1760177	5430965	11/04/2017
CPT 2	9.3	1570	1760217	5430869	11/04/2017
CPT 3	10.0	2470	1760002	5430185	12/04/2017
CPT 4	10.0	1720	1760227	5430716	12/04/2017
CPT 5	3.0	4000	1759633	5430019	18/04/2017
CPT 6	4.6	2520	1759975	5430108	18/04/2017
CPT 7	2.5	2550	1759974	5430087	18/04/2017
CPT 8	1.5	3250	1759816	5429508	20/04/2017
CPT 9	2.8	3280	1759809	5429478	20/04/2017
CPT 10	0.7	3840	1759627	5428987	21/04/2017
CPT 11	0.9	4020	1759500	5428873	21/04/2017
CPT 12	9.9	1480	1760185	5430950	24/04/2017
CPT 13	3.8	1600	1760229	5430840	24/04/2017
CPT 14	9.9	1670	1760229	5430764	24/04/2017
CPT 15	1.6	1680	1760228	5430757	26/04/2017
CPT 17	0.3	3970	1759527	5428916	26/04/2017

7.3 Laboratory Testing

7.3.1 Soil/Rock Properties Testing

Laboratory testing has been undertaken on selected samples from boreholes BH2 and BH3. The samples were tested for Unconfined Compressive Strength (UCS) and Elastic Modulus by Opus Laboratories Ltd, Lower Hutt; the extent of the testing is outlined in Table 4.

The laboratory testing results are presented in Appendix E.

Table 4: Laboratory testing results

Test Type	Borehole I.D.	Tests depth (m)	Results
UCS	BH2	4.5-4.68	1.5 MPa
UCS	BH3	3.93-4.16	21 MPa
Elastic Modulus	BH3	4.0	13000 MPa

8. Geological Interpretation

In the Wellington area, the bedrock comprises uplifted greywacke. Erosion has resulted in ridges and valleys producing colluvium deposits on the seashore at the valley's outlet. These deposit have washed down and been reworked by the sea resulting in heterogeneous layer comprising loose sand and coarse gravel typical of beach deposits with highly weathered Greywacke underlain.

The site investigation confirmed our assumptions obtained during the desktop review. The site materials typically comprised exposed ridges of weathered greywacke outcropping at resistant headlands. Greywacke was recorded as being predominantly moderately weathered, very weak to weak rock where exposed. The beach deposits typically comprised alternating gravels, sands, silts and clays up to 10m depth.

Based on information obtained during the desktop review, site walkover and geotechnical investigation we interpret the following ground conditions to be encountered at foundation level for the proposed wall Table 5.

Table 5: Material Type encountered along chainage

Chainage	Material type	Description
715-800	Sand & Gravel	Fine to coarse grained sand typical of beach deposits. Shallow rock expected to be encountered. Outcropping of moderately weathered weak greywacke during low tide. Shallow foundations expected.
800-1030	Greywacke	Greywacke is generally moderately weathered weak. Shallow foundations expected.
1030-1075	Sand & Gravel	Fine to coarse grained sand typical of beach deposits. Foundations expected to be founded in sands.
1100-1250	Greywacke	Greywacke is generally moderately weathered weak. Shallow foundations expected.
1250-1830	Sand & Gravel	Fine to coarse grained sand typical of beach deposits. Foundations expected to be founded in sand. CPT results vary throughout Lowry Bay.
1830-1960	Greywacke	Greywacke is generally moderately weathered weak. Shallow foundations expected.
2180-2340	Greywacke	Greywacke is generally moderately weathered weak. Shallow foundations expected.
2340-2730	Sand & Gravel	Fine to coarse grained sand typical of beach deposits. Foundations expected to be founded in sands.
2780-3080	Greywacke	Greywacke is generally moderately weathered weak. Shallow foundations expected.
3080-3120	Sand & Gravel	Fine to coarse grained sand typical of beach deposits. Shallow rock expected to be encountered. Shallow foundations expected.
3120-3220	Greywacke	Greywacke is generally moderately weathered weak. Shallow foundations expected.

3220-3310	Sand & Gravel	Fine to coarse grained sand typical of beach deposits. Foundations expected to be founded in greywacke from CPT results.
3310-3780	Greywacke	Greywacke is generally moderately weathered weak. Shallow foundations expected.
3780-4030	Sand & Gravel	Fine to coarse grained sand typical of beach deposits. Foundations expected to be founded in sands.
5010-5390	Greywacke	Greywacke is generally moderately weathered weak. Shallow foundations expected.

9. Geotechnical Assessment

9.1 Importance Level

The proposed development includes the construction of a sea wall supporting a cycleway.

Referencing Table 2.2 of the NZ Transport Agency Bridge Manual, 3rd Edition the following is evident:

- The proposed seawall is not on a primary lifeline route, as per Figure 2.1(a) of the Bridge Manual.
- The wall height is not greater than 5 m high, but is greater than 50 m^2 in area.
- Failure of the wall would not result in significantly endangering adjacent property (other than the road itself and possibly utilities contained within it).

The development can be assigned Importance Level IL1.

It is recommended that HCC may wish to build additional resilience to this structure on the basis that this road is the only road in and out of the Eastern Bays community. This may involve elevating the seawall structure in importance from IL1 to IL2.

The proposed development is feasible in terms of geologic or geotechnical assessment.

9.2 Project Constraints

9.2.1 Loose beach deposits

Due to the cohesionless nature of beach deposits, excavations made on site will need to be carefully managed using either sheet piles or mixing a bentonite slurry within the materials to enable sufficient excavation wall stability to allow concrete pour.

9.2.2 Tides

As the project is situated on the Wellington Harbour, tides will influence construction timelines. Tides will limit construction zones and concrete pours. Pre cast structures may be an option to consider.

9.2.3 Excavatability

Our assessment of excavatability of rock materials was undertaken based on geotechnical properties of the rock, method of excavation and type and size of excavation equipment.

The main geotechnical properties of the rock impacting excavation conditions are:

- Discontinuity spacing
- Strength of the intact rock and
- Aperture, infilling and frictional strength of the discontinuities.

The main excavation methods considered are:

- Digging; and
- Ripping and rock breaking;

There may be areas where these methods (rock breaking and ripping) may need to be employed.

9.3 Foundation Design Considerations

It is crucial for the seawall to be founded in material that will provide adequate bearing capacity and avoid adverse effect of potential scouring. The exposed rock should provide, however, special consideration should be made within beach areas to ensure bearing capacity is sufficient.

9.3.1 Seismic Assessment

The project is IL1 and therefore seismic assessment is not considered.

9.3.2 Potential for liquefaction

The project is IL1 and therefore liquefaction assessment is not considered.

9.4 Geotechnical Constraints and Hazards

The preliminary geotechnical ground model highlights the following hazards, constraints and risks. These include but are not limited to:

- A scour prone site. It is recommended that structures founded on beach deposits are constructed at least 1.5 m bgl and founded on adequate subgrade with suitable bearing.
- The beach deposits may consist of soft or loose subgrade soils
- Tides and water levels
- Unsuitable excavations in beach sand
- Liquefaction analysis was not carried out for the structure, as the structure is IL1

10. Geotechnical Design Recommendations

10.1 General

Given the low strength materials within the beach deposits, adequate bearing may be difficult to achieve in the beach areas. Founding directly on the greywacke when close to the surface may be considered.

10.2 Additional site investigation to inform design

It is recommended that further site investigations in the form of additional CPT testing be undertaken at York and Lowry Bay and where depths to rock head vary significantly due to infilled gullies.

The additional site investigations will provide better confidence for the design and construction to confirm the extent of the seawall will be embedded into greywacke vs embedment within beach deposits.

10.3 Importance Level

It is recommended that HCC may wish to build additional resilience to this structure on the basis that it will linked to the existing road. Currently the existing road is IL2 and is the only road in and out of the Eastern Bays community. This may involve elevating the seawall structure in importance from IL1 to IL2.

10.4 Geotechnical Design Parameters

The inferred drained friction angle (φ') and saturated unit weights of soil layers (γ) have been adopted based on correlations of derived SPT N values (see Appendix B) found in the Steel Sheet Piling Design Manual (USS, 1975). These have been refined and rationalised against interpretation of data collected from CPT testing (see Appendix D).

The values are appropriate under static conditions only and an upper limit friction angle of 40° has been adopted. The soil design parameters are represented in Table 6. Values for sand and gravel are indicative only.

Based on the factual records of the exploratory holes, the in-situ (CPT and SPT) test results and our experience of similar materials elsewhere, the following properties have been adopted for the geological materials present at the site.

A range of values are reported so that a sensitivity check can be made for various design scenarios. The appropriate geotechnical parameters should be adopted depending on what material is exposed during construction.

Table 6: Design Geotechnical Parameters

Soil description	Depth (m)	Bulk Density V (kN/m³)	Internal Angle of Friction φ' (Degrees)	N_{60}	Apparent Cohesion C' (kPa)	UCS (MPa)
Beach deposits	1.0-3.0	16-18	35 - 40	25	0	N/A
Highly Weathered Greywacke	3.0-10.0	18-20	35	30	5	1 – 5
Moderately weathered greywacke	3.0-10.0	19-20	30-35	35	200 – 300	3 – 15

The information in Table 7 has been derived from CPT test results undertaken within the beach sand materials.

Table 7: Soil Profile and Parameters

Soil Profile	Thickness (m)	Density/ Consistency	Cone Resistance Qt (MPa)	Friction Angle øo	Shear Strength (kPa)	Young Modulas (kPa)
Fill (SAND / Silty SAND)	0.3-1.5	N/A	0-5	30	-	15000-20000
Sandy SILT/ Clayey SILT	10	Very Soft to Firm	2-5	26	30	8000-15000
Lenses of SAND / Silty SAND layers in 10m	-	Loose to Medium Dense	10-30	32	-	15000- 40000

10.5 Foundation Recommendations

The following Table 8, below provides foundation recommendations for the proposed seawall related to chainage along the site. This has been established based on the existing information, site walkover and investigation testing results. The following depths assume depth of scouring of 1.5 m and a minimal bearing capacity of 300 kPa.

Table 8: Recommended depth of foundation at chainage along alignment

Chainage	Inferred foundation depth (m)	Founding Material type	Description
715-800	0.9	Greywacke	Fine to coarse grained sand typical of beach deposits at surface. Shallow rock expected to be encountered.
800-1030	0.5	Greywacke	Greywacke at surface.
1030-1075	1.5	Sand & Gravel	Fine to coarse grained sand typical of beach deposits at surface. Foundations expected to be founded in sands.
1100-1250	0.5	Greywacke	Greywacke outcropping at surface
1250-1830	2.0 - 5.0	Sand & Gravel	Fine to coarse grained sand typical of beach deposits. Foundations expected to be founded in sand. CPT results vary throughout Lowry Bay.
1830-1960	0.5	Greywacke	Greywacke outcropping at surface.
2180-2390	0.5	Greywacke	Greywacke outcropping at surface.
2390-2730	2.0 - 5.0	Sand & Gravel	Fine to coarse grained sand typical of beach deposits at surface. Foundations expected to be founded in sands.
2780-3080	0.5	Greywacke	Greywacke outcropping at surface.
3080-3120	0.9	Greywacke	Fine to coarse grained sand typical of beach deposits at surface. Shallow rock expected to be encountered.
3120-3220	0.5	Greywacke	Greywacke outcropping at surface.
3220-3310	1.5	Greywacke	Fine to coarse grained sand typical of beach deposits at surface. Foundations expected to be founded in greywacke from CPT results.
3310-3780	0.5	Greywacke	Greywacke outcropping at surface
3780-4030	1.5	Sand & Gravel	Fine to coarse grained sand typical of beach deposits at surface. Foundations expected to be founded in sands.
5010-5390	0.5	Greywacke	Greywacke outcropping at surface.

Ground conditions between chainage 1250-1830 and 2390-2730 indicate bearing capacity of 300 kPa may not be achieve until 2m – 5m depth below ground level. Foundation improvements should be considered here in the form of cement stabilised foundation pads or piles. Additional testing is recommended here to confirm the extent and depth of improvement required.

11. Conclusions

Stantec was commissioned by Hutt City Council to undertake geotechnical site investigations and reporting to provide recommendations for foundations for the proposed sea wall supporting the shared path along Eastern Bays.

Typical subsurface materials found on site generally comprised moderately weathered to highly weathered greywacke and beach sand deposits. Generally greywacke was exposed and outcropping at surface and has formed resistant headlands. Beach sand deposits comprising loose sand and gravels have been deposited within embayments along the site. Due to the tidal nature of the site, we recommend structures founded within beach sand deposits to be 1.5 m bgl to limit scour and undermining.

Based on the existing information, site observations and site investigation information the proposed foundation recommendations have been made in table 8 subject to an allowable bearing capacity of 300kPa along the project.

12. Limitations

This report has been prepared for Hutt City Council in accordance with the generally accepted practices and standards in use at the time it was prepared. Stantec accepts no liability to any third party who relies on this report.

The information contained in this report is accurate to the best of our knowledge at the time of issue. Stantec has made no independent verification of this information beyond the agreed scope set out in the report.

The interpretations as to the likely subsurface conditions contained in this report are based on the site observations and field investigations made at discrete locations as described in this report. The type, spacing and frequency of the investigations, sampling, and testing of materials were selected to meet the technical, financial and time requirements agreed by the client. Stantec accepts no liability for any unknown or adverse ground conditions that would have been identified had further investigations, sampling, and testing been undertaken.

Actual ground conditions encountered may vary from the predicted subsurface conditions. For example, subsurface groundwater conditions often change seasonally and over time. No warranty is expressed or implied that the actual conditions encountered will conform exactly to the conditions described herein.

Where conditions encountered at the site differ from those inferred in this report Stantec should be notified of such changes, and should be given an opportunity to review the report recommendations made in this report in light of any further information.

This report does not purport to describe all the site characteristics and properties. Subsurface conditions and testing relevant to construction works must be undertaken and assessed by any contractors as necessary for their own purposes.

Appendices

Appendix A Investigation Location Plan

DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1

Last modified: Apr 26 2017 By Graeme Corin

REV	REVISIONS	DRN	CHK	APP	DATE

SURVEYED
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CAD REVIEW
DESIGN CHECK
DESIGN REVIEW
APPROVED
PROF REGISTRATION:

NOT APPROVED

MWH now part of Stantec

Client:

1
2

NOT FOR CONSTRUCTION

Status Stamp WORKING PLOT

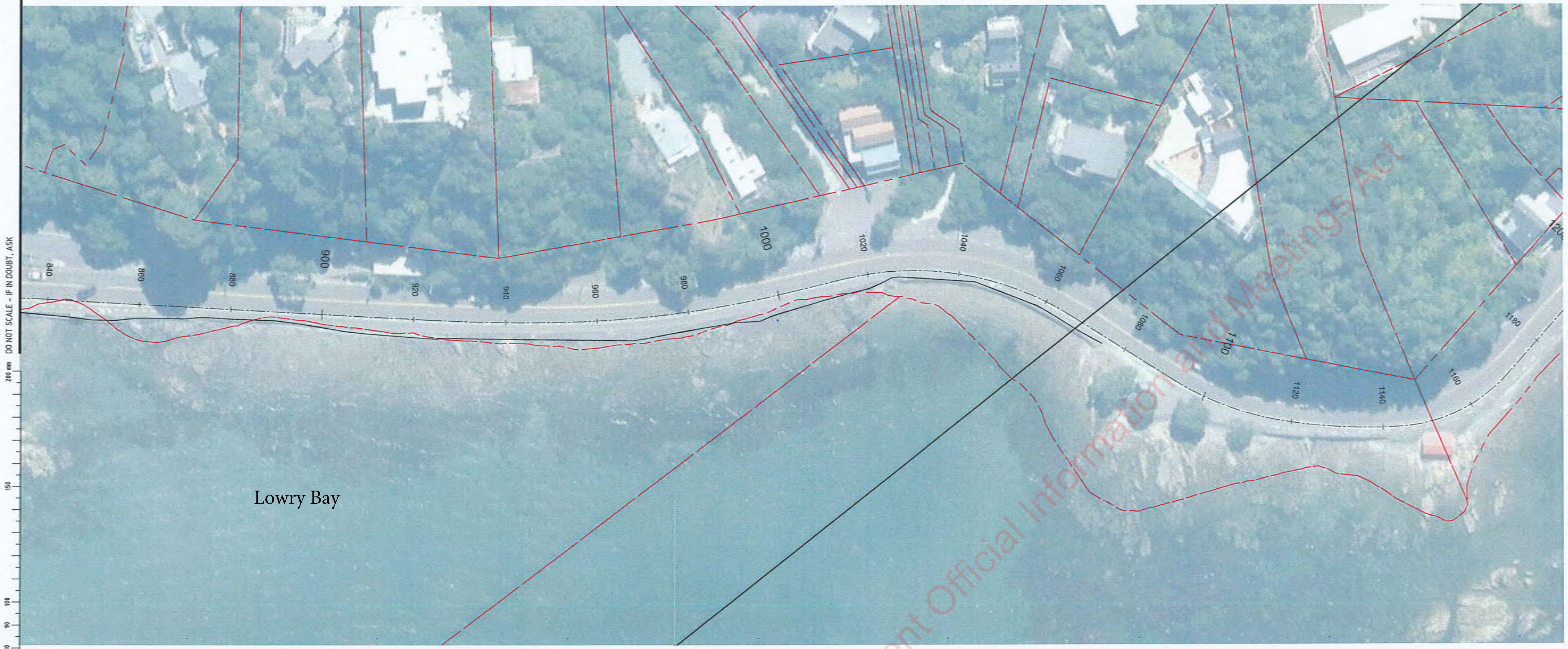
Date Stamp

Scales AS SHOWN

Drawing No. 80509137-01-001-C200

Rev. A

pw:\\asiavpwint04.mwhglobal.com:AP_PROJECTS\Documents\New Zealand Clients\Hutt City Council\80509137 - HCC - Eastern Bays Shared Path Business Case\01\Civil\80509137-01-001-C200



DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1

Last modified: May 17 2017 By Phillip Cook

NOT FOR CONSTRUCTION

REV	REVISIONS	DRN	CHK	APP	DATE

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DESIGN REVIEW
APPROVED NOT APPROVED
PROF REGISTRATION:

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Client

HUTT CITY COUNCIL
EASTERN BAYS SHARED PATH - DBC

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Status Stamp: WORKING PLOT
Date Stamp
Scales: AS SHOWN
Drawing No.: 80509137-01-001-C201
Rev.: A

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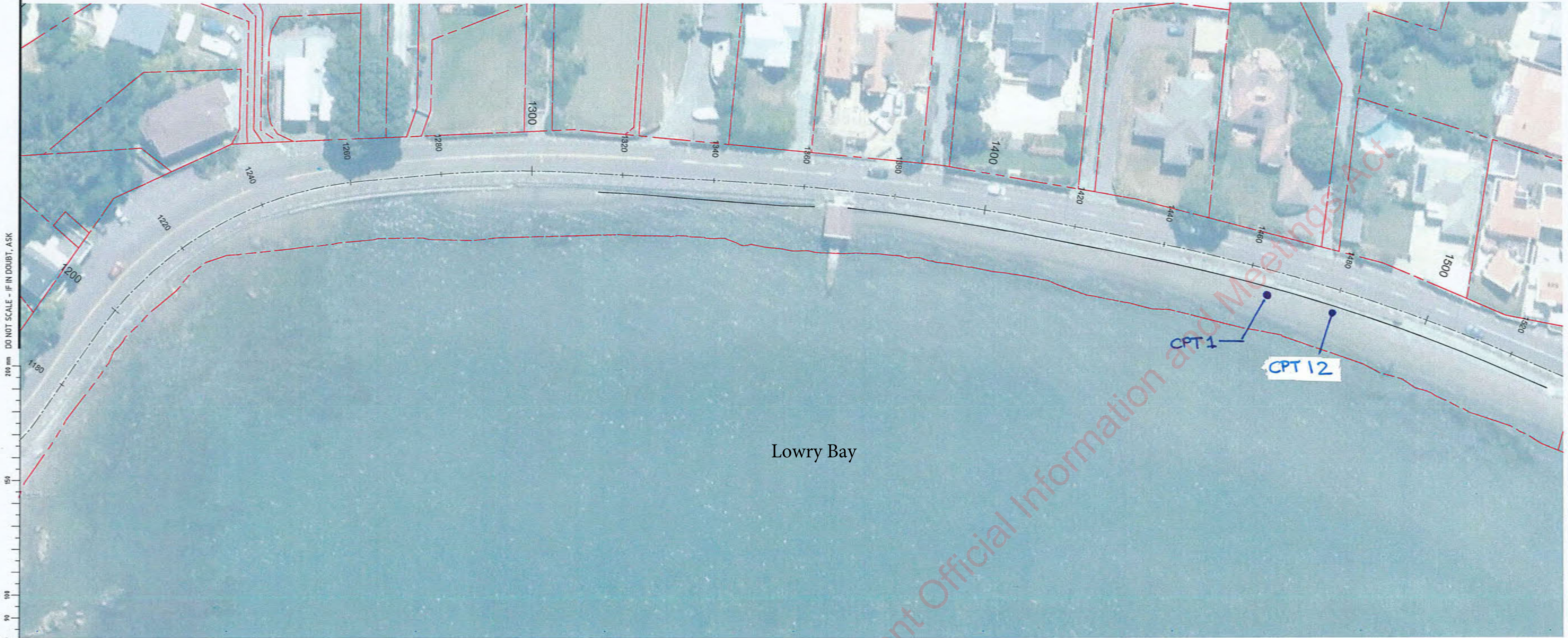

DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1

Last modified: May 17 2017 By Phillip Cook

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REV	REVISIONS	DRN	CHK	APP	DATE

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APPROVED NOT APPROVED
PROF REGISTRATION:

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Client:

HUTT CITY COUNCIL
EASTERN BAYS SHARED PATH - DBC

1
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Status Stamp: WORKING PLOT

Date Stamp

Scales: AS SHOWN

Drawing No. 80509137-01-001-C202

Rev. A

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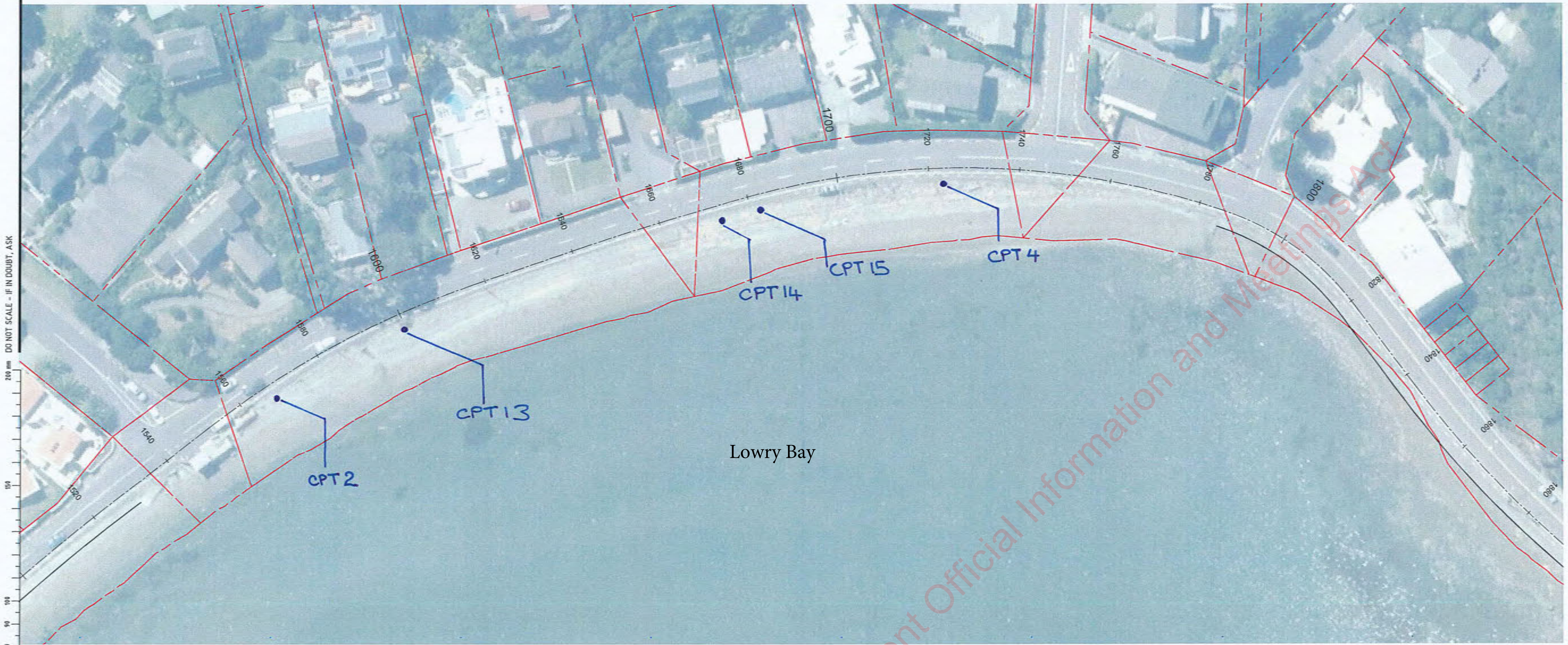

DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1

Last modified: May 17 2017 By Phillip Cook

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REV	REVISIONS	DRN	CHK	APP	DATE

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DESIGN REVIEW
APPROVED
PROF REGISTRATION:

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MWH. now part of Stantec

Client:

HUTT CITY COUNCIL
EASTERN BAYS SHARED PATH - DBC

1
2

Status Stamp: WORKING PLOT

Date Stamp

Scales: AS SHOWN

Drawing No.: 80509137-01-001-C203

Rev.: A

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DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1

Last modified: May 17 2017 By Phillip Cook

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PROF REGISTRATION:	

MWH. now part of Stantec

Client:

HUTT CITY COUNCIL
EASTERN BAYS SHARED PATH - DBC

1
2

Status Stamp: WORKING PLOT

Date Stamp

Scales: AS SHOWN

Drawing No.: 80509137-01-001-C204

Rev.: A

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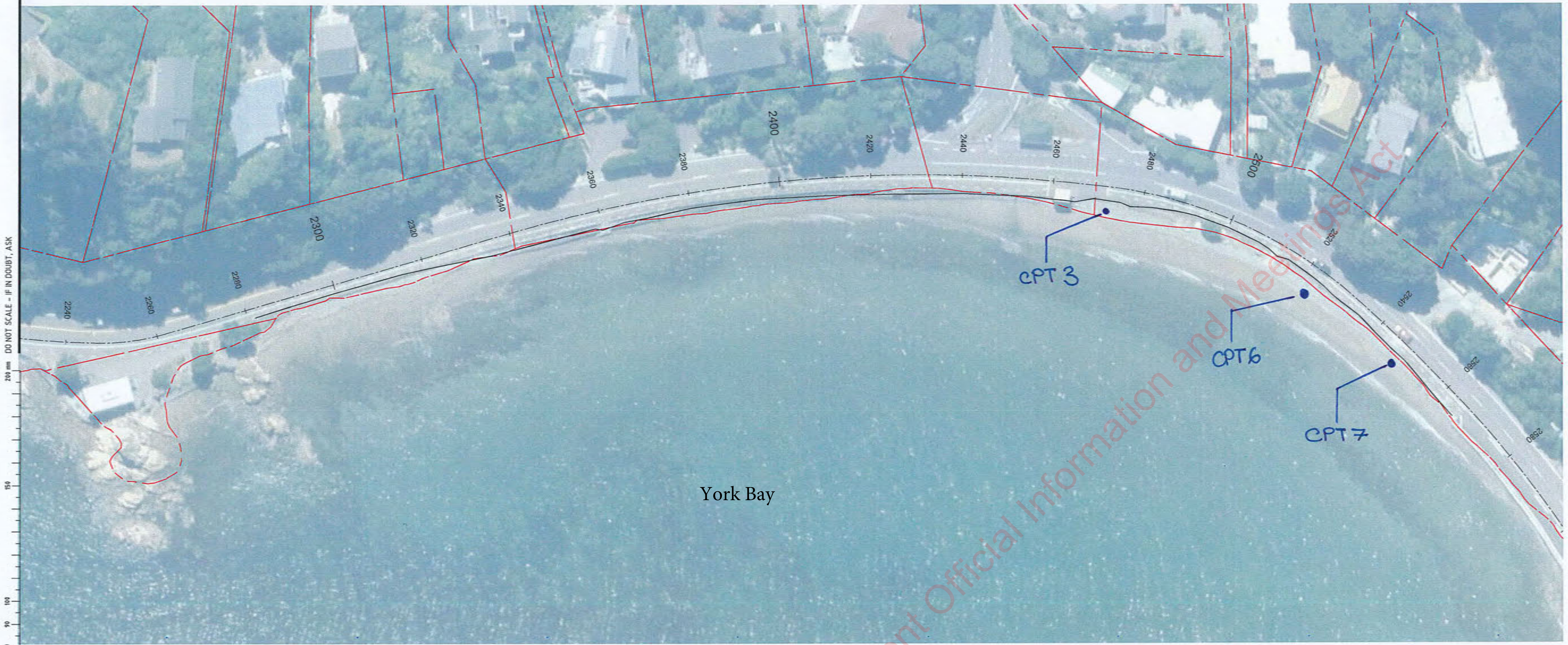

DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1

Last modified: May 17 2017 By Phillip Cook

NOT FOR CONSTRUCTION

REV	REVISIONS	DRN	CHK	APP	DATE

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APPROVED
PROF REGISTRATION:

NOT APPROVED

MWH now part of Stantec

Client:

HUTT CITY COUNCIL
EASTERN BAYS SHARED PATH - DBC

1
2

Status Stamp: WORKING PLOT

Date Stamp

Scales: AS SHOWN

Drawing No. 80509137-01-001-C205

Rev. A

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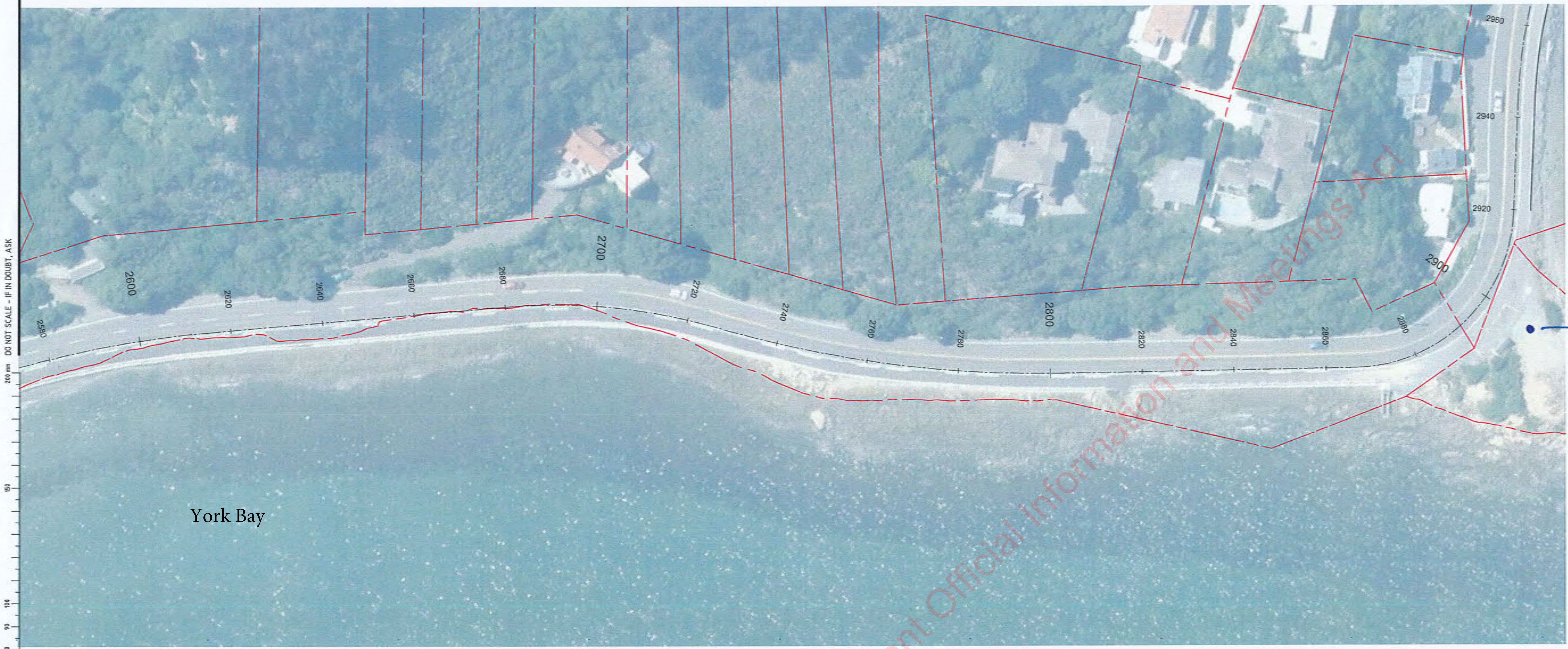

DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1

Last modified: May 17 2017 By Phillip Cook

NOT FOR CONSTRUCTION

REV	REVISIONS	DRN	CHK	APP	DATE

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DESIGN REVIEW
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PROF REGISTRATION:

NOT APPROVED

MWH now part of Stantec

Client:

HUTT CITY COUNCIL
EASTERN BAYS SHARED PATH - DBC

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Status Stamp: WORKING PLOT
Date Stamp:
Scales: AS SHOWN
Drawing No.: 80509137-01-001-C206
Rev.: A

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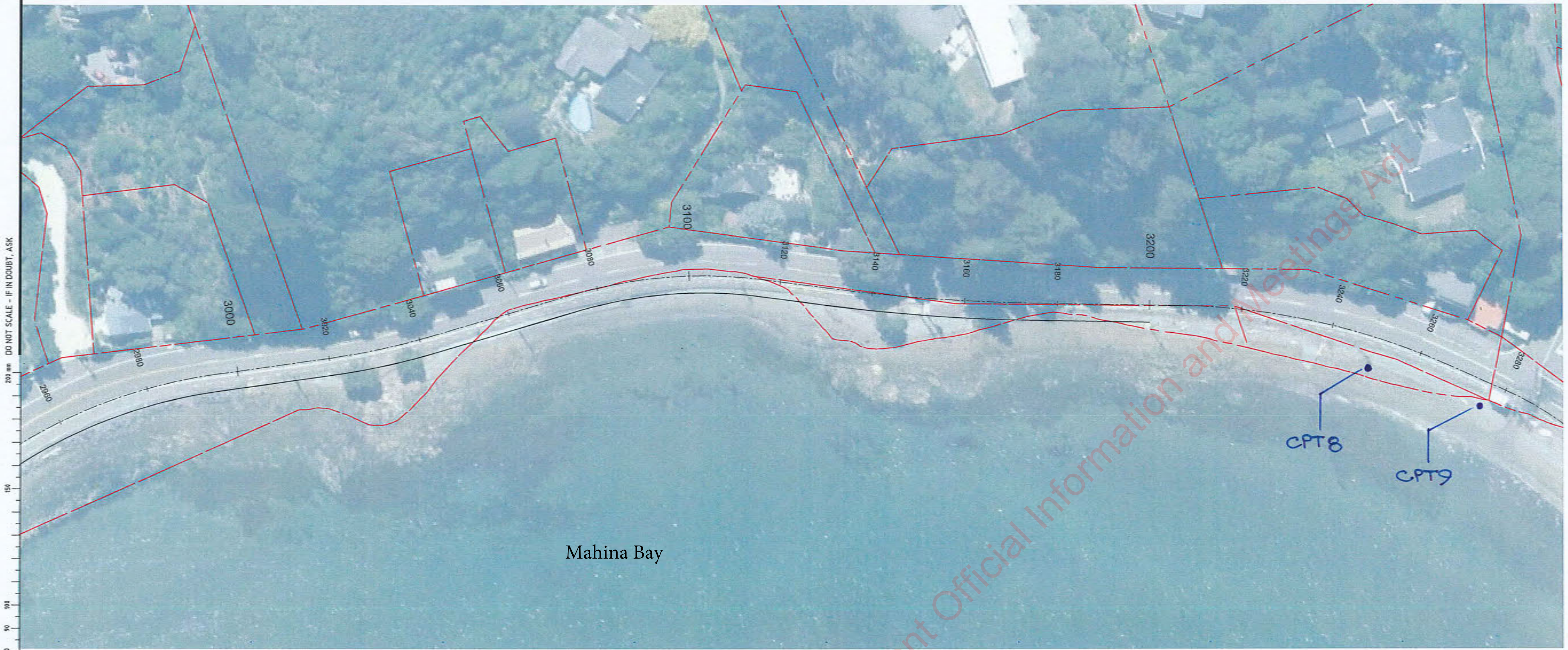

DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1

Last modified: May 17 2017 By Phillip Cook

NOT FOR CONSTRUCTION

REV	REVISIONS	DRN	CHK	APP	DATE

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DESIGN REVIEW	NOT APPROVED
APPROVED	
PROF REGISTRATION:	

MWH. now part of Stantec

Client:

HUTT CITY COUNCIL
EASTERN BAYS SHARED PATH - DBC

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Status Stamp: WORKING PLOT

Date Stamp

Scales: AS SHOWN

Drawing No. 80509137-01-001-C207 Rev. A

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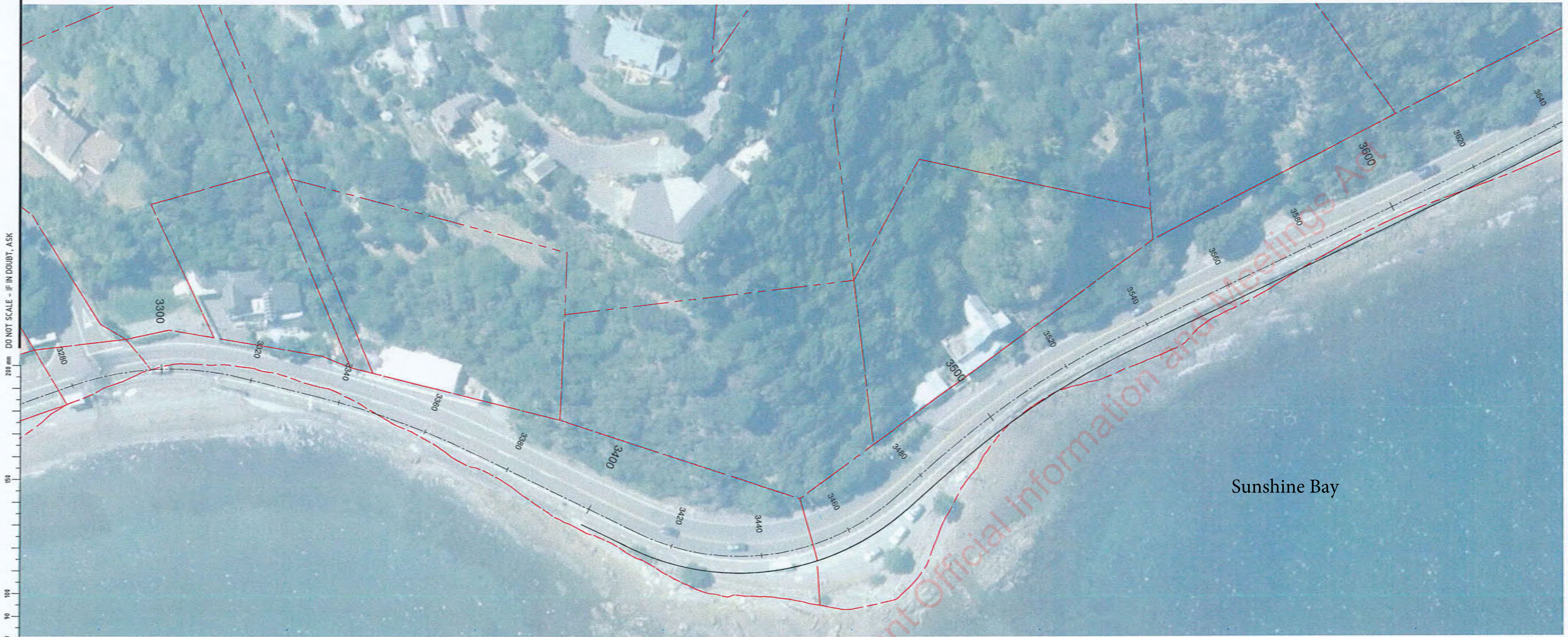

DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1

Last modified: May 17 2017 By Phillip Cook

NOT FOR CONSTRUCTION

REV	REVISIONS	DRN	CHK	APP	DATE

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DESIGN CHECK
DESIGN REVIEW
APPROVED
PROF REGISTRATION:

NOT APPROVED

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Client:

HUTT CITY COUNCIL
EASTERN BAYS SHARED PATH - DBC

1
2

Status Stamp: WORKING PLOT

Date Stamp

Scales: AS SHOWN

Drawing No.: 80509137-01-001-C208

Rev.: A

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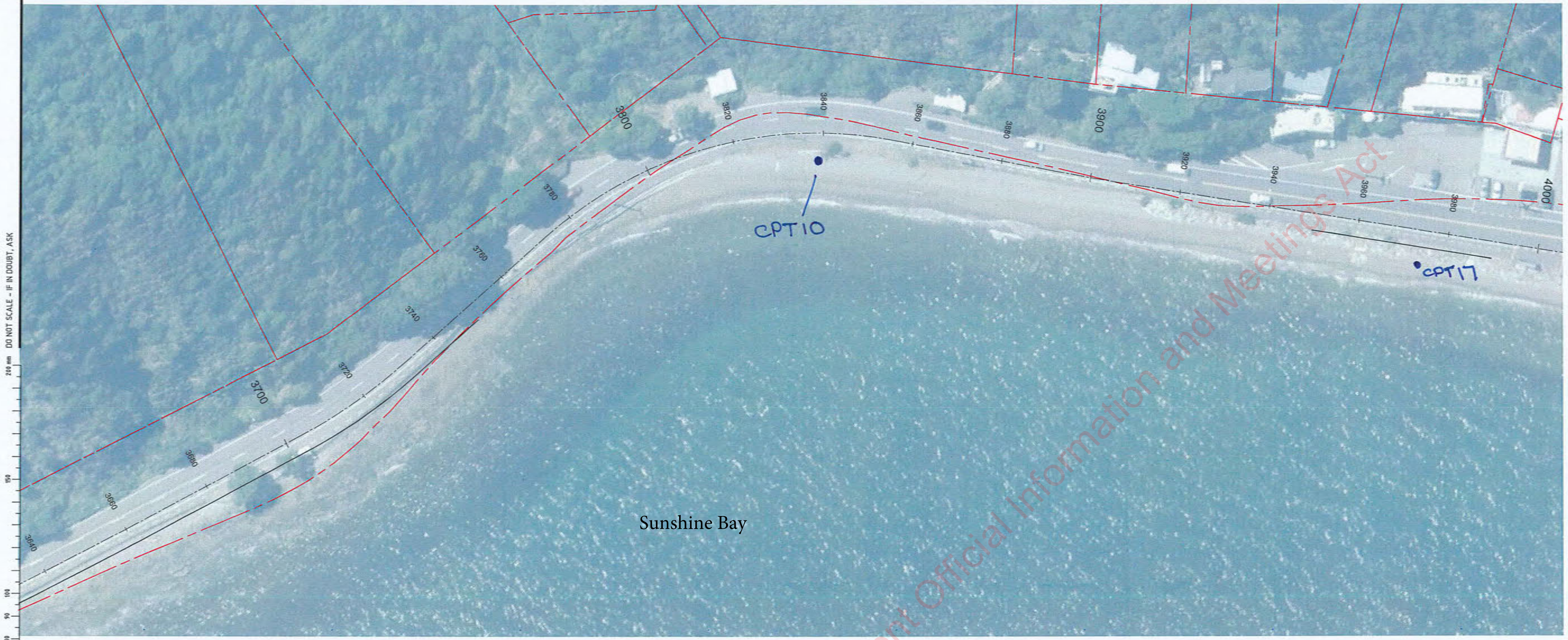

DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1

Last modified: May 17 2017 By Phillip Cook

NOT FOR CONSTRUCTION

REV	REVISIONS	DRN	CHK	APP	DATE

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DESIGN CHECK
DESIGN REVIEW
APPROVED NOT APPROVED
PROF REGISTRATION:

MWH now part of Stantec

Client:

HUTT CITY COUNCIL
EASTERN BAYS SHARED PATH - DBC

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Status Stamp: WORKING PLOT
Date Stamp
Scales: AS SHOWN
Drawing No. 80509137-01-001-C209
Rev. A

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DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1

Last modified: May 17 2017 By Phillip Cook

NOT FOR CONSTRUCTION

REV	REVISIONS	DRN	CHK	APP	DATE

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CAD REVIEW
DESIGN CHECK
DESIGN REVIEW
APPROVED
PROF REGISTRATION:

NOT APPROVED

MWH. now part of Stantec

Client:

HUTT CITY COUNCIL
EASTERN BAYS SHARED PATH - DBC

1
2

Status Stamp: WORKING PLOT

Date Stamp

Scales AS SHOWN

Drawing No. 80509137-01-001-C210

Rev. A

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DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1

Last modified: May 17 2017 By Phillip Cook

NOT FOR CONSTRUCTION

REV	REVISIONS	DRN	CHK	APP	DATE

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PROF REGISTRATION:	

MWH. now part of Stantec

Client:

HUTT CITY COUNCIL
EASTERN BAYS SHARED PATH - DBC

1
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Status Stamp: WORKING PLOT

Date Stamp:

Scales: AS SHOWN

Drawing No.: 80509137-01-001-C211

Rev.: A

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DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1

Last modified: May 17 2017 By Phillip Cook

NOT FOR CONSTRUCTION

REV	REVISIONS	DRN	CHK	APP	DATE

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DESIGN REVIEW	
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PROF REGISTRATION:	

MWH now part of Stantec

Client:

HUTT CITY COUNCIL
EASTERN BAYS SHARED PATH - DBC

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Status Stamp: WORKING PLOT

Date Stamp

Scales: AS SHOWN

Drawing No.: 80509137-01-001-C212

Rev.: A

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DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1

Last modified: May 17 2017 By Phillip Cook

NOT FOR CONSTRUCTION

REV	REVISIONS	DRN	CHK	APP	DATE

SURVEYED
DESIGNED
DRAWN
CAD REVIEW
DESIGN CHECK
DESIGN REVIEW
APPROVED
PROF REGISTRATION:

NOT APPROVED

MWH. now part of Stantec

Client:

HUTT CITY COUNCIL
EASTERN BAYS SHARED PATH - DBC

1
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Status Stamp: WORKING PLOT

Date Stamp

Scales: AS SHOWN

Drawing No.: 80509137-01-001-C213

Rev.: A

pw:\\asiapwint04.mwhglobal.com:AP_PROJECTS\Documents\New Zealand Clients\Hutt City Council\80509137 - HCC - Eastern Bays Shared Path Business Case\01\Civil\80509137-01-001-C213

DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1

Last modified: May 17 2017 By Phillip Cook

NOT FOR CONSTRUCTION

REV	REVISIONS	DRN	CHK	APP	DATE

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CAD REVIEW
DESIGN CHECK
DESIGN REVIEW
APPROVED
PROF REGISTRATION:

NOT APPROVED

MWH. now part of Stantec

Client:

HUTT CITY COUNCIL
EASTERN BAYS SHARED PATH - DBC

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Status Stamp: WORKING PLOT

Date Stamp

Scales: AS SHOWN

Drawing No.: 80509137-01-001-C214

Rev.: A

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Appendix B BH Logs and Photos

Stantec

BOREHOLE LOG

MWH NEW ZEALAND LTD
Level 13, 80 The Terrace
Wellington
Tel: 04 381 6700
Fax: 04 473 1982

Job No: 80509137
Hole No: BH1
Sheet: 1 of 1

Client: Hutt City Council
Started: 11/04/17

Project: Eastern Bays cycleway and seawalls
Location: Eastbourne
Finished: 12/04/17

[redacted] s7(2)(a)

Description: Chainage approximately 655 drilled at road level

[redacted]

Easting: 324436m Northing: 5431033m Inclination: Vertical
RL Surface: 1.686m

Diameter (Int/Ext): mm/mm
Datum: Wellington 2000

Material Description (Logging carried out in accordance with Guidelines for the Field Classification of Soil and Rock for Engineering Purposes. New Zealand Geotechnical Society, 2005)

Natural Defects: Type, orientation, spacing, persistence, roughness, wall strength, aperture, infill, seepage, no. of sets, block size

Weathering Grade: RS, CW, HW, MW, SW, UW
Strength UCS MPa: EW R0 <1, VW R1 1-5, W R2 5-20, MS R3 20-50, S R4 50-100, VS R5 100-250, ES R6 >250
Spacing mm: ECS <20, VCS 20-60, CS 60-200, MWS 200-600, WS 600-2000, VWS >2000

Depth (m)	Samples / Insitu Testing	Material Description
0.0–1.5		Vaccum excavation - presumed pavement fill material. (1.5)
1.5–2.15	SPT 1/1//4/2/2/2 for 280 mm 10 Blows	Silty sands and GRAVEL, brown loose, wet [FILL]. (2.15)
2.15–4.145	SPT 14/36 for 145 mm (seating)	Highly to completely weathered, brown grey, streaked red orange, GREYWACKE SILTSTONE and SANDSTONE, weak, very closed space defects. [TORLESSE TERRAIN SUPERGROUP]. (4.145)
4.145–4.5	SPT 12/21//27/23 for 85 mm 50 Blows	Moderately weathered, dark bluish grey streaked yellow brown, GREYWACKE SILTSTONE and SANDSTONE, weak with very closed space defects. [TORLESSE TERRAIN SUPERGROUP]. (4.5)
4.5–5.05		Moderately weathered, dark bluish grey streaked yellow brown, GREYWACKE SILTSTONE and SANDSTONE, moderately strong with very closed space defects. [TORLESSE TERRAIN SUPERGROUP] (5.05)
5.05–7.3	SPT 17/37 for 140 mm (seating)	Slightly to moderately weathered, dark bluish grey streaked brown, GREYWACKE SILTSTONE and SANDSTONE, weak to moderately strong with very closed space defects. [TORLESSE TERRAIN SUPERGROUP]. (7.3)
7.3–8.5	SPT sample	Slightly to moderately weathered, dark greyish brown, GREYWACKE SILTSTONE and SANDSTONE, weak to moderately strong with very closed space defects. [TORLESSE TERRAIN SUPERGROUP]. (8.5)
8.5		Borehole terminated at 8.5m due to Target Depth

Length of Run (m)	Total Core Recovery %	Solid Core Recovery %	RQD %
1.50			
0.45	95	0	0
0.65	90	0	0
0.40	90	0	0
0.15			
0.50	90	0	0
0.50	90	0	0
0.36	90	0	0
0.24			
0.67	100	50	50
0.60	100	50	50
0.14			
1.16	100	50	50
0.20	100	80	70
1.00	100	80	70

Graphic Log | Groundwater

Drilling Method: **HQ**
Casing:
Contractor: **Griffiths Drilling**
Flush:
Equipment Type: **PLG**

Remarks: See key sheets for abbreviations and symbols
- Material descriptions conform to FIELD DESCRIPTION OF SOIL AND ROCK, 2005, NZGS
- SPT testing performed to NZS4402.6.5.1

Stantec

BOREHOLE LOG

Job No: 80509137
Hole No: BH2
Sheet: 1 of 1

MWH NEW ZEALAND LTD
Level 13, 80 The Terrace
Wellington
Tel: 04 381 6700
Fax: 04 473 1982

Client: Hutt City Council
Started: 18/04/17
Project: Eastern Bays cycleway and seawalls
Finished: 18/04/17
Location: Eastbourne
s7(2)(a) [redacted]
Description: Chainage approximately 2900 drilled at road level
[redacted]
Easting: 324674m | Northing: 5429480m | Inclination: Vertical
RL Surface: 1.89m
Diameter (Int/Ext): mm/mm
Datum: Wellington 2000

Depth (m)	Elevation (m)	Samples / Insitu Testing	Material Description (Logging carried out in accordance with Guidelines for the Field Classification of Soil and Rock for Engineering Purposes. New Zealand Geotechnical Society, 2005)	Graphic Log	Natural Defects (Type, orientation, spacing, persistence, roughness, wall strength, aperture, infill, seepage, no. of sets, block size)	Weathering Grade (RS CW HW MW SW UW)	Strength UCS MPa (EW R0 <1, VW R1 1-5, W R2 5-20, MS R3 20-50, S R4 50-100, VS R5 100-250, ES R6 >250)	Spacing mm (ECS <20, VCS 20-60, CS 60-200, MWS 200-600, WS 600-2000, VWS >2000)	Length of Run (m)	Total Core Recovery %	Solid Core Recovery %	RQD %	Groundwater
0.0–1.5		SPT 10/14//25/25 for 75 mm (seating)	Vaccum excavation - presumed pavement fill material. (1.5)						1.50				
1.5–1.8			slightly to moderately weathered, dark grey brown streaked brownish yellow, GREYWACKE, SILTSTONE and SANDSTONE, weak to moderately strong, very closely spaced defects.[TORLESSE TERRAIN SUPERGROUP]. (1.8)						0.30				
1.8–7.5			slightly to moderately weathered, dark grey brown streaked brownish yellow,, GREYWACKE, SILTSTONE and SANDSTONE, weak to moderately strong, very closely spaced defects. [TORLESSE TERRAIN SUPERGROUP]. (7.5)						1.20	100	70	70	
									1.20	100	90	70	
									0.30	100	50	50	
									1.50	100	50	70	
									1.35	100	70	50	
									0.15	100	80	80	
7.5			Borehole terminated at 7.5m due to Target Depth										

Drilling Method: **HQ**
Casing:
Contractor: **Griffiths Drilling**
Flush:
Equipment Type: **PLG**

Remarks: See key sheets for abbreviations and symbols
- Material descriptions conform to FIELD DESCRIPTION OF SOIL AND ROCK, 2005, NZGS
- SPT testing performed to NZS4402.6.5.1

BOREHOLE LOG

Stantec

MWH NEW ZEALAND LTD
Level 13, 80 The Terrace
Wellington
Tel: 04 381 6700
Fax: 04 473 1982

Job No: 80509137	
Hole No: BH3	
Sheet: 1 of 1	
Client: Hutt City Council	Started: 20/04/17
Project: Eastern Bays cycleway and seawalls	Finished: 20/04/17
Location: Eastbourne	s7(2)(a) [redacted]
Description: Chainage approximately 5180 drilled at road level	[redacted]
Easting: 324410m Northing: 5427603m Inclination: Vertical	RL Surface: 1.372m
Diameter (Int/Ext): mm/mm	Datum: Wellington 2000

Material Description: (Logging carried out in accordance with Guidelines for the Field Classification of Soil and Rock for Engineering Purposes. New Zealand Geotechnical Society, 2005)

Natural Defects: Type, orientation, spacing, persistence, roughness, wall strength, aperture, infill, seepage, no. of sets, block size

Weathering Grade: RS, CW, HW, MW, SW, UW

Strength UCS MPa: EW R0 <1, VW R1 1-5, W R2 5-20, MS R3 20-50, S R4 50-100, VS R5 100-250, ES R6 >250

Spacing mm: ECS <20, VCS 20-60, CS 60-200, MWS 200-600, WS 600-2000, VWS >2000

Depth (m)	Samples / Insitu Testing	Material Description	Length of Run (m)	Total Core Recovery %	Solid Core Recovery %	RQD %	Groundwater
0.0–1.5	SPT 1/3// 7/10/12/14 N = 43 (at 1.5)	Vaccum excavation - presumed pavement fill material. *(1.5)*	1.50				
1.5–1.95		slightly to moderately weathered, dark grey brown, GREYWACKE, SILTSTONE and SANDSTONE, weak to moderately strong, very closely spaced defects. [TORLESSE TERRAIN SUPERGROUP]. *(1.95)*	0.45				
1.95–6.0		slightly to moderately weathered, dark grey brown, GREYWACKE, SILTSTONE and SANDSTONE, weak to moderately strong, very closely spaced defects. [TORLESSE TERRAIN SUPERGROUP]. *(6)*	1.05	100	10	10	
			1.50	100	40	40	
			1.50	100	0	0	
6.0		Borehole terminated at 6m due to Target Depth					

Drilling Method: **HQ**	Casing:	Remarks: See key sheets for abbreviations and symbols - Material descriptions conform to FIELD DESCRIPTION OF SOIL AND ROCK, 2005, NZGS - SPT testing performed to NZS4402.6.5.1
Contractor: **Griffiths Drilling**	Flush:	
Equipment Type: **PLG**		

Information status: ,

Stantec

Photographic Log

Client:	**Hutt City Council**	**Project:**	**Eastern Bays Cycleway Footpath**
Site Name:	**Marine Drive**	**Site Location:**	**Eastern Bays**

Photograph ID: 1

Photo Location:
BH1 0.00 - 4.50m

Direction:

Survey Date:
4/05/2017

Comments:

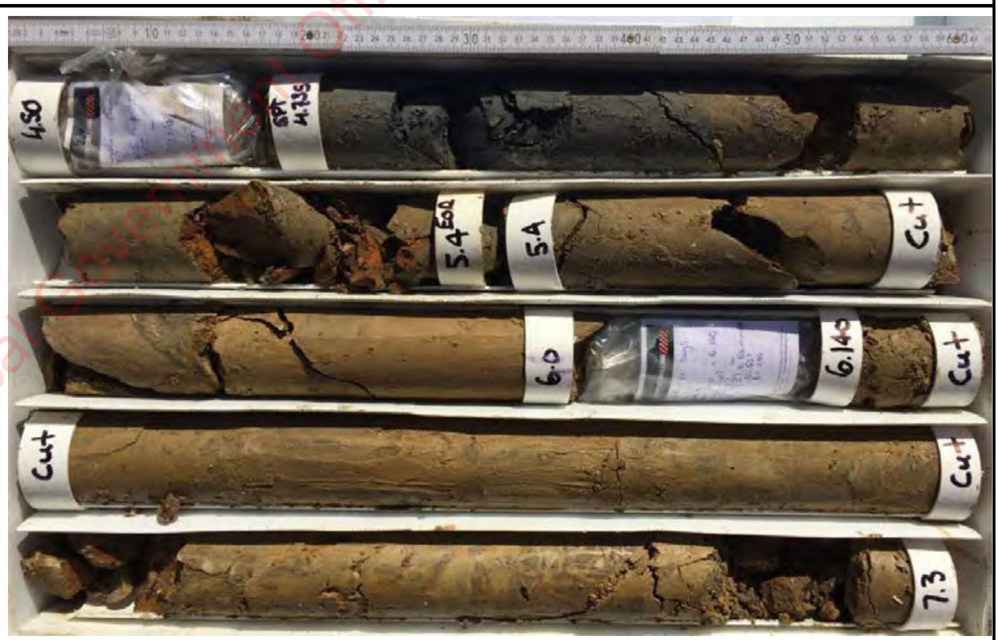
Photograph ID: 2

Photo Location:
BH1 4.50m - 7.30m

Direction:

Survey Date:
4/05/2017

Comments:



Stantec

Photographic Log

Client:	**Hutt City Council**	**Project:**	**Eastern Bays Cycleway Footpath**
Site Name:	**Marine Drive**	**Site Location:**	**Eastern Bays**

Photograph ID: 3

Photo Location: BH1 7.3m - 8.50m

Direction:

Survey Date: 4/05/2017

Comments:

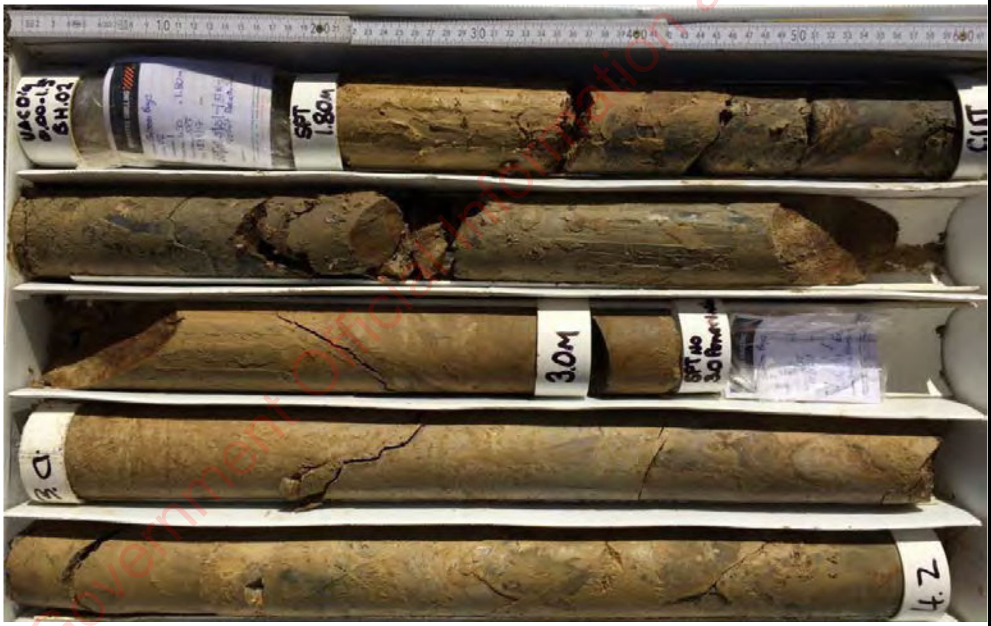
Photograph ID: 4

Photo Location: BH2 0.00 - 4.20m

Direction:

Survey Date: 4/05/2017

Comments:



Photograph ID: 5

Photo Location: BH2 4.20m - 7.350m

Direction:

Survey Date: 4/05/2017

Comments:

Stantec

Photographic Log

Client:	**Hutt City Council**	**Project:**	**Eastern Bays Cycleway Footpath**
Site Name:	**Marine Drive**	**Site Location:**	**Eastern Bays**

Photograph ID: 6

Photo Location: BH2 7.350m - 7.50m

Direction:

Survey Date: 4/05/2017

Comments:

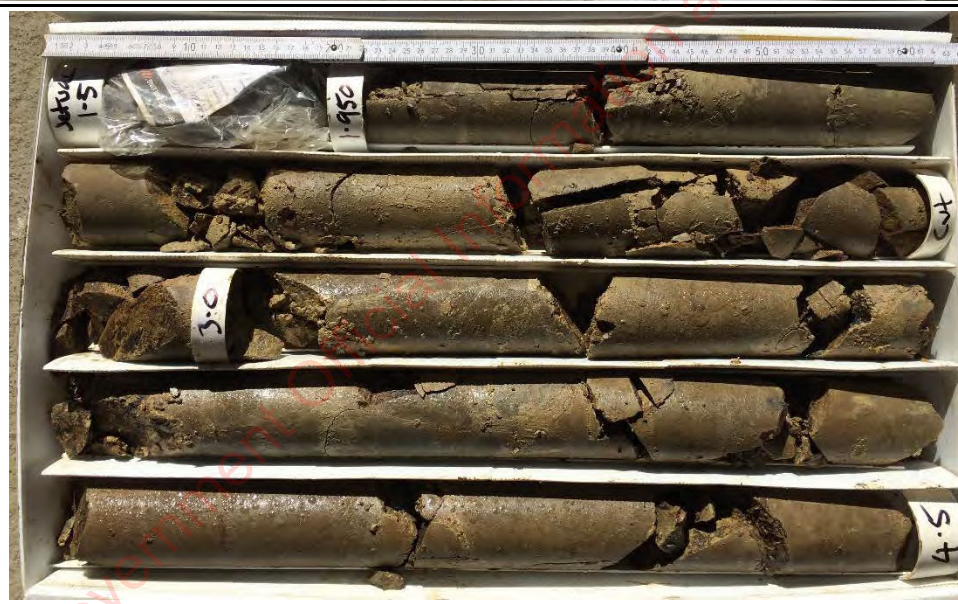
Photograph ID: 7

Photo Location: BH3 1.5 m - 4.5 m

Direction:

Survey Date: 4/05/2017

Comments:



Photograph ID: 8

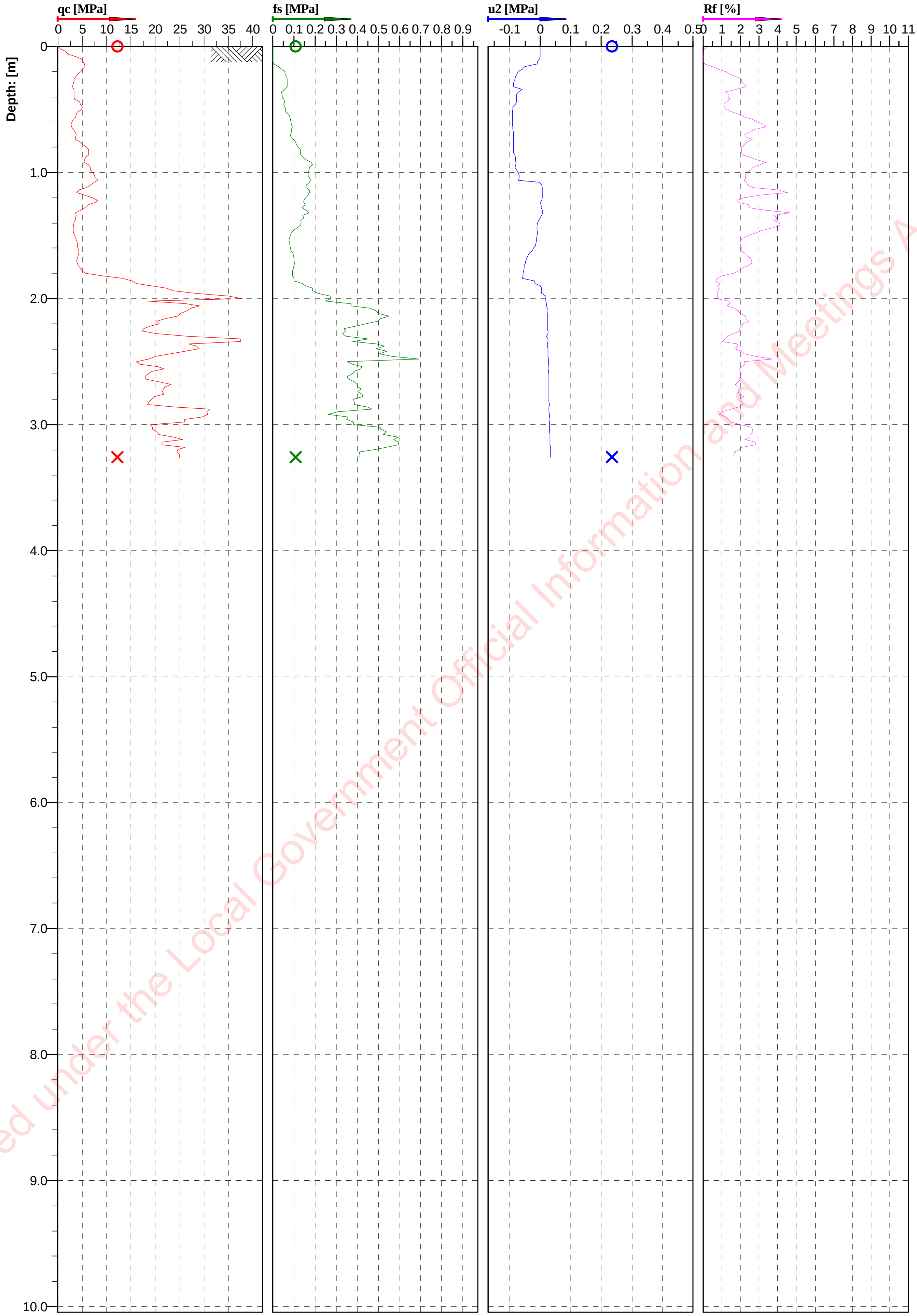
Photo Location: BH3 4.5 m – 6.0 m

Direction:

Survey Date: 4/05/2017

Comments:

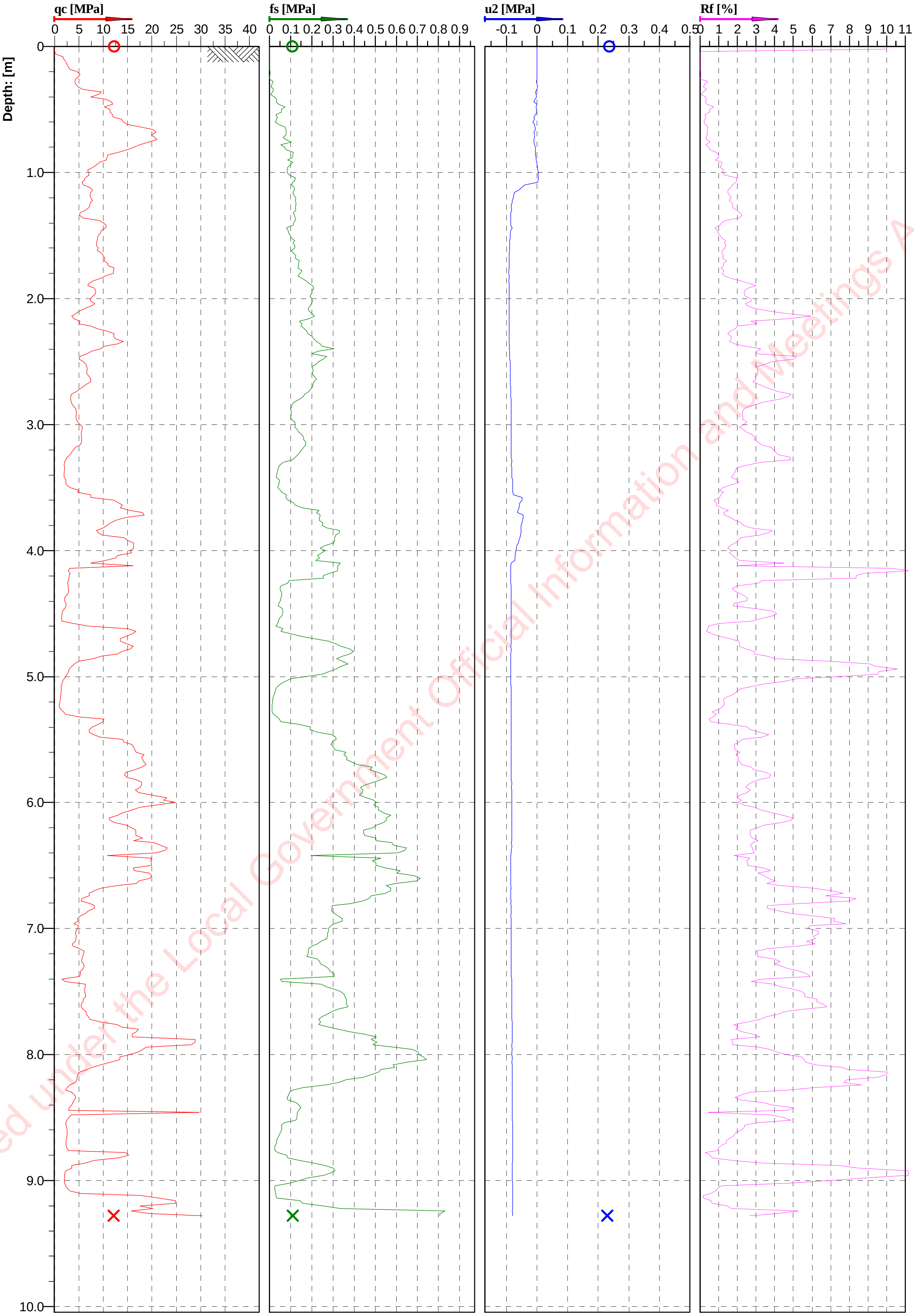
Appendix C CPT Tests



u2

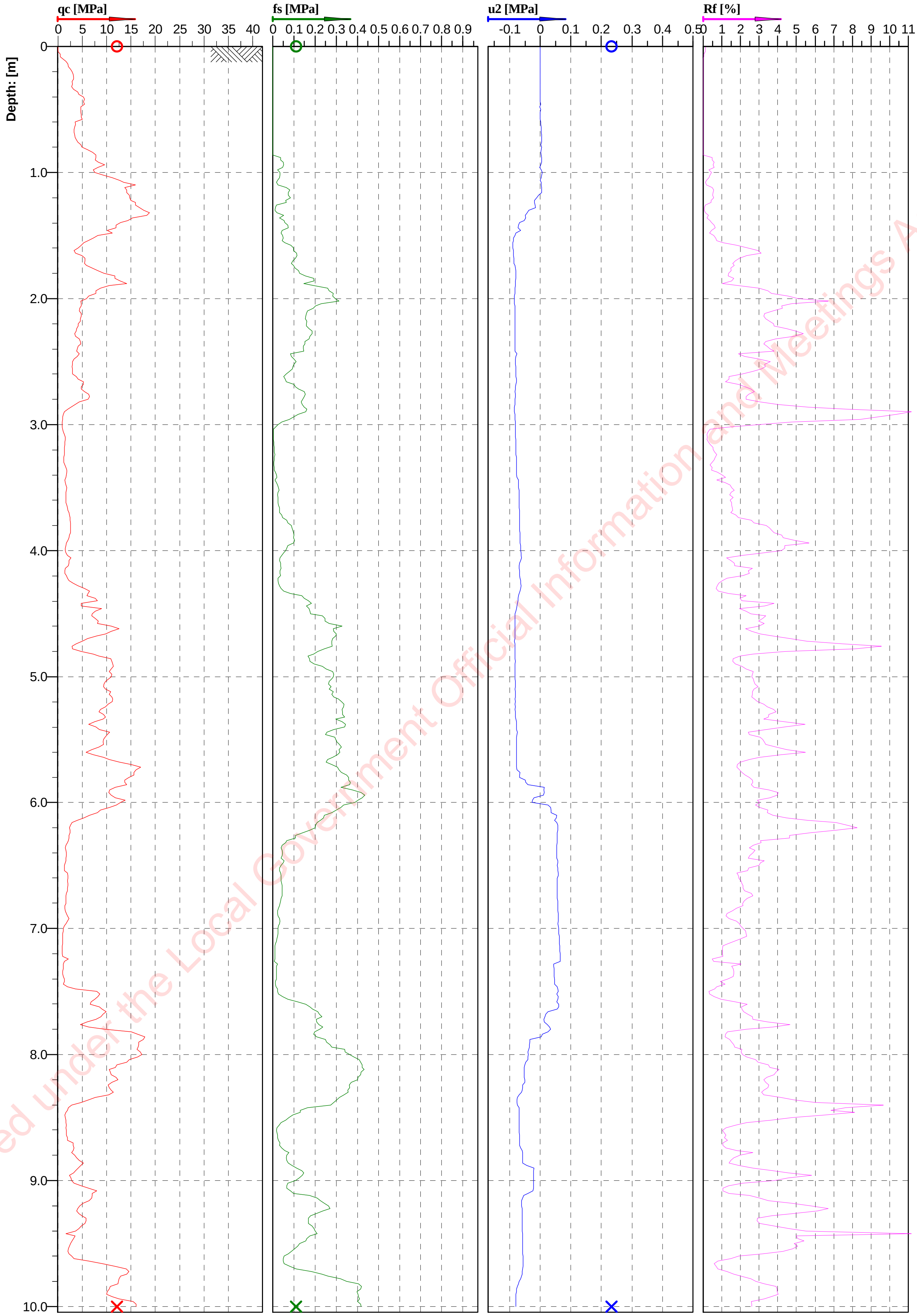
Cone No: 4616
Tip area [cm2]: 10
Sleeve area [cm2]: 150

Location: Lowrey Bay	Position: X: 0.00 m, Y: 0.00 m	Ground level: 0.00	Test No.: CPT 1.0
Project ID:	Client: MWH	Date: 11/04/2017	Scale: 1 : 41
Project: EASTBOURNE		Page: 1/1	Fig.:
Could not push		File: CPT 1.0.cpt	



Cone No: 4616
Tip area [cm2]: 10
Sleeve area [cm2]: 150

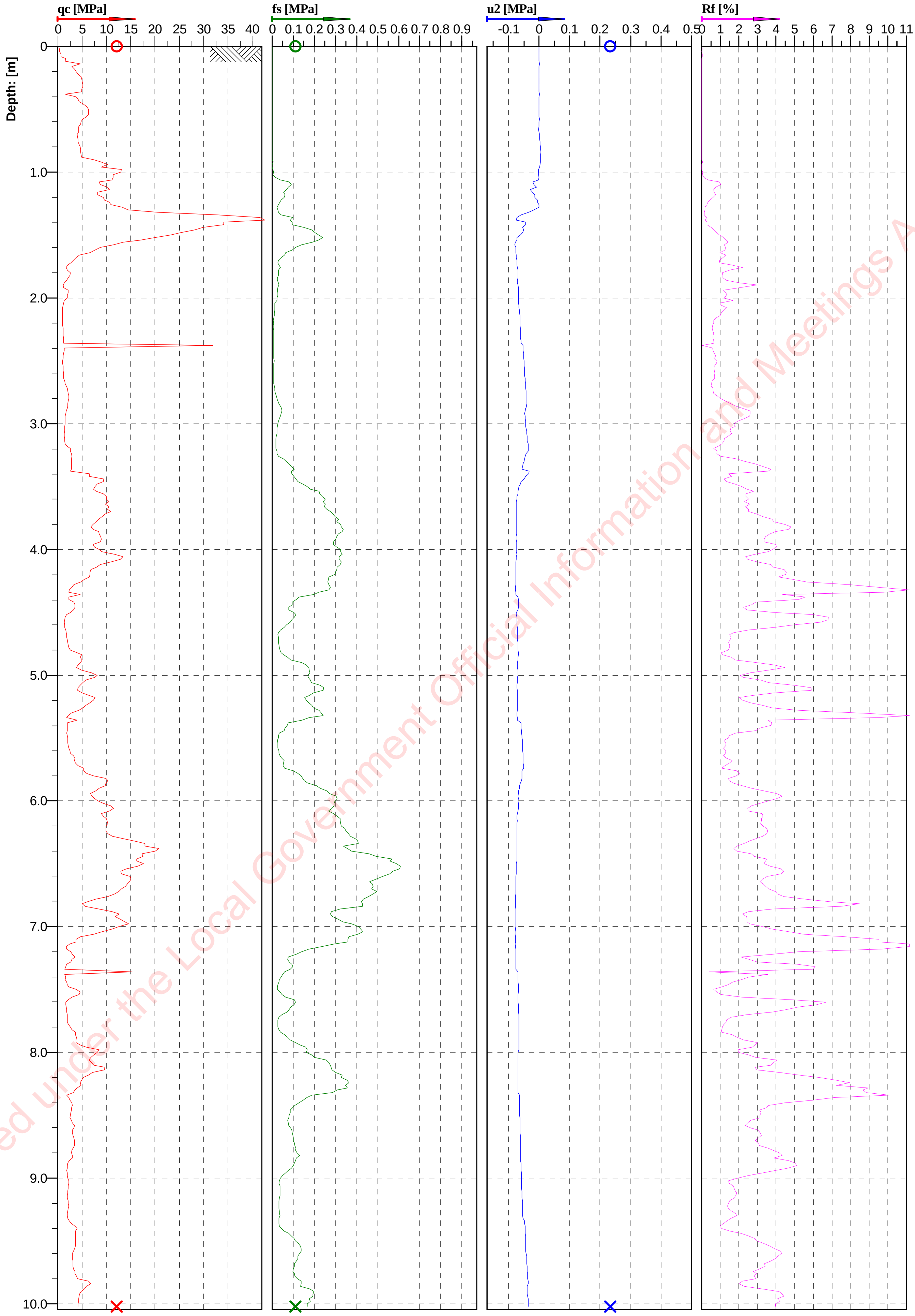
Location: Lowrey Bay	Position: X: 0.00 m, Y: 0.00 m	Ground level: 0.00	Test No.: CPT 2
Project ID:	Client: MWH	Date: 11/04/2017	Scale: 1 : 41
Project: EASTBOURNE		Page: 1/1	Fig.:
Max QC		File: CPT 2.0.cpt	

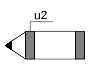


u2

Cone No: 4616
Tip area [cm2]: 10
Sleeve area [cm2]: 150

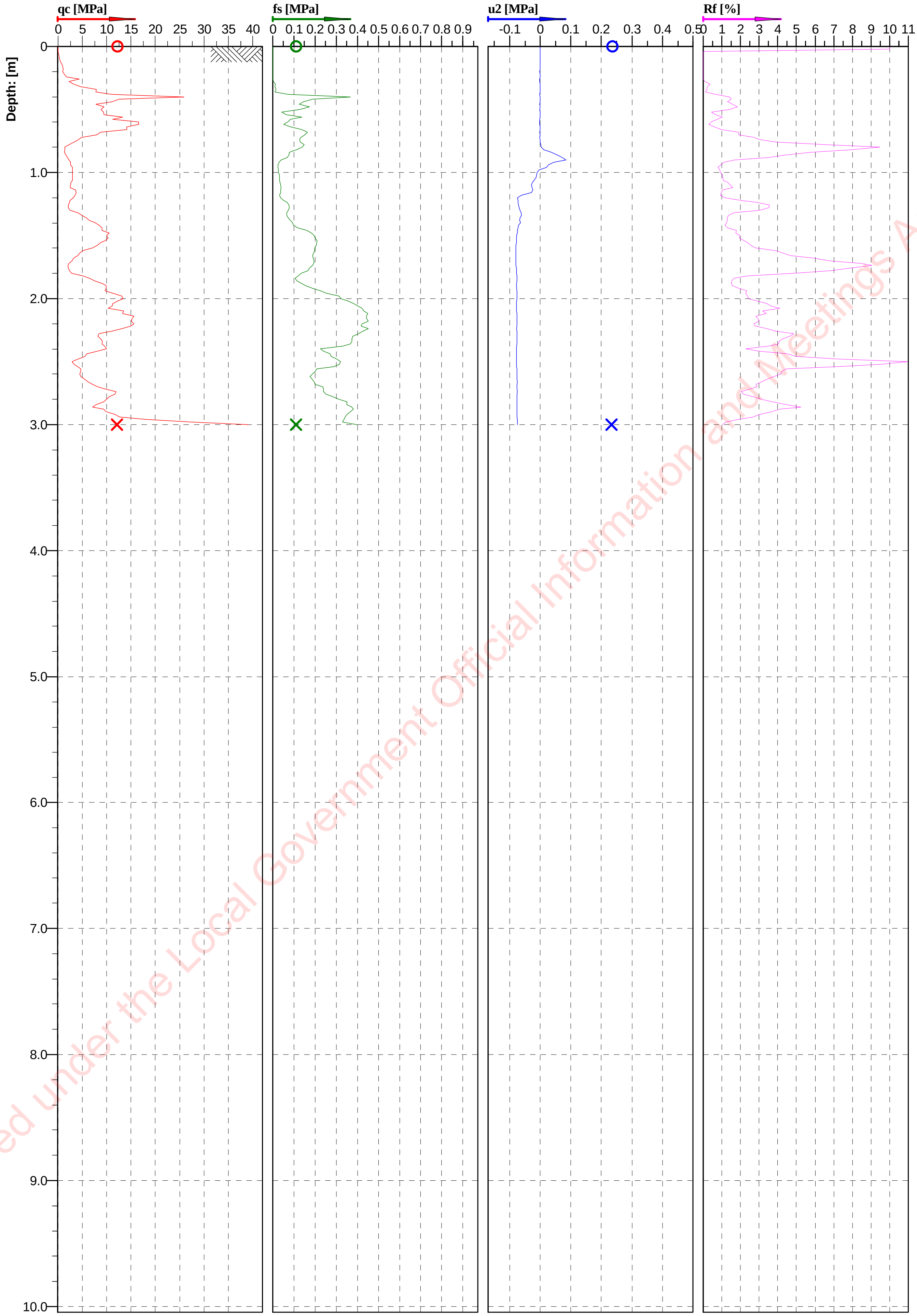
Location: Lowry Bay	Position: X: 0.00 m, Y: 0.00 m	Ground level: 0.00	Test No.: CPT 3.0
Project ID:	Client: MWH	Date: 12/04/2017	Scale: 1 : 41
Project: EASTBOURNE		Page: 1/1	Fig.:
full depth		File: CPT 3.1.cpt	





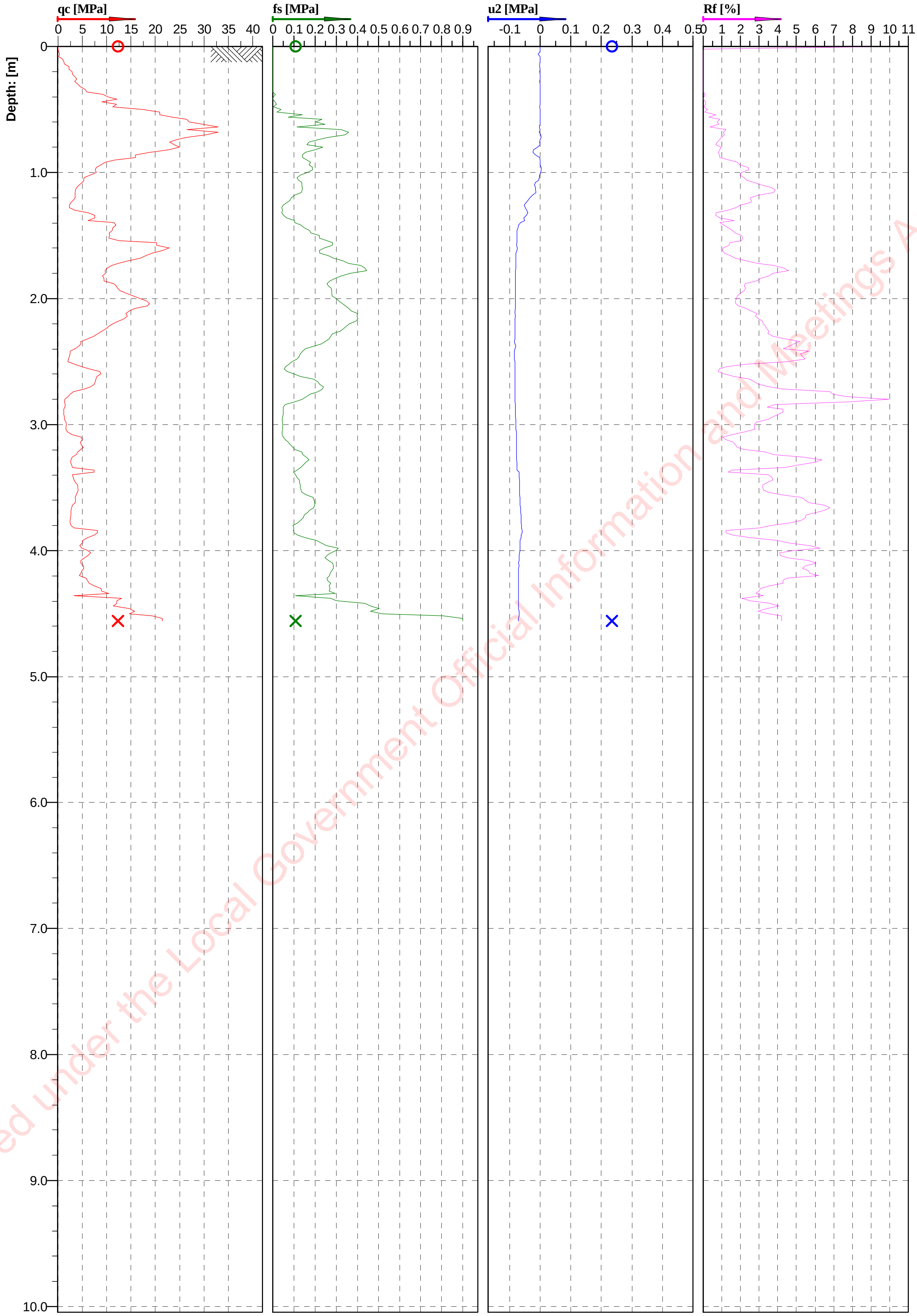
Cone No: 4616
Tip area [cm2]: 10
Sleeve area [cm2]: 150

Location: Lowery Bay	Position: X: 0.00 m, Y: 0.00 m	Ground level: 0.00	Test No.: CPT 4.0
Project ID:	Client: MWH	Date: 12/04/2017	Scale: 1 : 41
Project: EASTBOURNE		Page: 1/1	Fig.:
Max Depth		File: CPT 4.0.cpt	



Cone No: 4616
Tip area [cm2]: 10
Sleeve area [cm2]: 150

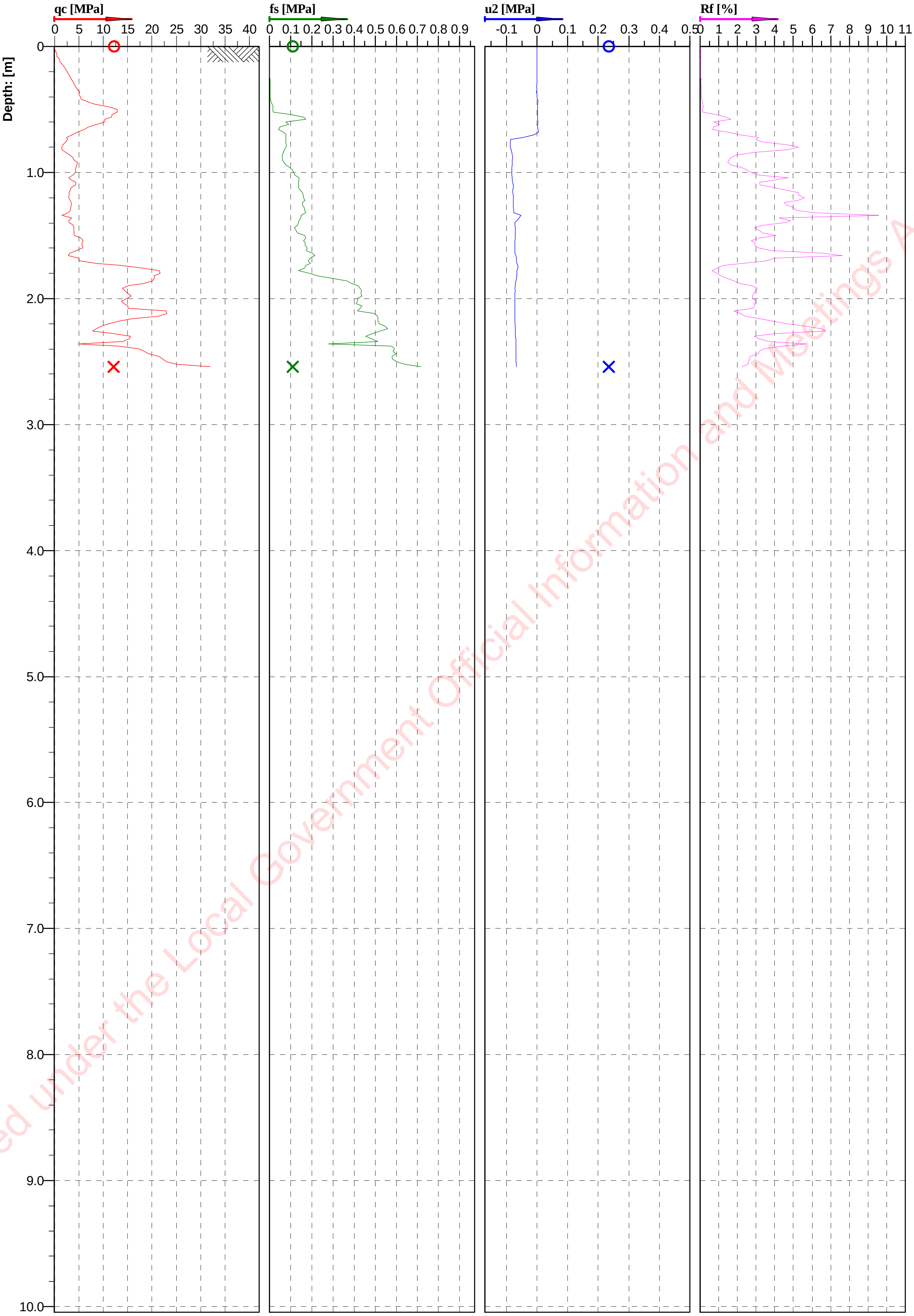
Location: York Bay	Position: X: 0.00 m, Y: 0.00 m	Ground level: 0.00	Test No.: CPT 5
Project ID:	Client: MWH	Date: 18/04/2017	Scale: 1 : 41
Project: EASTBOURNE		Page: 1/1	Fig.:
Max Qc		File: CPT 5.3.cpt	



u2

Cone No: 4616
Tip area [cm2]: 10
Sleeve area [cm2]: 150

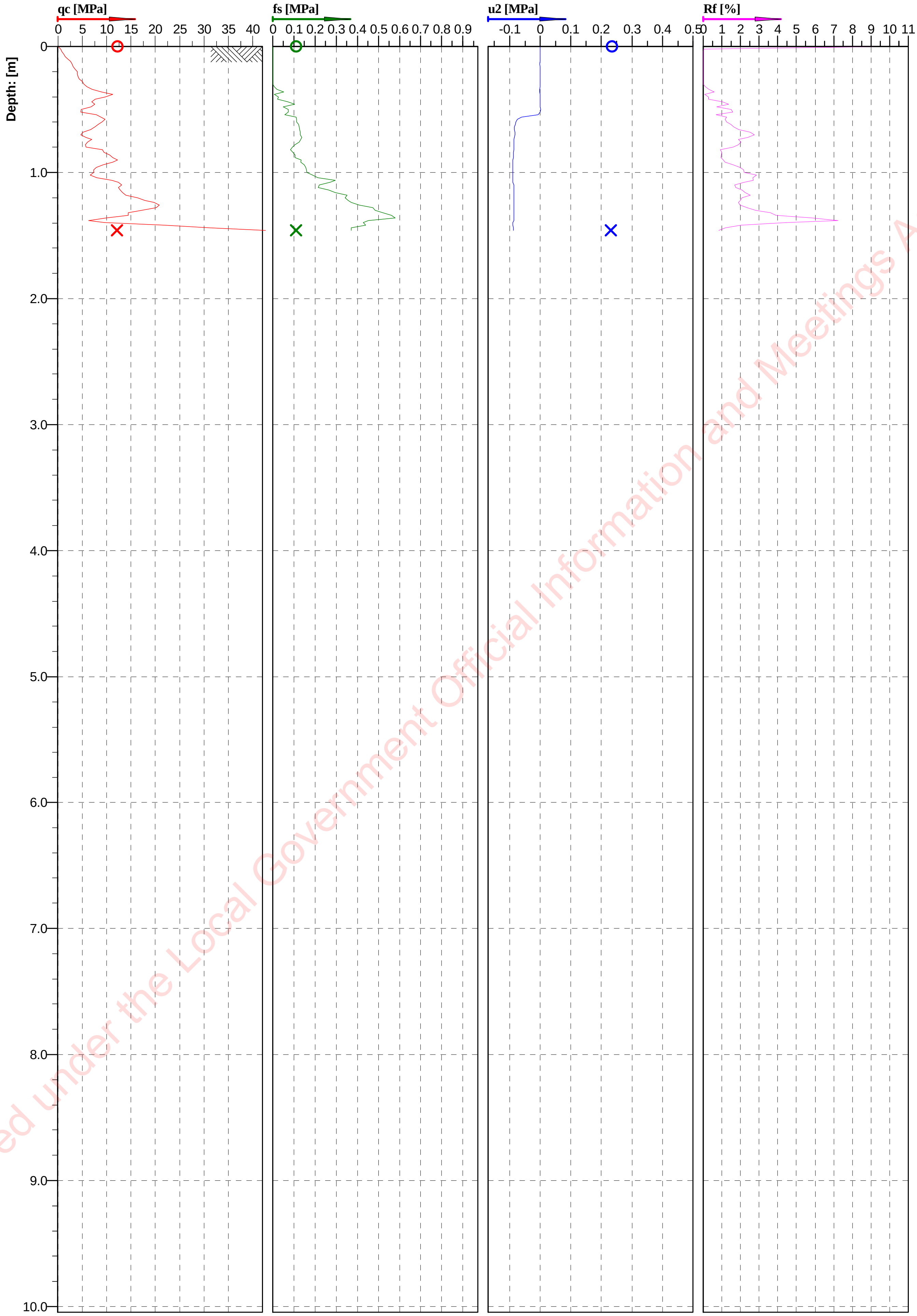
Location: York Bay	Position: X: 0.00 m, Y: 0.00 m	Ground level: 0.00	Test No.: CPT 6
Project ID:	Client: MWH	Date: 18/04/2017	Scale: 1 : 41
Project: EASTBOURNE		Page: 1/1	Fig.:
Anchor Refusal		File: CPT 6.0.cpt	



GEO soft

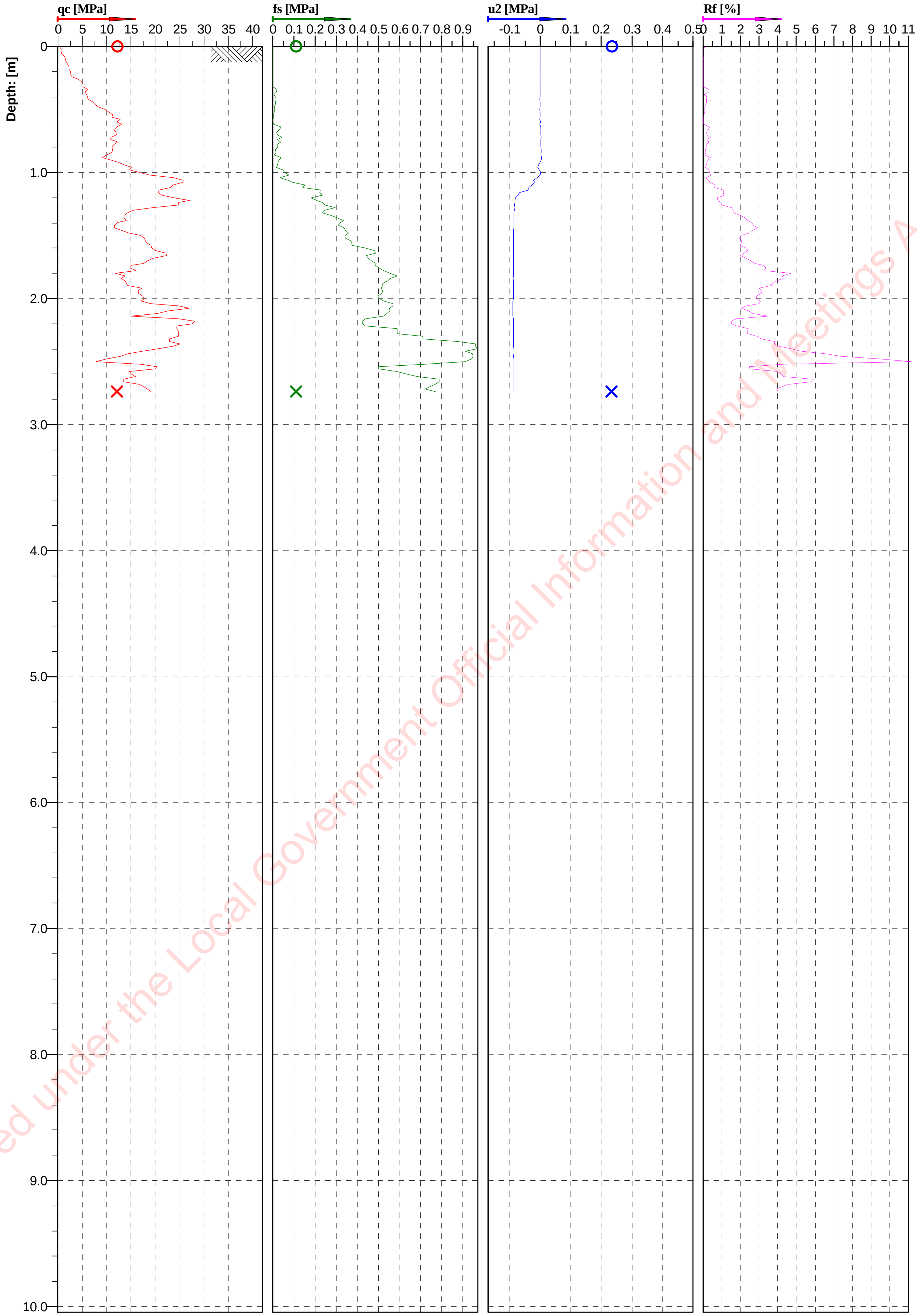
Cone No: 4616
Tip area [cm2]: 10
Sleeve area [cm2]: 150

Location: York Bay	Position: X: 0.00 m, Y: 0.00 m	Ground level: 0.00	Test No.: CPT 7
Project ID:	Client: MWH	Date: 18/04/2017	Scale: 1 : 41
Project: EASTBOURNE		Page: 1/1	Fig.:
Max QC		File: CPT 7.0.cpt	



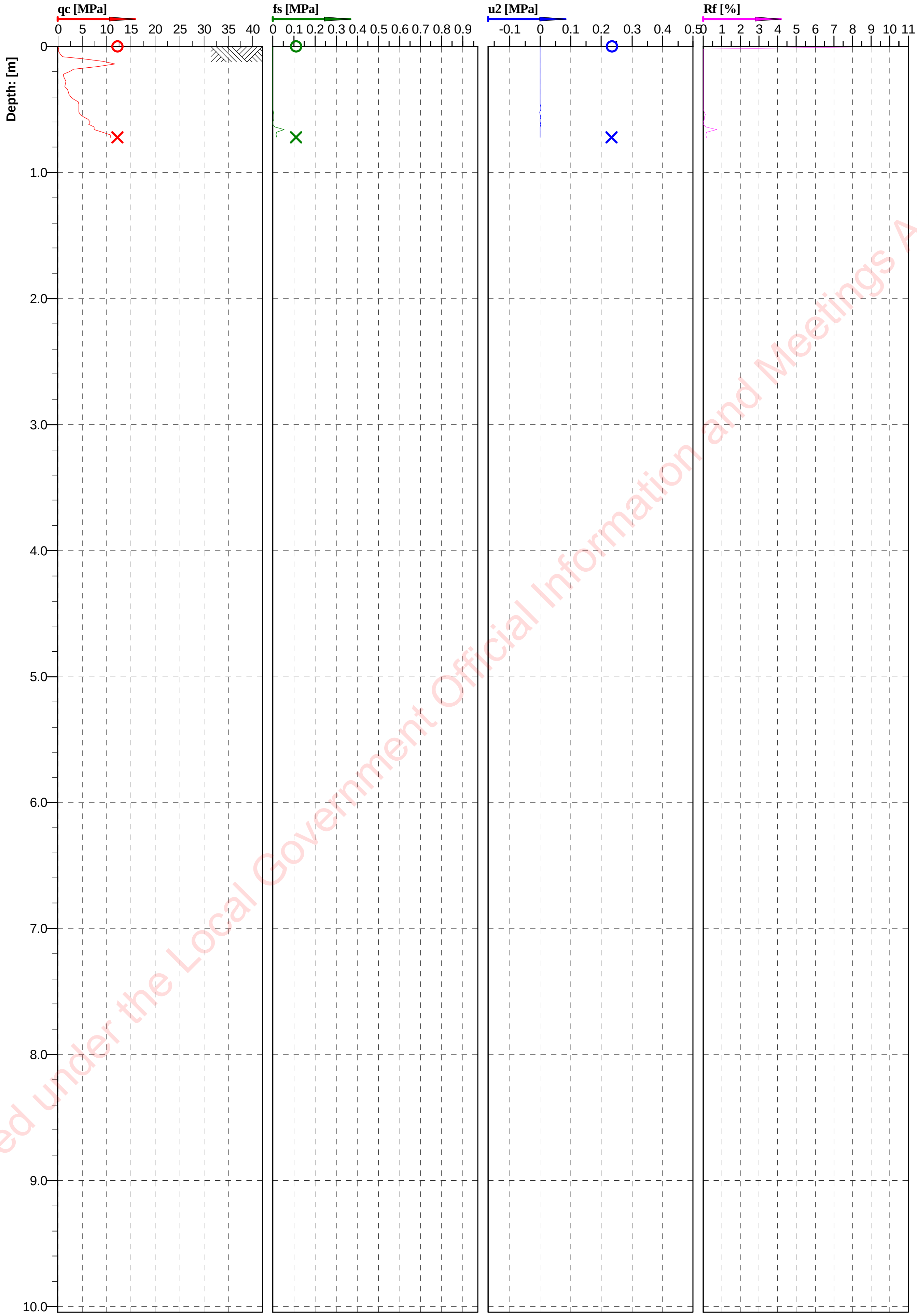
Cone No: 4616
Tip area [cm2]: 10
Sleeve area [cm2]: 150

Location: Mahina Bay	Position: X: 0.00 m, Y: 0.00 m	Ground level: 0.00	Test No.: CPT 8
Project ID:	Client: MWH	Date: 20/04/2017	Scale: 1 : 41
Project: EASTBOURNE		Page: 1/1	Fig.:
Max QC		File: CPT 8.1.cpt	

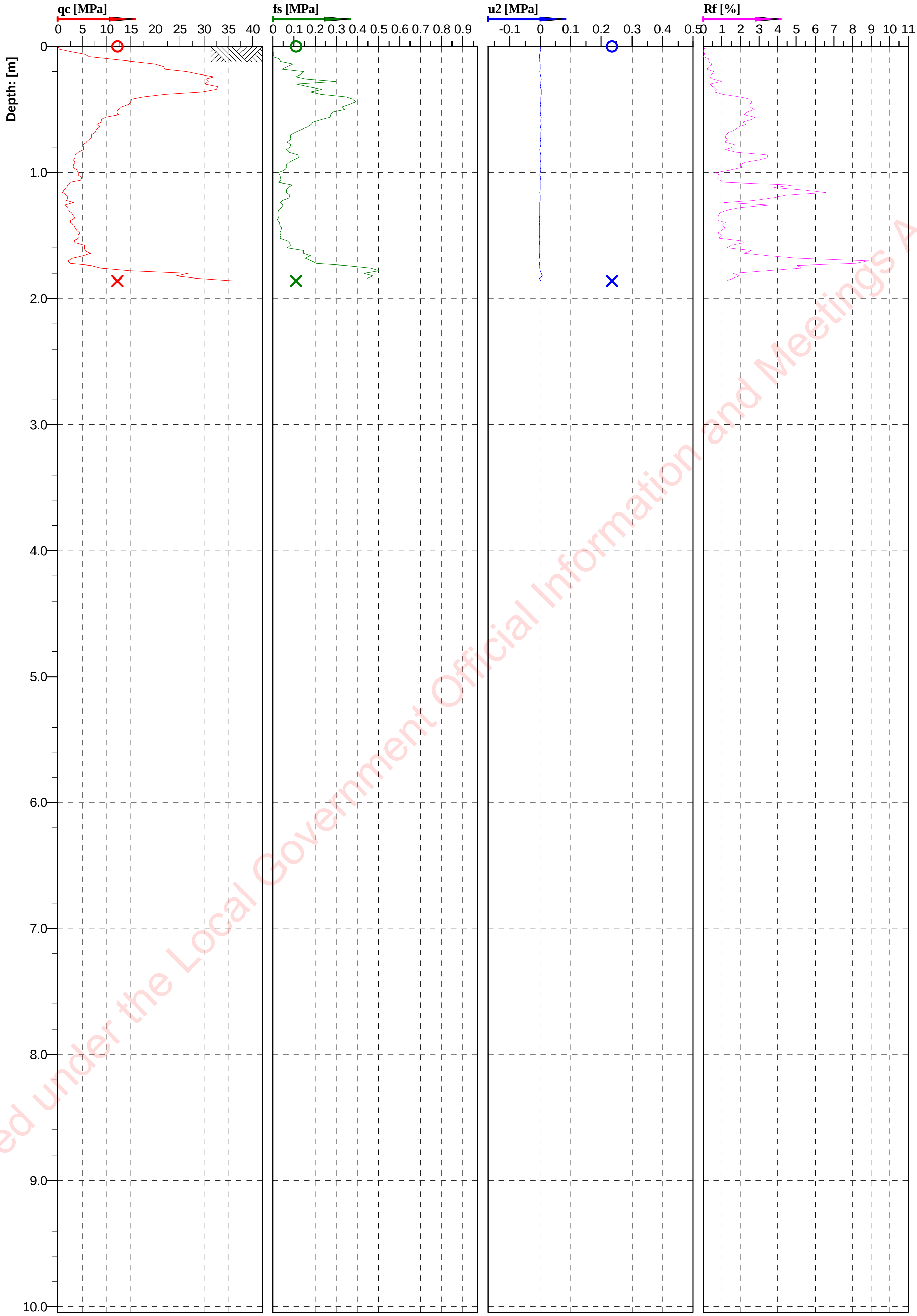


Location: Mahina Bay	Position: X: 0.00 m, Y: 0.00 m	Ground level: 0.00	Test No.: CPT 9.0
Project ID:	Client: MWH	Date: 20/04/2017	Scale: 1 : 41
Project: EASTBOURNE		Page: 1/1	Fig.:
Could not push		File: CPT 9.0.cpt	

Cone No: 4616
Tip area [cm2]: 10
Sleeve area [cm2]: 150



Location: Sumshine Bay	Position: X: 0.00 m, Y: 0.00 m	Ground level: 0.00	Test No.: CPT 10
Project ID:	Client: MWH	Date: 21/04/2017	Scale: 1 : 41
Project: EASTBOURNE		Page: 1/1	Fig.:
Anchor Refusal		File: cpt 10.cpt	

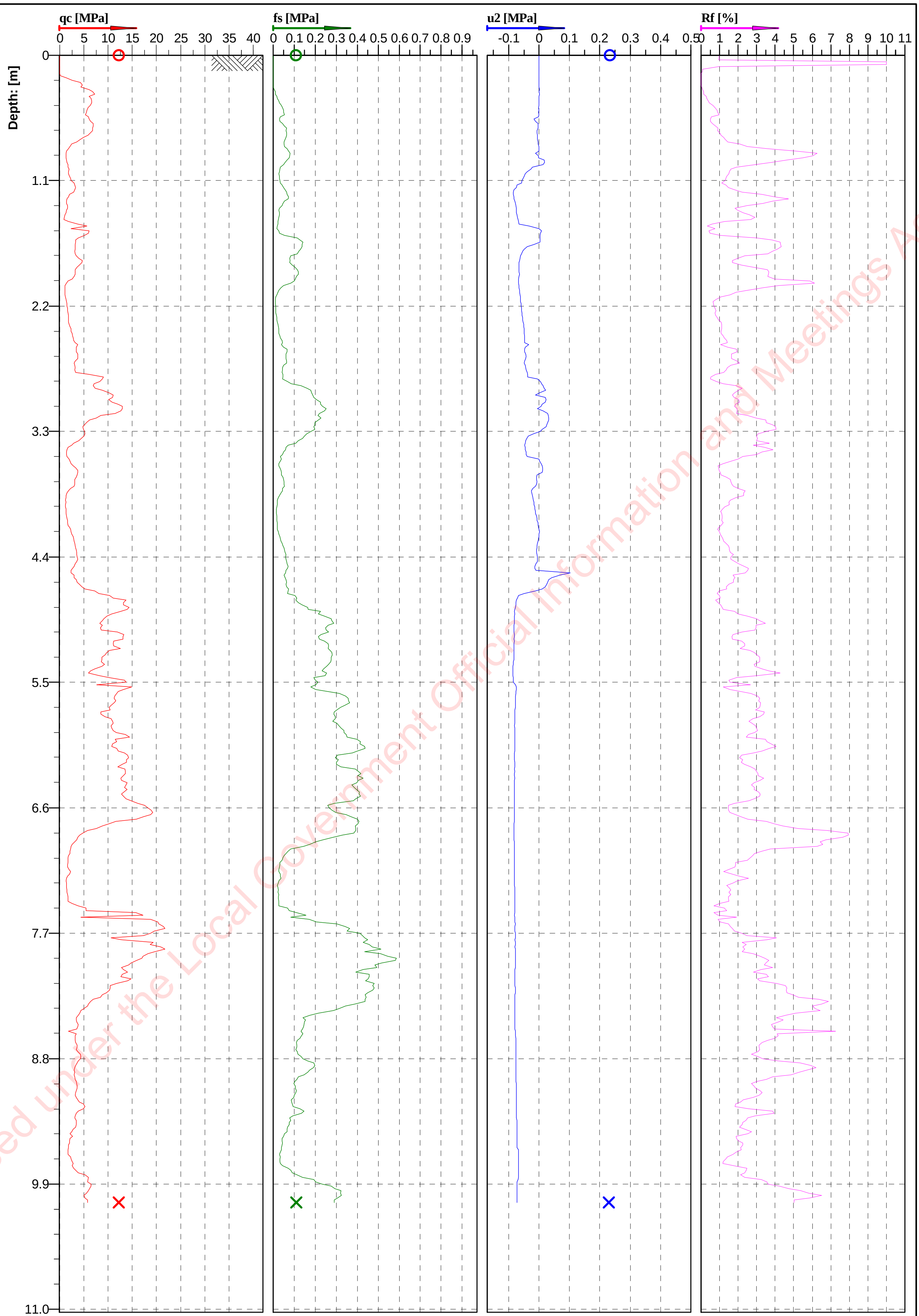


GEO soft

u2

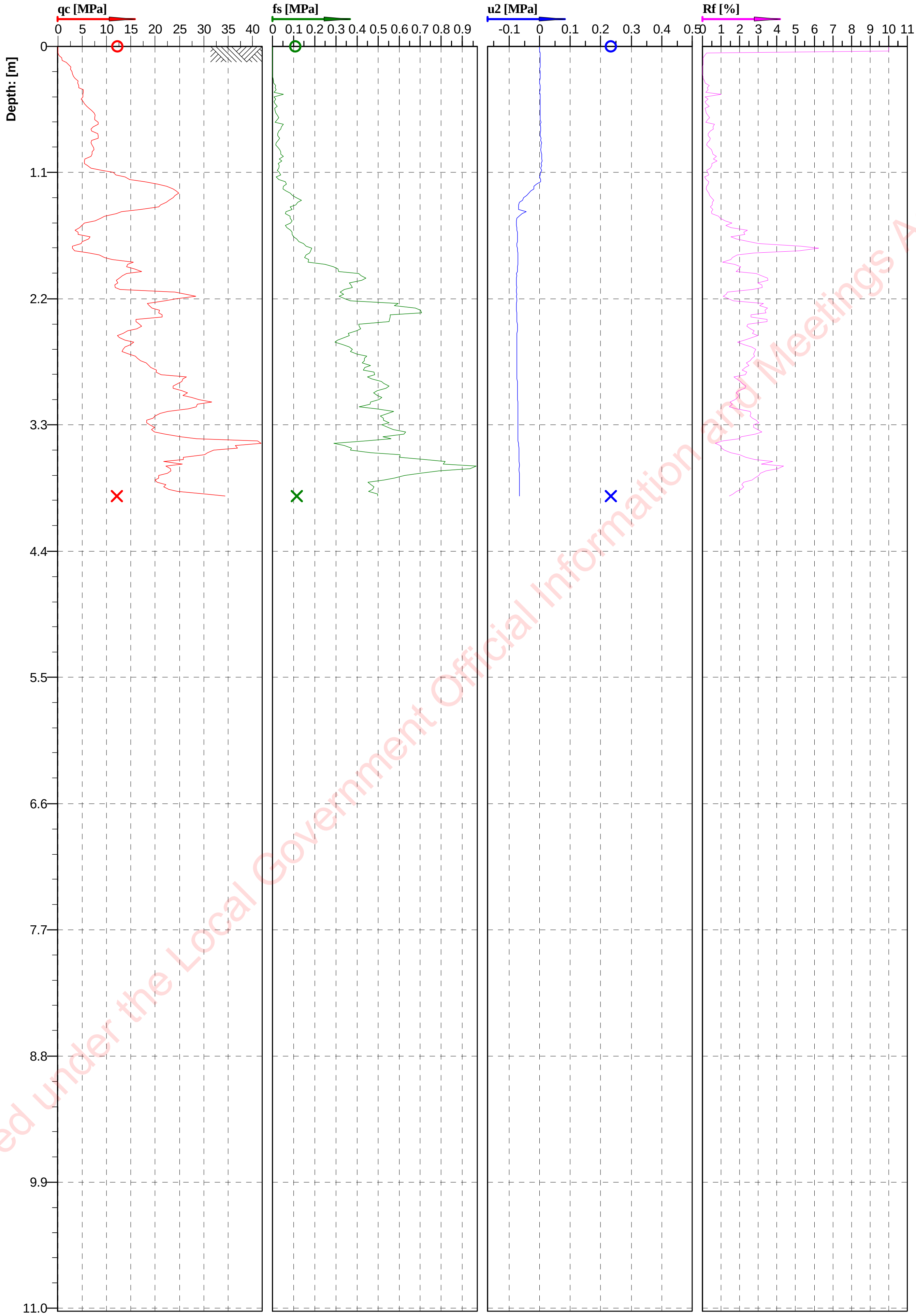
Cone No: 4616
Tip area [cm2]: 10
Sleeve area [cm2]: 150

Location: Sunshine Bay	Position: X: 0.00 m, Y: 0.00 m	Ground level: 0.00	Test No.: CPT11
Project ID:	Client: MWH	Date: 21/04/2017	Scale: 1 : 41
Project: EASTBOURNE		Page: 1/1	Fig.:
Max QC		File: cpt 11.cpt	



GEO soft

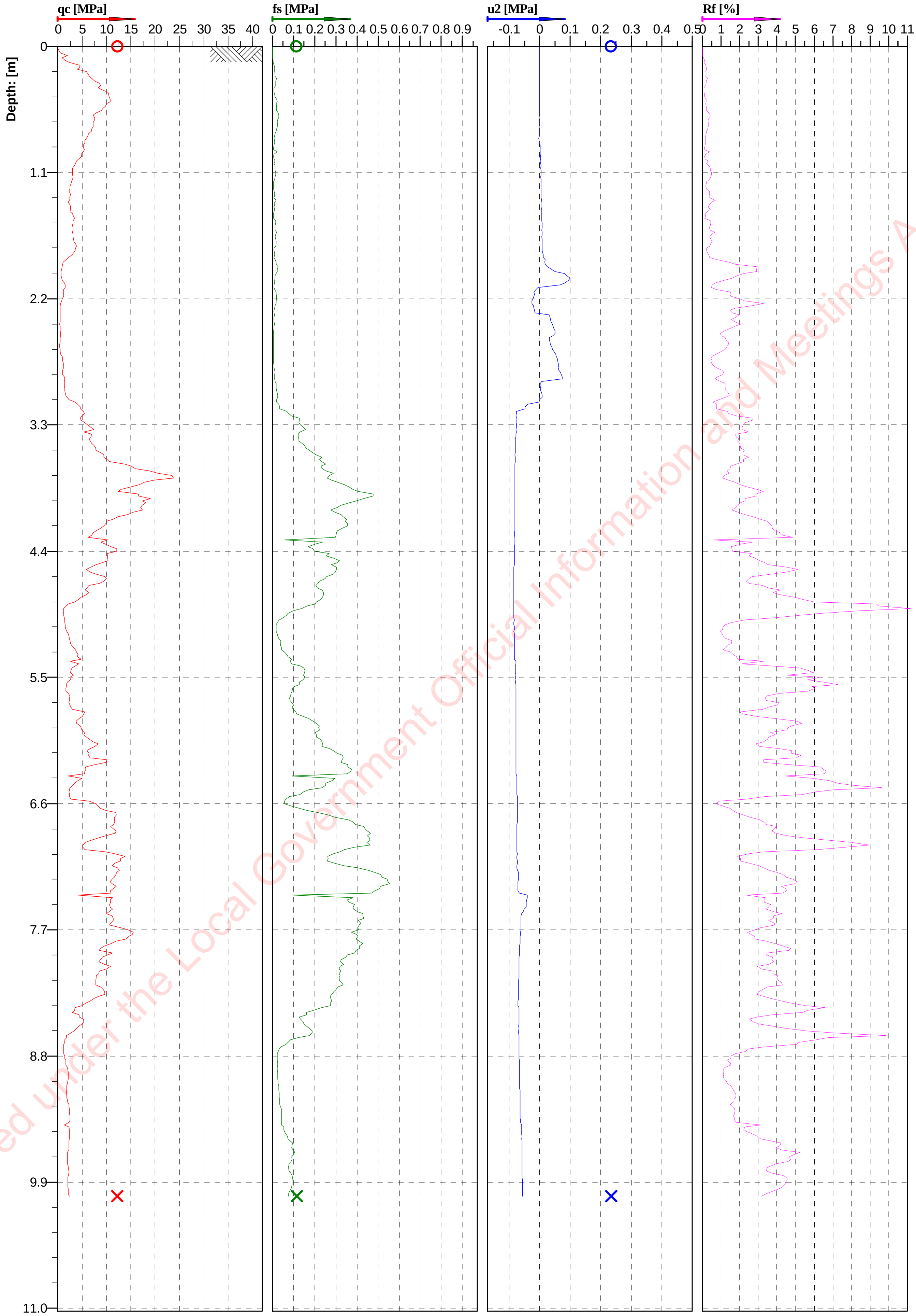
Location: Lowery Bay	Position: X: 0.00 m, Y: 0.00 m	Ground level: 0.00	Test No.: CPT 12
Project ID:	Client: MWH	Date: 24/04/2017	Scale: 1 : 45
Project: EASTBOURNE 2		Page: 1/1	Fig.:
Full Depth		File: cpt12.cpd	



Location: Lowery Bay	Position: X: 0.00 m, Y: 0.00 m	Ground level: 0.00	Test No.: CPT13
Project ID:	Client: MWH	Date: 24/04/2017	Scale: 1 : 45
Project: EASTBOURNE 2		Page: 1/1	Fig.:
Qc Max		File: cpt13.cpt	

u2

Cone No: 4616
Tip area [cm2]: 10
Sleeve area [cm2]: 150

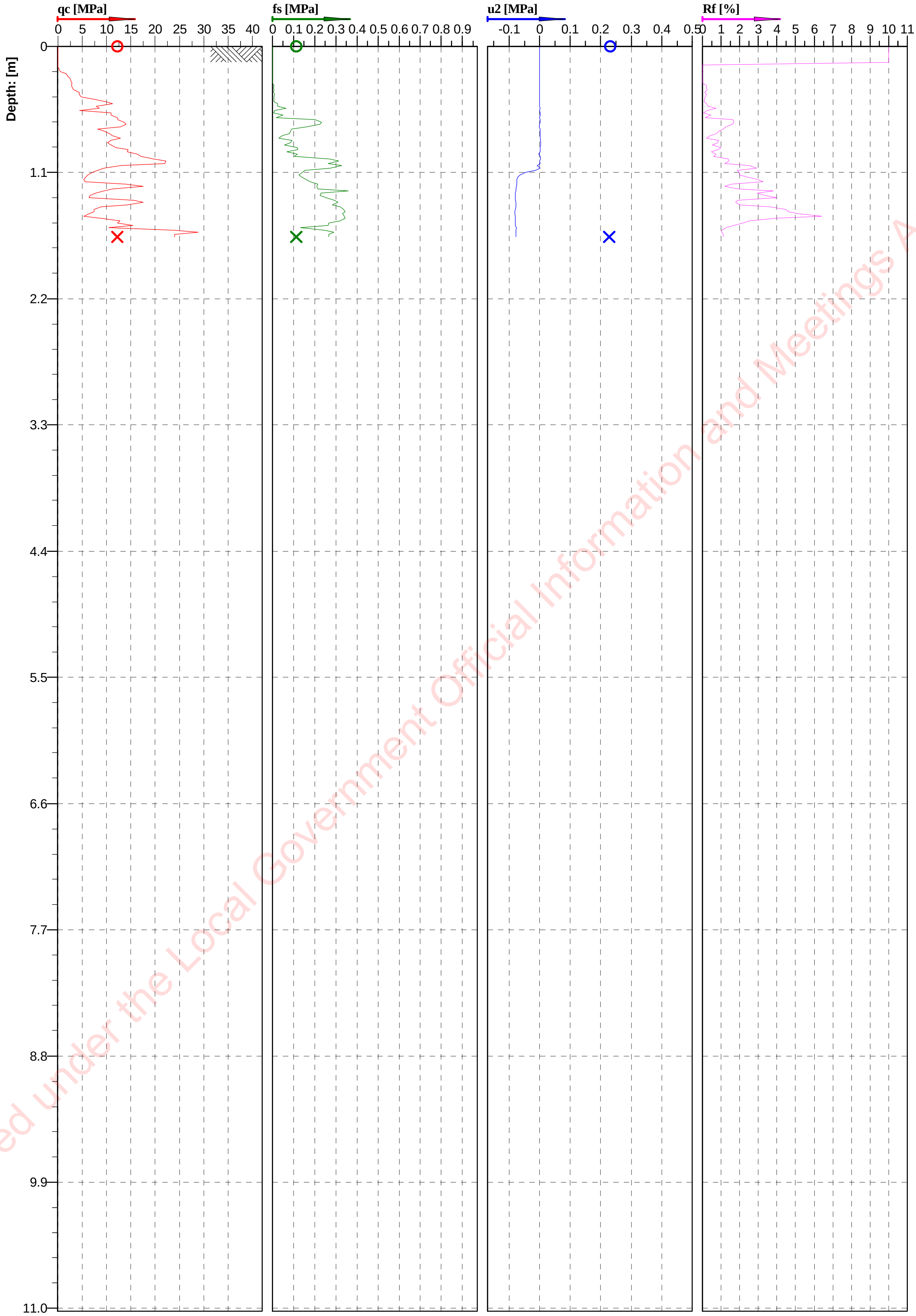


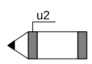
GEO soft

u2

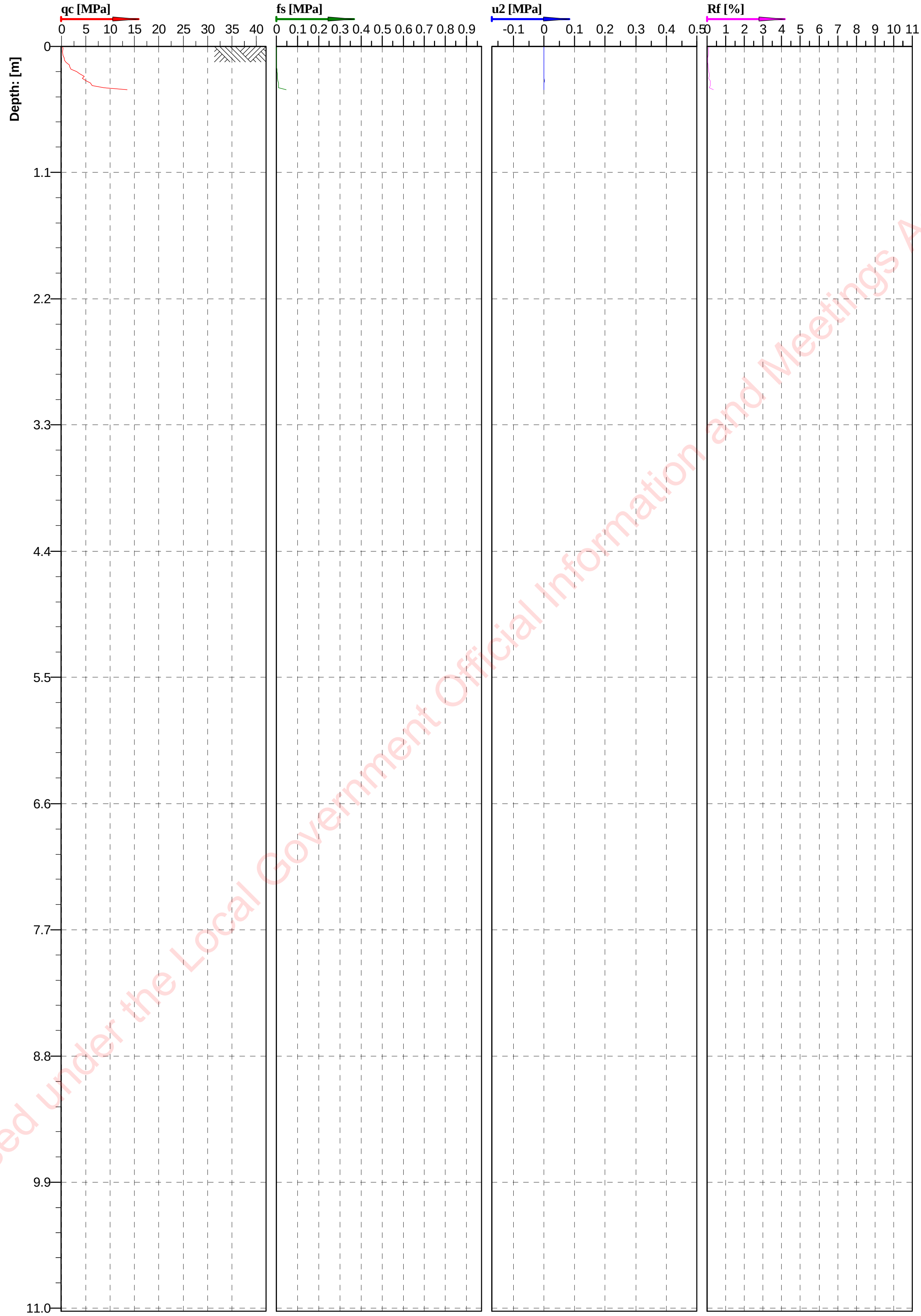
Cone No: 4616
Tip area [cm2]: 10
Sleeve area [cm2]: 150

Location: Lowrey Bay	Position: X: 0.00 m, Y: 0.00 m	Ground level: 0.00	Test No.: CPT 14
Project ID:	Client: MWH	Date: 24/04/2017	Scale: 1 : 45
Project: EASTBOURNE 2		Page: 1/1	Fig.:
Full Depth		File: cpt14.cpt	





Location: Mahina Bay	Position: X: 0.00 m, Y: 0.00 m	Ground level: 0.00	Test No.: CPT15
Project ID:	Client: MWH	Date: 26/04/2017	Scale: 1 : 45
Project: EASTBOURNE 2		Page: 1/1	Fig.:
Anchor Refusal		File: cpt15.cpt	



GEO soft

u2

Cone No: 4616
Tip area [cm2]: 10
Sleeve area [cm2]: 150

Location: Sunshine Bay	Position: X: 0.00 m, Y: 0.00 m	Ground level: 0.00	Test No.: CPT 17
Project ID:	Client: MWH	Date: 26/04/2017	Scale: 1 : 45
Project: EASTBOURNE 2		Page: 1/1	Fig.:
Max QC		File: cpt17.cpt	

Appendix D CPT Interpretive

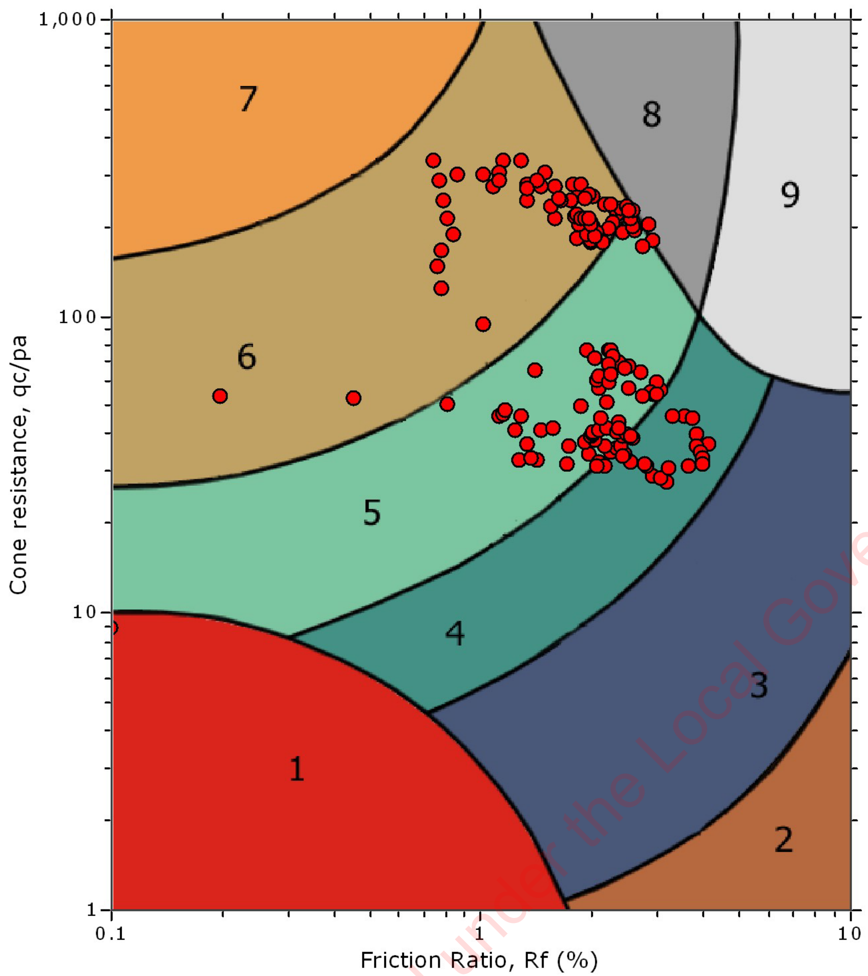
MWH now part of Stantec
Level 11, 155 The Terrace
Wellington, 6141, New Zealand
http://nz.mwhglobal.com/

CPT: CPT-01
Total depth: 3.26 m, Date: 11/04/2017
Surface Elevation: 0.00 m
Coords: X:1760177.00, Y:5430965.00
Cone Type: Uknown
Cone Operator: Uknown

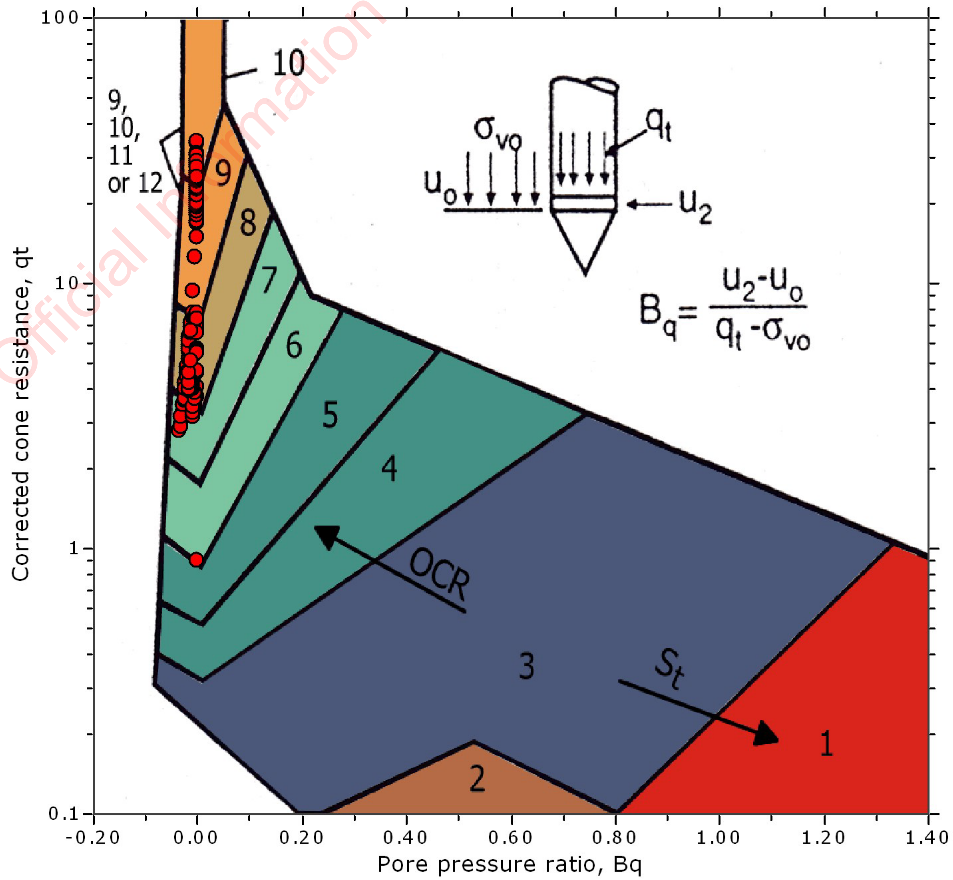
Project: Eastern Bays Shared Path
Location: Lower Hutt, New Zealand

SBT - Bq plots

SBT plot



Bq plot



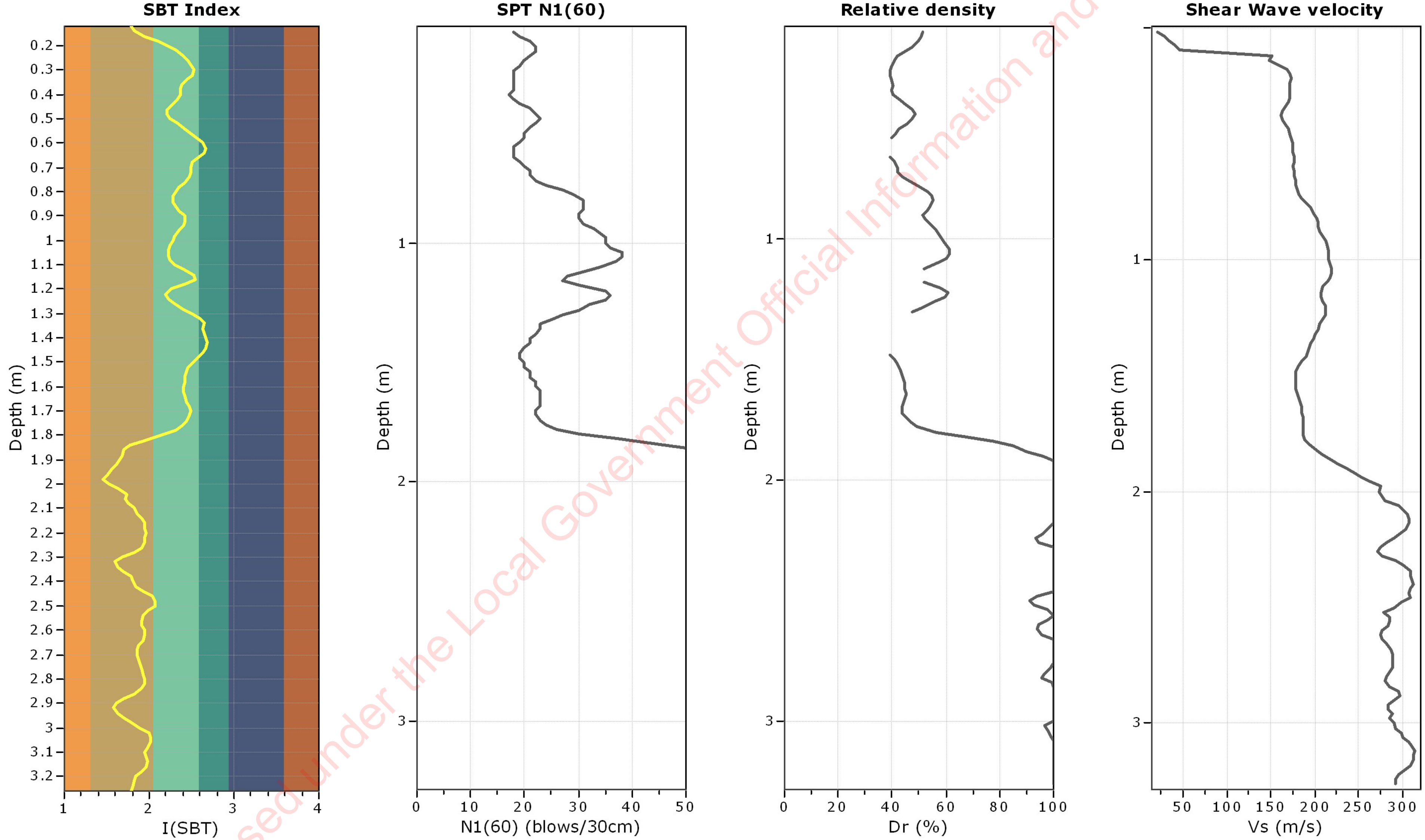
SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

MWH now part of Stantec
Level 11, 155 The Terrace
Wellington, 6141, New Zealand
http://nz.mwhglobal.com/

CPT: CPT-01
Total depth: 3.26 m, Date: 11/04/2017
Surface Elevation: 0.00 m
Coords: X:1760177.00, Y:5430965.00
Cone Type: Uknown
Cone Operator: Uknown

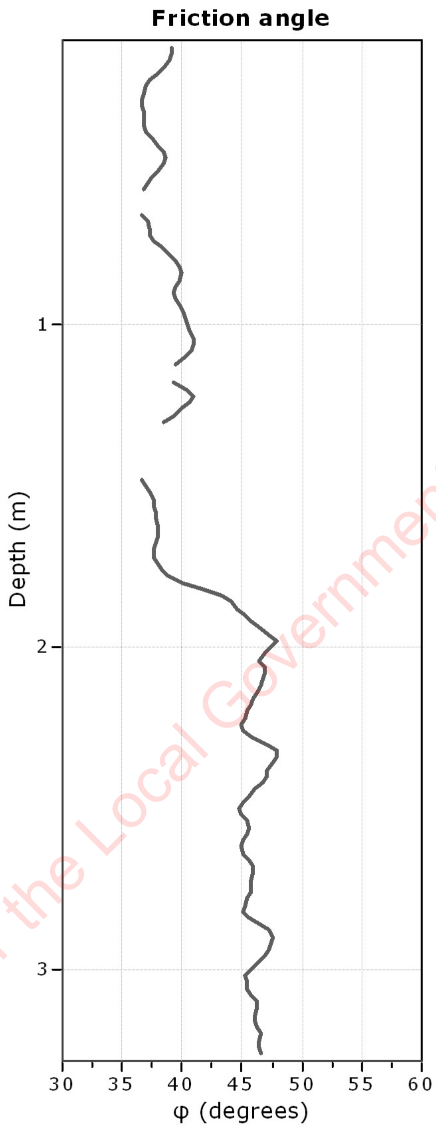
Project: **Eastern Bays Shared Path**
Location: **Lower Hutt, New Zealand**

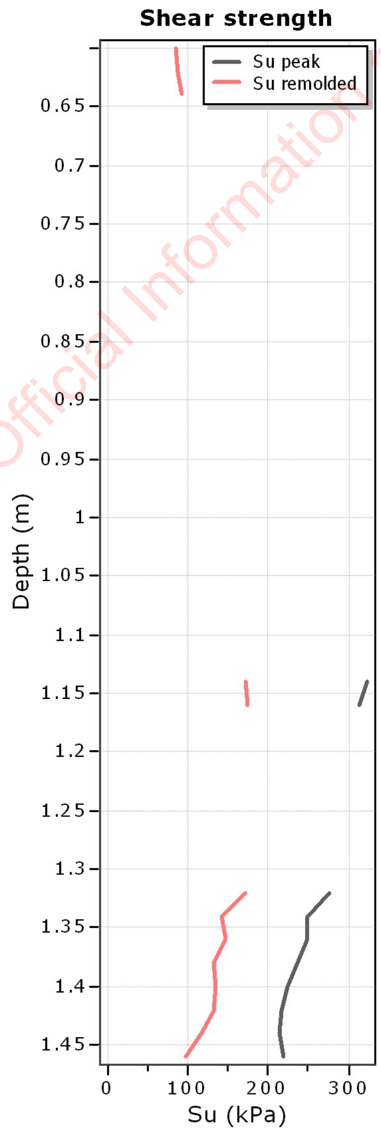


MWH now part of Stantec
Level 11, 155 The Terrace
Wellington, 6141, New Zealand
http://nz.mwhglobal.com/

CPT: CPT-01
Total depth: 3.26 m, Date: 11/04/2017
Surface Elevation: 0.00 m
Coords: X:1760177.00, Y:5430965.00
Cone Type: Uknown
Cone Operator: Uknown

Project: **Eastern Bays Shared Path**
Location: **Lower Hutt, New Zealand**





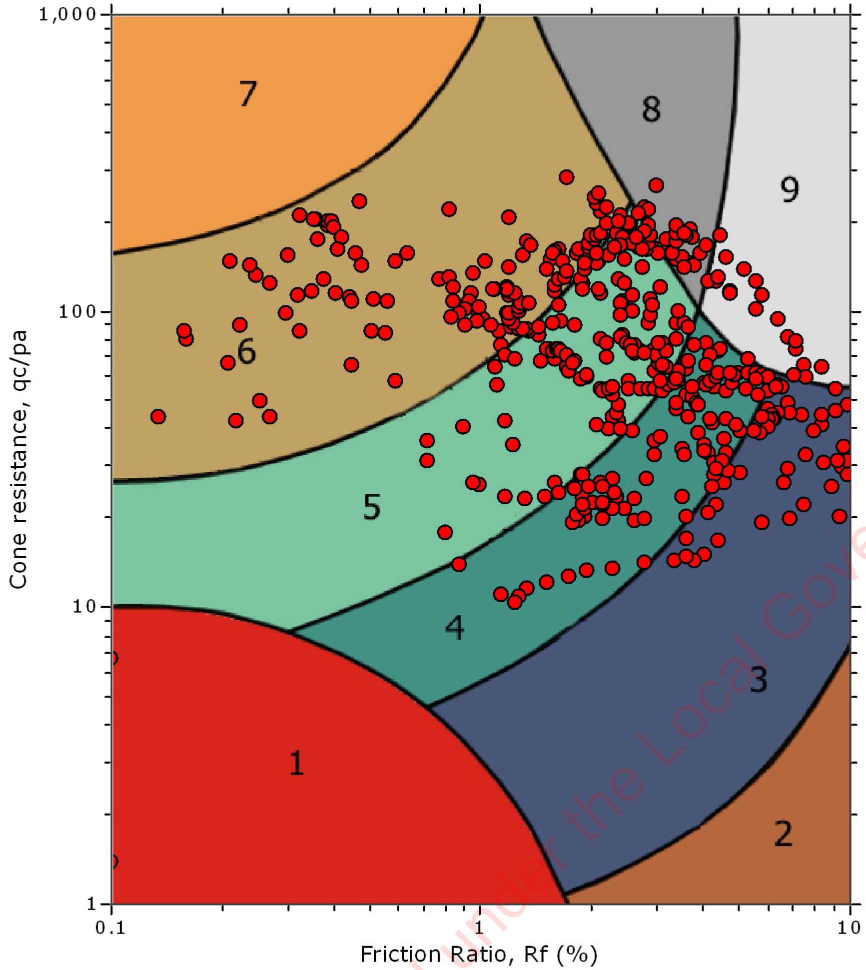
MWH now part of Stantec
Level 11, 155 The Terrace
Wellington, 6141, New Zealand
http://nz.mwhglobal.com/

CPT: CPT-02
Total depth: 9.28 m, Date: 11/04/2017
Surface Elevation: 0.00 m
Coords: X:1760217.00, Y:5430869.00
Cone Type: Uknown
Cone Operator: Uknown

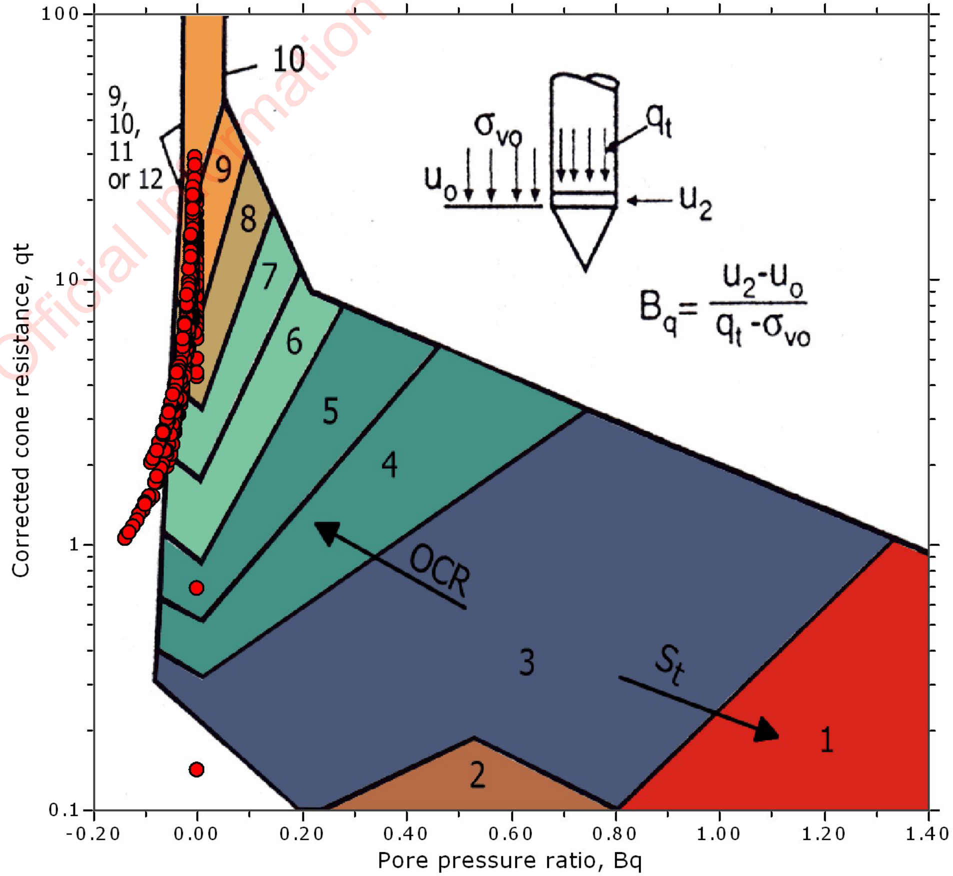
Project: Eastern Bays Shared Path
Location: Lower Hutt, New Zealand

SBT - Bq plots

SBT plot



Bq plot



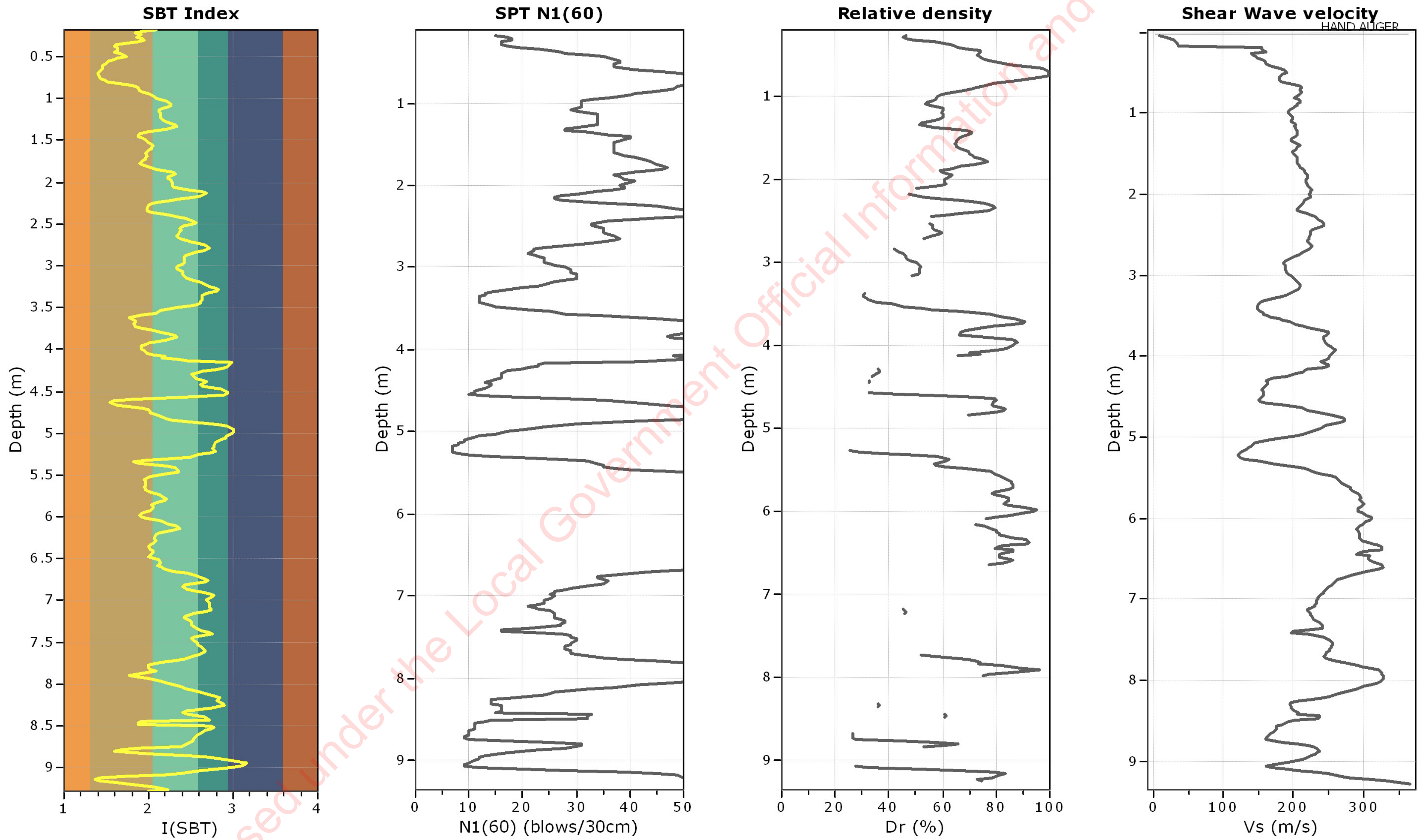
SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

MWH now part of Stantec
Level 11, 155 The Terrace
Wellington, 6141, New Zealand
http://nz.mwhglobal.com/

CPT: CPT-02
Total depth: 9.28 m, Date: 11/04/2017
Surface Elevation: 0.00 m
Coords: X:1760217.00, Y:5430869.00
Cone Type: Uknown
Cone Operator: Uknown

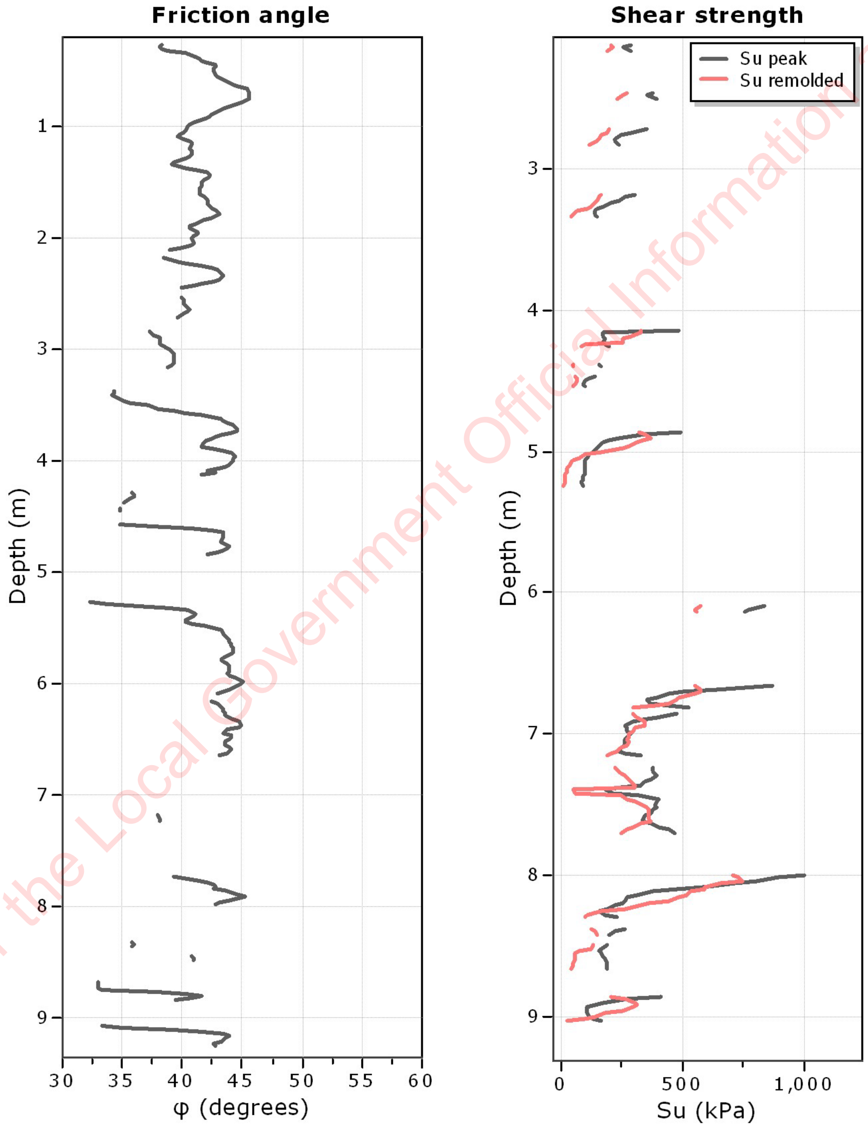
Project: **Eastern Bays Shared Path**
Location: **Lower Hutt, New Zealand**



MWH now part of Stantec
Level 11, 155 The Terrace
Wellington, 6141, New Zealand
http://nz.mwhglobal.com/

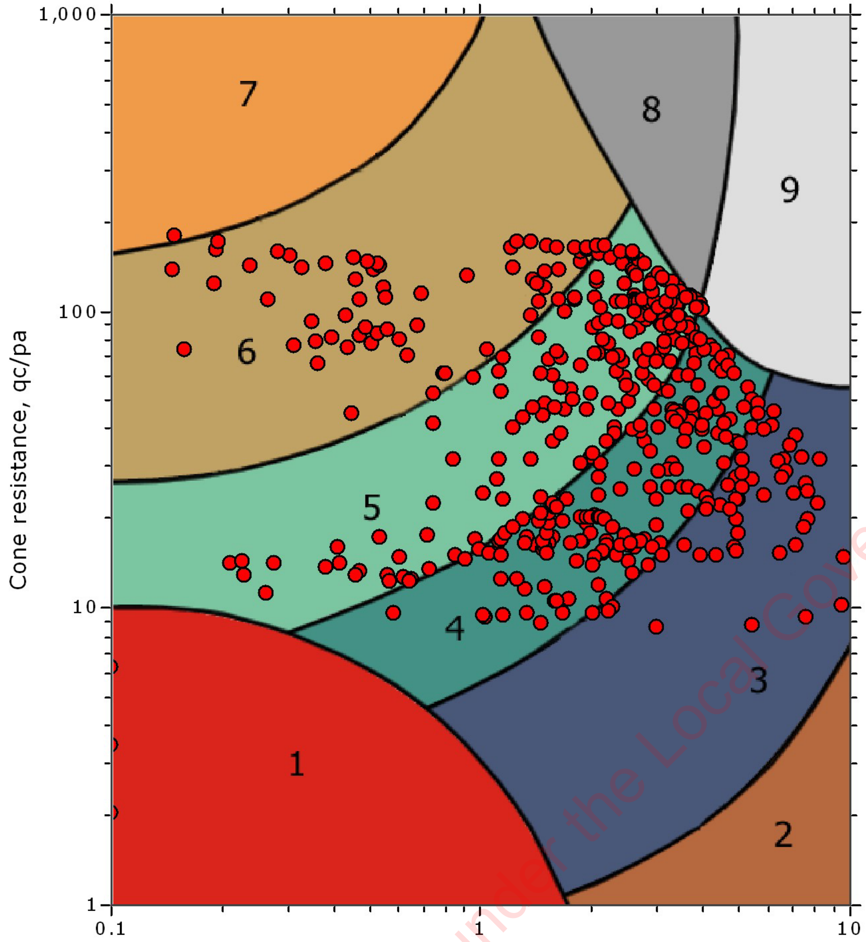
CPT: CPT-02
Total depth: 9.28 m, Date: 11/04/2017
Surface Elevation: 0.00 m
Coords: X:1760217.00, Y:5430869.00
Cone Type: Uknown
Cone Operator: Uknown

Project: **Eastern Bays Shared Path**
Location: **Lower Hutt, New Zealand**

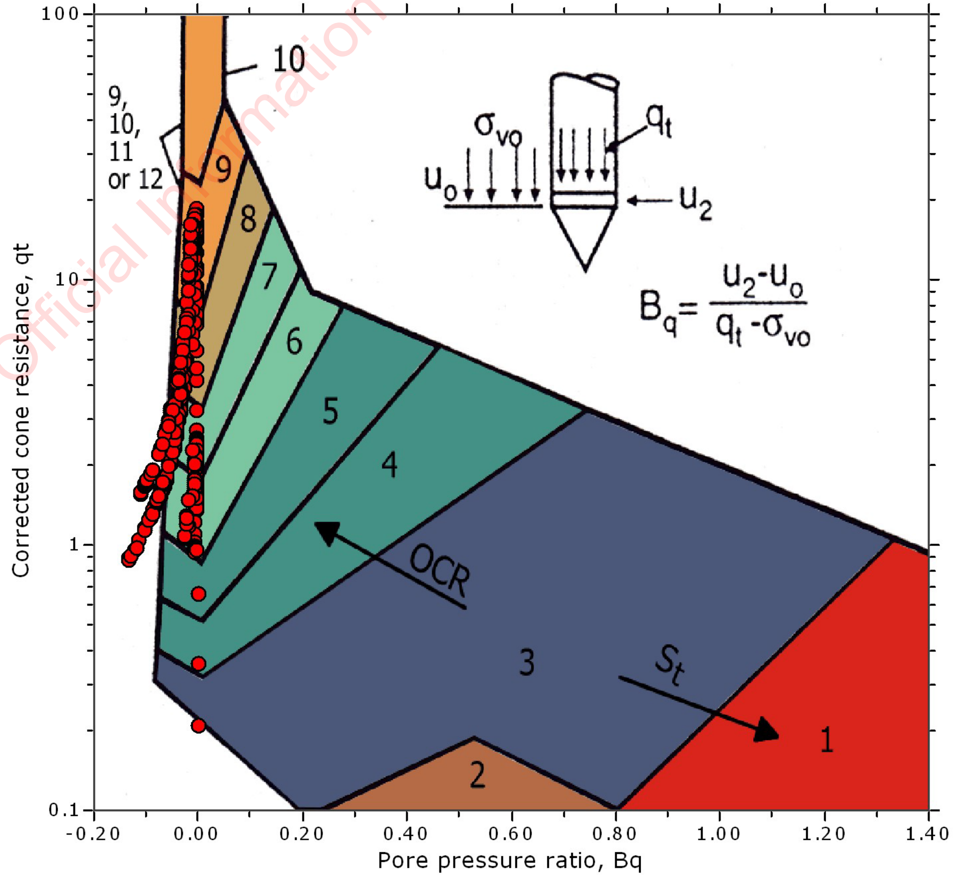


SBT - Bq plots

SBT plot



Bq plot



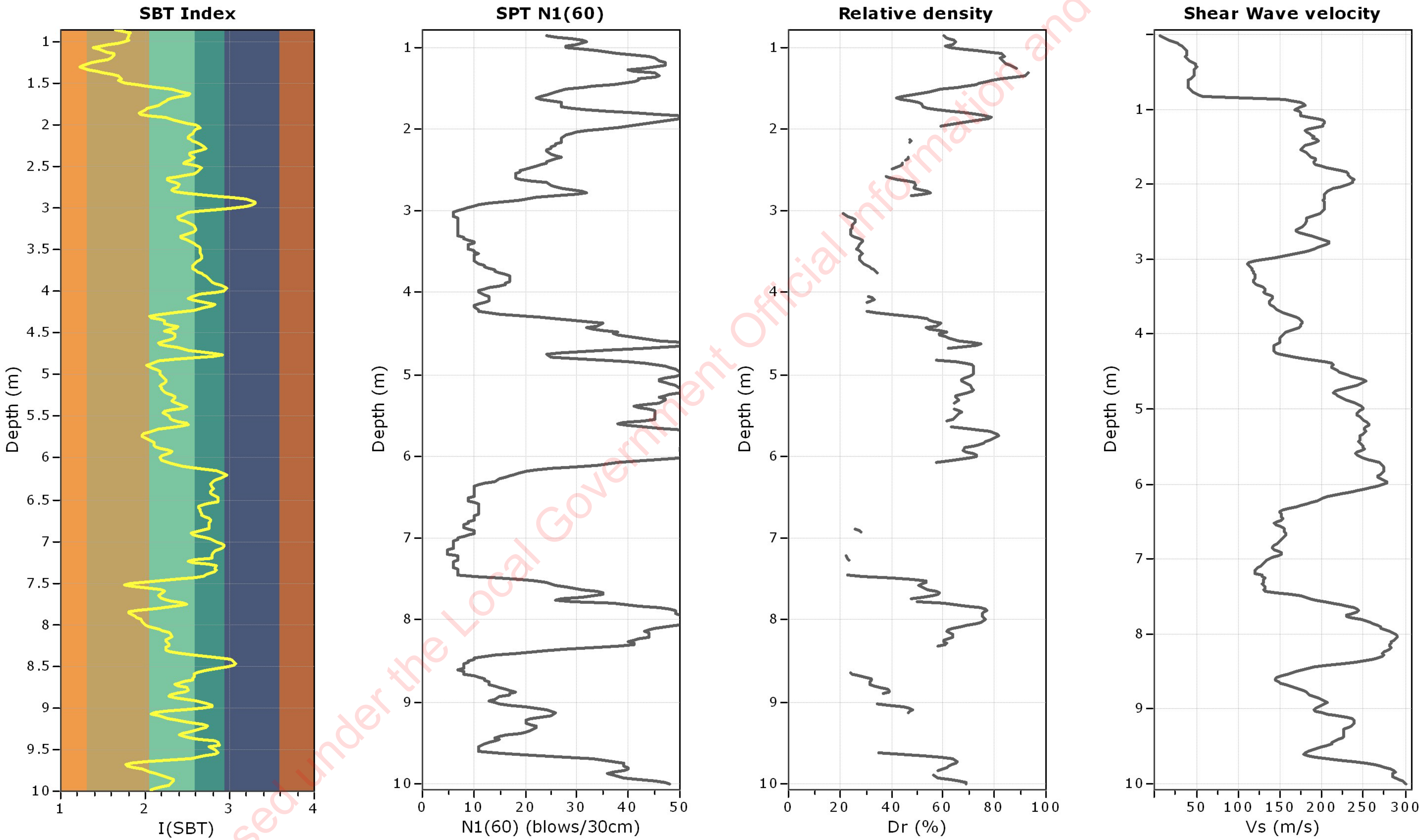
SBT legend

- 1. Sensitive fine grained
- 2. Organic material
- 3. Clay to silty clay
- 4. Clayey silt to silty clay
- 5. Silty sand to sandy silt
- 6. Clean sand to silty sand
- 7. Gravely sand to sand
- 8. Very stiff sand to clayey sand
- 9. Very stiff fine grained

MWH now part of Stantec
Level 11, 155 The Terrace
Wellington, 6141, New Zealand
http://nz.mwhglobal.com/

CPT: CPT-03
Total depth: 10.00 m, Date: 12/04/2017
Surface Elevation: 0.00 m
Coords: X:1760002.00, Y:5430185.00
Cone Type: Uknown
Cone Operator: Uknown

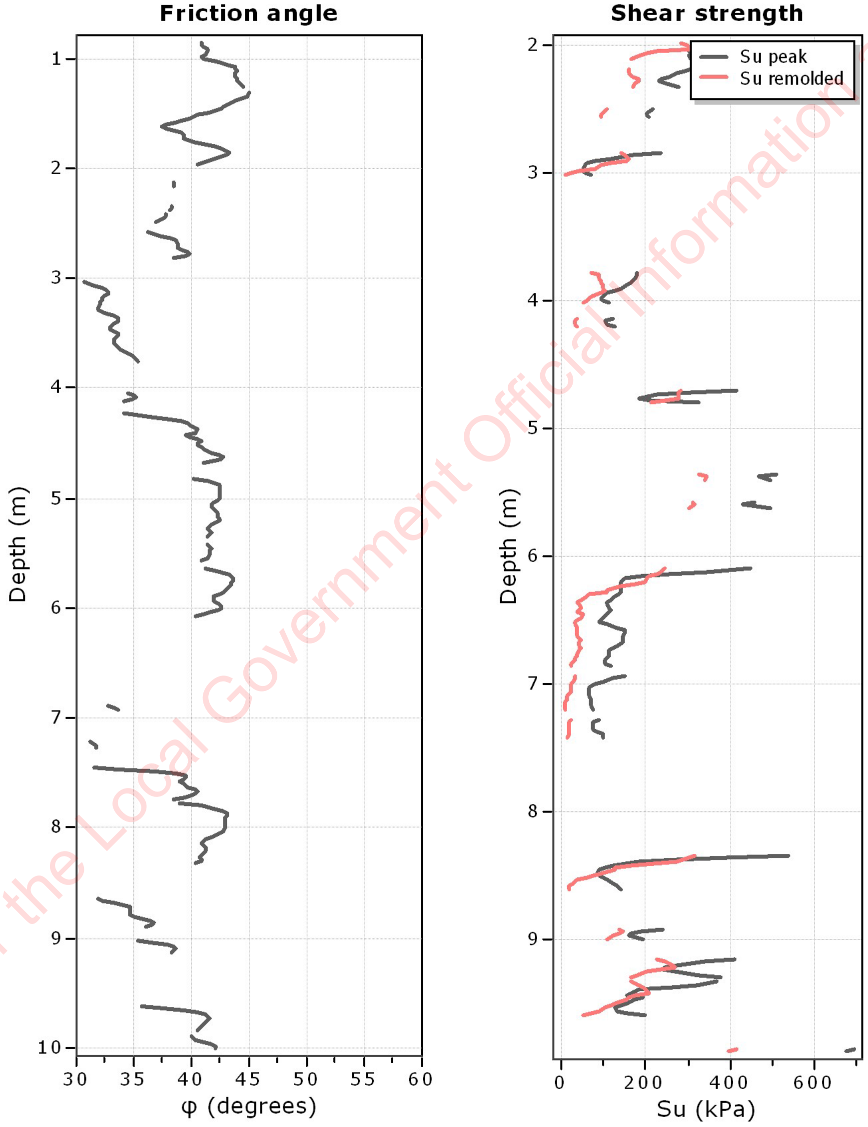
Project: **Eastern Bays Shared Path**
Location: **Lower Hutt, New Zealand**



MWH now part of Stantec
Level 11, 155 The Terrace
Wellington, 6141, New Zealand
http://nz.mwhglobal.com/

CPT: CPT-03
Total depth: 10.00 m, Date: 12/04/2017
Surface Elevation: 0.00 m
Coords: X:1760002.00, Y:5430185.00
Cone Type: Uknown
Cone Operator: Uknown

Project: **Eastern Bays Shared Path**
Location: **Lower Hutt, New Zealand**



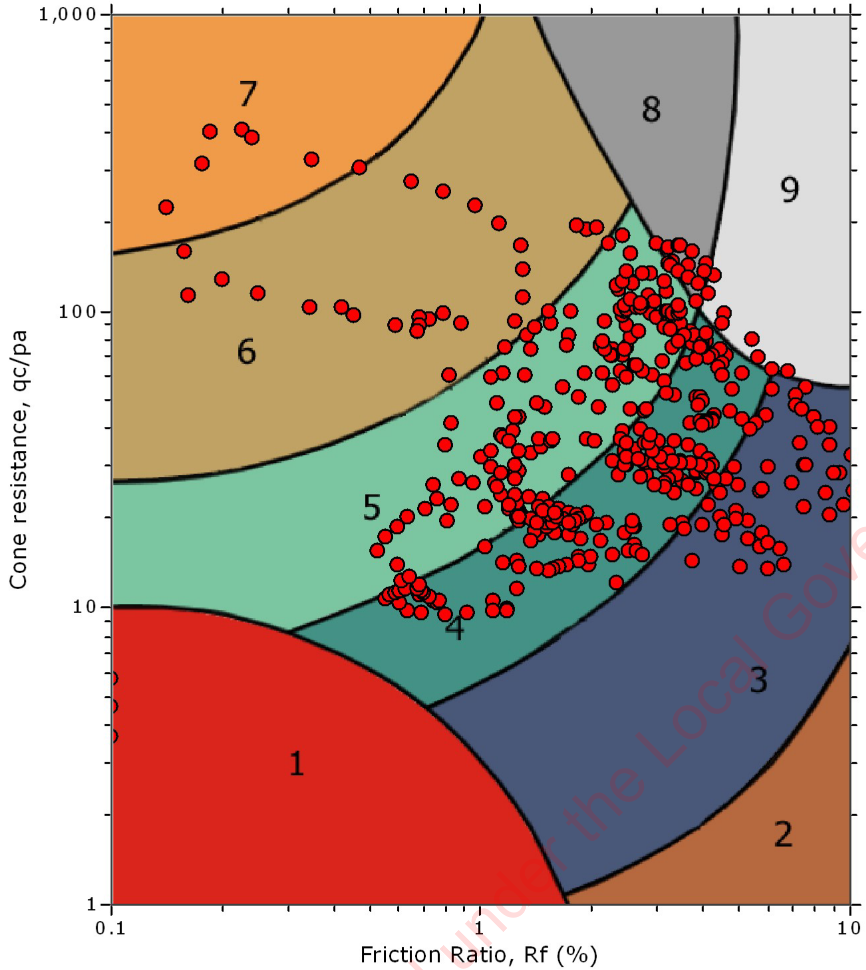
MWH now part of Stantec
Level 11, 155 The Terrace
Wellington, 6141, New Zealand
http://nz.mwhglobal.com/

CPT: CPT-04
Total depth: 10.02 m, Date: 12/04/2017
Surface Elevation: 0.00 m
Coords: X:1760227.00, Y:5430716.00
Cone Type: Uknown
Cone Operator: Uknown

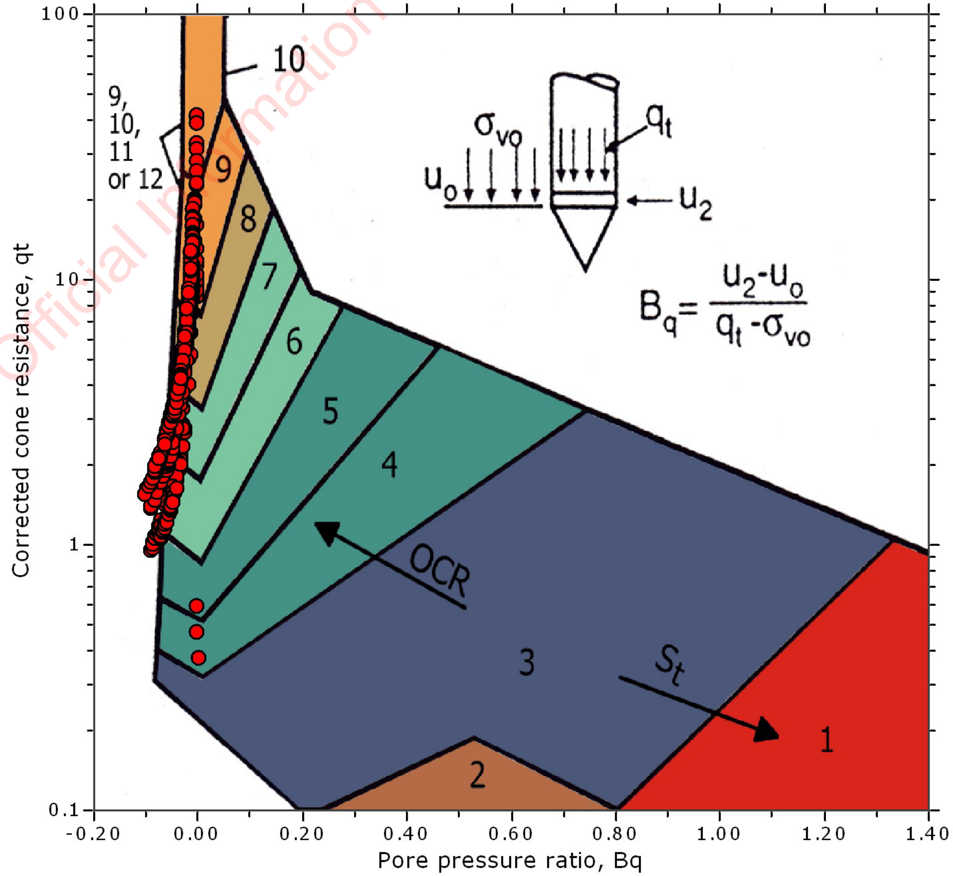
Project: Eastern Bays Shared Path
Location: Lower Hutt, New Zealand

SBT - Bq plots

SBT plot



Bq plot



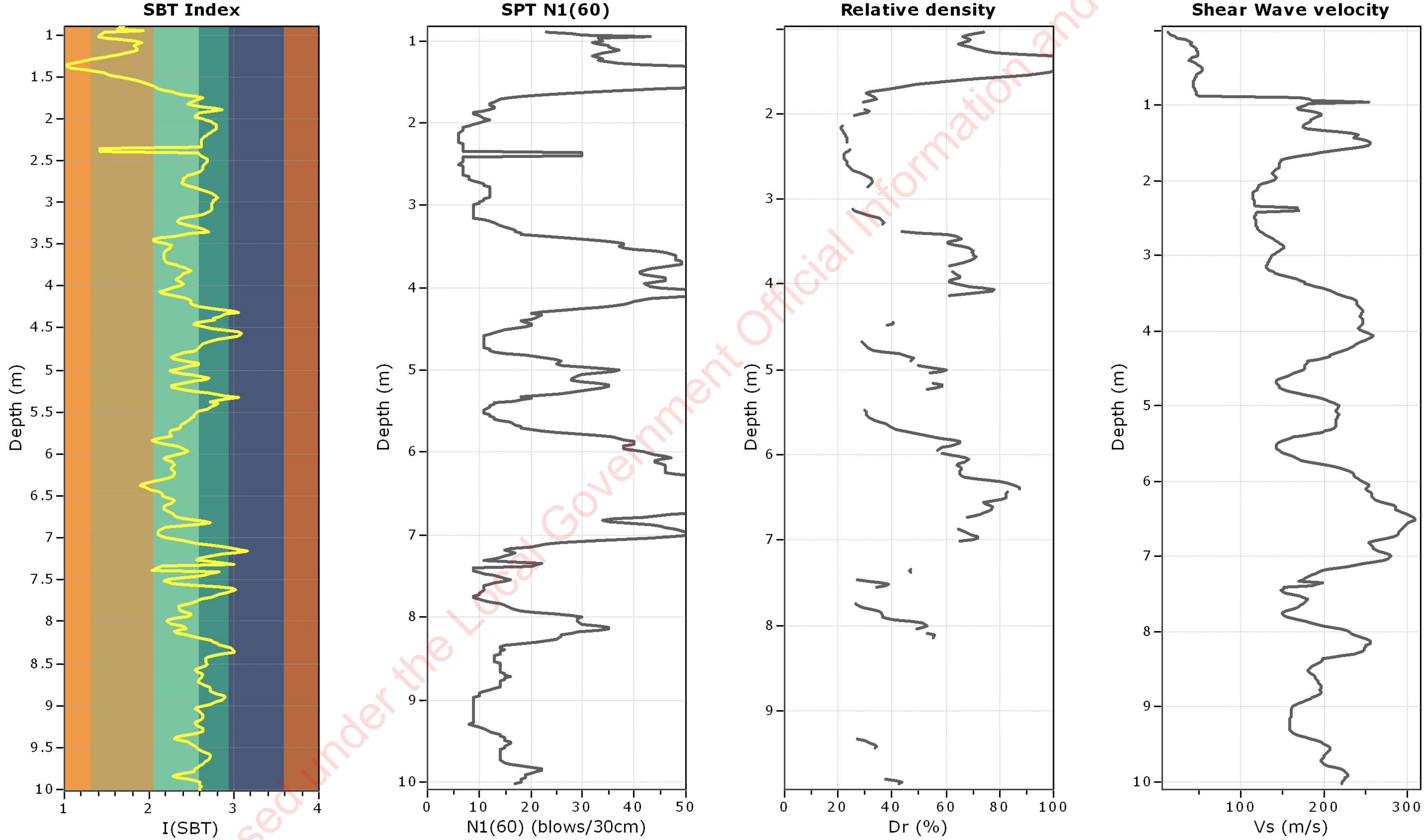
SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

MWH now part of Stantec
Level 11, 155 The Terrace
Wellington, 6141, New Zealand
http://nz.mwhglobal.com/

CPT: CPT-04
Total depth: 10.02 m, Date: 12/04/2017
Surface Elevation: 0.00 m
Coords: X:1760227.00, Y:5430716.00
Cone Type: Uknown
Cone Operator: Uknown

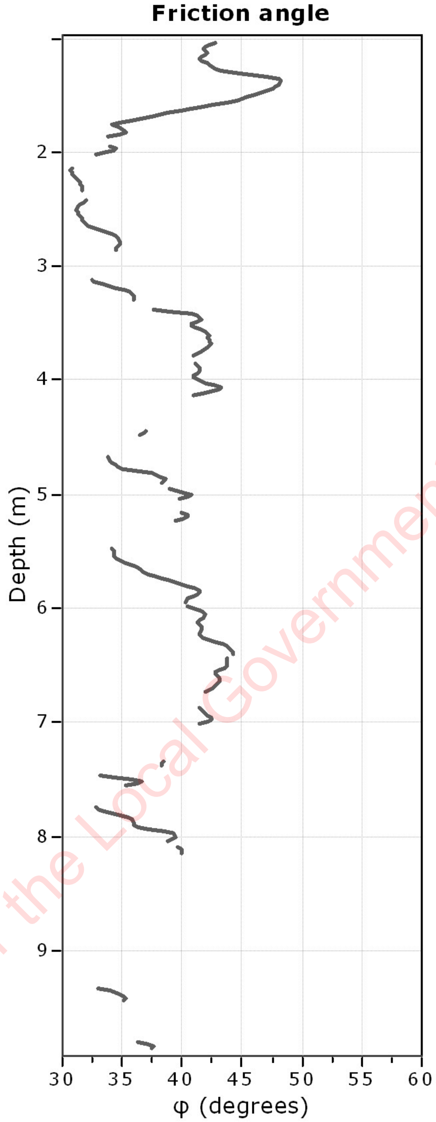
Project: **Eastern Bays Shared Path**
Location: **Lower Hutt, New Zealand**

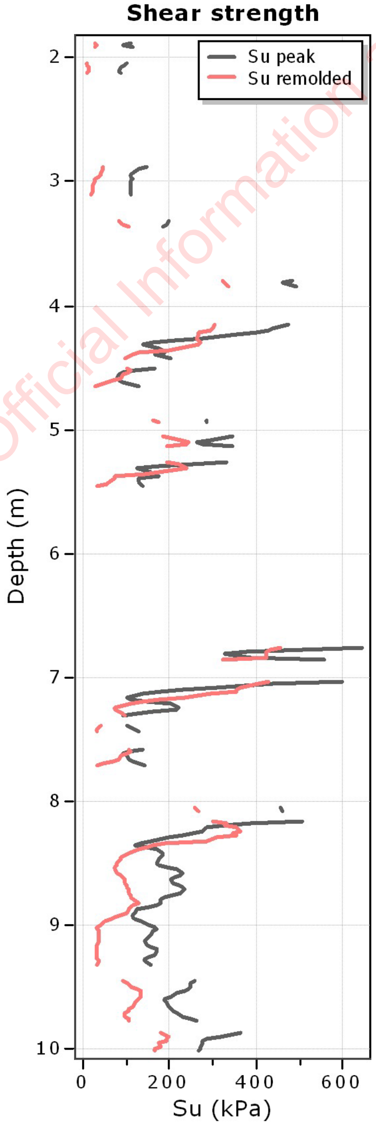


MWH now part of Stantec
Level 11, 155 The Terrace
Wellington, 6141, New Zealand
http://nz.mwhglobal.com/

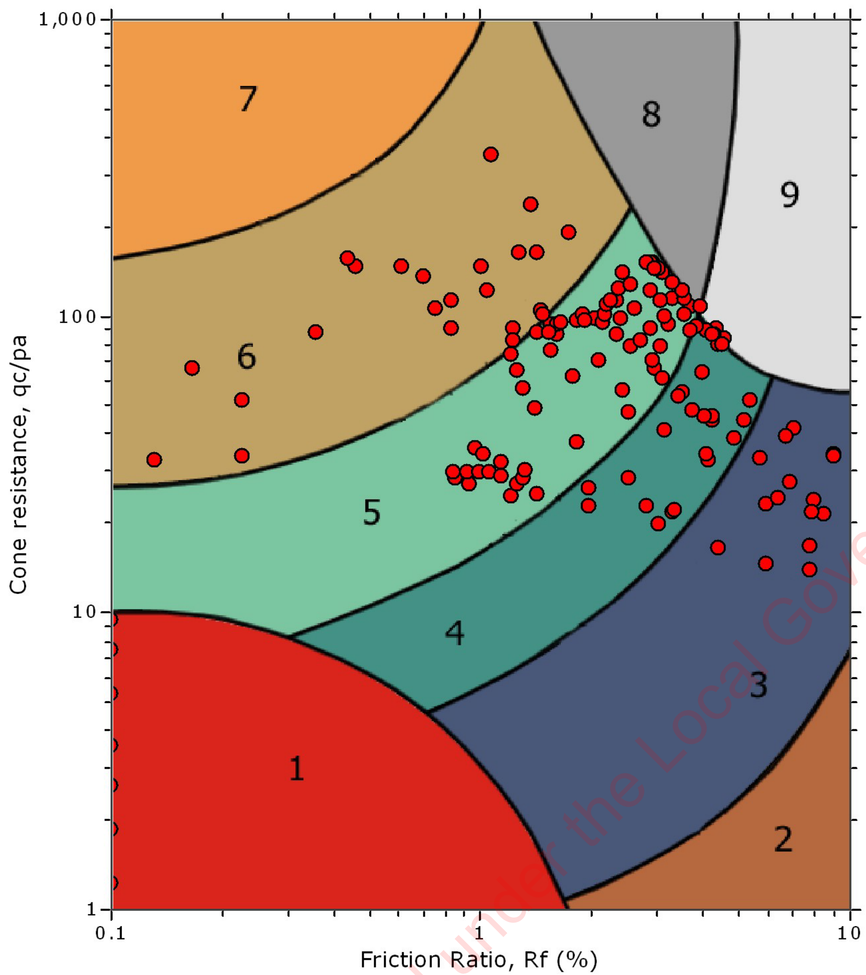
CPT: CPT-04
Total depth: 10.02 m, Date: 12/04/2017
Surface Elevation: 0.00 m
Coords: X:1760227.00, Y:5430716.00
Cone Type: Uknown
Cone Operator: Uknown

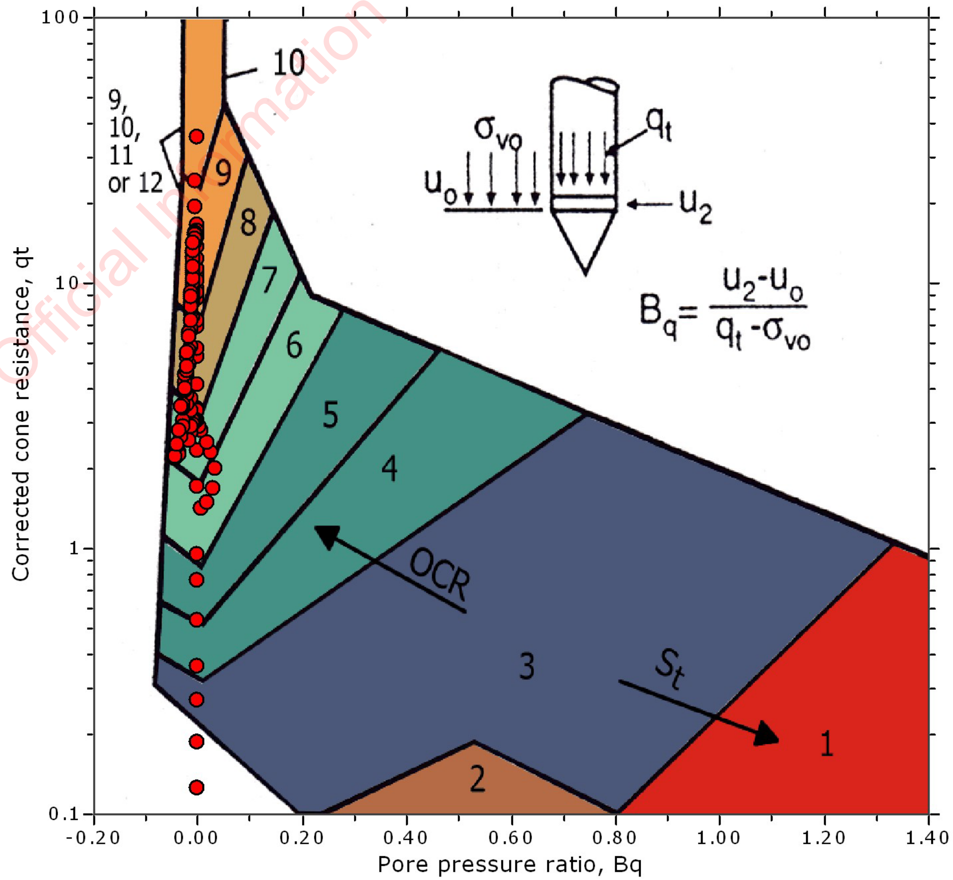
Project: **Eastern Bays Shared Path**
Location: **Lower Hutt, New Zealand**





SBT - Bq plots





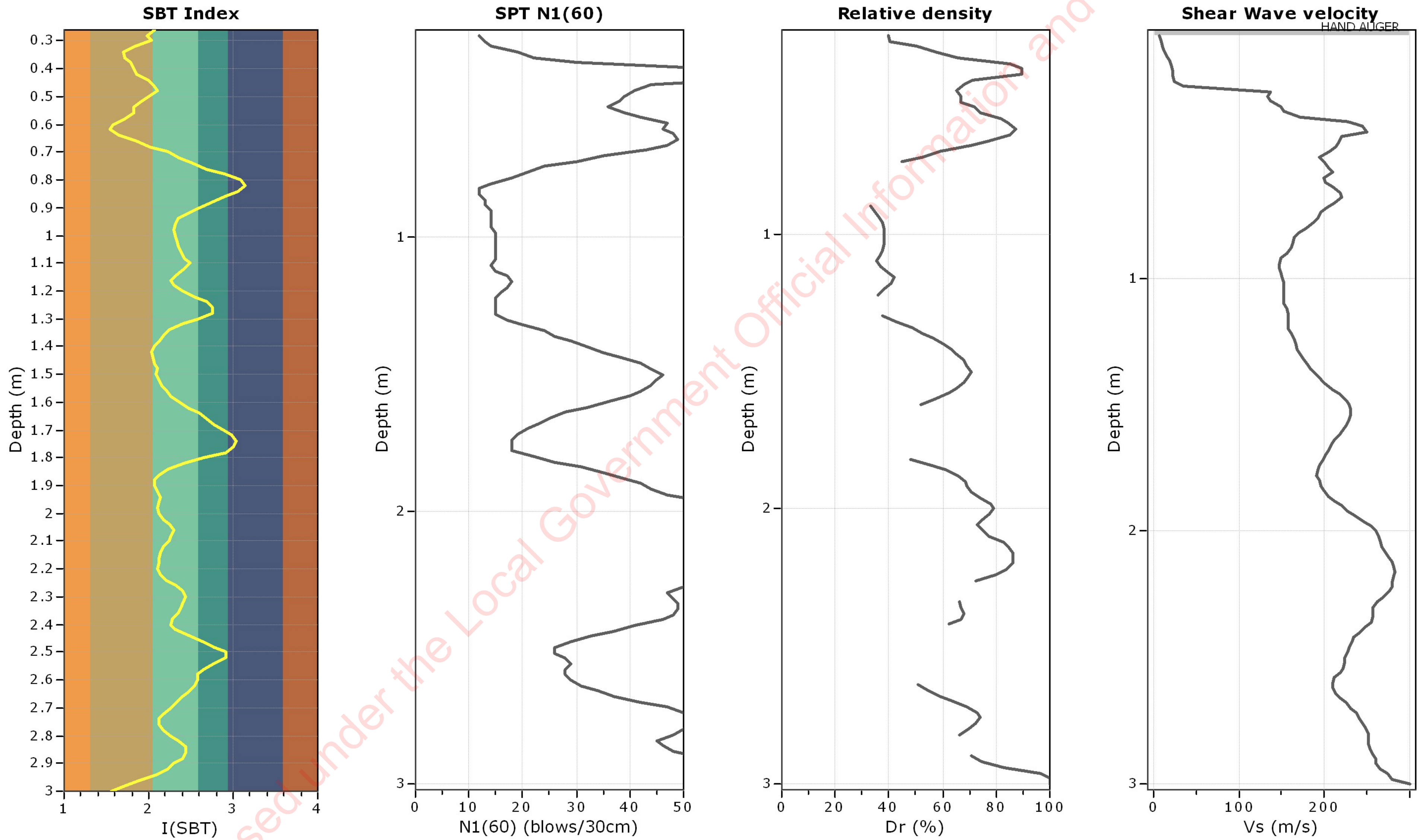
SBT legend

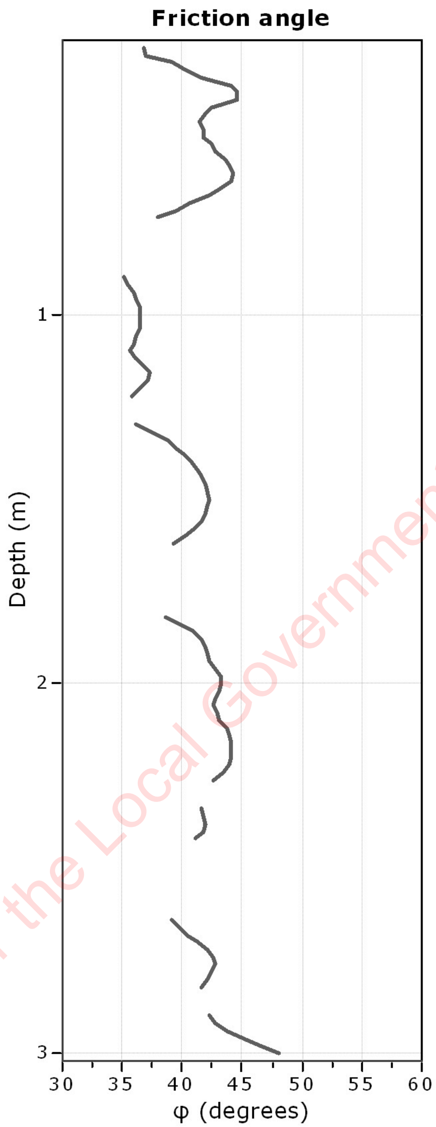
1. Sensitive fine grained	4. Clayey silt to silty clay	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to clayey sand
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

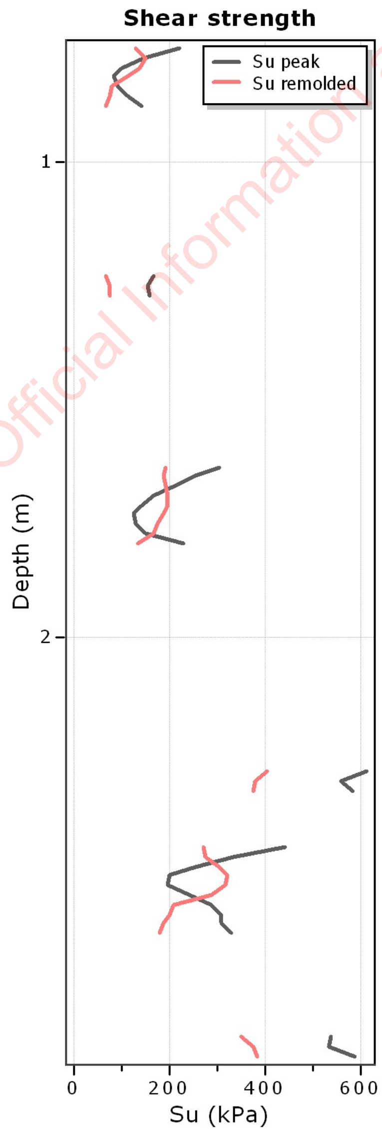
MWH now part of Stantec
Level 11, 155 The Terrace
Wellington, 6141, New Zealand
http://nz.mwhglobal.com/

CPT: CPT-05
Total depth: 3.00 m, Date: 18/04/2017
Surface Elevation: 0.00 m
Coords: X:1759633.00, Y:5436019.00
Cone Type: Uknown
Cone Operator: Uknown

Project: **Eastern Bays Shared Path**
Location: **Lower Hutt, New Zealand**




Friction angle
Depth (m)
1
2
3
30
35
40
45
50
55
60
φ (degrees)


Shear strength
Su peak
Su remolded
Depth (m)
1
2
0
200
400
600
Su (kPa)

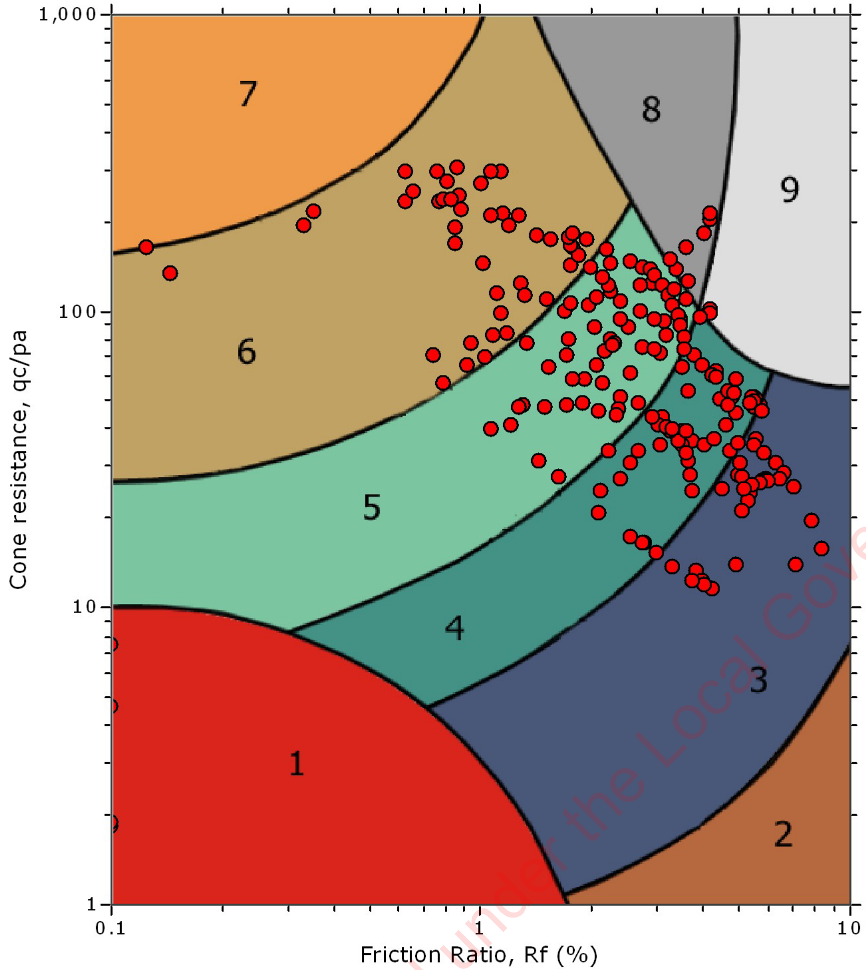
MWH now part of Stantec
Level 11, 155 The Terrace
Wellington, 6141, New Zealand
http://nz.mwhglobal.com/

CPT: CPT-06
Total depth: 4.56 m, Date: 18/04/2017
Surface Elevation: 0.00 m
Coords: X:1759975.00, Y:5430108.00
Cone Type: Uknown
Cone Operator: Uknown

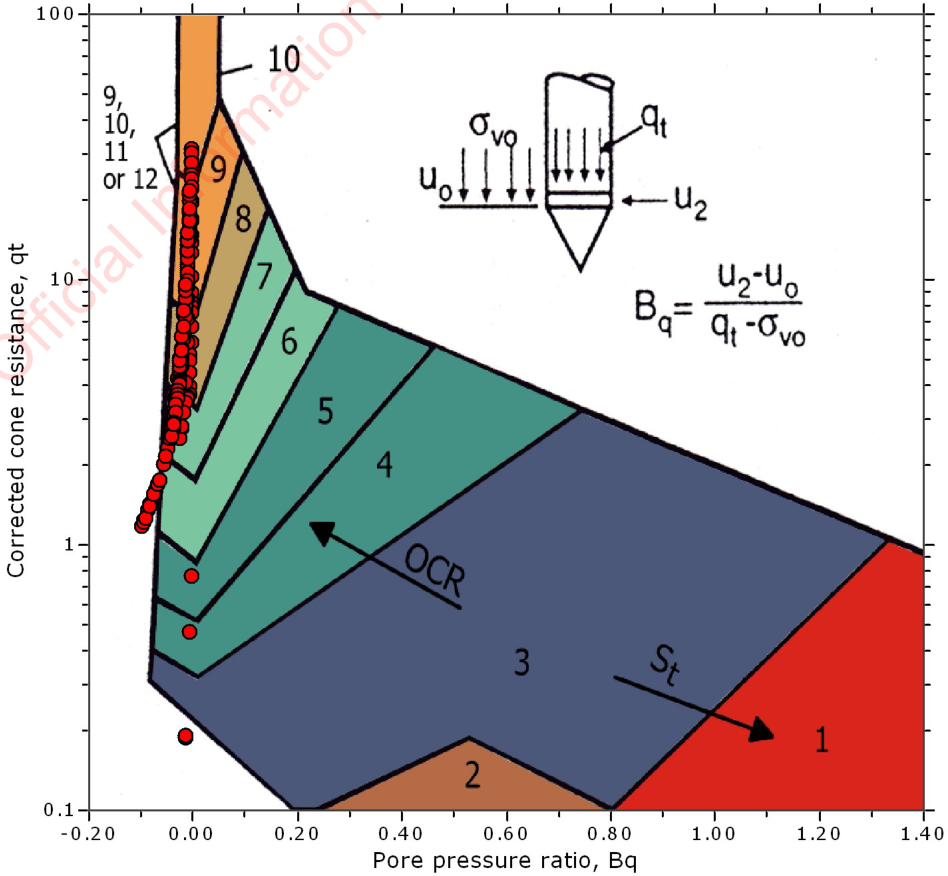
Project: Eastern Bays Shared Path
Location: Lower Hutt, New Zealand

SBT - Bq plots

SBT plot



Bq plot



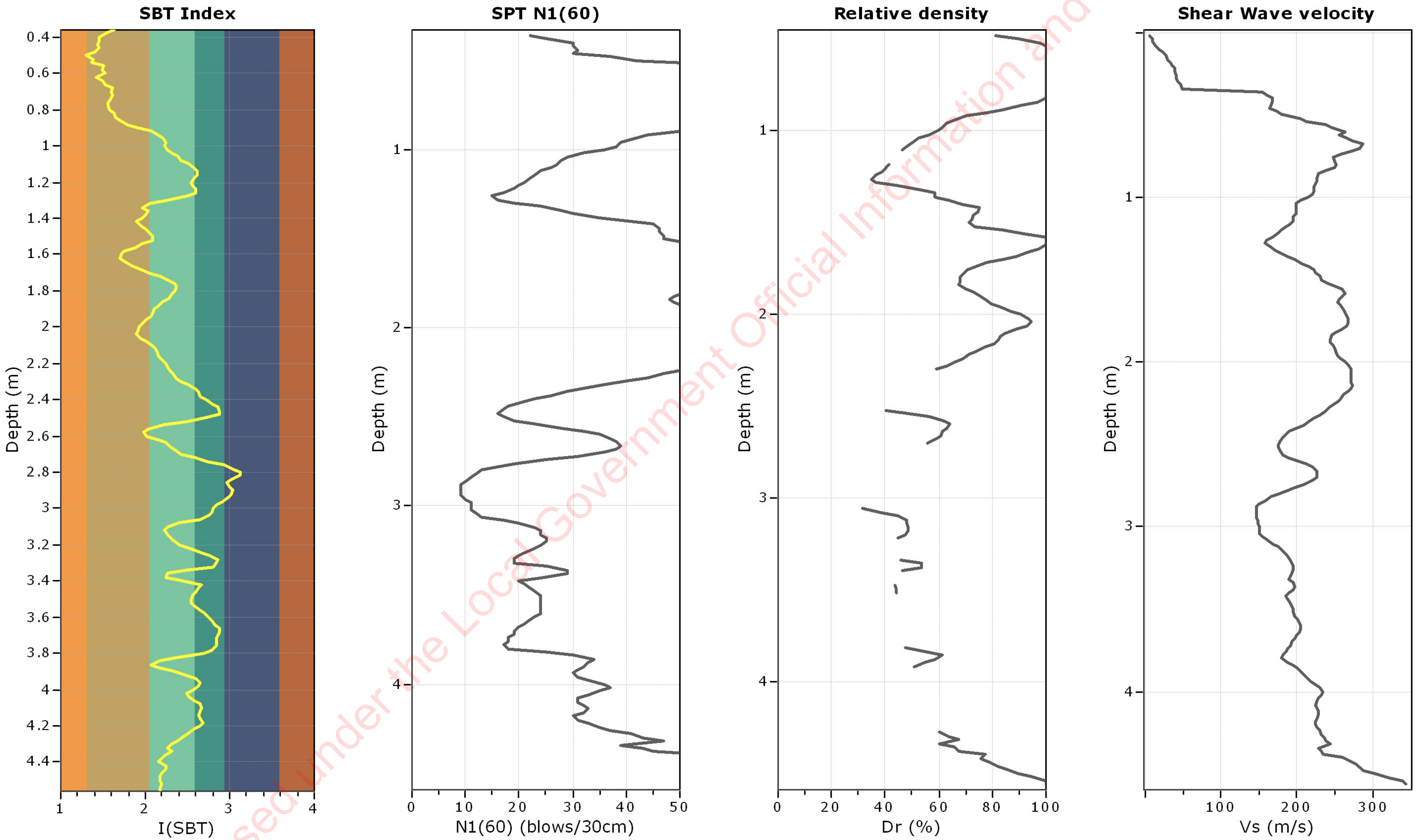
SBT legend

- 1. Sensitive fine grained
- 2. Organic material
- 3. Clay to silty clay
- 4. Clayey silt to silty clay
- 5. Silty sand to sandy silt
- 6. Clean sand to silty sand
- 7. Gravely sand to sand
- 8. Very stiff sand to clayey sand
- 9. Very stiff fine grained

MWH now part of Stantec
Level 11, 155 The Terrace
Wellington, 6141, New Zealand
http://nz.mwhglobal.com/

CPT: CPT-06
Total depth: 4.56 m, Date: 18/04/2017
Surface Elevation: 0.00 m
Coords: X:1759975.00, Y:5430108.00
Cone Type: Uknown
Cone Operator: Uknown

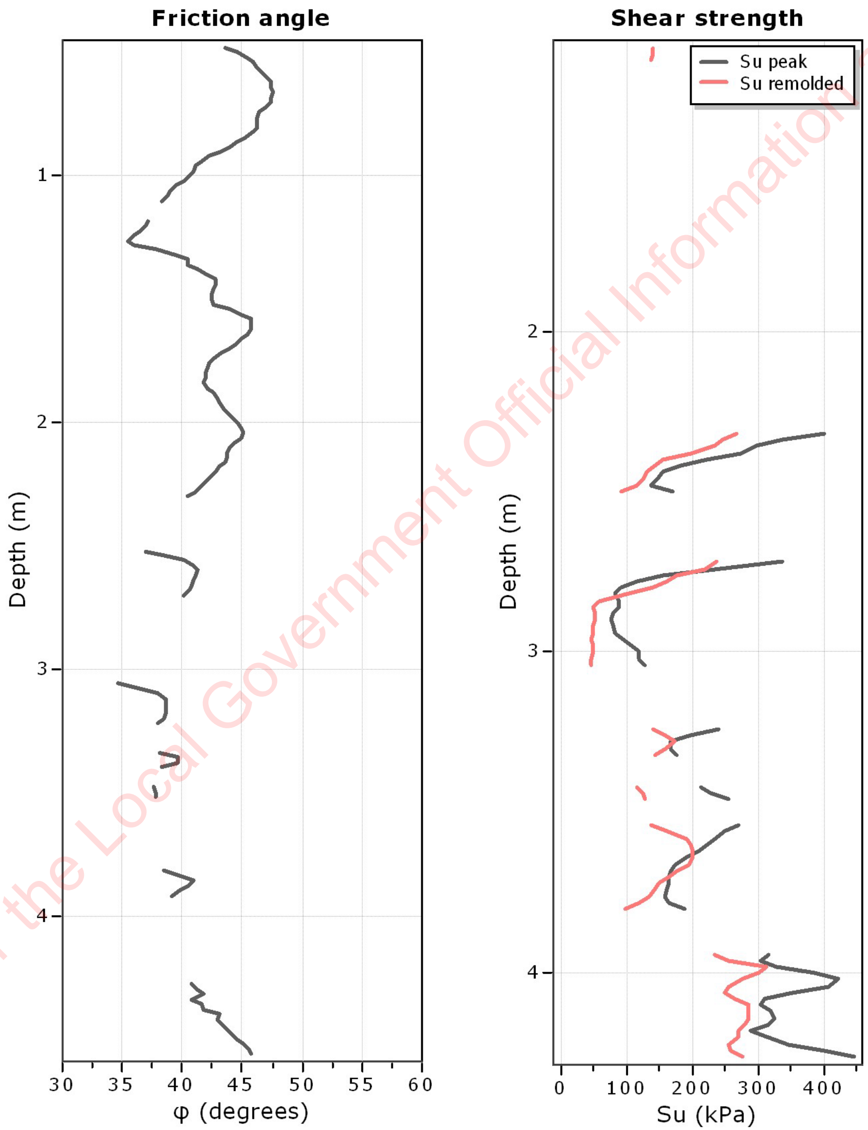
Project: **Eastern Bays Shared Path**
Location: **Lower Hutt, New Zealand**



MWH now part of Stantec
Level 11, 155 The Terrace
Wellington, 6141, New Zealand
http://nz.mwhglobal.com/

CPT: CPT-06
Total depth: 4.56 m, Date: 18/04/2017
Surface Elevation: 0.00 m
Coords: X:1759975.00, Y:5430108.00
Cone Type: Uknown
Cone Operator: Uknown

Project: **Eastern Bays Shared Path**
Location: **Lower Hutt, New Zealand**



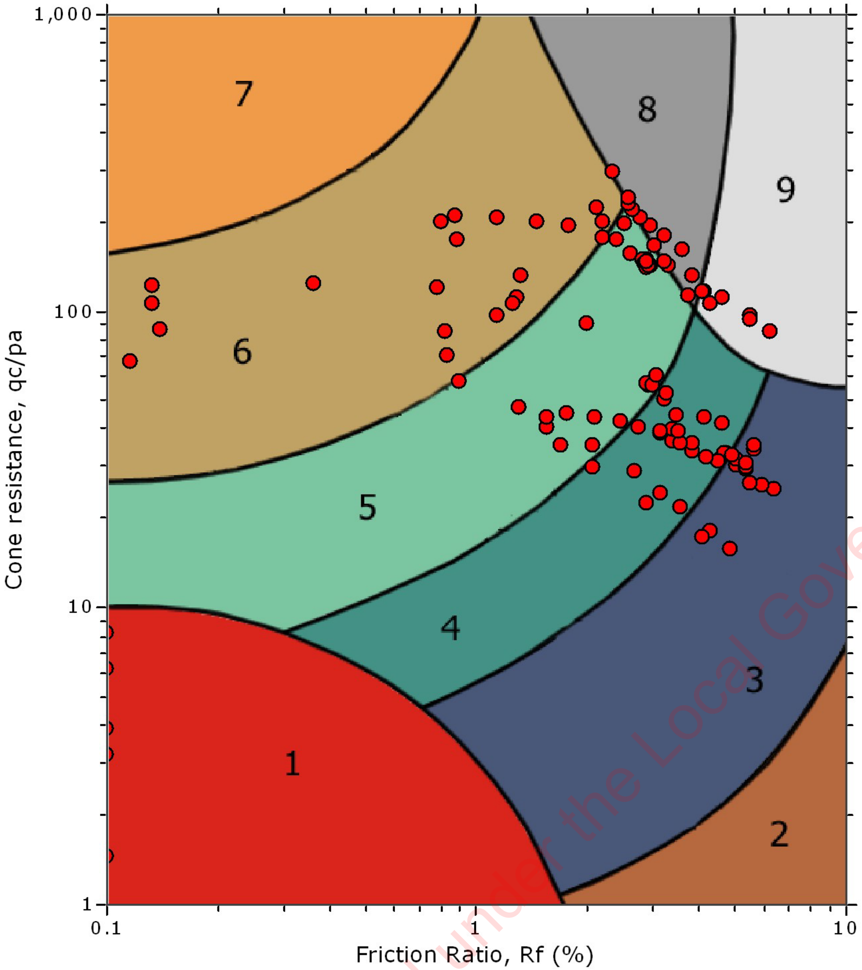
MWH now part of Stantec
Level 11, 155 The Terrace
Wellington, 6141, New Zealand
http://nz.mwhglobal.com/

CPT: CPT-07
Total depth: 2.54 m, Date: 18/04/2017
Surface Elevation: 0.00 m
Coords: X:1759974.00, Y:5430087.00
Cone Type: Uknown
Cone Operator: Uknown

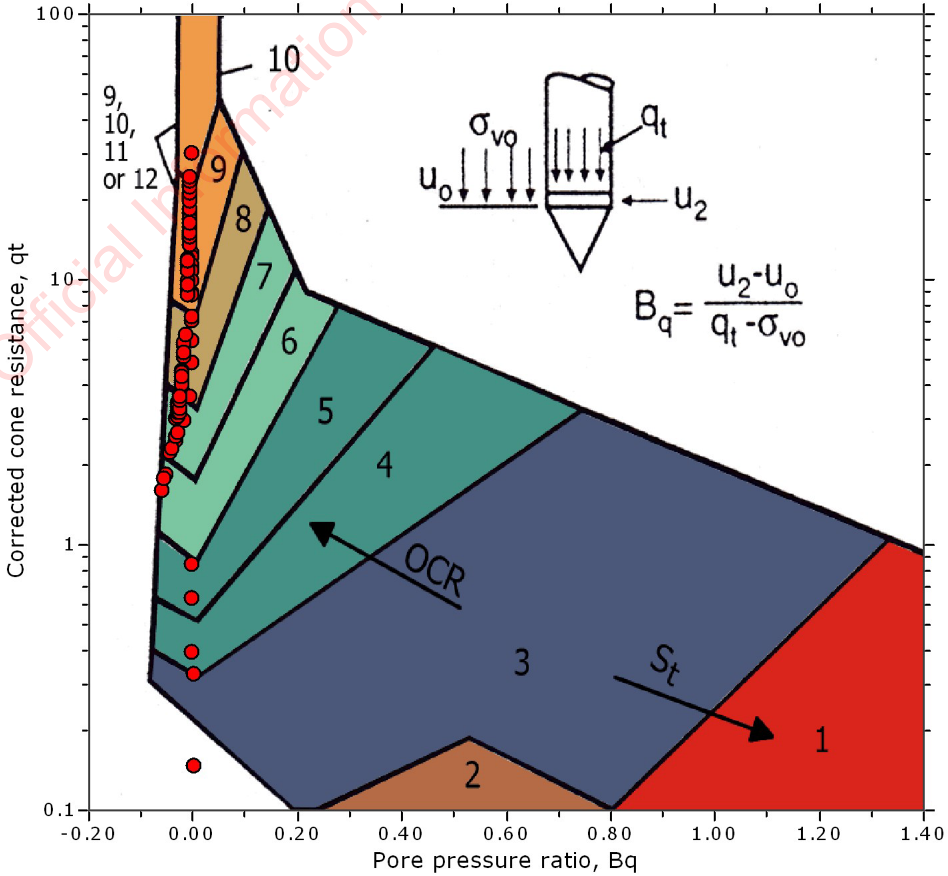
Project: **Eastern Bays Shared Path**
Location: **Lower Hutt, New Zealand**

SBT - Bq plots

SBT plot



Bq plot



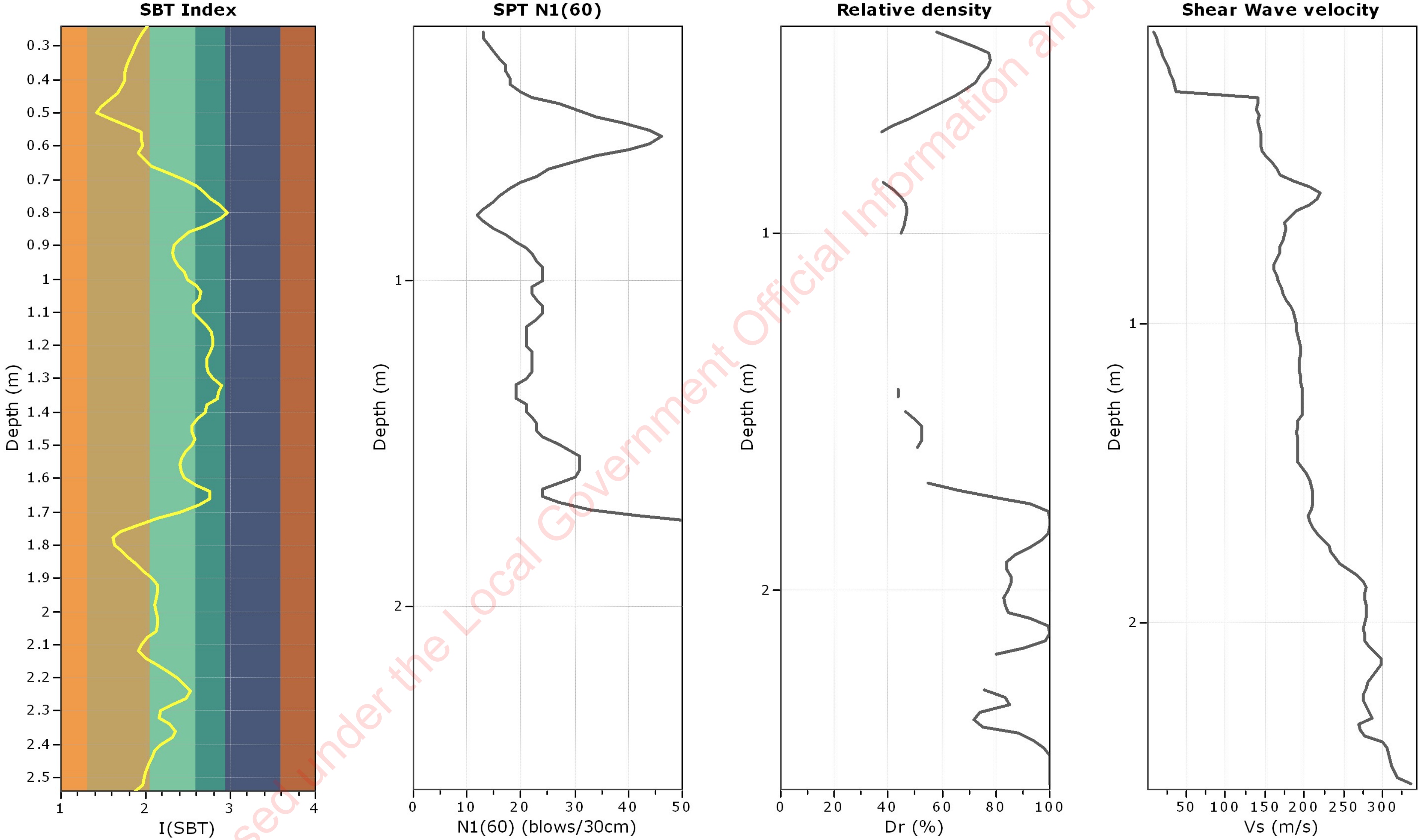
SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

MWH now part of Stantec
Level 11, 155 The Terrace
Wellington, 6141, New Zealand
http://nz.mwhglobal.com/

CPT: CPT-07
Total depth: 2.54 m, Date: 18/04/2017
Surface Elevation: 0.00 m
Coords: X:1759974.00, Y:5430087.00
Cone Type: Uknown
Cone Operator: Uknown

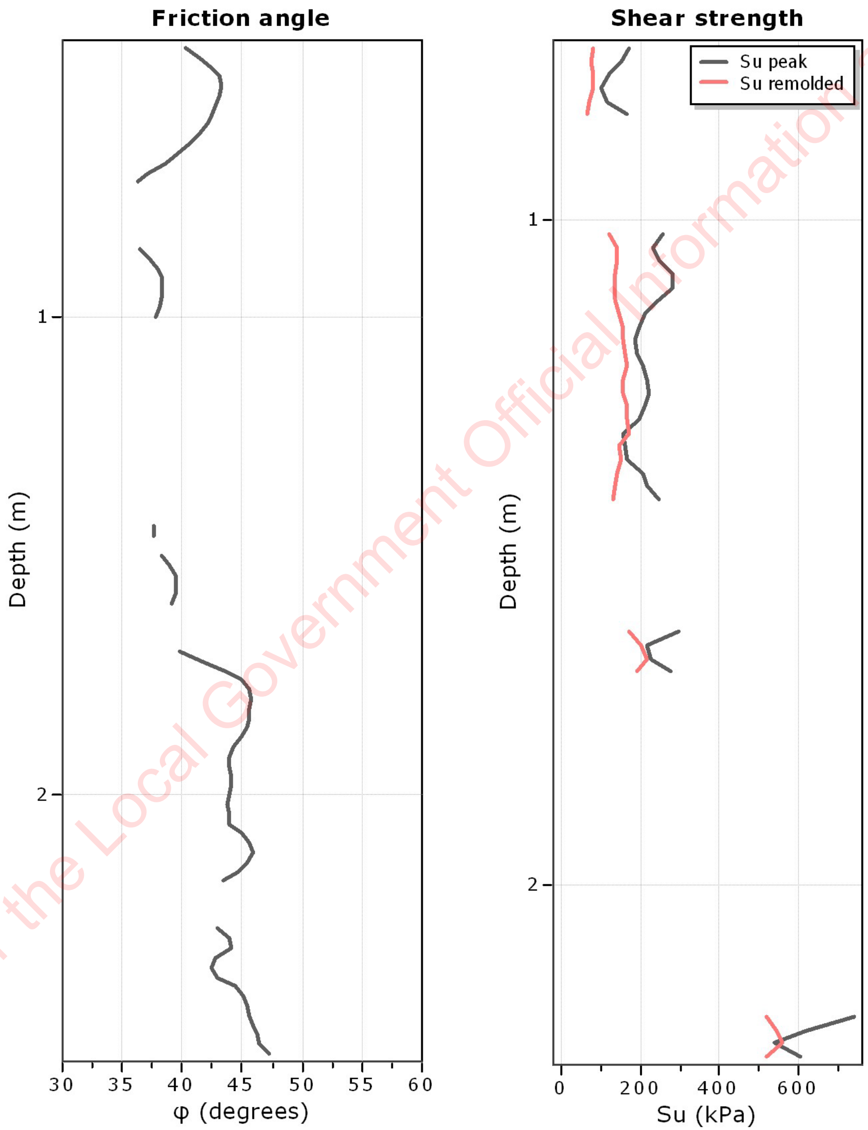
Project: **Eastern Bays Shared Path**
Location: **Lower Hutt, New Zealand**



MWH now part of Stantec
Level 11, 155 The Terrace
Wellington, 6141, New Zealand
http://nz.mwhglobal.com/

CPT: CPT-07
Total depth: 2.54 m, Date: 18/04/2017
Surface Elevation: 0.00 m
Coords: X:1759974.00, Y:5430087.00
Cone Type: Uknown
Cone Operator: Uknown

Project: **Eastern Bays Shared Path**
Location: **Lower Hutt, New Zealand**

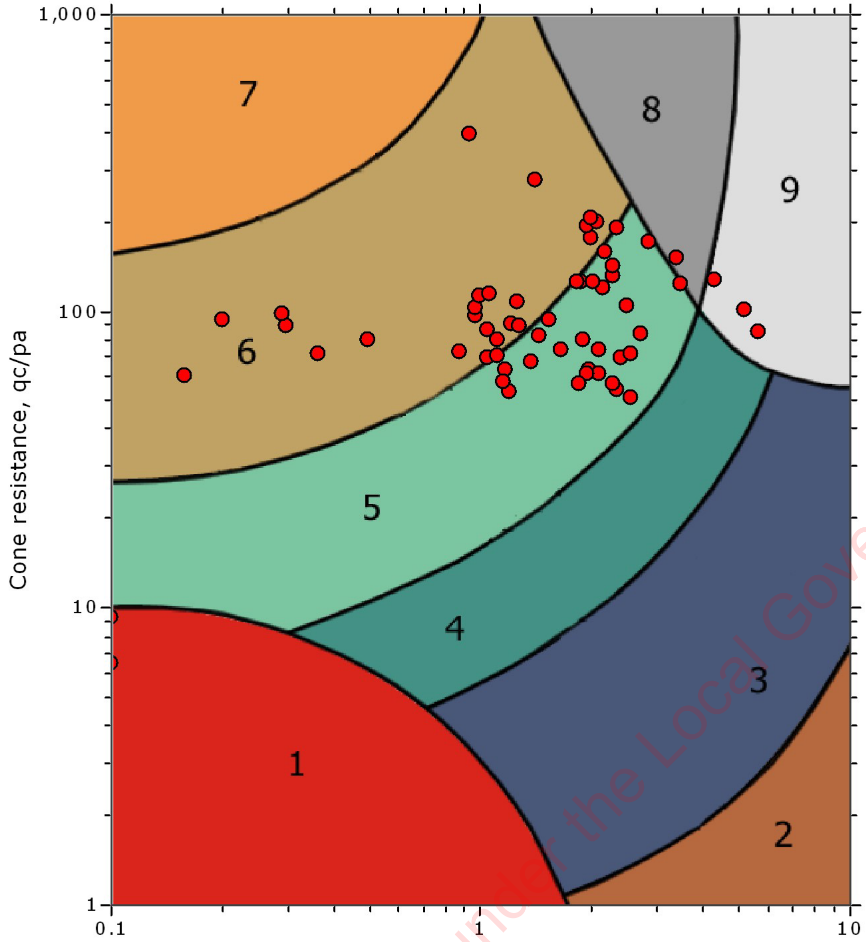


CPT: CPT-08
Total depth: 1.46 m, Date: 20/04/2017
Surface Elevation: 0.00 m
Coords: X:1759816.00, Y:5429508.00
Cone Type: Uknown
Cone Operator: Uknown

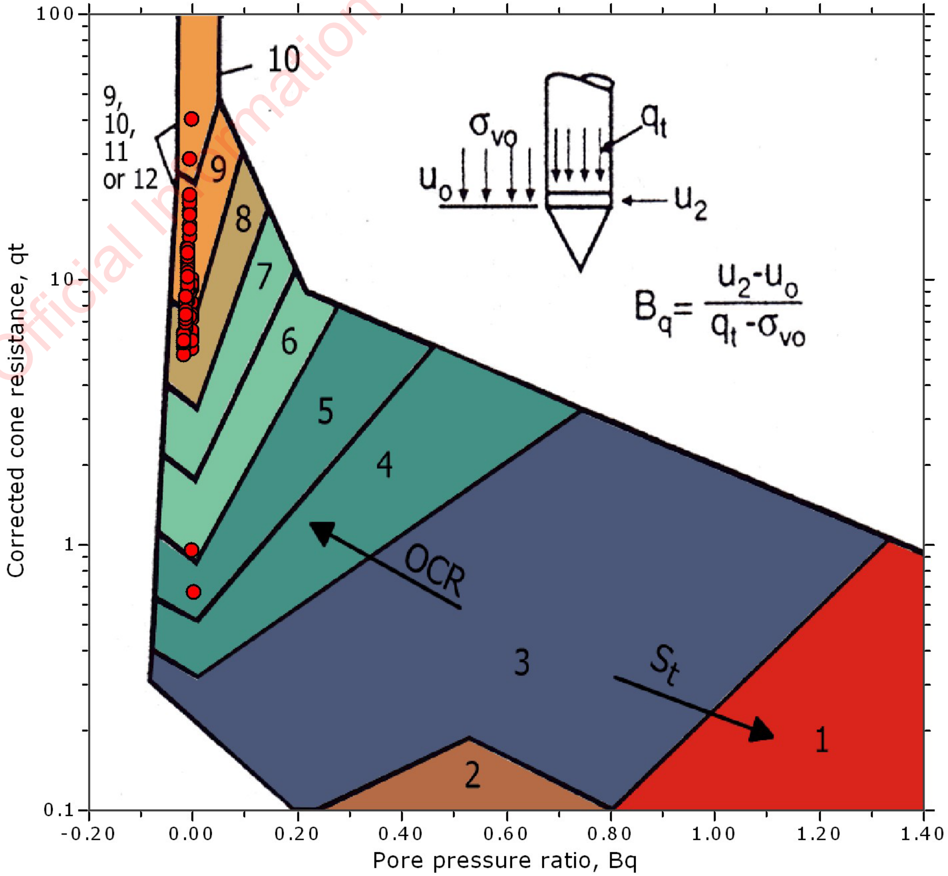
Project: Eastern Bays Shared Path
Location: Lower Hutt, New Zealand

SBT - Bq plots

SBT plot



Bq plot



SBT legend

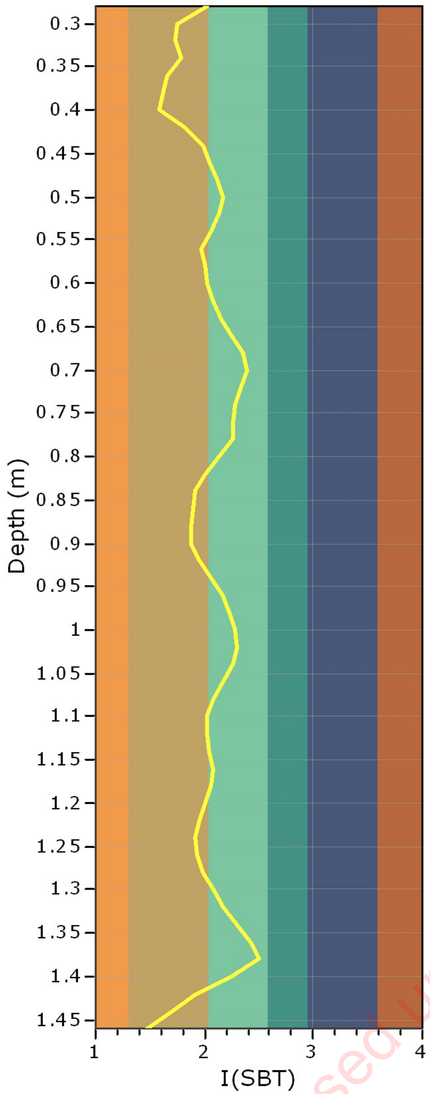
1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

MWH now part of Stantec
Level 11, 155 The Terrace
Wellington, 6141, New Zealand
http://nz.mwhglobal.com/

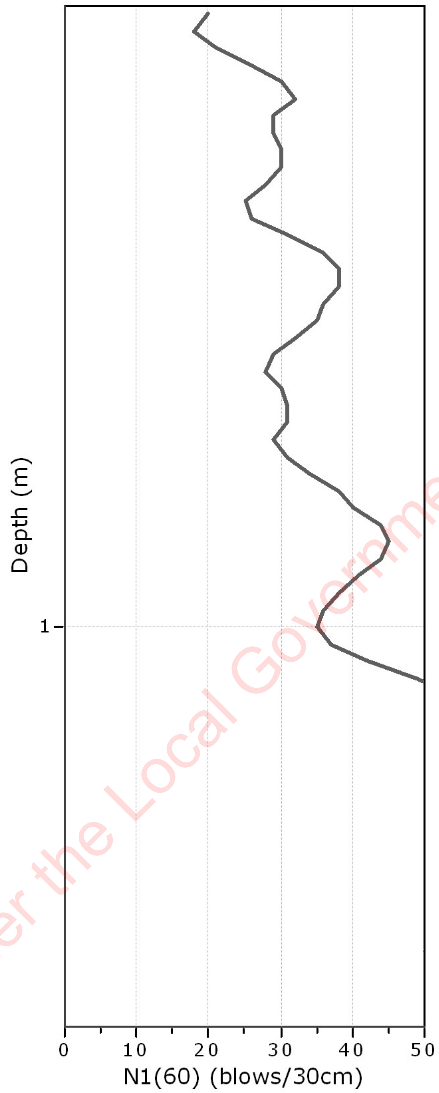
CPT: CPT-08
Total depth: 1.46 m, Date: 20/04/2017
Surface Elevation: 0.00 m
Coords: X:1759816.00, Y:5429508.00
Cone Type: Uknown
Cone Operator: Uknown

Project: **Eastern Bays Shared Path**
Location: **Lower Hutt, New Zealand**

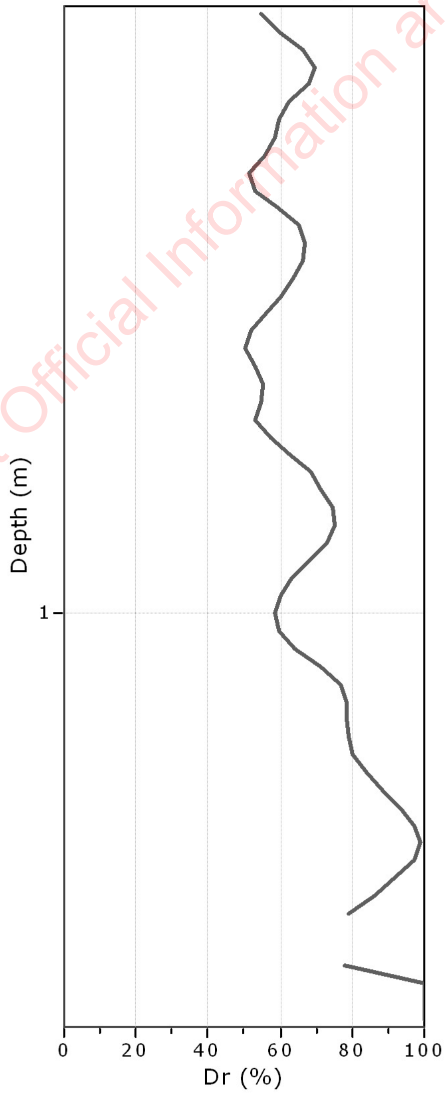
SBT Index



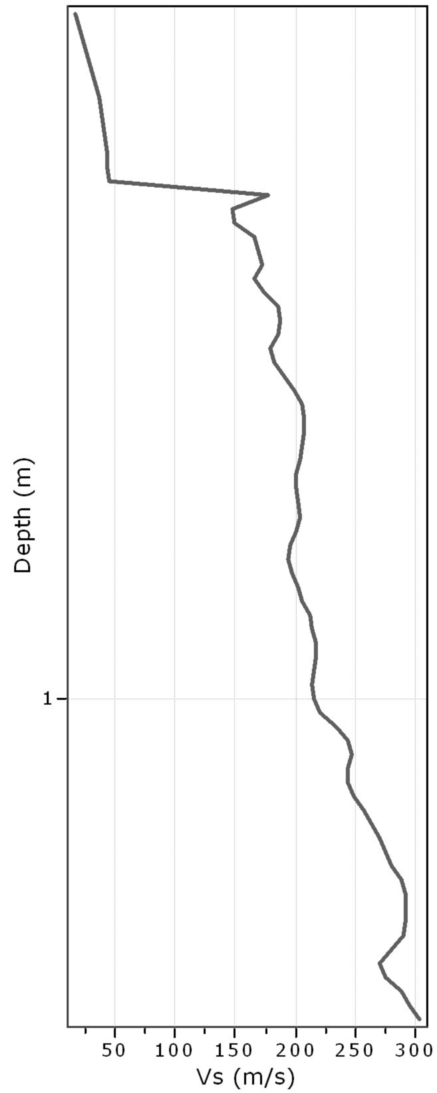
SPT N1(60)

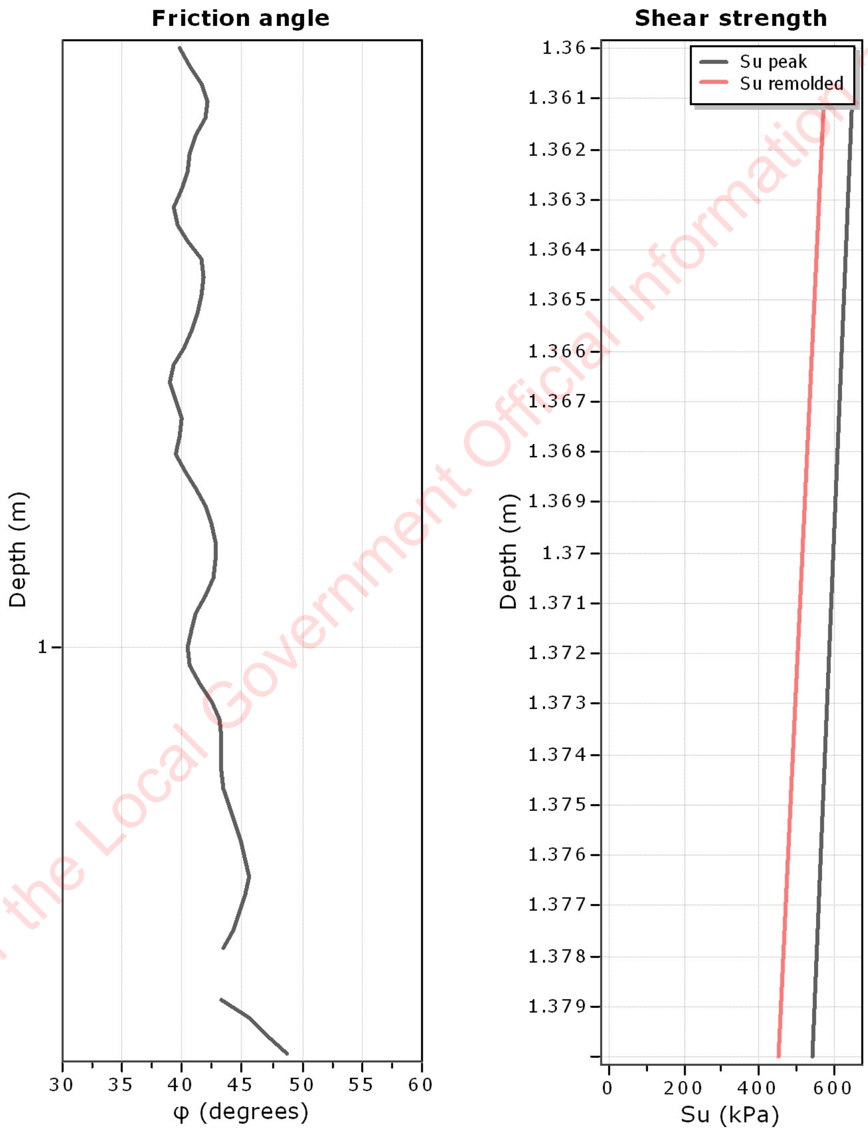


Relative density



Shear Wave velocity



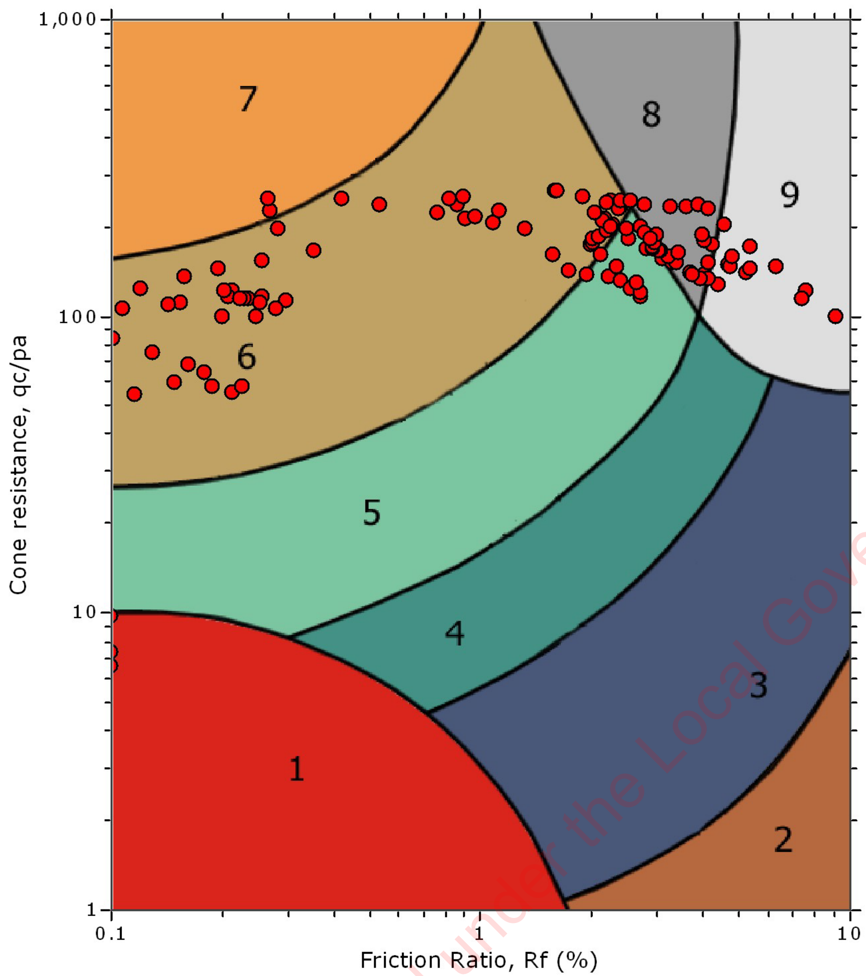

Friction angle
Depth (m)
1
30 35 40 45 50 55 60
φ (degrees)
Shear strength
Su peak
Su remolded
1.36
1.361
1.362
1.363
1.364
1.365
1.366
1.367
1.368
1.369
1.37
1.371
1.372
1.373
1.374
1.375
1.376
1.377
1.378
1.379
0 200 400 600
Su (kPa)

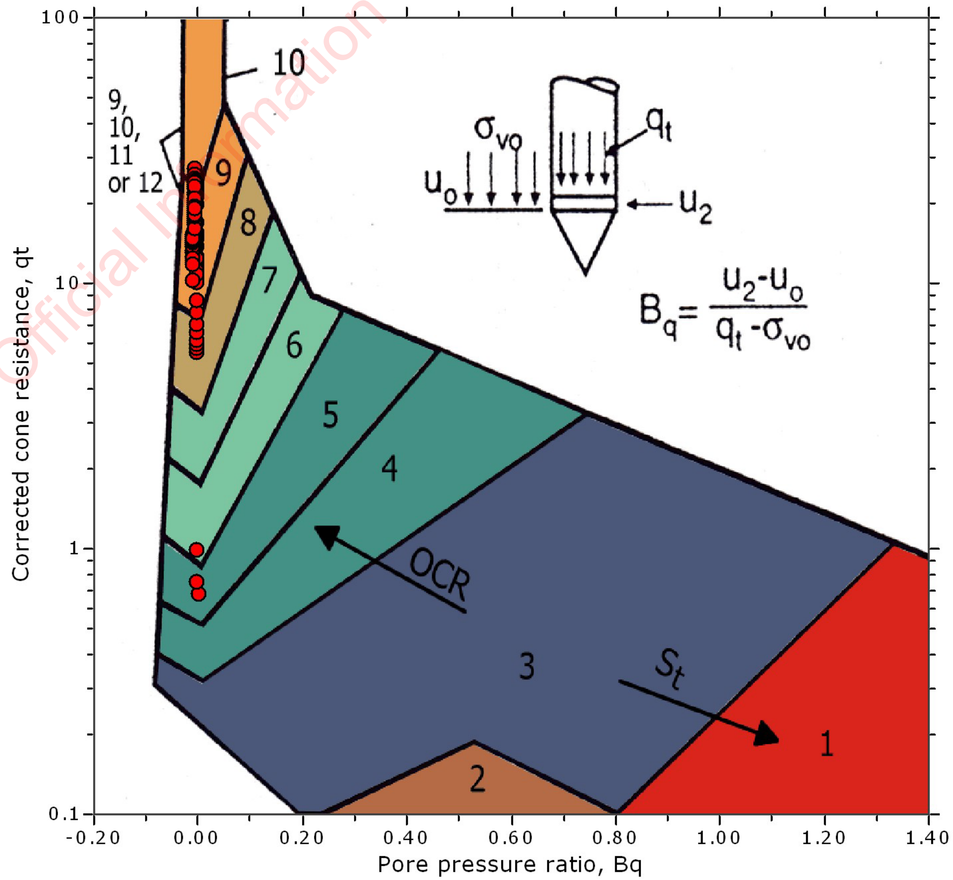
MWH now part of Stantec
Level 11, 155 The Terrace
Wellington, 6141, New Zealand
http://nz.mwhglobal.com/

CPT: CPT-09
Total depth: 2.74 m, Date: 20/04/2017
Surface Elevation: 0.00 m
Coords: X:1759809.00, Y:5429478.00
Cone Type: Uknown
Cone Operator: Uknown

Project: Eastern Bays Shared Path
Location: Lower Hutt, New Zealand

SBT - Bq plots





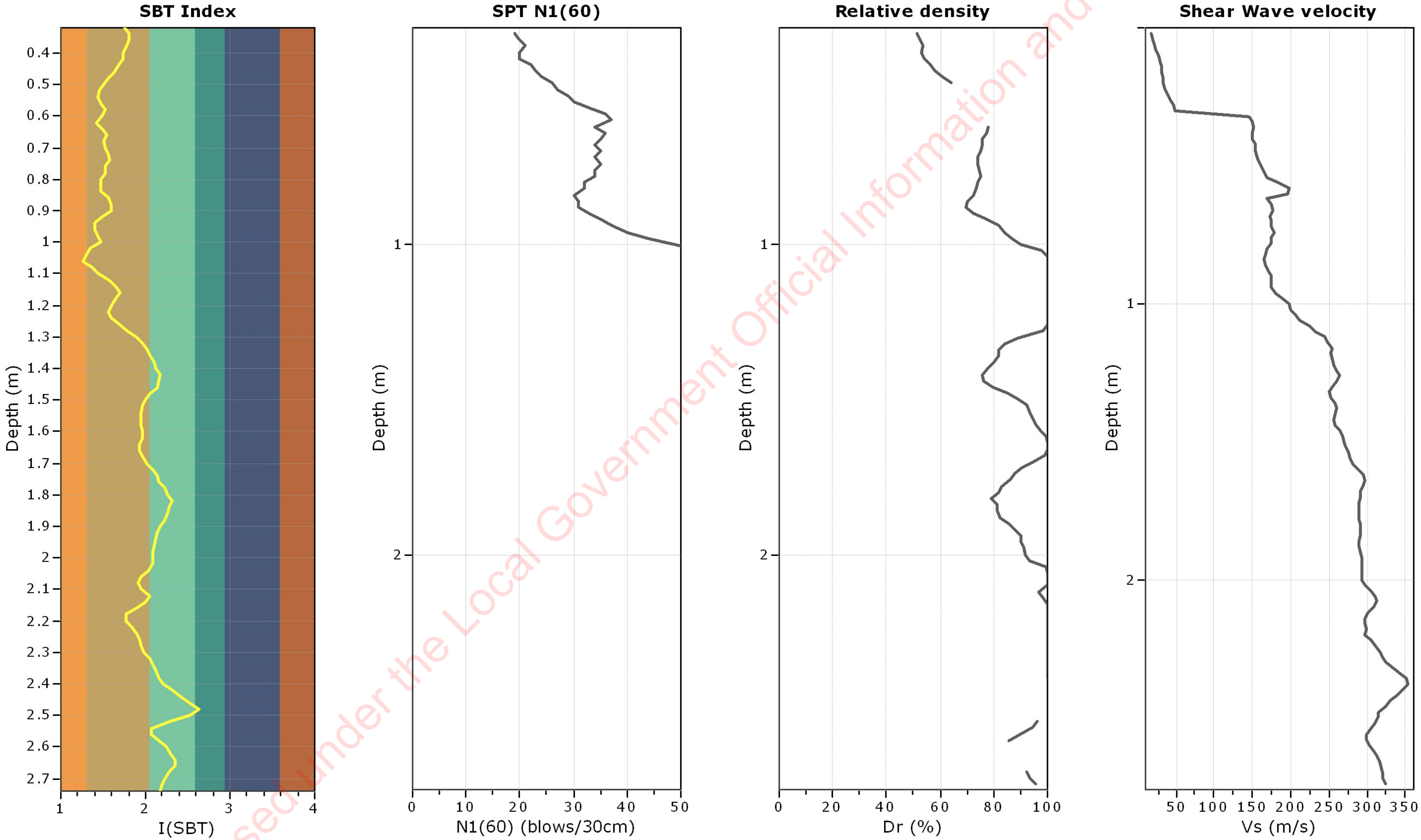
SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

MWH now part of Stantec
Level 11, 155 The Terrace
Wellington, 6141, New Zealand
http://nz.mwhglobal.com/

CPT: CPT-09
Total depth: 2.74 m, Date: 20/04/2017
Surface Elevation: 0.00 m
Coords: X:1759809.00, Y:5429478.00
Cone Type: Uknown
Cone Operator: Uknown

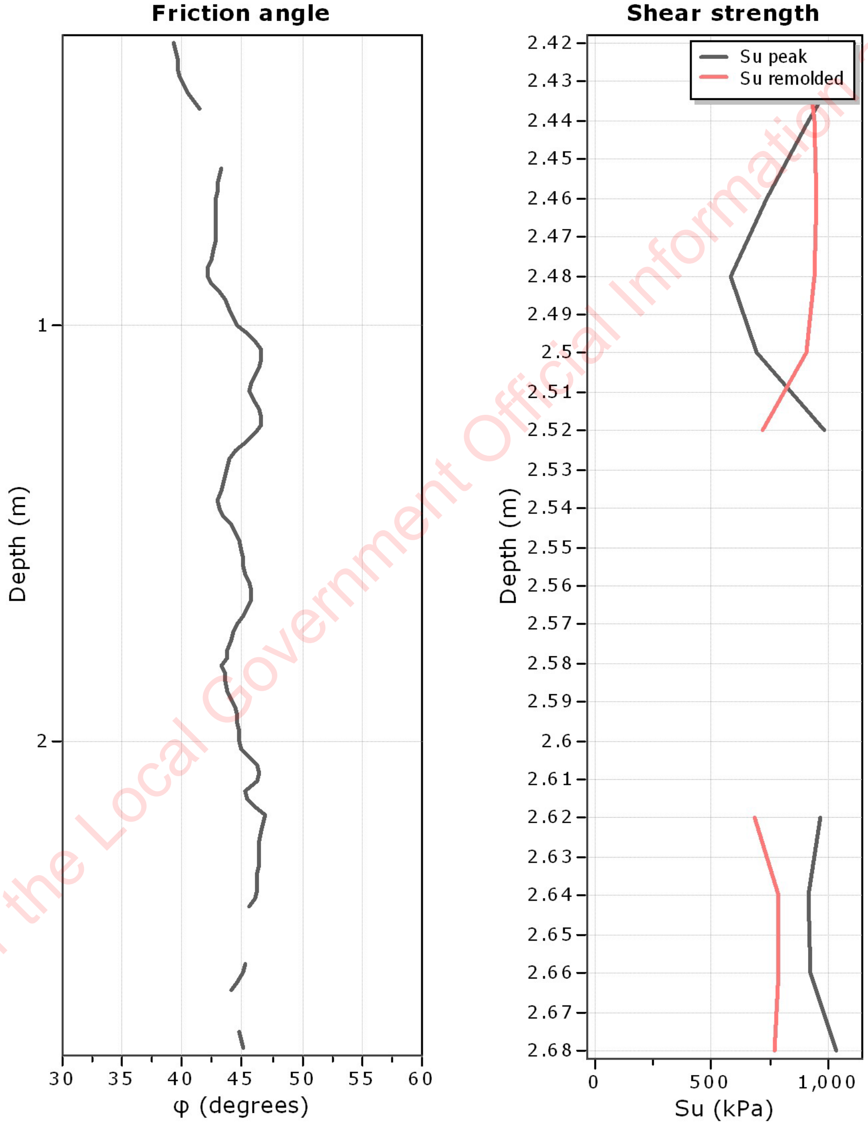
Project: Eastern Bays Shared Path
Location: Lower Hutt, New Zealand



MWH now part of Stantec
Level 11, 155 The Terrace
Wellington, 6141, New Zealand
http://nz.mwhglobal.com/

CPT: CPT-09
Total depth: 2.74 m, Date: 20/04/2017
Surface Elevation: 0.00 m
Coords: X:1759809.00, Y:5429478.00
Cone Type: Uknown
Cone Operator: Uknown

Project: **Eastern Bays Shared Path**
Location: **Lower Hutt, New Zealand**

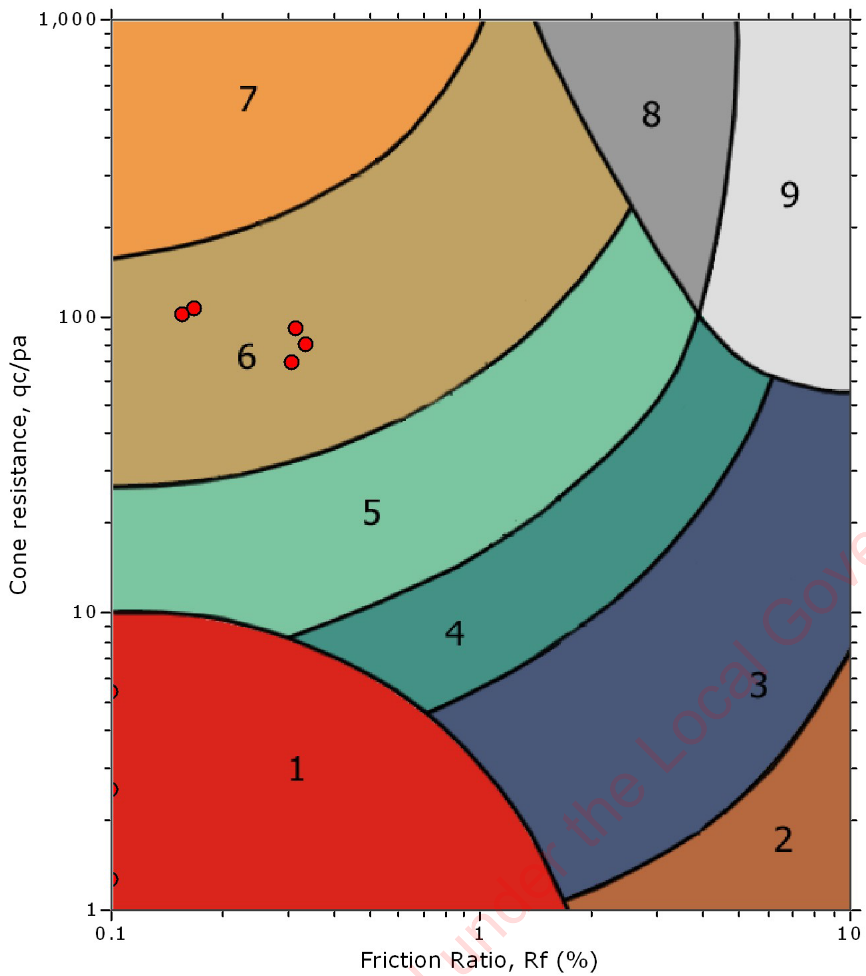


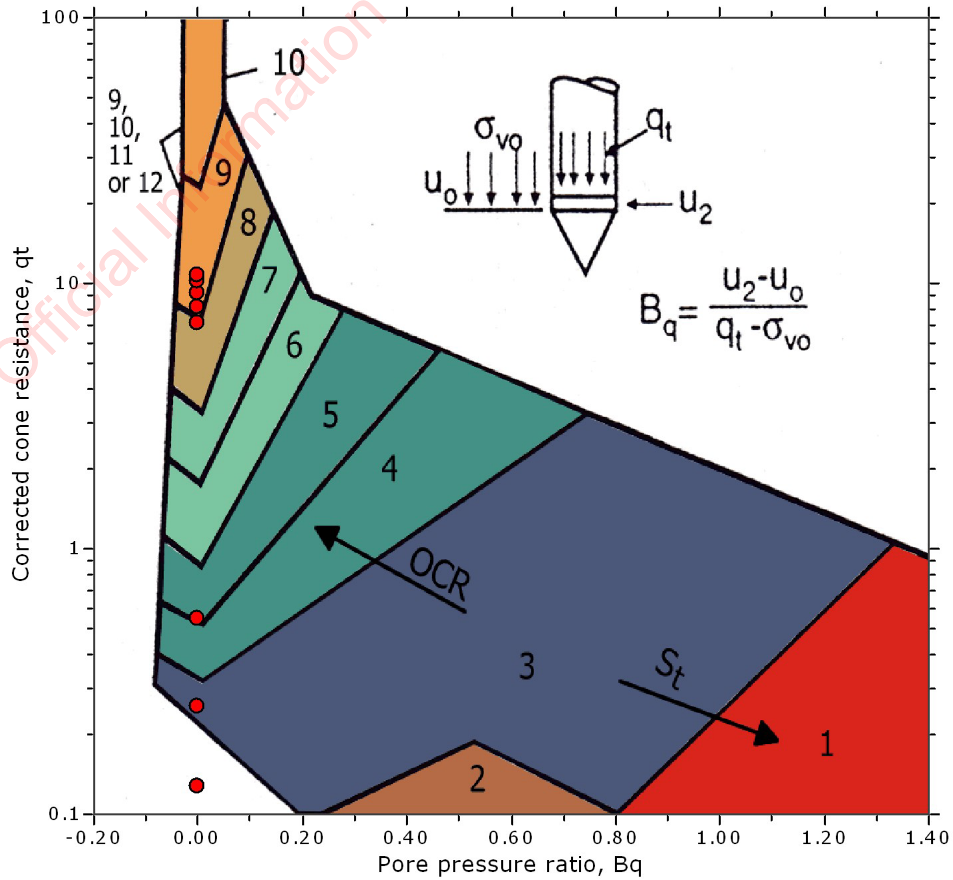
MWH now part of Stantec
Level 11, 155 The Terrace
Wellington, 6141, New Zealand
http://nz.mwhglobal.com/

CPT: CPT-10
Total depth: 0.72 m, Date: 21/04/2017
Surface Elevation: 0.00 m
Coords: X:1759627.00, Y:5428987.00
Cone Type: Uknown
Cone Operator: Uknown

Project: **Eastern Bays Shared Path**
Location: **Lower Hutt, New Zealand**

SBT - Bq plots





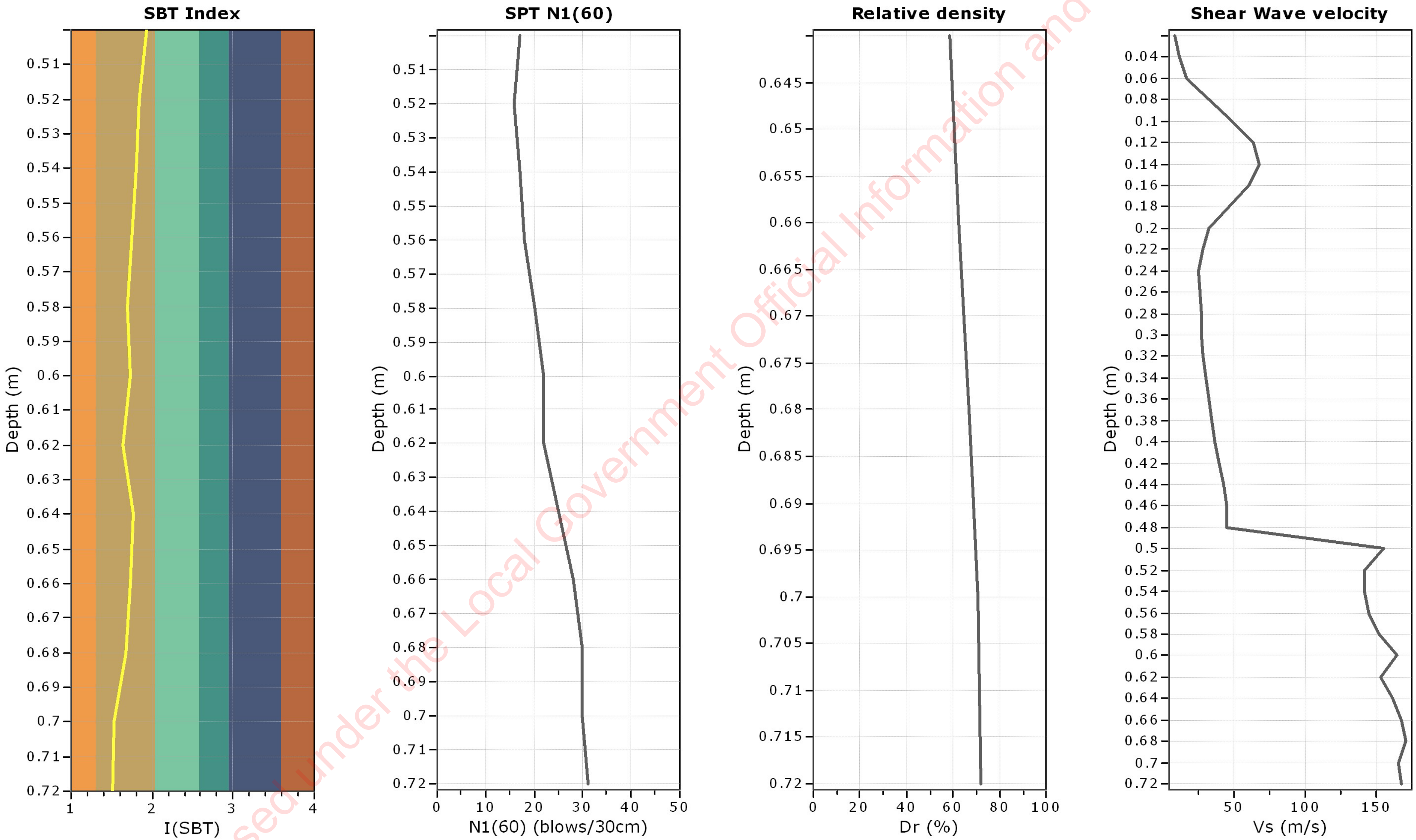
SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

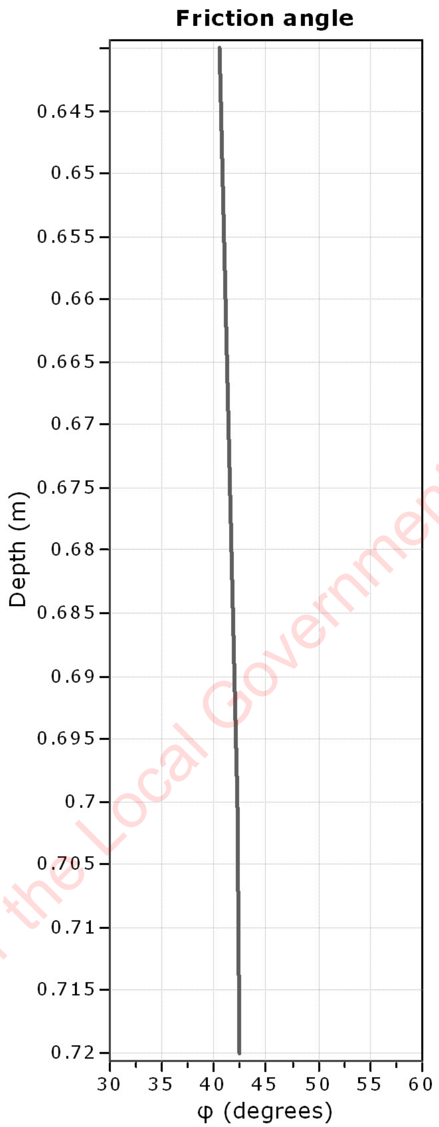
MWH now part of Stantec
Level 11, 155 The Terrace
Wellington, 6141, New Zealand
http://nz.mwhglobal.com/

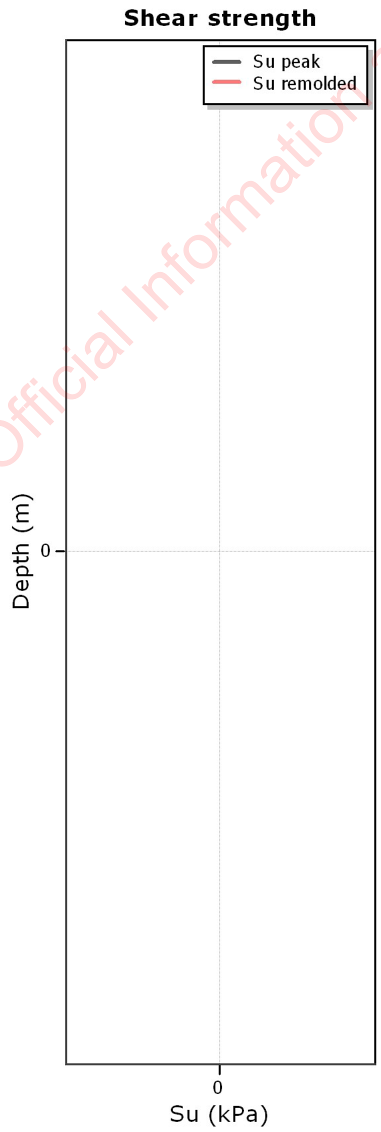
CPT: CPT-10
Total depth: 0.72 m, Date: 21/04/2017
Surface Elevation: 0.00 m
Coords: X:1759627.00, Y:5428987.00
Cone Type: Uknown
Cone Operator: Uknown

Project: **Eastern Bays Shared Path**
Location: **Lower Hutt, New Zealand**



Project: **Eastern Bays Shared Path**
Location: **Lower Hutt, New Zealand**



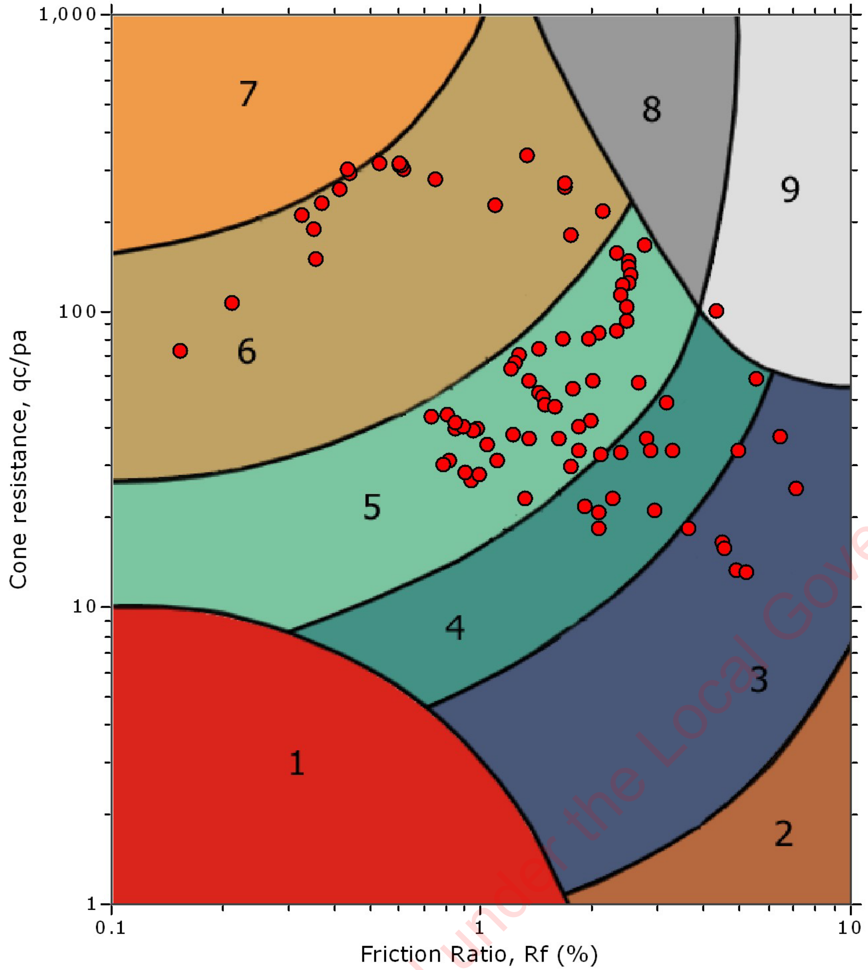


CPT: CPT-11
Total depth: 1.86 m, Date: 21/04/2017
Surface Elevation: 0.00 m
Coords: X:1759500.00, Y:5428873.00
Cone Type: Uknown
Cone Operator: Uknown

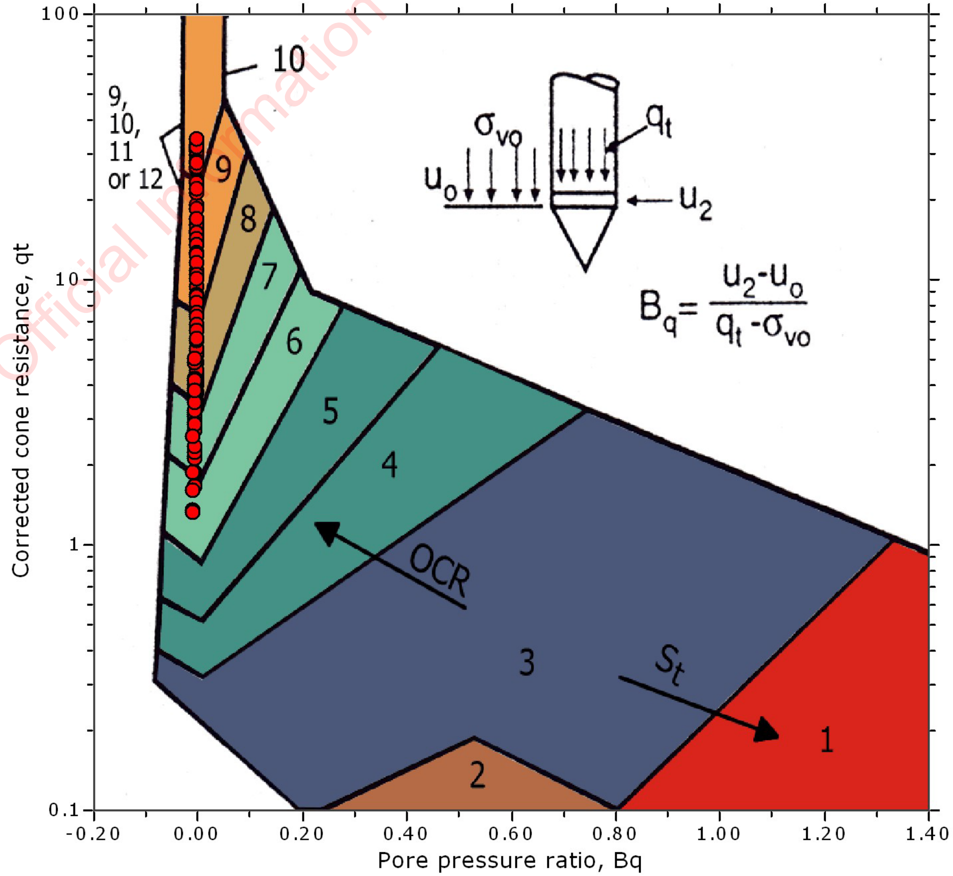
Project: **Eastern Bays Shared Path**
Location: **Lower Hutt, New Zealand**

SBT - Bq plots

SBT plot



Bq plot



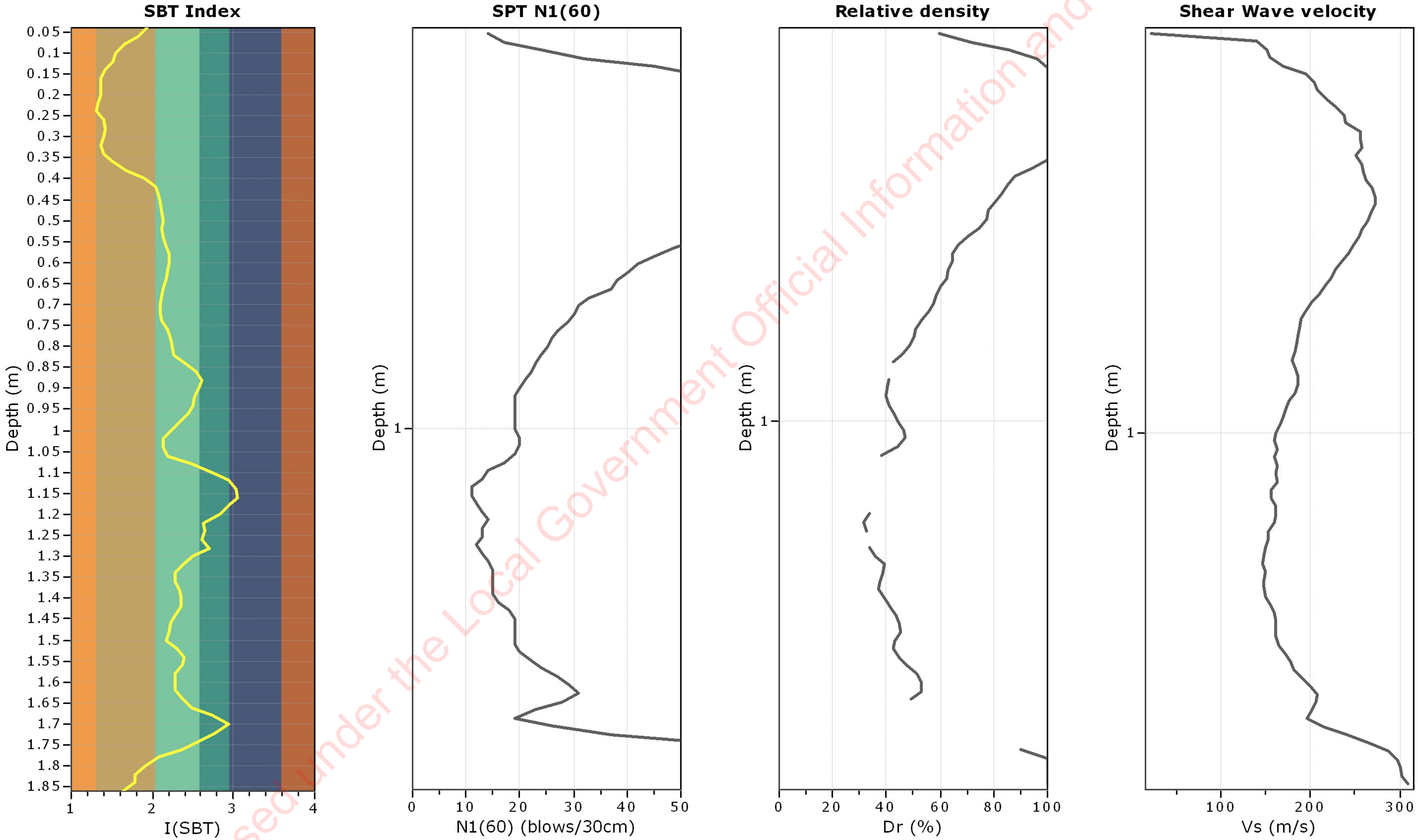
SBT legend

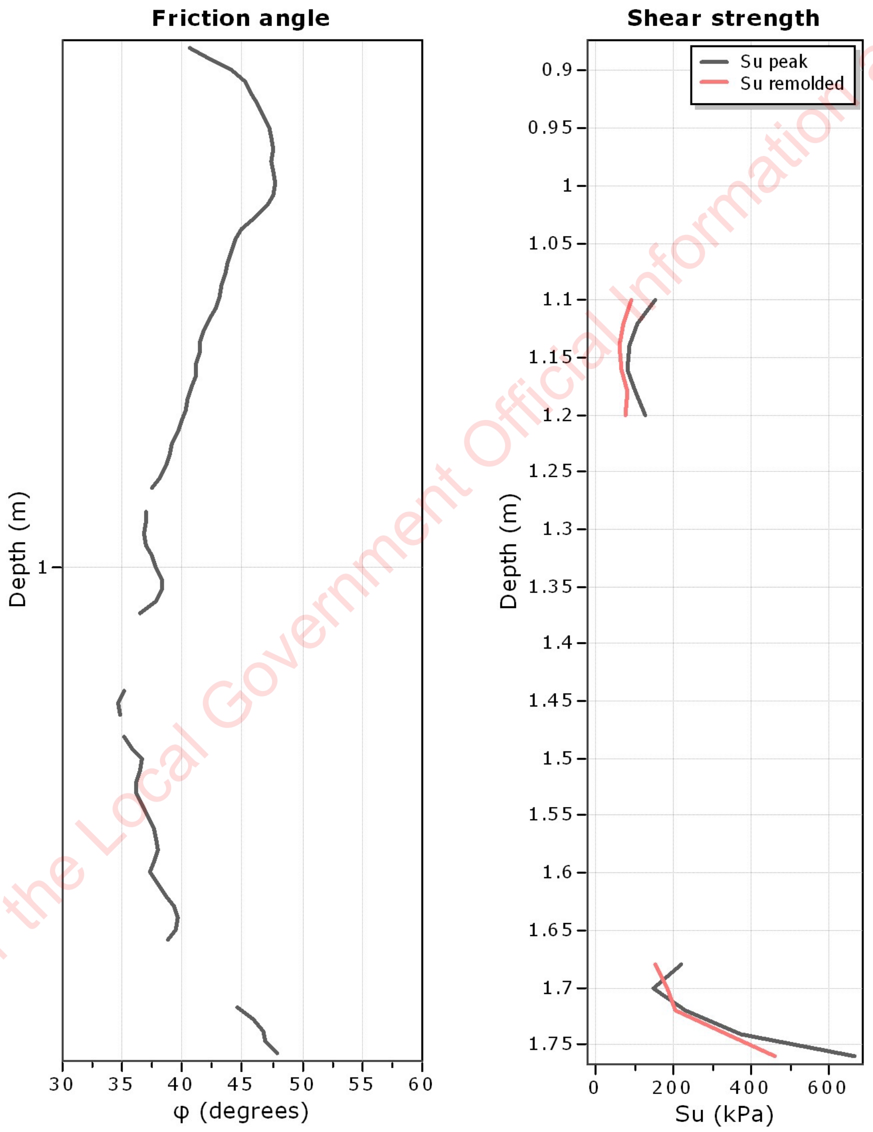
- 1. Sensitive fine grained
- 2. Organic material
- 3. Clay to silty clay
- 4. Clayey silt to silty clay
- 5. Silty sand to sandy silt
- 6. Clean sand to silty sand
- 7. Gravely sand to sand
- 8. Very stiff sand to clayey sand
- 9. Very stiff fine grained

MWH now part of Stantec
Level 11, 155 The Terrace
Wellington, 6141, New Zealand
http://nz.mwhglobal.com/

CPT: CPT-11
Total depth: 1.86 m, Date: 21/04/2017
Surface Elevation: 0.00 m
Coords: X:1759500.00, Y:5428873.00
Cone Type: Uknown
Cone Operator: Uknown

Project: **Eastern Bays Shared Path**
Location: **Lower Hutt, New Zealand**



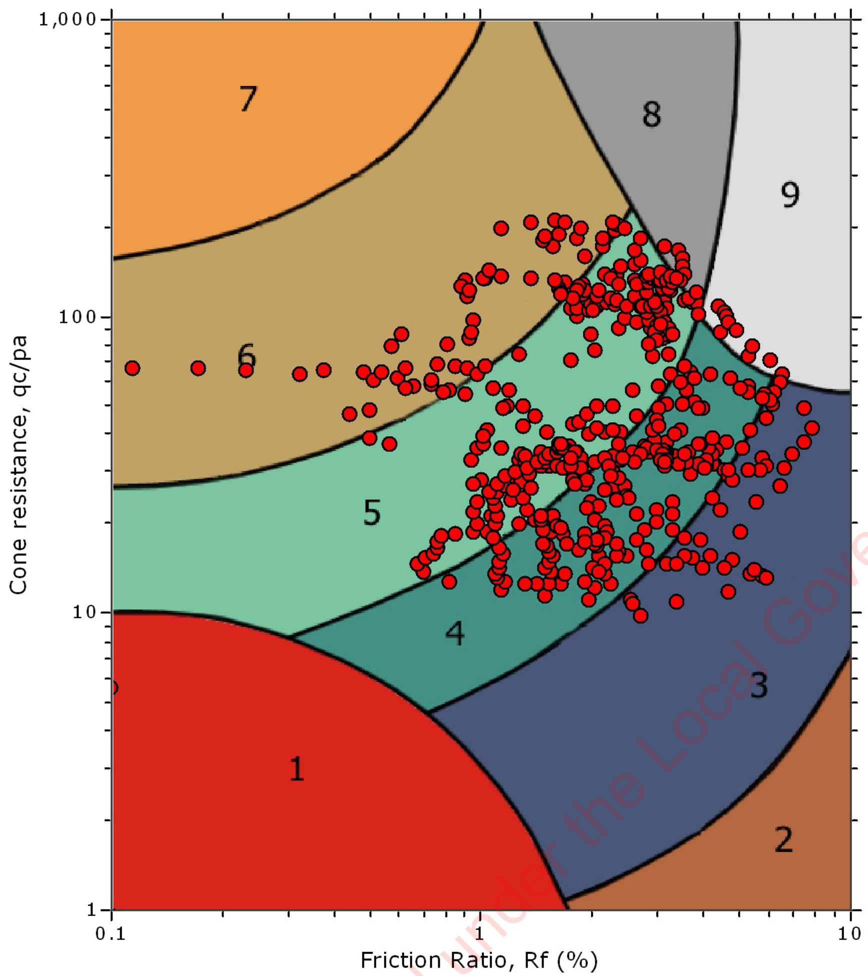

Friction angle
Depth (m)
1
30 35 40 45 50 55 60
φ (degrees)
Shear strength
Su peak
Su remolded
0.9
0.95
1
1.05
1.1
1.15
1.2
1.25
1.3
1.35
1.4
1.45
1.5
1.55
1.6
1.65
1.7
1.75
Depth (m)
0 200 400 600
Su (kPa)

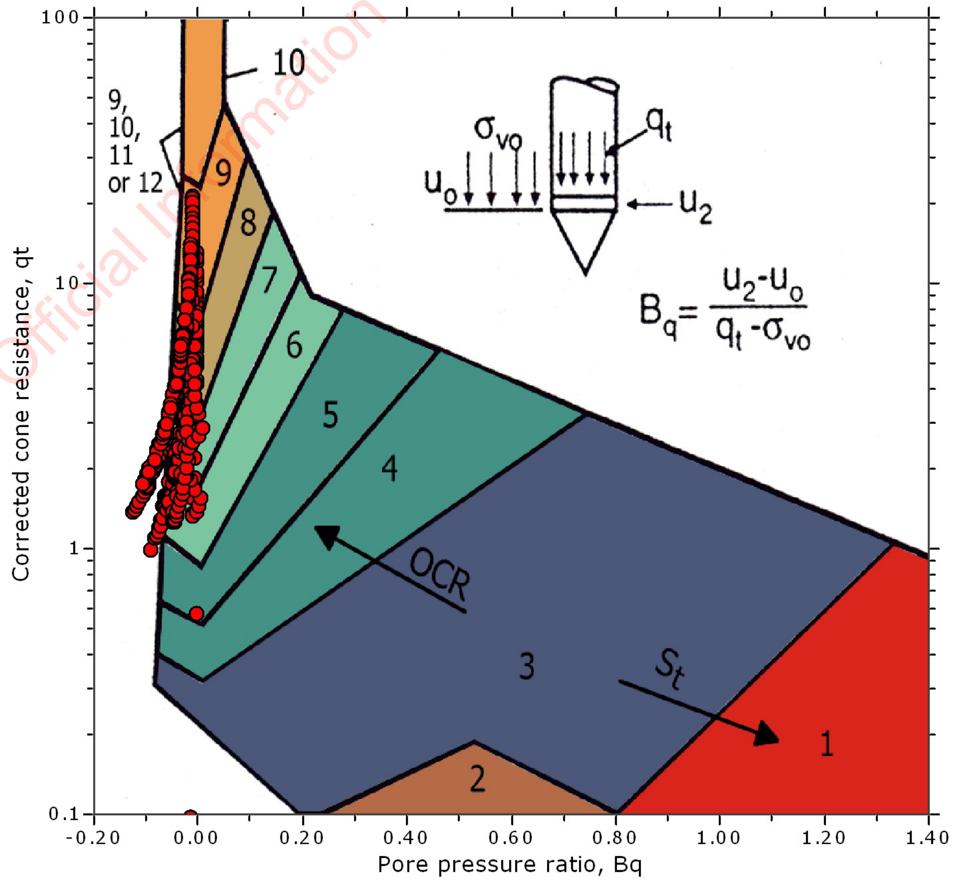
MWH now part of Stantec
Level 11, 155 The Terrace
Wellington, 6141, New Zealand
http://nz.mwhglobal.com/

CPT: CPT-12
Total depth: 10.06 m, Date: 24/04/2017
Surface Elevation: 0.00 m
Coords: X:1760185.00, Y:5430950.00
Cone Type: Uknown
Cone Operator: Uknown

Project: Eastern Bays Shared Path
Location: Lower Hutt, New Zealand

SBT - Bq plots





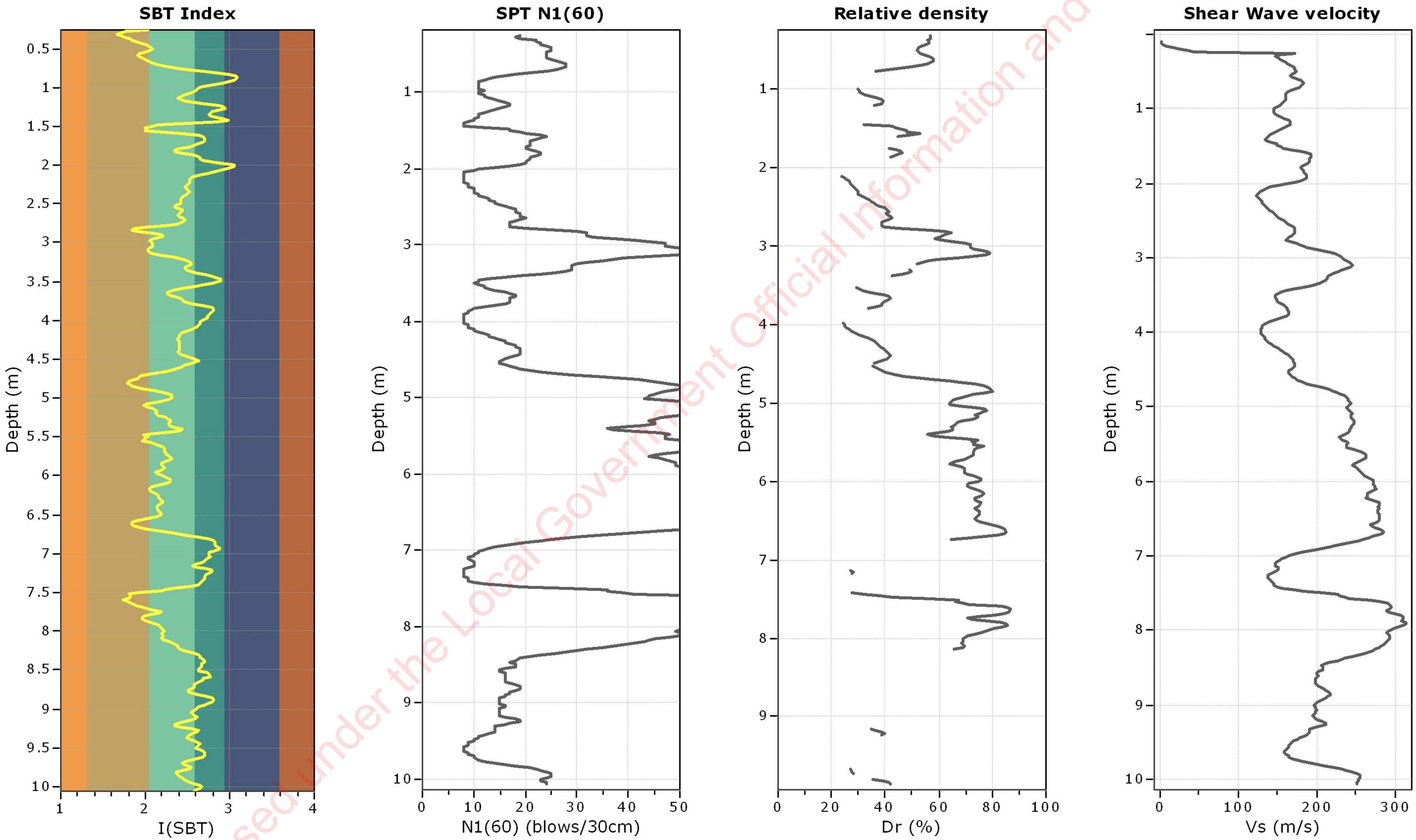
SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

MWH now part of Stantec
Level 11, 155 The Terrace
Wellington, 6141, New Zealand
http://nz.mwhglobal.com/

CPT: CPT-12
Total depth: 10.06 m, Date: 24/04/2017
Surface Elevation: 0.00 m
Coords: X:1760185.00, Y:5430950.00
Cone Type: Uknown
Cone Operator: Uknown

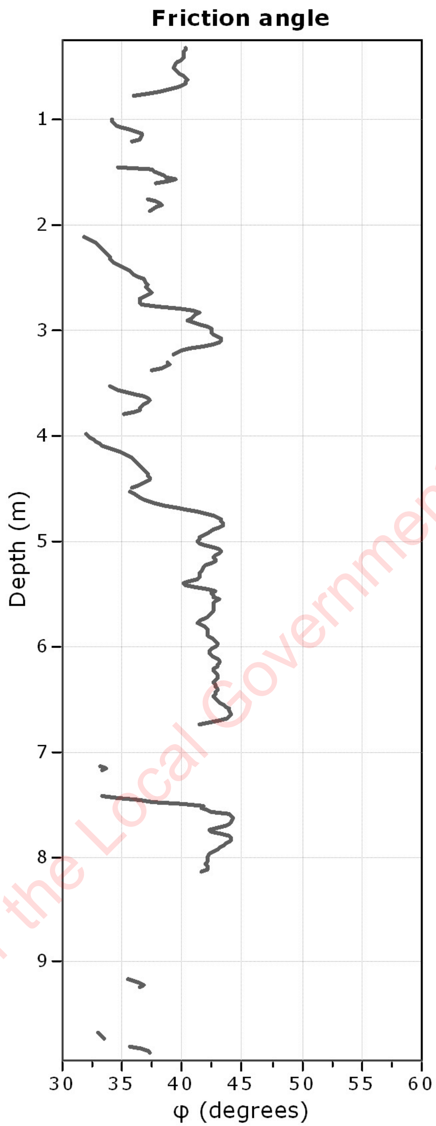
Project: **Eastern Bays Shared Path**
Location: **Lower Hutt, New Zealand**

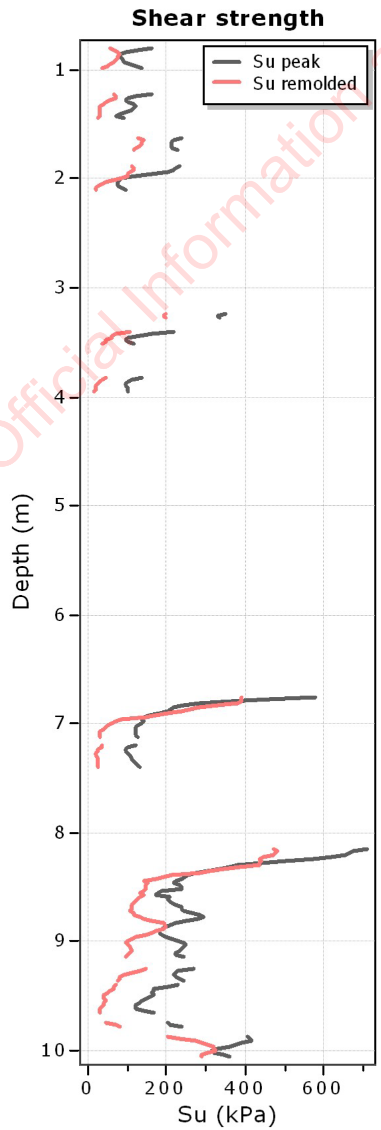


MWH now part of Stantec
Level 11, 155 The Terrace
Wellington, 6141, New Zealand
http://nz.mwhglobal.com/

CPT: CPT-12
Total depth: 10.06 m, Date: 24/04/2017
Surface Elevation: 0.00 m
Coords: X:1760185.00, Y:5430950.00
Cone Type: Uknown
Cone Operator: Uknown

Project: **Eastern Bays Shared Path**
Location: **Lower Hutt, New Zealand**



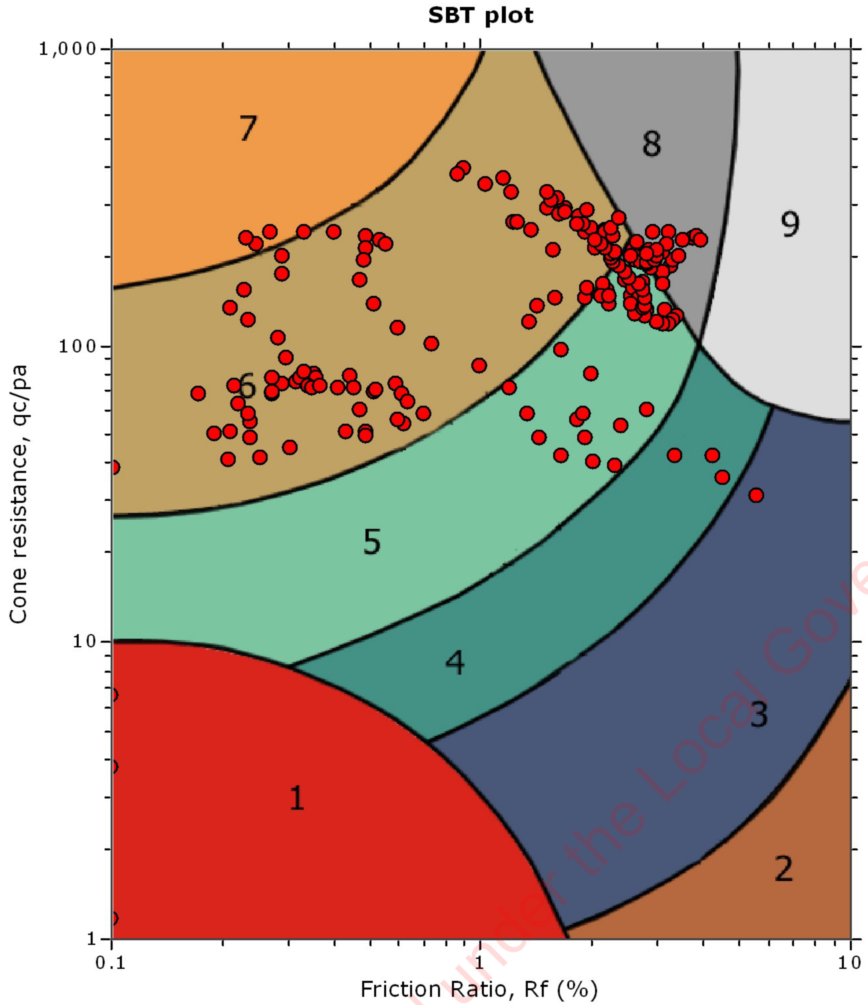


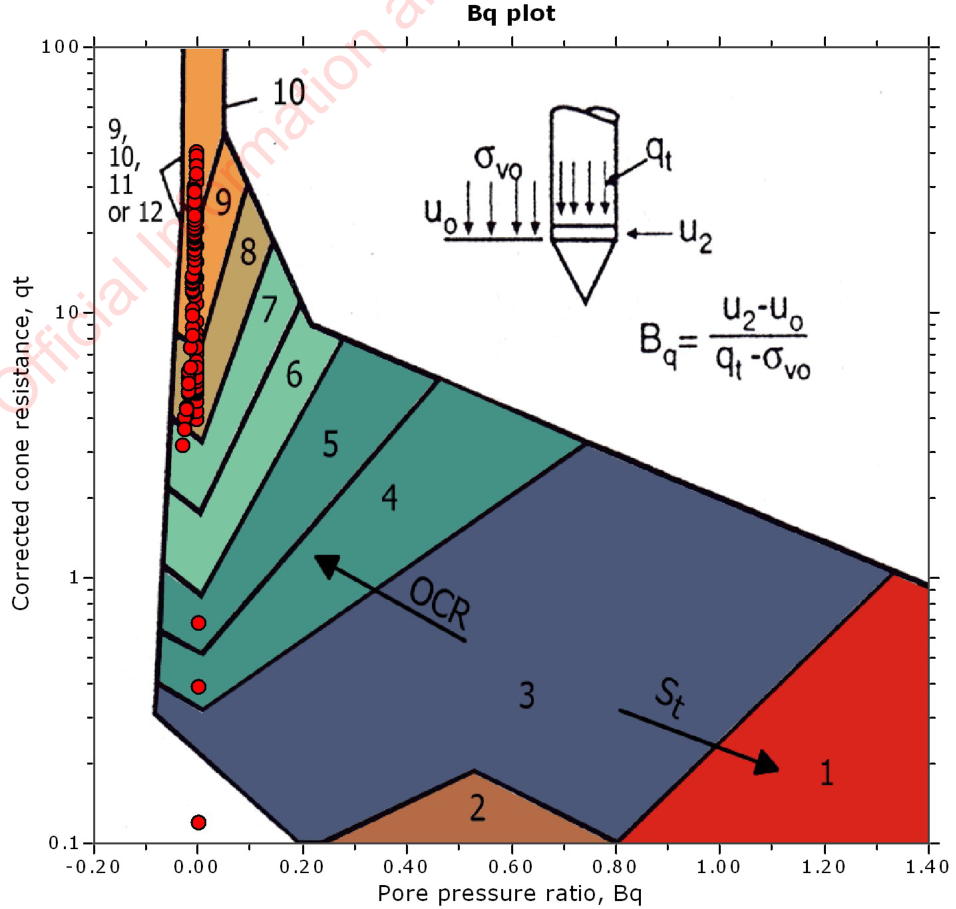
MWH now part of Stantec
Level 11, 155 The Terrace
Wellington, 6141, New Zealand
http://nz.mwhglobal.com/

CPT: CPT-13
Total depth: 3.92 m, Date: 24/04/2017
Surface Elevation: 0.00 m
Coords: X:1760229.00, Y:5430840.00
Cone Type: Uknown
Cone Operator: Uknown

Project: Eastern Bays Shared Path
Location: Lower Hutt, New Zealand

SBT - Bq plots





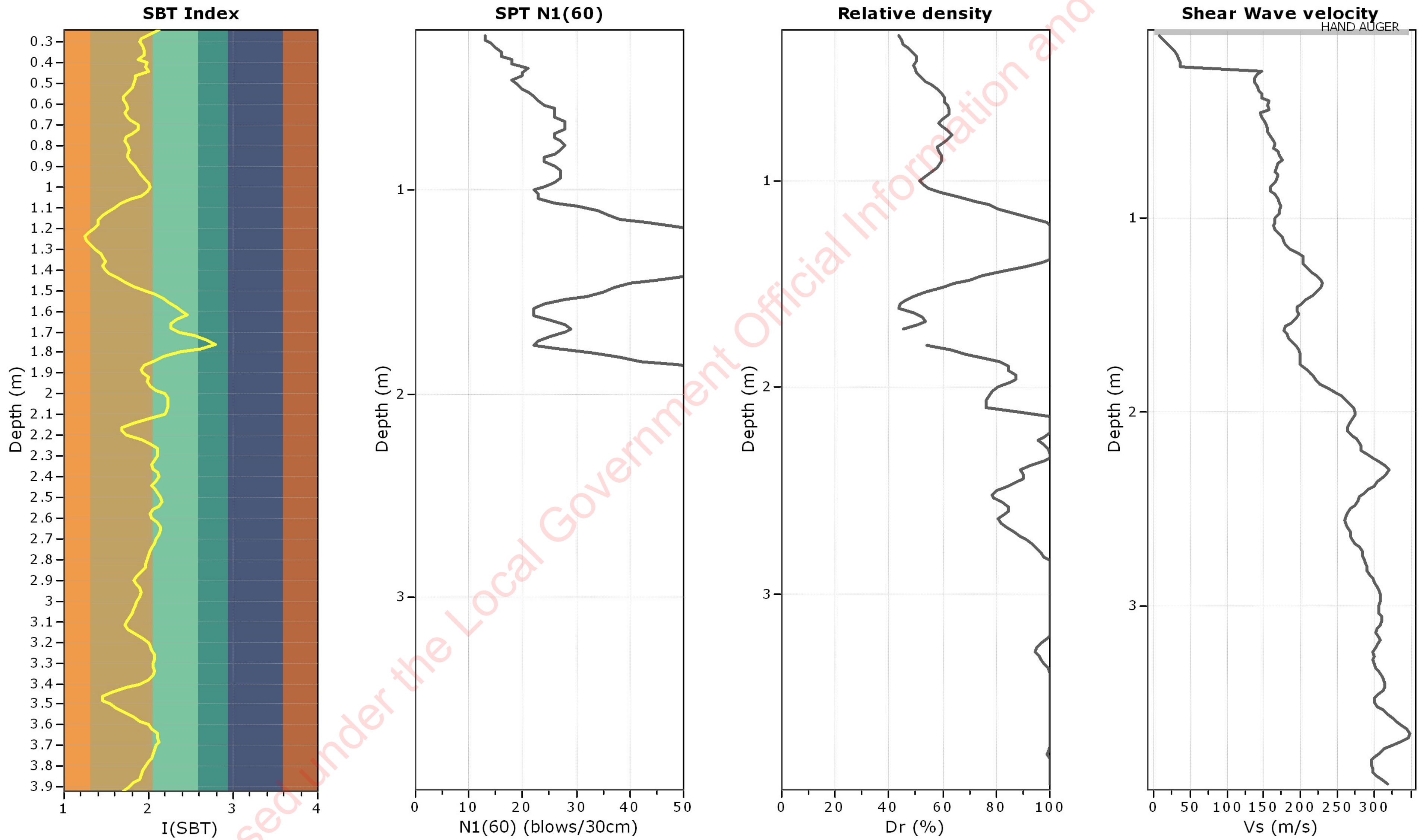
SBT legend

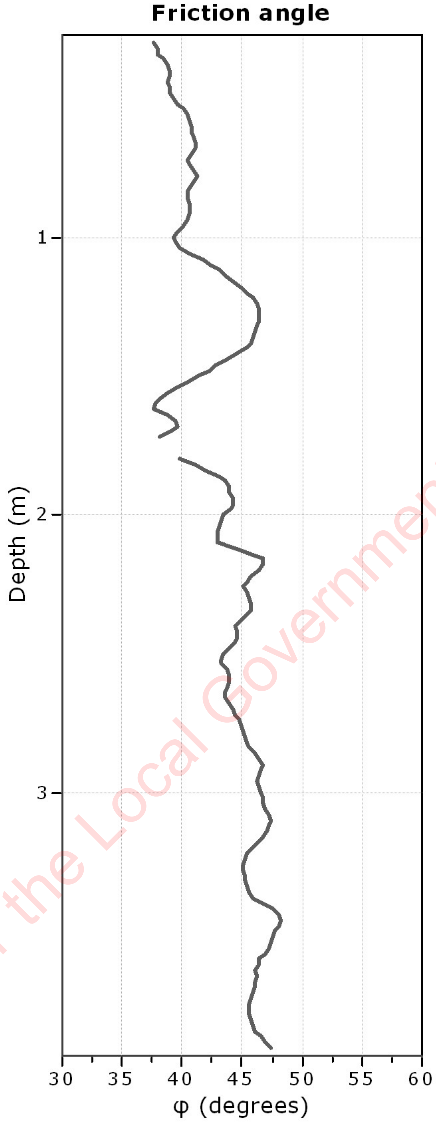
1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

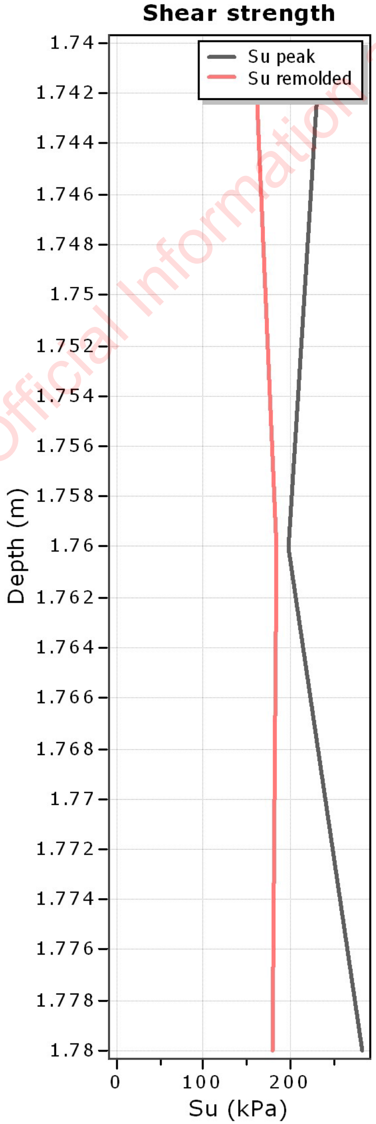
MWH now part of Stantec
Level 11, 155 The Terrace
Wellington, 6141, New Zealand
http://nz.mwhglobal.com/

CPT: CPT-13
Total depth: 3.92 m, Date: 24/04/2017
Surface Elevation: 0.00 m
Coords: X:1760229.00, Y:5430840.00
Cone Type: Uknown
Cone Operator: Uknown

Project: **Eastern Bays Shared Path**
Location: **Lower Hutt, New Zealand**




Friction angle
Depth (m)
1
2
3
30 35 40 45 50 55 60
φ (degrees)

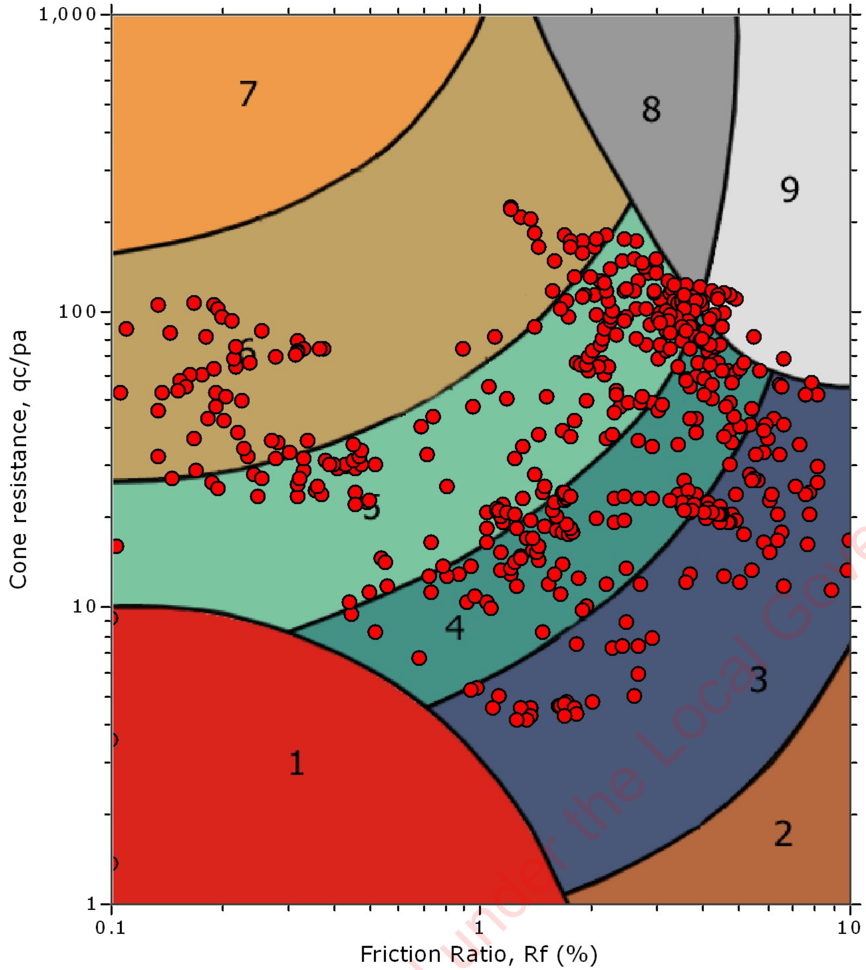

Shear strength
Su peak
Su remolded
Depth (m)
1.74
1.742
1.744
1.746
1.748
1.75
1.752
1.754
1.756
1.758
1.76
1.762
1.764
1.766
1.768
1.77
1.772
1.774
1.776
1.778
1.78
0 100 200
Su (kPa)

Project: Eastern Bays Shared Path
Location: Lower Hutt, New Zealand

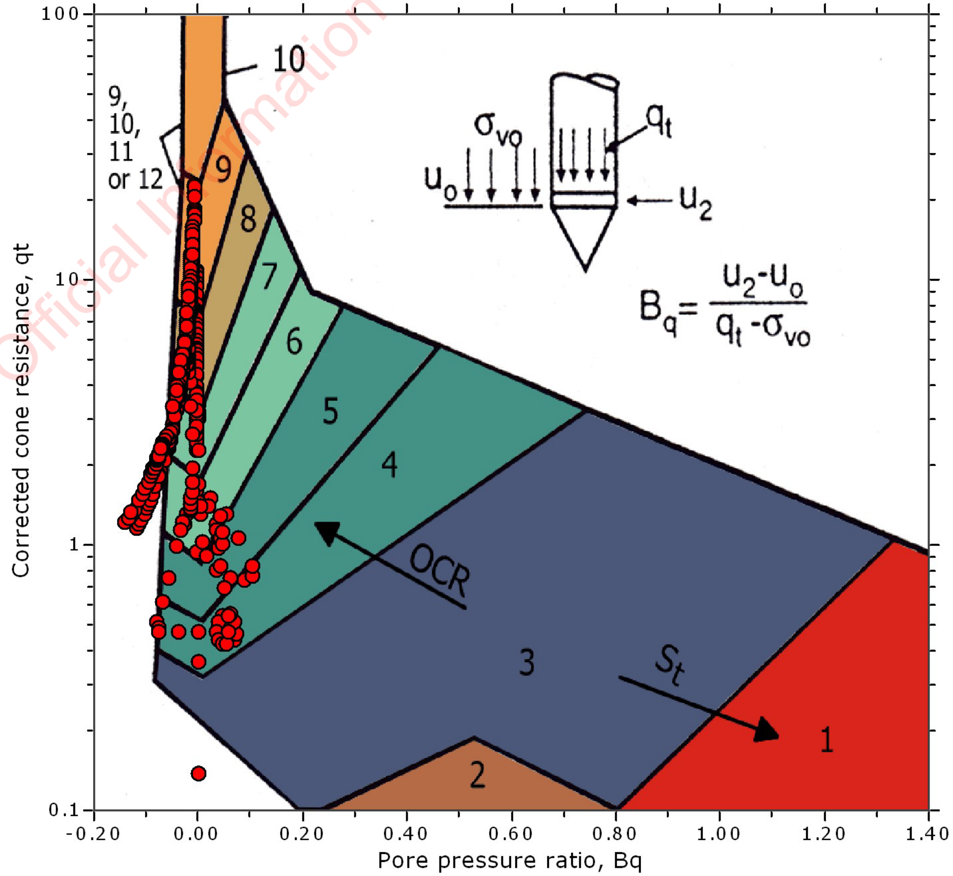
CPT: CPT-14
Total depth: 10.02 m, Date: 24/04/2017
Surface Elevation: 0.00 m
Coords: X:1760229.00, Y:5430764.00
Cone Type: Uknown
Cone Operator: Uknown

SBT - Bq plots

SBT plot



Bq plot



SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

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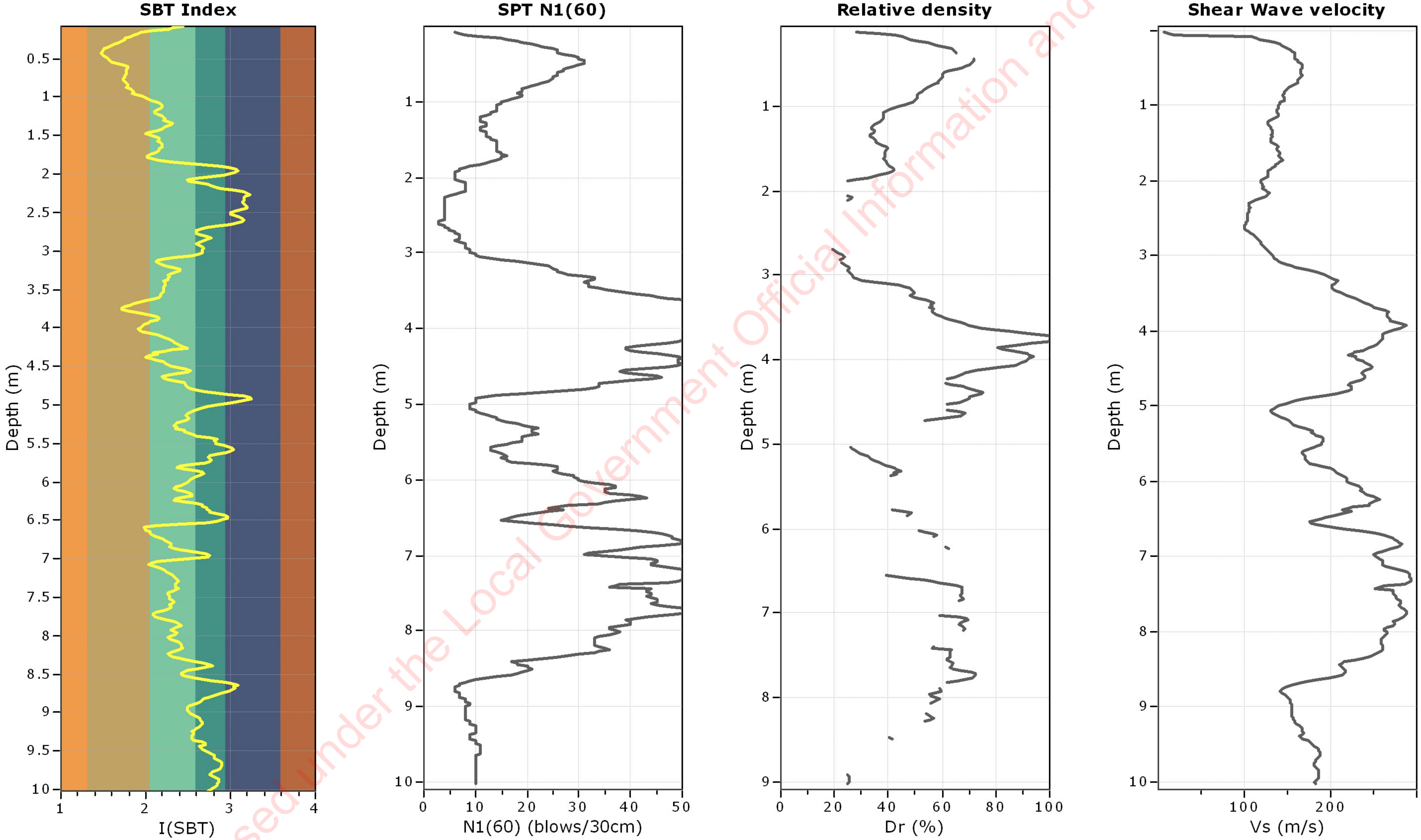
Project: **Eastern Bays Shared Path**
Location: **Lower Hutt, New Zealand**

CPT: CPT-14
Total depth: 10.02 m, Date: 24/04/2017
Surface Elevation: 0.00 m
Coords: X:1760229.00, Y:5430764.00
Cone Type: Uknown
Cone Operator: Uknown



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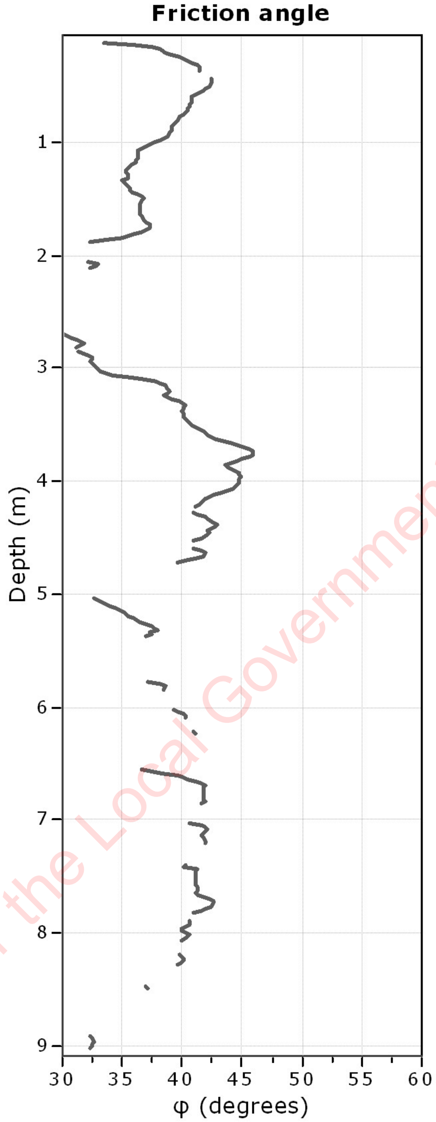
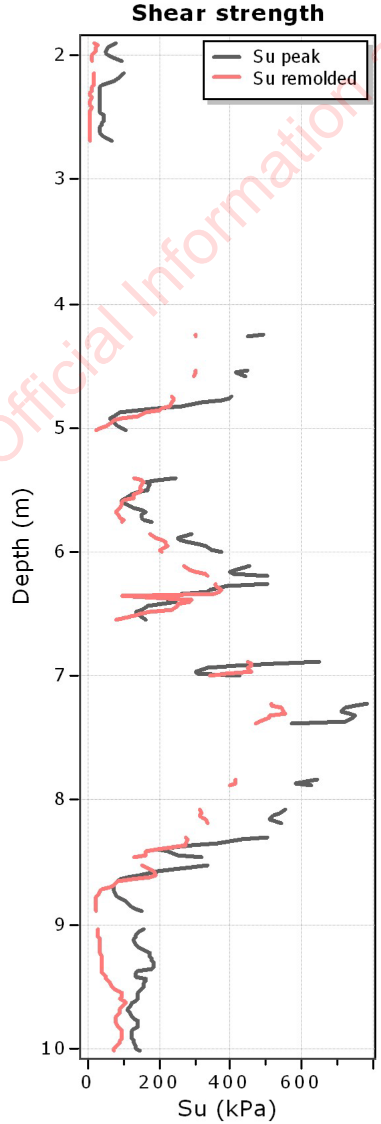
http://nz.mwhglobal.com/

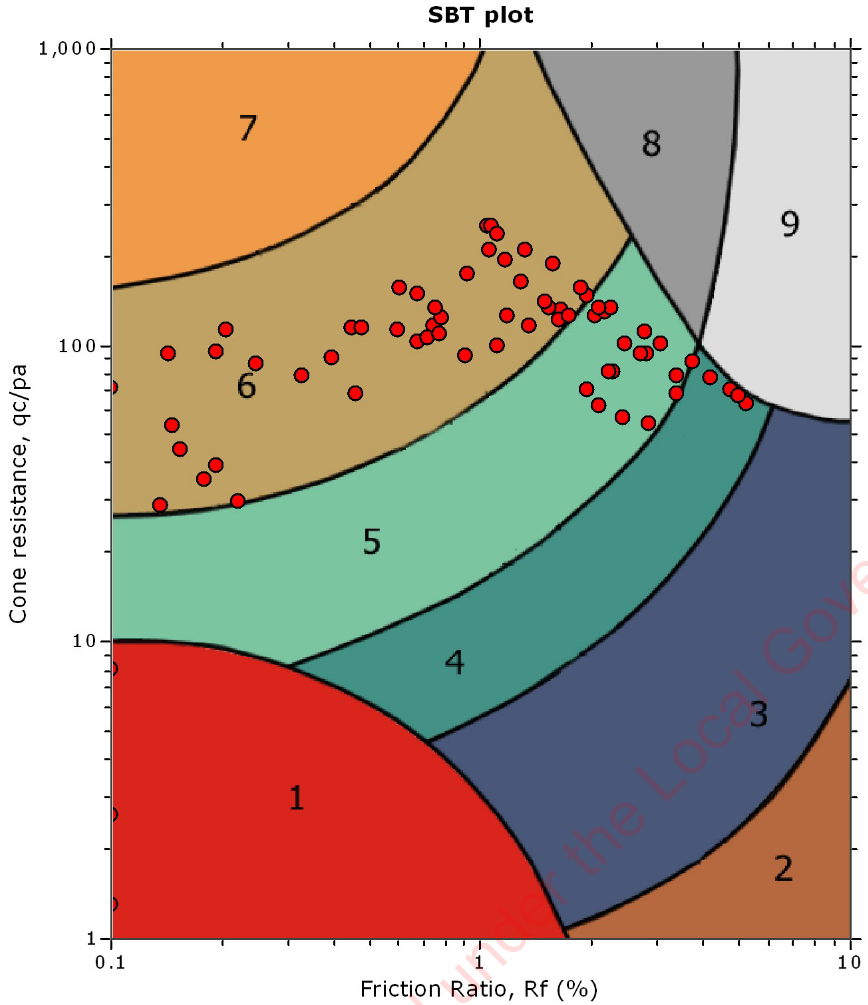
CPT: CPT-14
Total depth: 10.02 m, Date: 24/04/2017
Surface Elevation: 0.00 m
Coords: X:1760229.00, Y:5430764.00
Cone Type: Uknown
Cone Operator: Uknown

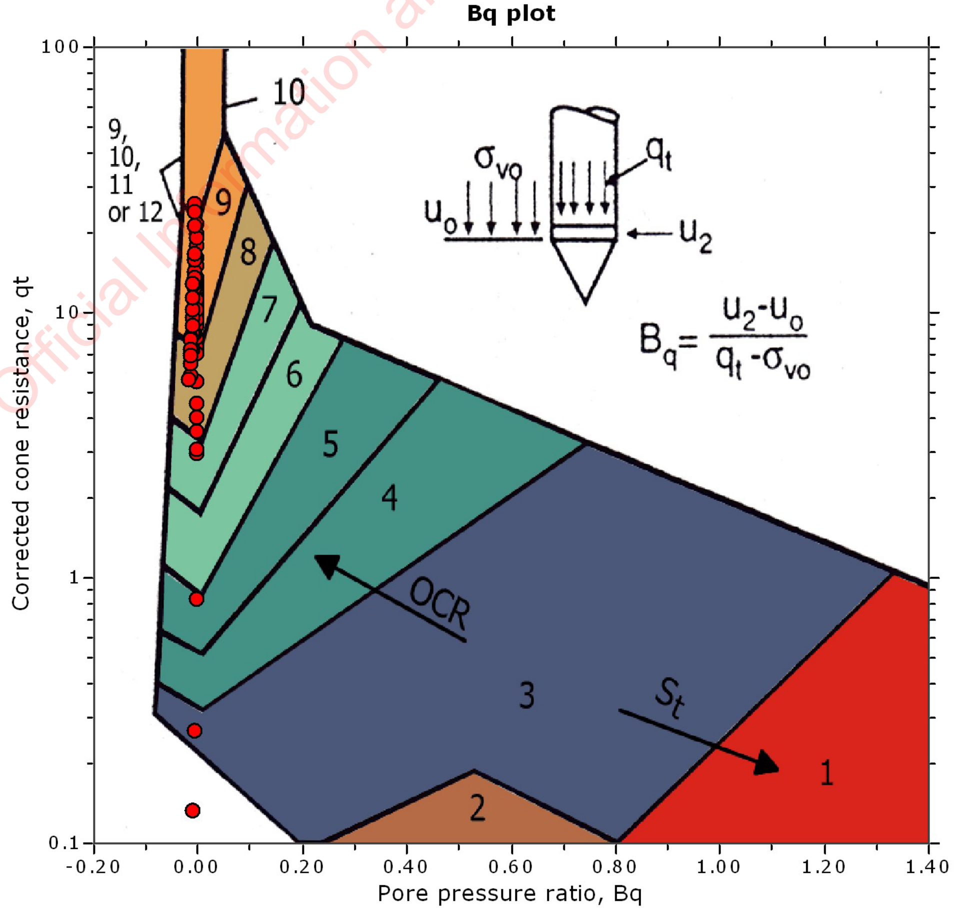
Project: **Eastern Bays Shared Path**
Location: **Lower Hutt, New Zealand**





SBT - Bq plots





SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

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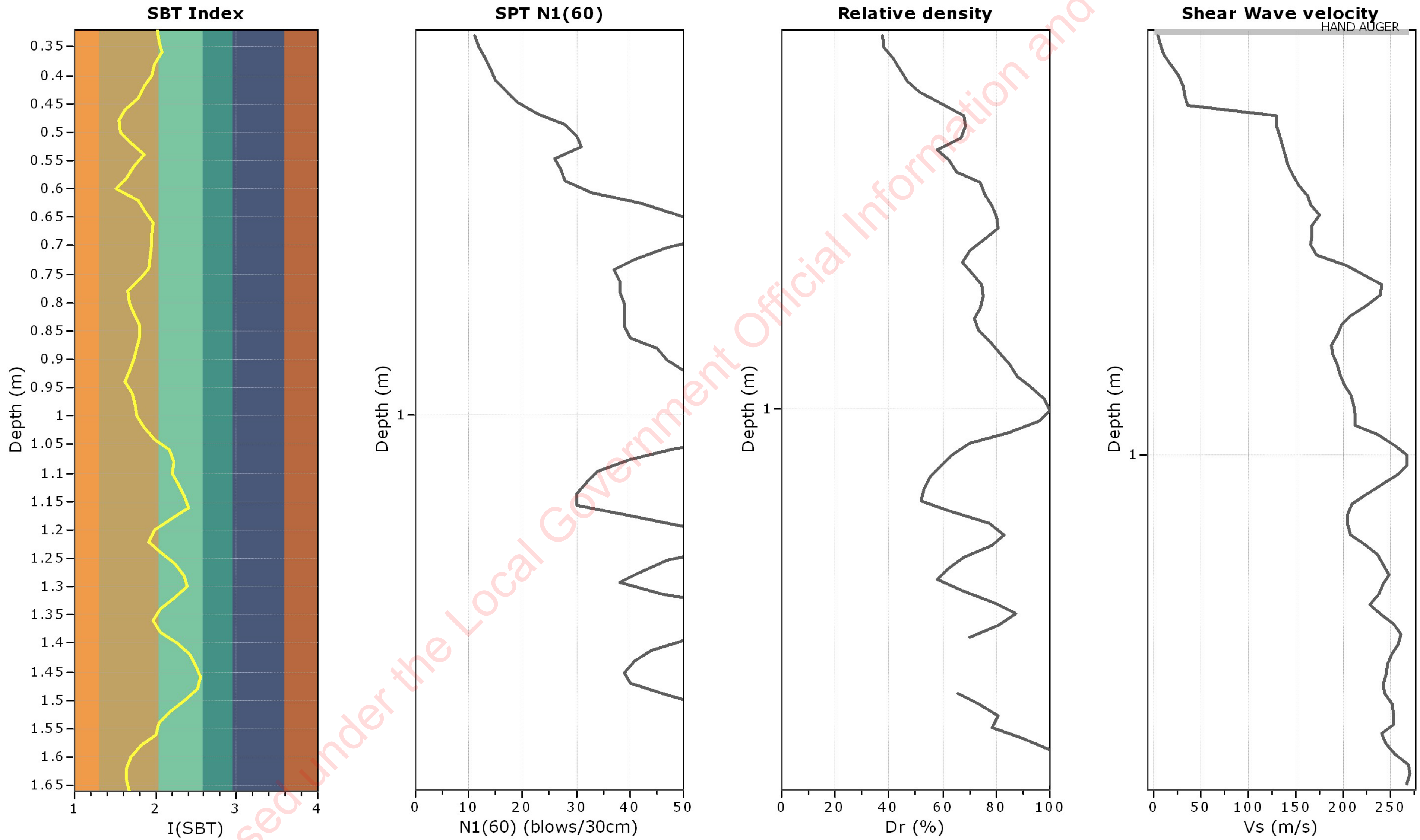
CPT: CPT-15
Total depth: 1.66 m, Date: 26/04/2017
Surface Elevation: 0.00 m
Coords: X:1760228.00, Y:5430757.00
Cone Type: Uknown
Cone Operator: Uknown

Project: Eastern Bays Shared Path
Location: Lower Hutt, New Zealand



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Wellington, 6141, New Zealand
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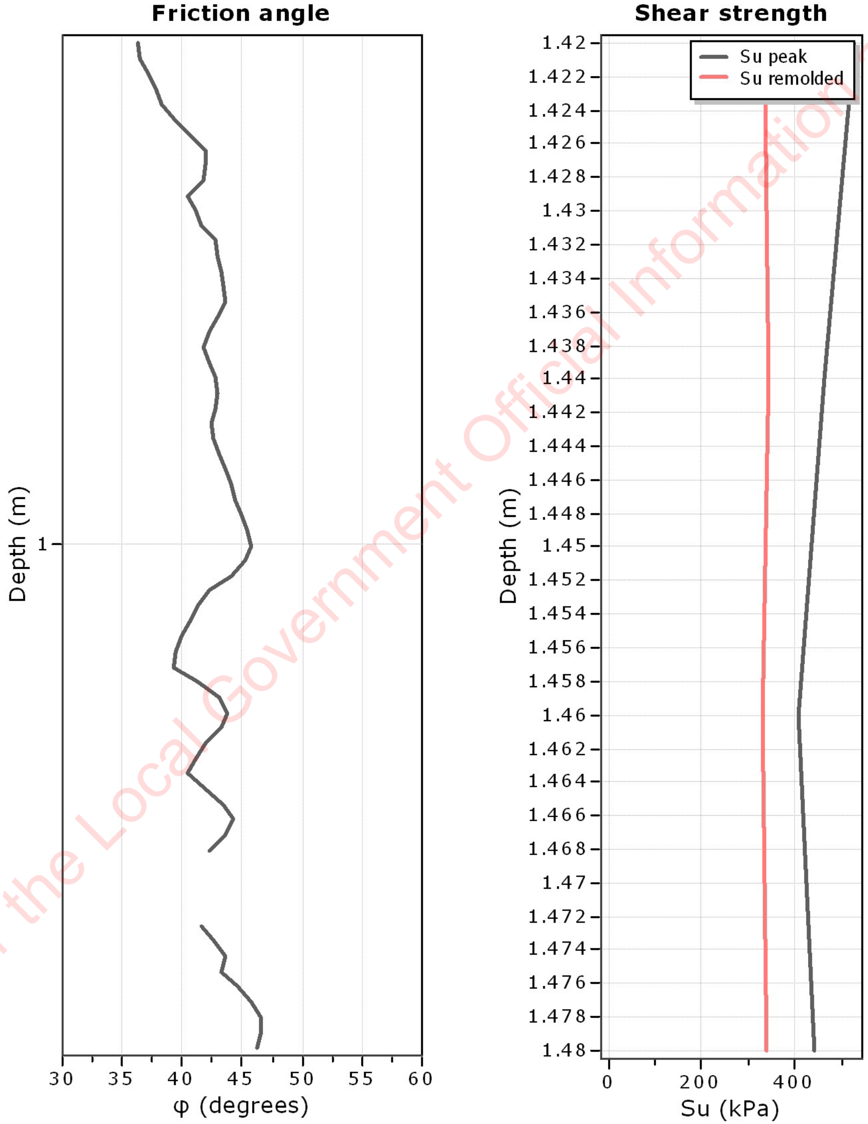
CPT: CPT-15
Total depth: 1.66 m, Date: 26/04/2017
Surface Elevation: 0.00 m
Coords: X:1760228.00, Y:5430757.00
Cone Type: Uknown
Cone Operator: Uknown

Project: **Eastern Bays Shared Path**
Location: **Lower Hutt, New Zealand**



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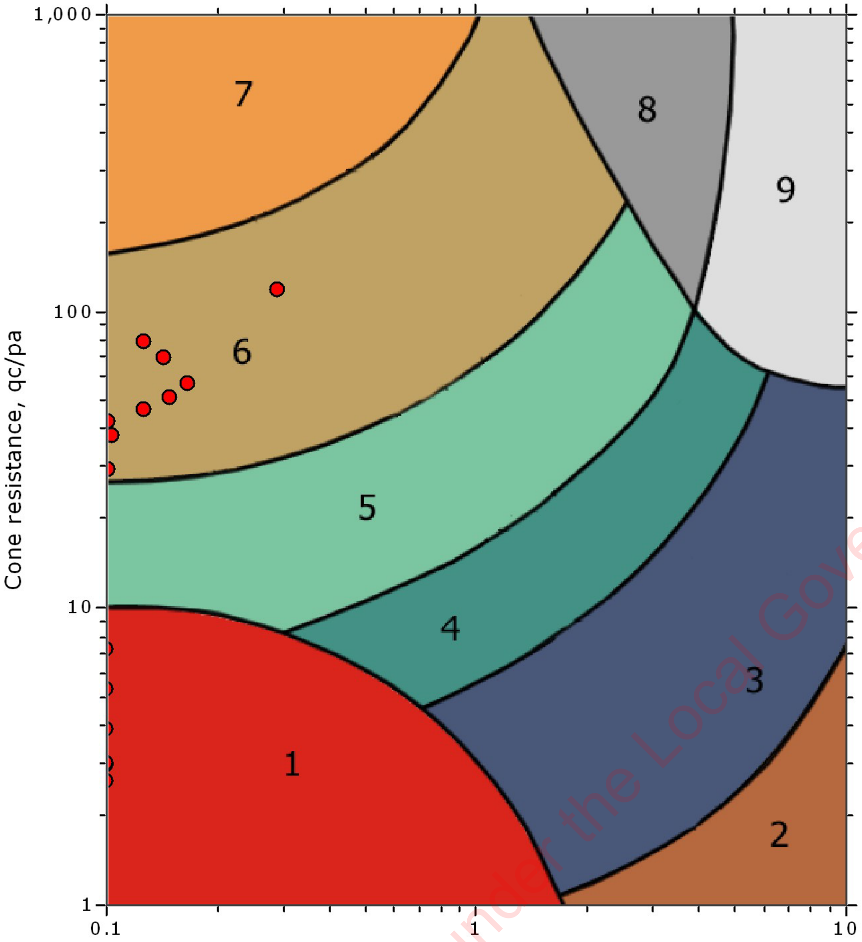
CPT: CPT-17
Total depth: 0.38 m, Date: 26/04/2017
Surface Elevation: 0.00 m
Coords: X:1759527.00, Y:5428916.00
Cone Type: Uknown
Cone Operator: Uknown

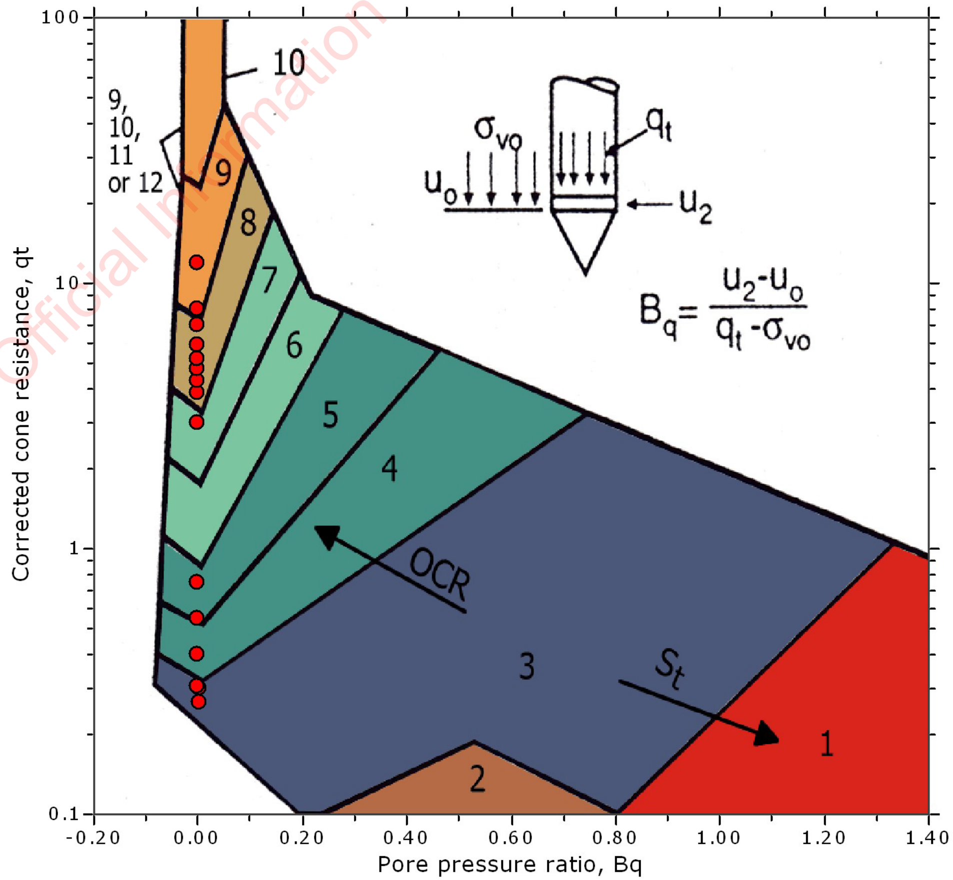
Project: **Eastern Bays Shared Path**
Location: **Lower Hutt, New Zealand**

SBT - Bq plots

SBT plot



Bq plot



SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

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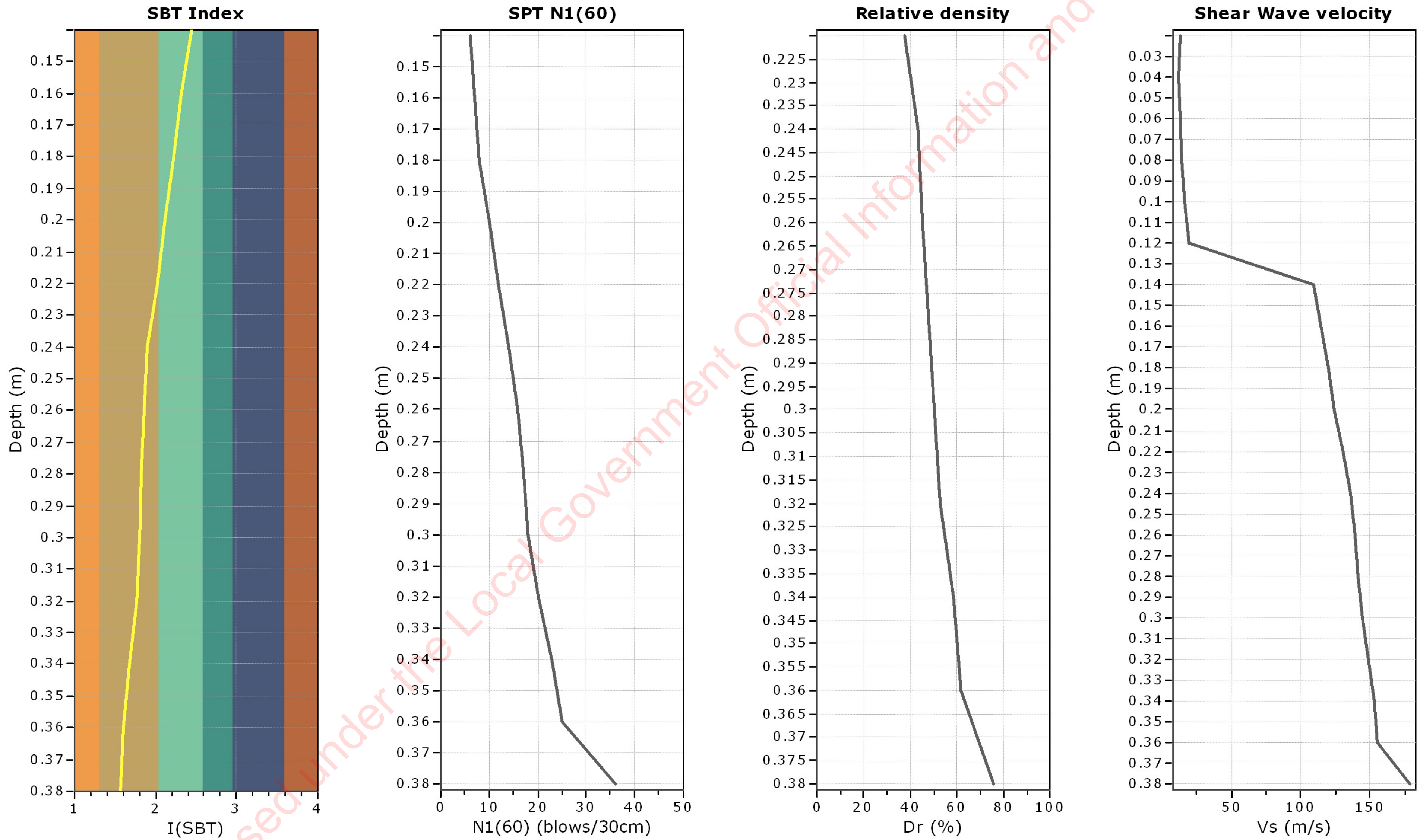
CPT: CPT-17
Total depth: 0.38 m, Date: 26/04/2017
Surface Elevation: 0.00 m
Coords: X:1759527.00, Y:5428916.00
Cone Type: Uknown
Cone Operator: Uknown

Project: **Eastern Bays Shared Path**
Location: **Lower Hutt, New Zealand**



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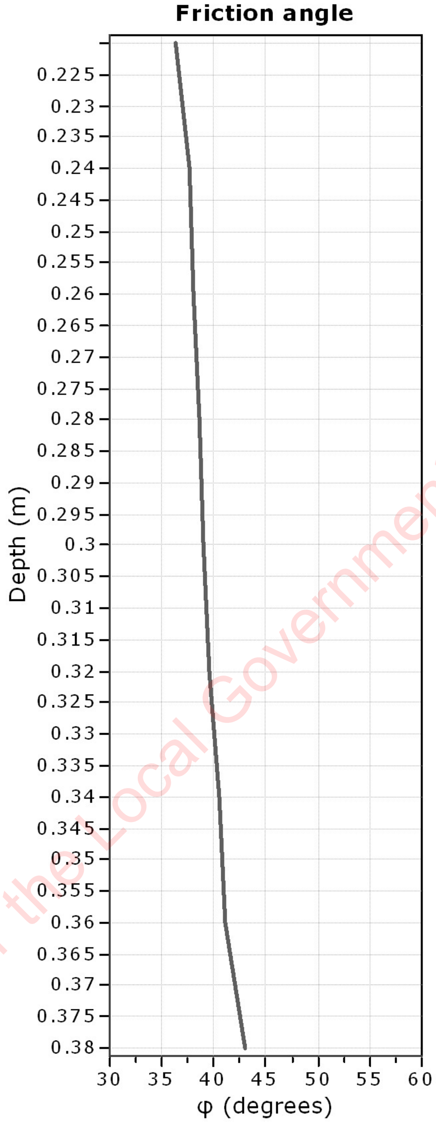
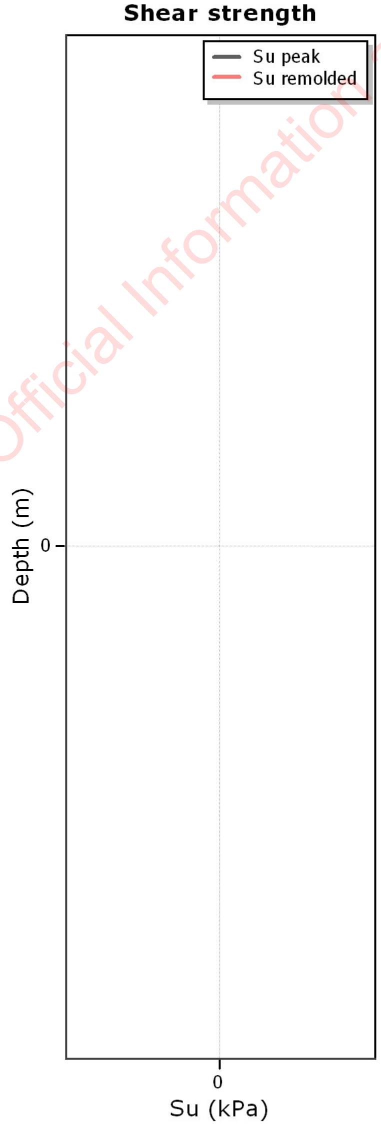
CPT: CPT-17
Total depth: 0.38 m, Date: 26/04/2017
Surface Elevation: 0.00 m
Coords: X:1759527.00, Y:5428916.00
Cone Type: Uknown
Cone Operator: Uknown

Project: **Eastern Bays Shared Path**
Location: **Lower Hutt, New Zealand**





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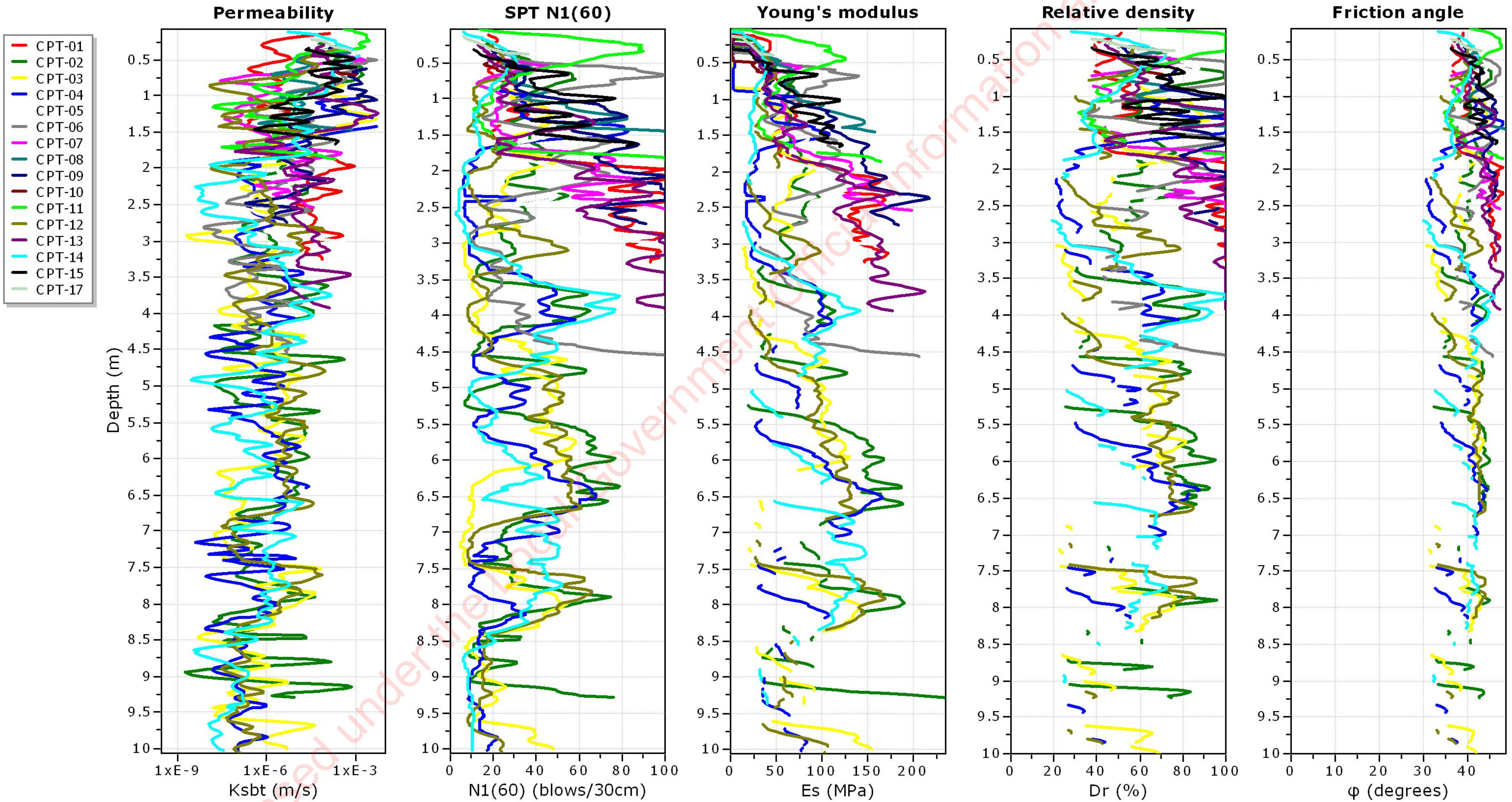
Project: **Eastern Bays Shared Path**
Location: **Lower Hutt, New Zealand**

Overlay estimation plots (1)



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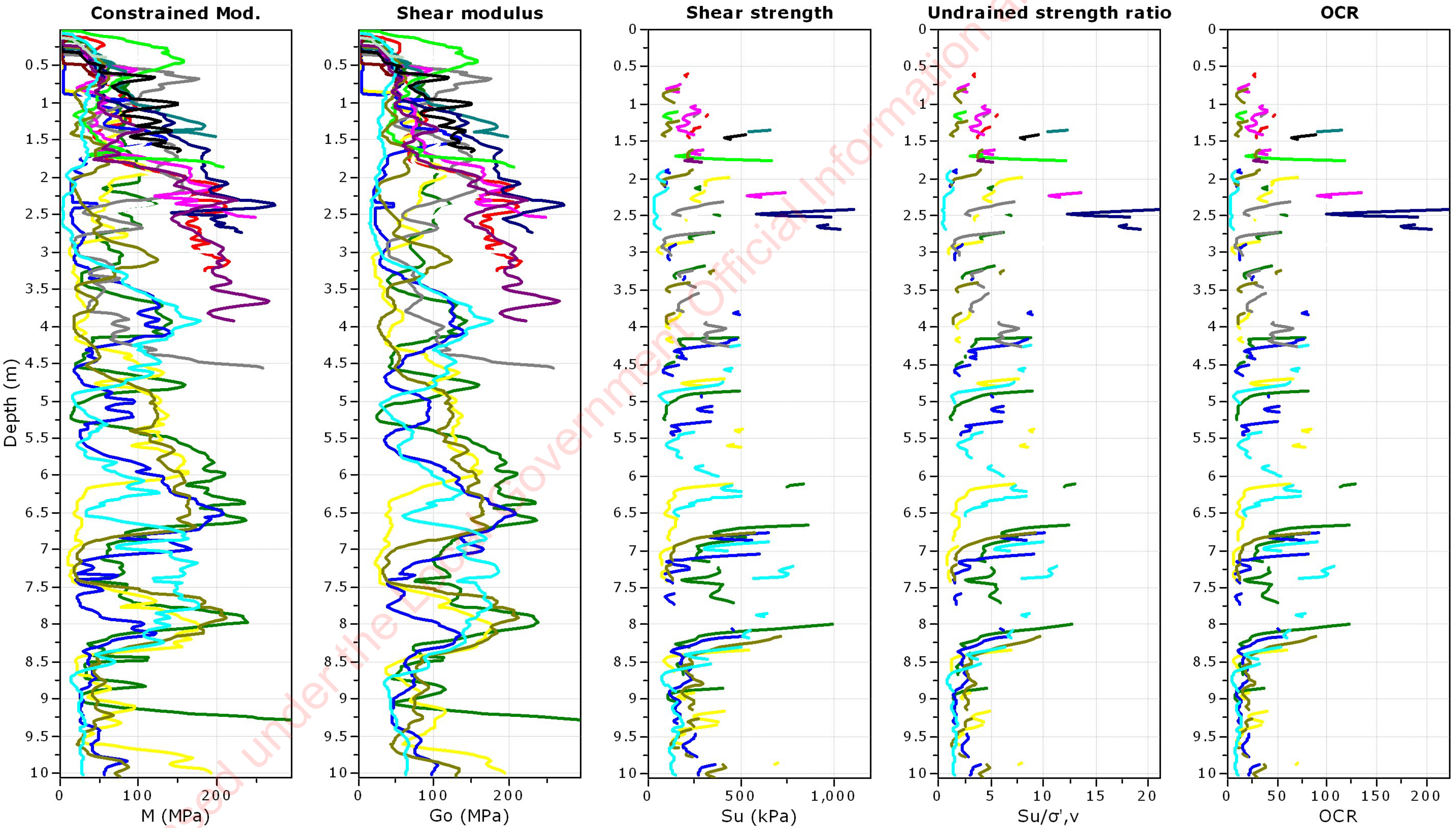
Overlay estimation plots (2)



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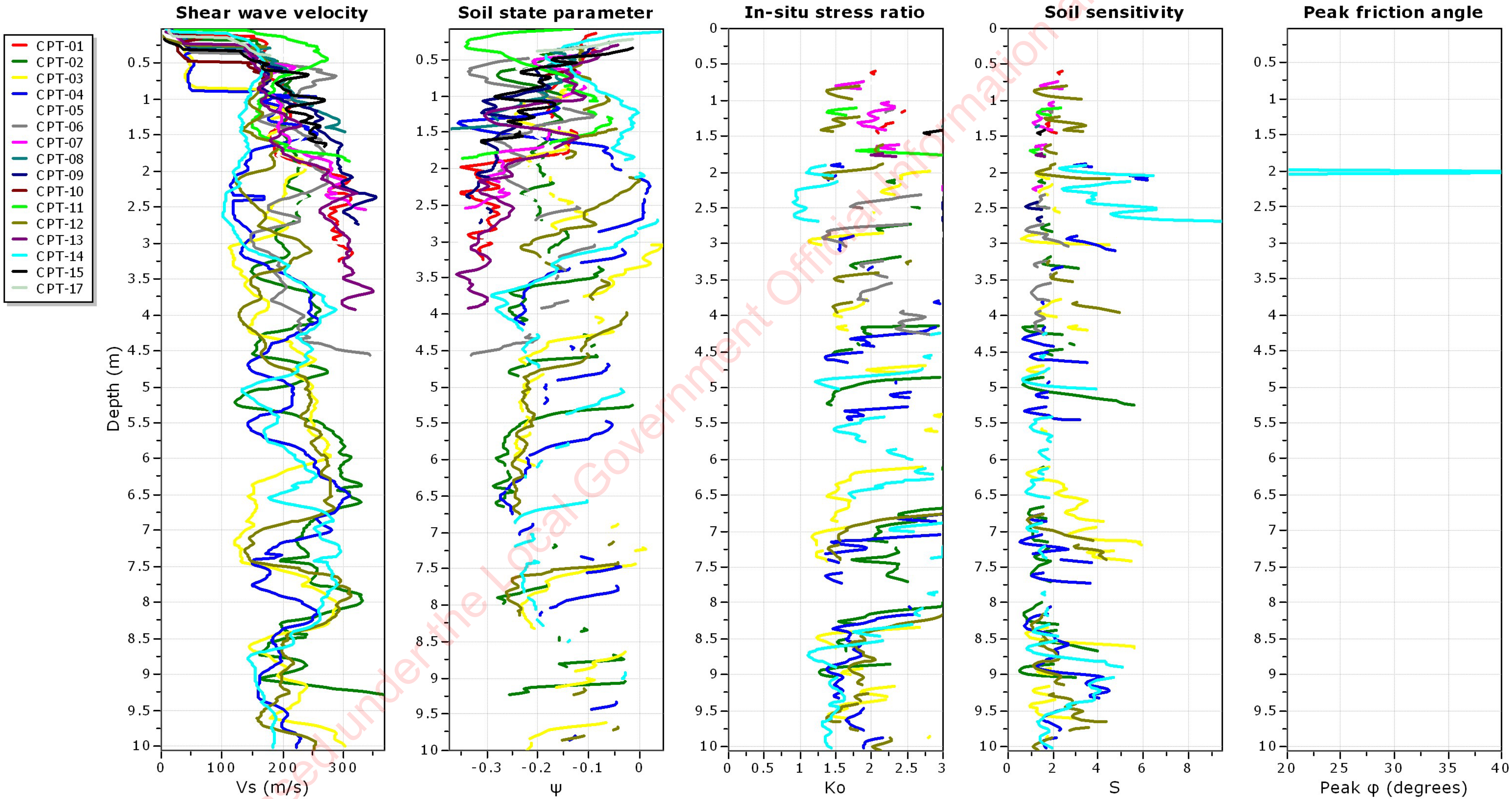
Location: Lower Hutt, New Zealand

Overlay estimation plots (3)



Appendix E Rock Testing Results

OPUS

30 June 2017

Opus International Consultants Ltd

P +64 4 587 0600

Opus Research
33 The Esplanade, Petone
PO Box 30 845, Lower Hutt 5040
New Zealand

s7(2)(a) [redacted]
MWH/Stantec
Level 11,
155 The Terrace,
Wellington 6141

Ref: 5-24A17.00

Eastern Bays Rock Core Testing

Dear s7(2)(a) [redacted]

1. Introduction

Two rock cores removed from your Eastern Bays Project (Hutt City Council), were received at Opus Research in Petone on 8th of June 2017. The cores were required to be tested for uniaxial compressive strength and elastic modulus. This letter reports the results of that testing.

2. Samples

The two cores were nominally 60mm in diameter and were identified as weathered greywacke. Both cores were initially assessed for compressive strength testing. BH3 was assessed as viable for UCS and elastic modulus testing. BH2 was highly weathered and was less clear on whether it would sustain the testing programme. It was agreed with MWH to proceed for both samples. Details of the cores are presented in Table 1.

Table 1: Cores Details

Sample	Depth (m)		Average diameter	Length before caping	Lithology
	From	To	(mm)	(mm)	
BH2	4.50	4.68	60.70	106.5	weathered greywacke
BH3	3.93	4.16	60.99	94.9	weathered greywacke

3. Methodology

The core ends were first trimmed with a wet cut diamond saw then capped with a high strength gypsum plaster capping compound.

The modulus of elasticity was measured in accordance with Method 17 ***Determination of the static chord modulus of elasticity and Poisson's ratio of concrete specimens*** from AS 1012 ***Methods of testing concrete***. Longitudinal strain was measured using a pair of 67mm long bonded strain gauges on each core. The recorded strain was the average of the two of strain gauge measurements.

The compressive strength of the concrete core samples was measured in accordance with Section 9 ***Determination of Strength in Compression of Drilled Cores*** from NZS 3112: Part 2 ***Tests Relating to the Determination of Strength of Concrete***. The cores were stored in ambient laboratory conditions before test.

The preferred length to diameter ratio for core testing is 2:1 but this cannot always be achieved. To account for this, when necessary the compressive strength was normalised to this aspect ratio using the correction factors given in ASTM C 42 ***Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.*** The minimum length to diameter ratio allowed under this method is 1:1.

Following the principles of AS 1012, the elastic modulus test load was taken as 40 percent of the compressive strength from the first tested sample, which should give an approximate representative compressive strength. When suitable, the modulus of elasticity was calculated in the elastic range of the cores using the load at 50με (microstrain) and the elastic modulus test load. In the case these points were not appropriate, the modulus of elasticity was calculated from the nearest linear range.

4. Results

The testing was carried out on the 27th of June 2017.

The results of this testing are shown in Table 2.

BH2 showed a very low compressive strength, i.e. 1.5 MPa, and the deflection behaviour of the core was inconsistent therefore the elastic modulus was unable to be determined.

The compressive strength of BH3 was measured 21.0 MPa. The elastic modulus was measured 13.0 GPa.

The photos of the cores before and after testing are shown in Figures 1 and 2 in the Appendix to this document.

Plots of the load versus strain are shown in Figures 3 and 4 in the Appendix.

Table 2: Testing Results

Sample	Failure load (kN)	Compressive strength (MPa)	Elastic Modulus (GPa)
BH2	4.1	1.5	-
BH3	61.4	21.0	13.0

Regards

Tested and reported by: Reviewed by:

s7(2)(a)

[redacted]

APPENDIX

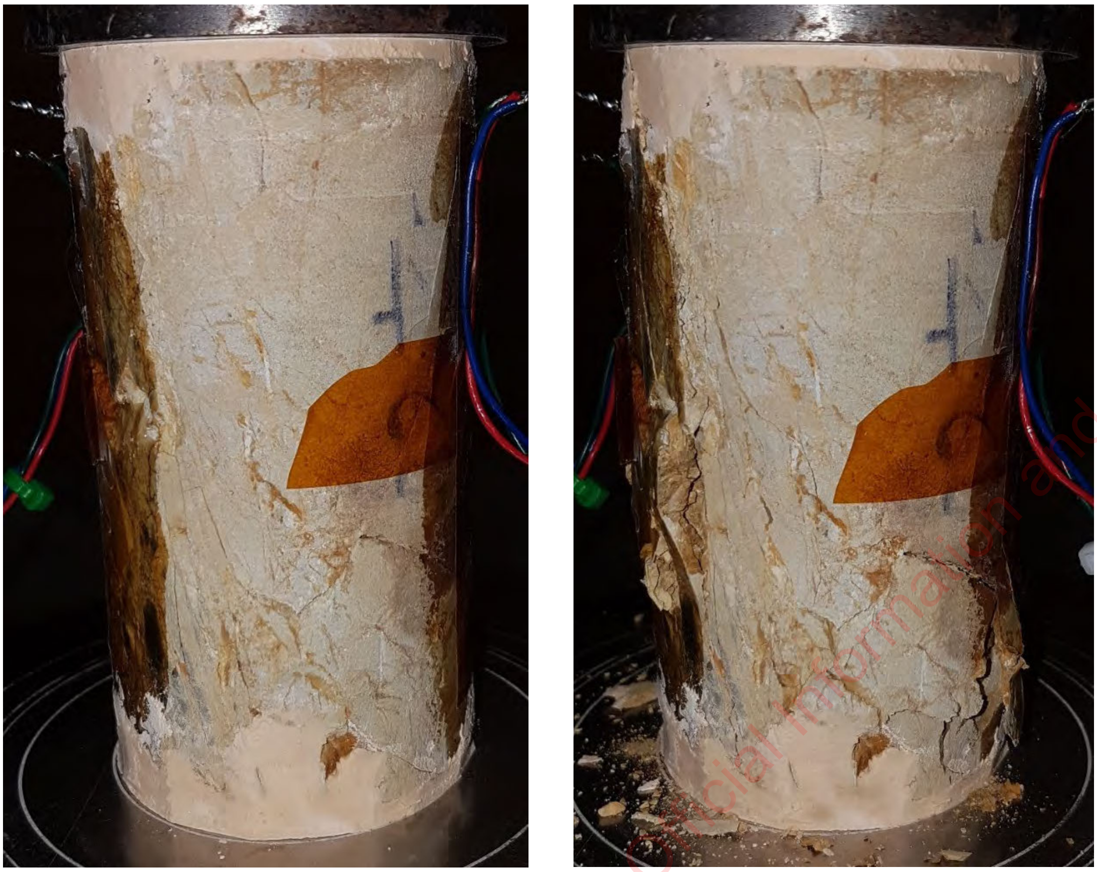


Figure 1: BH2 before (left) and after (right) testing.

Figure 2: BH3 before (left) and after (right) testing.

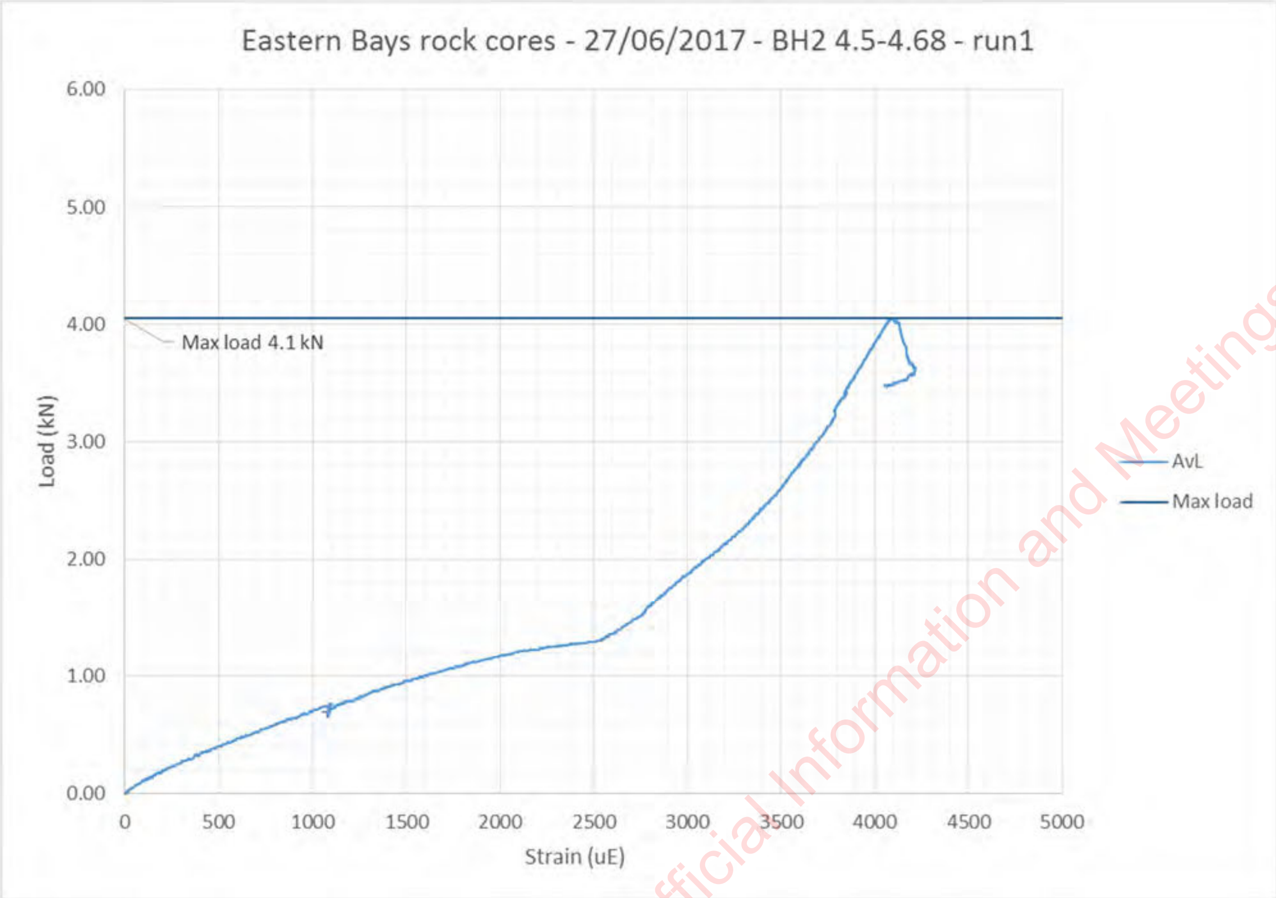


Figure 3: Loading of BH2.

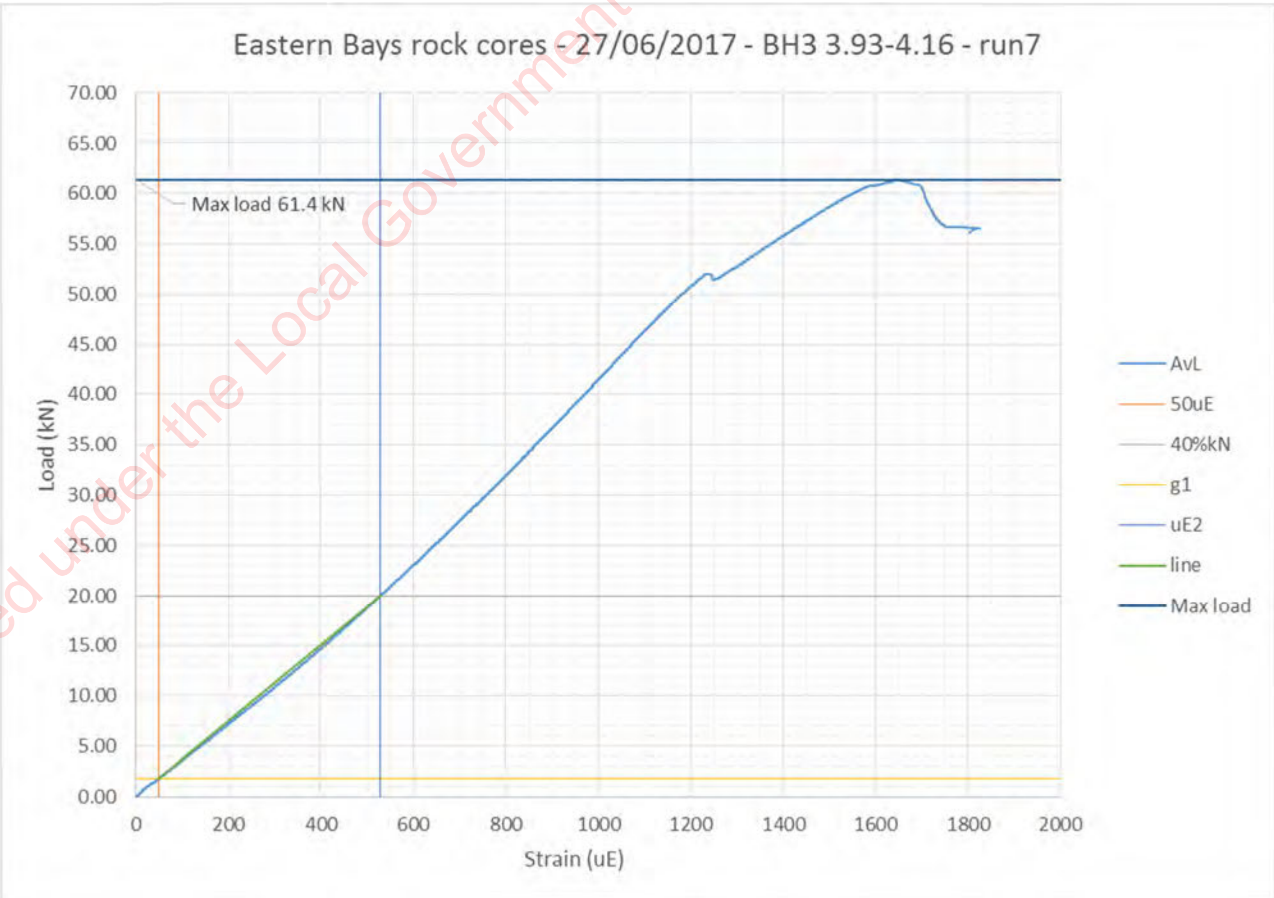


Figure 4: Loading of BH3.

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Christchurch 8141
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Fax +64 4 473 1982

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Appendix B Design Philosophy & Multi-Criteria Analysis – Seawall treatment options

Appendix C Map of consultation treatment options

Appendix D Community Consultation Summary Report

Appendix E Concept Plans – Recommended option

Appendix F Consenting Strategy

Appendix G Environmental and Social Responsibility Screen

Appendix H Economic Assessment

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Stantec design with community in mind.

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Appendix C Map of consultation treatment options

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ORIGINAL SIZE A1

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C	FOR REVIEW - MANY SHEETS ADDED, MANY SHEETS RE-NUMBERED	PJ COOK	JP		08/17

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CAD REVIEW
DESIGN CHECK
DESIGN REVIEW
APPROVED NOT APPROVED
PROF REGISTRATION:

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Client: HUTT CITY TE AWA KAIRANGI

HUTT CITY COUNCIL
EASTERN BAYS SHARED PATH - DBC

PLAN - MCA0
POINT HOWARD SORRENTO BAY STATION 480 - 720

Status Stamp: FOR REVIEW
Date Stamp: 21.08.17
Scales: 1 : 250 (A1)
Drawing No. 80509137-01-001-C220
Rev. C

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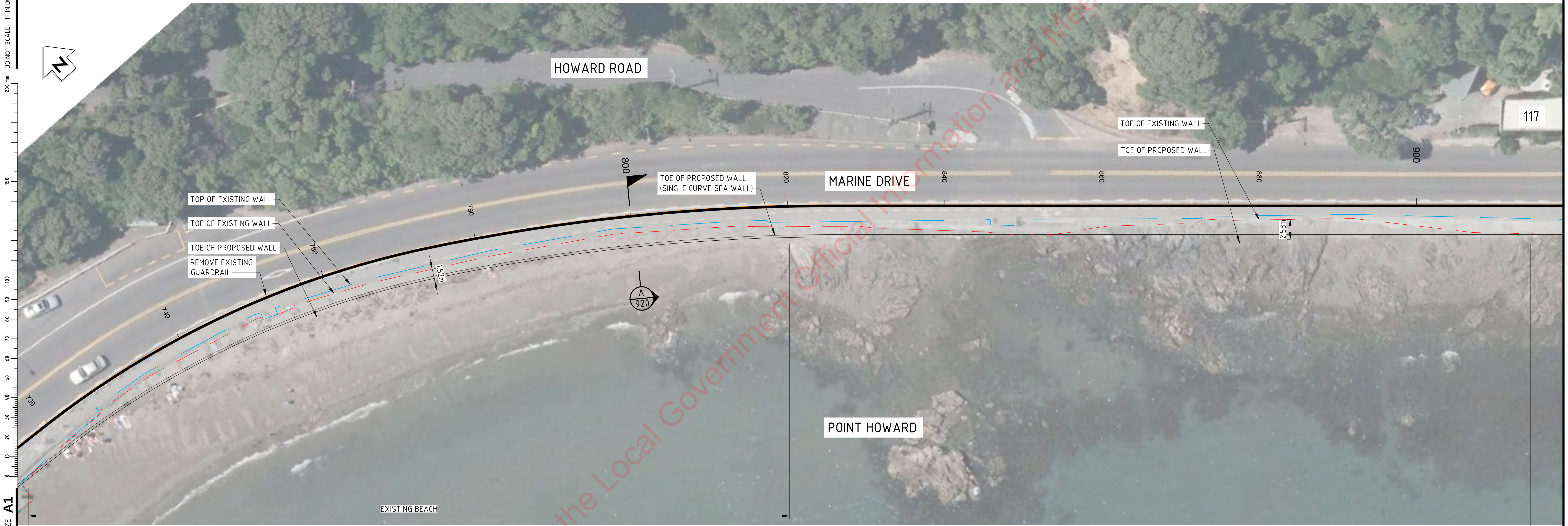

OPTION FOR 2.50 m OR 3.50 m PATH (3.50 m OPTION SHOWN)

DOUBLE OR SINGLE CURVE SEA WALL

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ORIGINAL SIZE A1

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HUTT CITY COUNCIL
EASTERN BAYS SHARED PATH - DBC

PLAN - MCA0
POINT HOWARD SORRENTO BAY STATION 720 - 900

Status Stamp: FOR REVIEW

Date Stamp: 21.08.17

Scales: 1 : 250 (A1)

Drawing No. 80509137-01-001-C221

Rev. C

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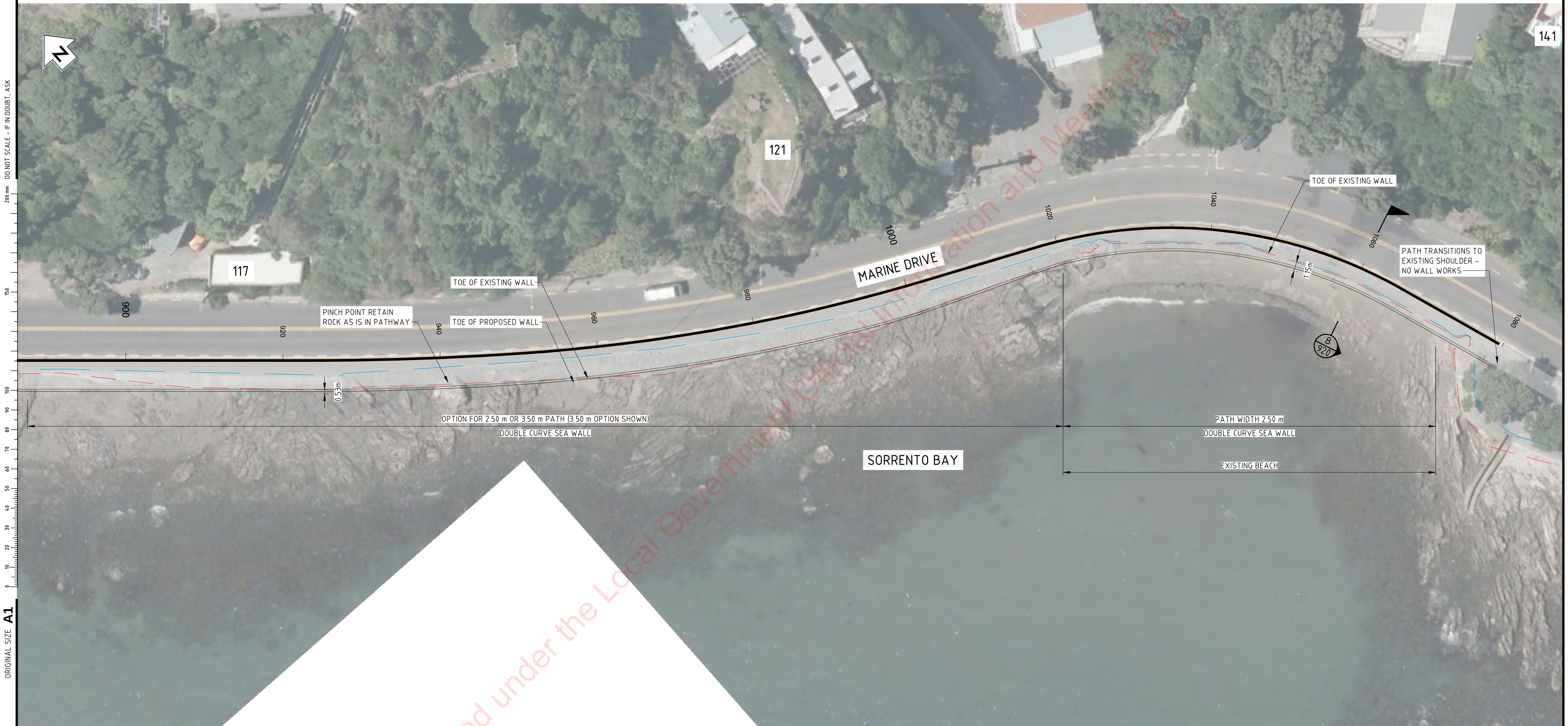

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Client: HUTT CITY TE AWA KAIRANGI

HUTT CITY COUNCIL
EASTERN BAYS SHARED PATH - DBC

PLAN - MCA0
POINT HOWARD SORRENTO BAY STATION 900 - 1080

Status Stamp: FOR REVIEW
Date Stamp: 21.08.17
Scales: 1 : 250 (A1)
Drawing No.: 80509137-01-001-C222
Rev.: C

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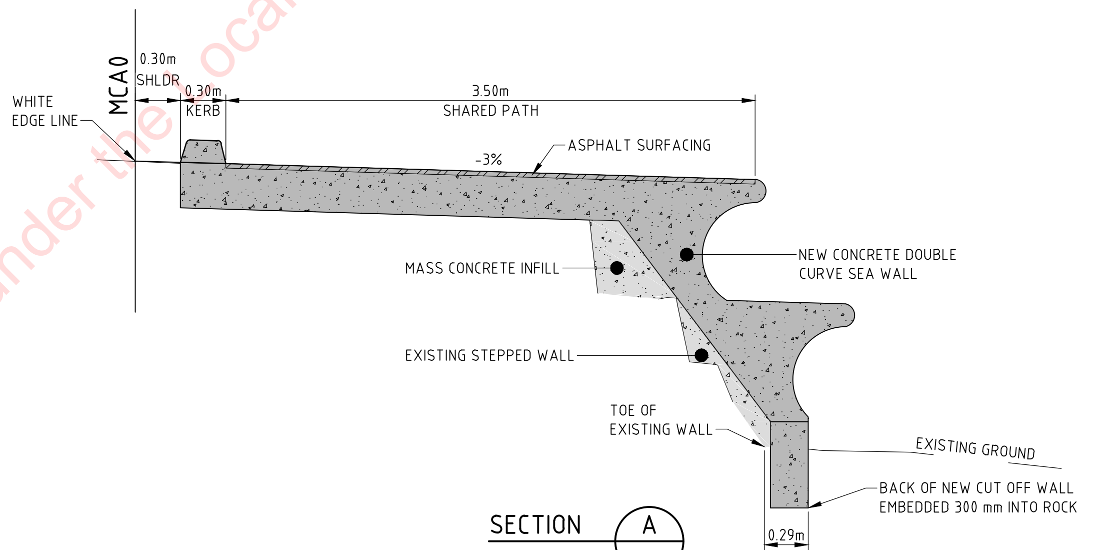

SECTION A
SCALE 1 : 25

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ORIGINAL SIZE A1

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DRAWN
CAD REVIEW
DESIGN CHECK
DESIGN REVIEW
APPROVED
PROF REGISTRATION:

NOT APPROVED

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HUTT CITY COUNCIL
EASTERN BAYS SHARED PATH - DBC

PLAN - MCA0
POINT HOWARD - LOWRY BAY STATION 1060 - 1260

Status Stamp: FOR REVIEW
Date Stamp: 21.08.17
Scales: AS SHOWN
Drawing No. 80509137-01-001-C223
Rev. C

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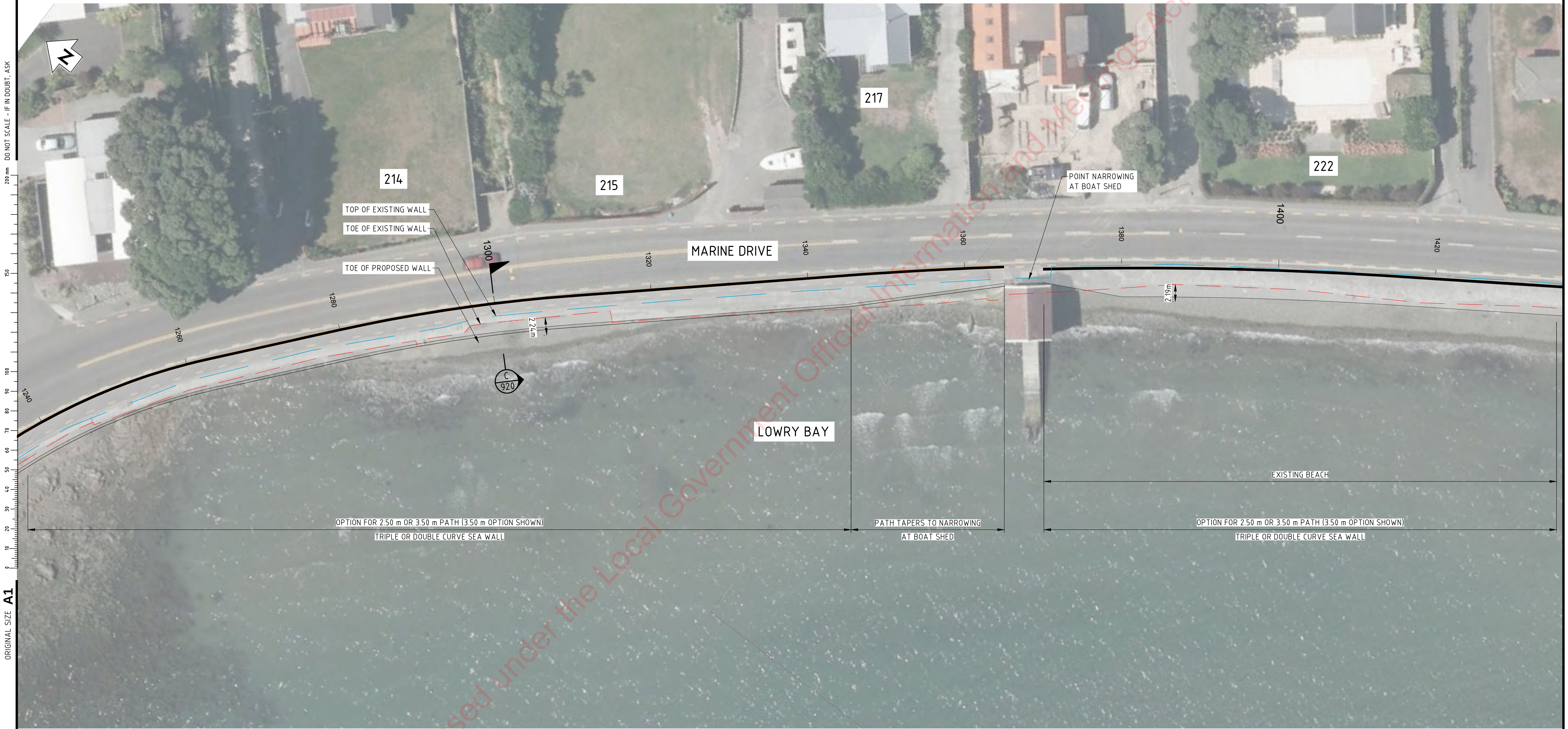

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DESIGNED	
DRAWN	
CAD REVIEW	
DESIGN CHECK	
DESIGN REVIEW	NOT APPROVED
APPROVED	
PROF REGISTRATION:	

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HUTT CITY COUNCIL
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PLAN - MCA0
LOWRY BAY STATION 1240 - 1420

Status Stamp: **FOR REVIEW**

Date Stamp: **21.08.17**

Scales: 1 : 250

Drawing No.: 80509137-01-001-C224

Rev.: C

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ORIGINAL SIZE A1

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DRAWN
CAD REVIEW
DESIGN CHECK
DESIGN REVIEW
APPROVED
PROF REGISTRATION

NOT APPROVED

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HUTT CITY COUNCIL
EASTERN BAYS SHARED PATH - DBC

PLAN - MCA0
LOWRY BAY STATION 1420 - 1600

Status Stamp: FOR REVIEW

Date Stamp: 21.08.17

Scales: 1 : 250

Drawing No.: 80509137-01-001-C225

Rev.: C

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PLAN - MCA0
LOWRY BAY STATION 1600 - 1780

Status Stamp: FOR REVIEW
Date Stamp: 21.08.17
Scales: 1 : 250
Drawing No.: 80509137-01-001-C226
Rev.: C

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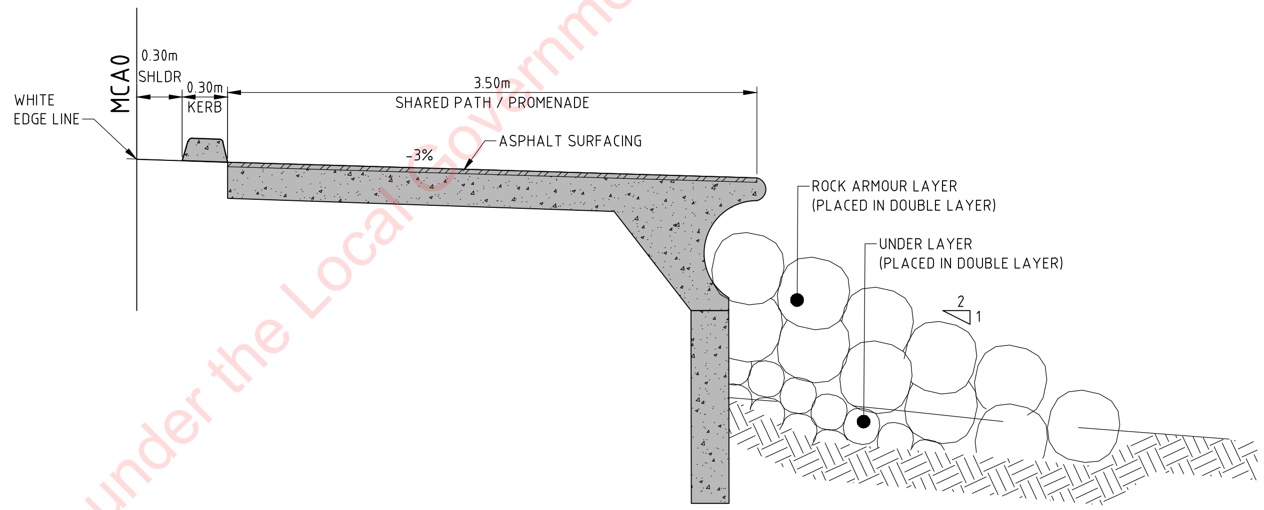

SECTION A
SCALE 1 : 25

DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1

Last modified: Aug 21 2017 By Phillip Cook

NOT FOR CONSTRUCTION

REV	REVISIONS	DRN	CHK	APP	DATE
C	FOR REVIEW - MANY SHEETS ADDED, MANY SHEETS RE-NUMBERED	PJ COOK	JP		08/17

SURVEYED
DESIGNED
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CAD REVIEW
DESIGN CHECK
DESIGN REVIEW
APPROVED
PROF REGISTRATION:

NOT APPROVED

MWH now part of Stantec

Client: HUTT CITY TE AWA KAIRANGI

HUTT CITY COUNCIL
EASTERN BAYS SHARED PATH - DBC

PLAN - MCA0
LOWRY BAY - YORK BAY STATION 1780 - 1960

Status Stamp: FOR REVIEW
Date Stamp: 21.08.17
Scales: AS SHOWN
Drawing No.: 80509137-01-001-C227
Rev.: C

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ORIGINAL SIZE A1

DO NOT SCALE - IF IN DOUBT, ASK

NOT FOR CONSTRUCTION

REV	REVISIONS	DRN	CHK	APP	DATE
C	FOR REVIEW - MANY SHEETS ADDED, MANY SHEETS RE-NUMBERED	PJ COOK	JP		08/17

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PROF REGISTRATION:	

MWH now part of Stantec

Client: HUTT CITY TE AWA KAIRANGI

HUTT CITY COUNCIL
EASTERN BAYS SHARED PATH - DBC

PLAN - MCA0
LOWRY BAY TO YORK BAY STATION 1960 - 2140

Status Stamp: FOR REVIEW
Date Stamp: 21.08.17
Scales: AS SHOWN
Drawing No. 80509137-01-001-C228
Rev. C

Last modified: Aug 21 2017 By Phillip Cook

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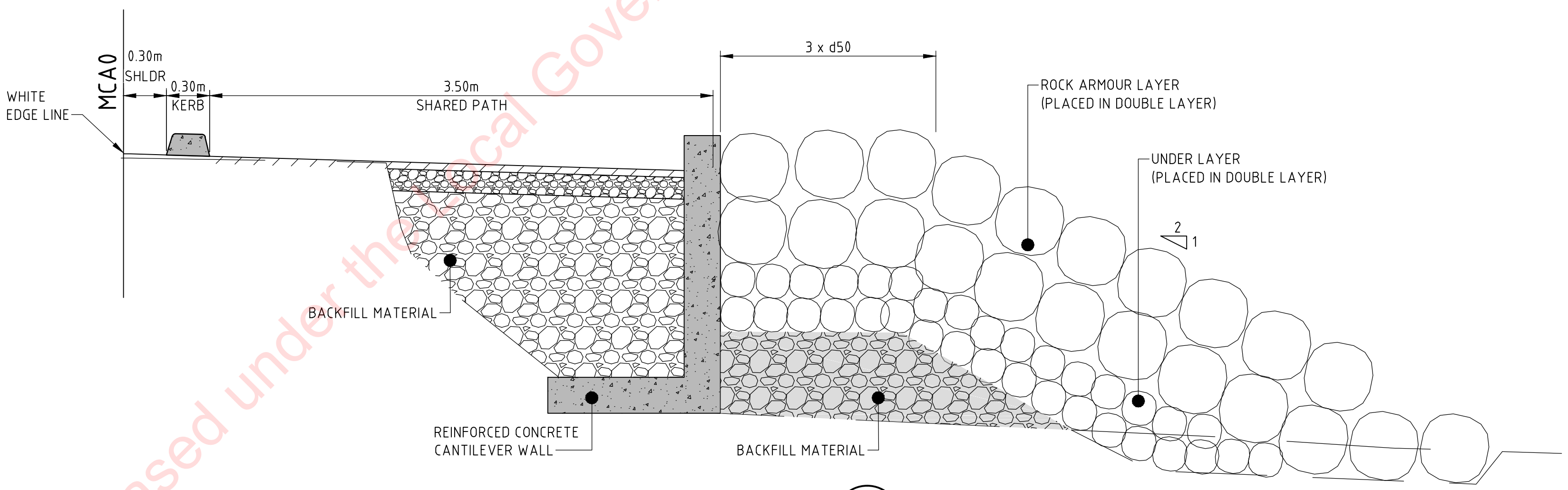

SECTION A
SCALE 1 : 25

DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1

Last modified: Aug 21 2017 By Phillip Cook

NOT FOR CONSTRUCTION

REV	REVISIONS	DRN	CHK	APP	DATE
C	FOR REVIEW - MANY SHEETS ADDED, MANY SHEETS RE-NUMBERED	PJ COOK	JP		08/17

SURVEYED
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CAD REVIEW
DESIGN CHECK
DESIGN REVIEW
APPROVED
PROF REGISTRATION:

NOT APPROVED

MWH now part of Stantec

Client: HUTT CITY TE AWA KAIRANGI

HUTT CITY COUNCIL
EASTERN BAYS SHARED PATH - DBC

PLAN - MCA0
LOWRY BAY TO YORK BAY STATION 2140 - 2300

Status Stamp: FOR REVIEW
Date Stamp: 21.08.17
Scales: AS SHOWN
Drawing No.: 80509137-01-001-C229
Rev.: C

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DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1

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C	FOR REVIEW - MANY SHEETS ADDED, MANY SHEETS RE-NUMBERED	PJ COOK	JP		08/17

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CAD REVIEW
DESIGN CHECK
DESIGN REVIEW
APPROVED
PROF REGISTRATION:

NOT APPROVED

MWH now part of Stantec

Client: HUTT CITY TE AWA KAIRANGI

HUTT CITY COUNCIL
EASTERN BAYS SHARED PATH - DBC

PLAN - MCA0
YORK BAY STATION 2300 - 2480

Status Stamp: FOR REVIEW
Date Stamp: 21.08.17
Scales: 1 : 250
Drawing No.: 80509137-01-001-C230
Rev.: C

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DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1

Last modified: Aug 21 2017 By Phillip Cook

NOT FOR CONSTRUCTION

REV	REVISIONS	DRN	CHK	APP	DATE
C	FOR REVIEW - MANY SHEETS ADDED, MANY SHEETS RE-NUMBERED	PJ COOK	JP		08/17

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CAD REVIEW	
DESIGN CHECK	
DESIGN REVIEW	NOT APPROVED
APPROVED	
PROF REGISTRATION:	

MWH. now part of Stantec

Client: HUTT CITY TE AWA KAIRANGI

HUTT CITY COUNCIL
EASTERN BAYS SHARED PATH - DBC

PLAN - MCA0
YORK BAY STATION 2480 - 2680

Status Stamp: FOR REVIEW

Date Stamp: 21.08.17

Scales 1 : 250

Drawing No. 80509137-01-001-C231

Rev. C

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DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1

Last modified: Aug 21 2017 By Phillip Cook

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REV	REVISIONS	DRN	CHK	APP	DATE
C	FOR REVIEW - MANY SHEETS ADDED, MANY SHEETS RE-NUMBERED	PJ COOK	JP		08/17

SURVEYED
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CAD REVIEW
DESIGN CHECK
DESIGN REVIEW
APPROVED
PROF REGISTRATION:

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Client: HUTT CITY TE AWA KAIRANGI

HUTT CITY COUNCIL
EASTERN BAYS SHARED PATH - DBC

PLAN - MCA0
YORK BAY TO MAHINA BAY STATION 2680 - 2873

Status Stamp: FOR REVIEW
Date Stamp: 21.08.17
Scales: AS SHOWN
Drawing No.: 80509137-01-001-C232
Rev.: C

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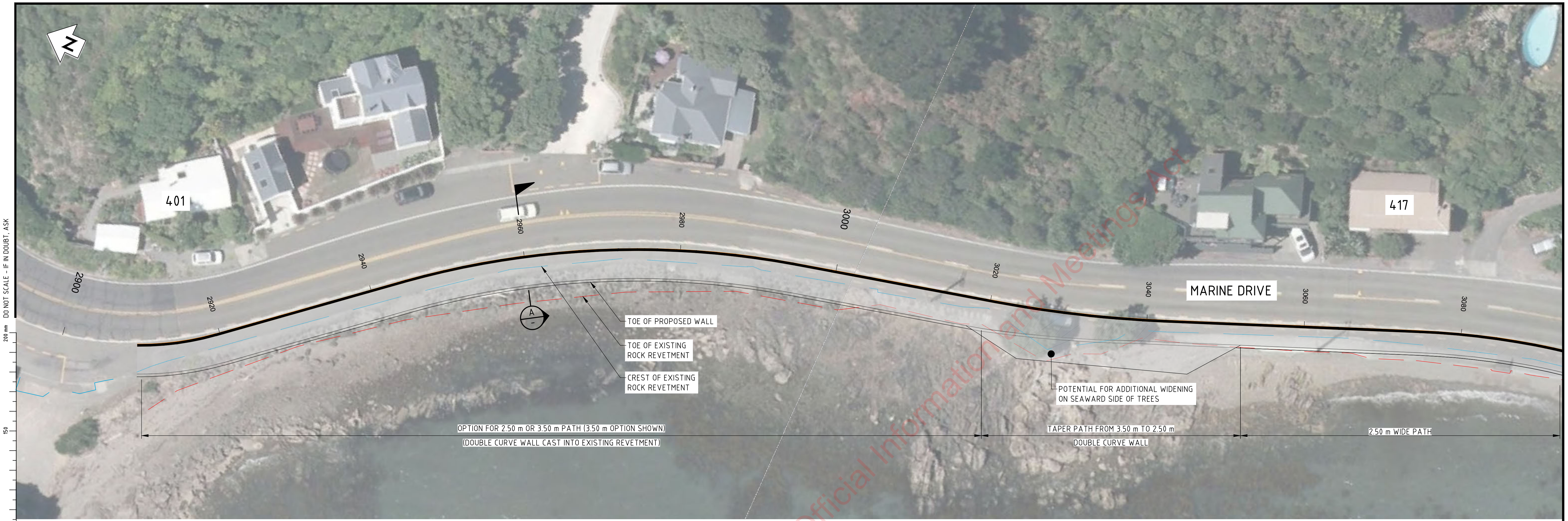
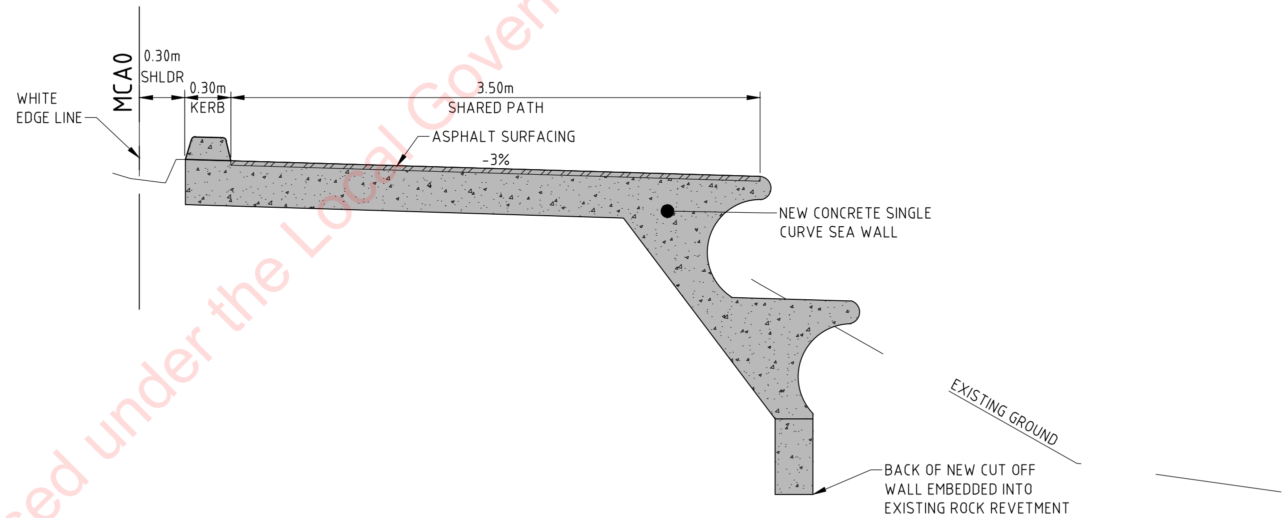


PLAN
SCALE 1 : 250



SECTION A -
SCALE 1 : 25

DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1

Last modified: Aug 21 2017 By Phillip Cook

NOT FOR CONSTRUCTION

REV	REVISIONS	DRN	CHK	APP	DATE
C	FOR REVIEW - MANY SHEETS ADDED, MANY SHEETS RE-NUMBERED	PJ COOK	JP		08/17

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DESIGN CHECK
DESIGN REVIEW
APPROVED
PROF REGISTRATION:

NOT APPROVED

MWH. now part of Stantec

Client: HUTT CITY TE AWA KAIRANGI

HUTT CITY COUNCIL
EASTERN BAYS SHARED PATH - DBC

PLAN - MCA0
MAHINA BAY STATION 2900 - 3080 (CURVED WALL OPTION)

Status Stamp: FOR REVIEW
Date Stamp: 21.08.17
Scales: AS SHOWN
Drawing No.: 80509137-01-001-C233
Rev.: C

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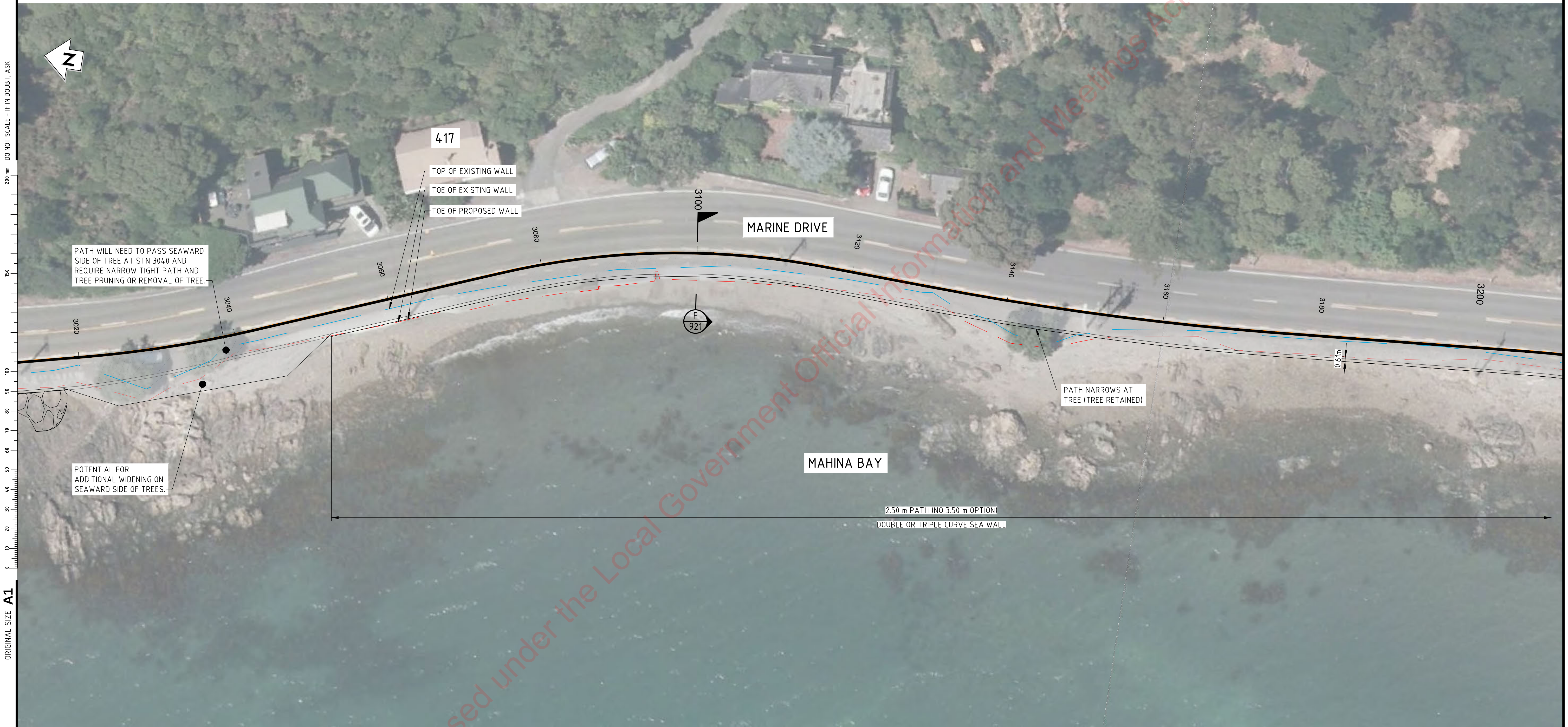

DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1

Last modified: Aug 21 2017 By Phillip Cook

NOT FOR CONSTRUCTION

REV	REVISIONS	DRN	CHK	APP	DATE
C	FOR REVIEW - MANY SHEETS ADDED, MANY SHEETS RE-NUMBERED	PJ COOK	JP		08/17

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DESIGN CHECK
DESIGN REVIEW
APPROVED
PROF REGISTRATION:

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Client: HUTT CITY TE AWA KAIRANGI

HUTT CITY COUNCIL
EASTERN BAYS SHARED PATH - DBC

PLAN - MCA0
MAHINA BAY STATION 3020 - 3200

Status Stamp: FOR REVIEW
Date Stamp: 21.08.17
Scales: 1 : 250 (A1)
Drawing No.: 80509137-01-001-C234
Rev.: C

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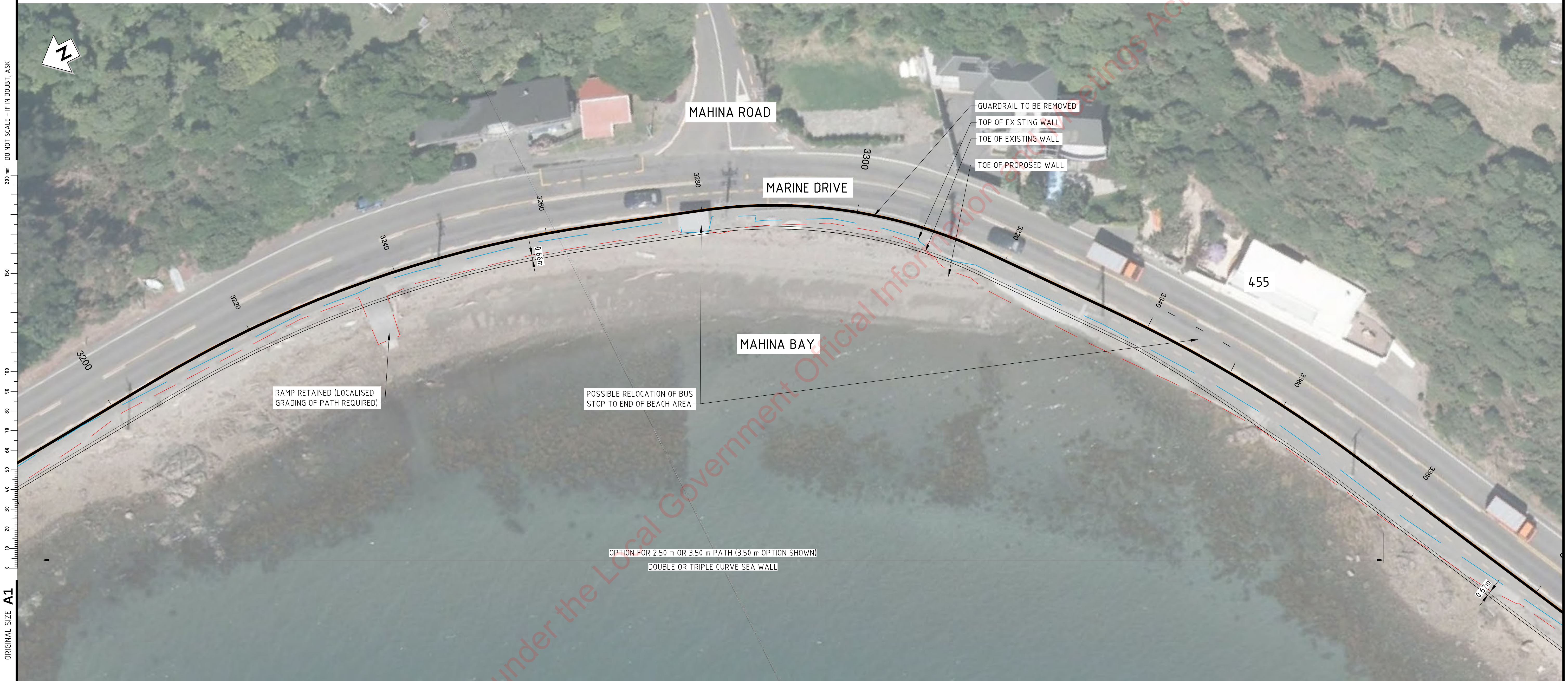
DO NOT SCALE - IF IN DOUBT, ASK



ORIGINAL SIZE A1

Last modified: Aug 21 2017 By Phillip Cook

NOT FOR CONSTRUCTION

REV	REVISIONS	DRN	CHK	APP	DATE
C	FOR REVIEW - MANY SHEETS ADDED, MANY SHEETS RE-NUMBERED	PJ COOK	JP		08/17

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DESIGN REVIEW
APPROVED
PROF REGISTRATION:

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Client: HUTT CITY TE AWA KAIRANGI

HUTT CITY COUNCIL
EASTERN BAYS SHARED PATH - DBC

PLAN - MCA0
MAHINA BAY STATION 3200 - 3380

Status Stamp: FOR REVIEW
Date Stamp: 21.08.17
Scales: 1 : 250 (A1)
Drawing No.: 80509137-01-001-C235
Rev.: C

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DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1

Last modified: Aug 21 2017 By Phillip Cook

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REV	REVISIONS	DRN	CHK	APP	DATE
C	FOR REVIEW - MANY SHEETS ADDED, MANY SHEETS RE-NUMBERED	PJ COOK	JP		08/17

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APPROVED
PROF REGISTRATION:

NOT APPROVED

MWH now part of Stantec

Client: HUTT CITY TE AWA KAIRANGI

HUTT CITY COUNCIL
EASTERN BAYS SHARED PATH - DBC

PLAN - MCA0
MAHINA BAY TO SUNSHINE BAY STATION 3360 - 3540

Status Stamp	FOR REVIEW
Date Stamp	21.08.17
Scales	AS SHOWN
Drawing No.	80509137-01-001-C236
Rev.	C

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DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1

Last modified: Aug 21 2017 By Phillip Cook

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REV	REVISIONS	DRN	CHK	APP	DATE
C	FOR REVIEW - MANY SHEETS ADDED, MANY SHEETS RE-NUMBERED	PJ COOK	JP		08/17

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CAD REVIEW
DESIGN CHECK
DESIGN REVIEW
APPROVED
PROF REGISTRATION:

NOT APPROVED

MWH now part of Stantec

Client: HUTT CITY TE AWA KAIRANGI

HUTT CITY COUNCIL
EASTERN BAYS SHARED PATH - DBC

PLAN - MCA0
MAHINA BAY TO SUNSHINE BAY STATION 3540 - 3680

Status Stamp: FOR REVIEW
Date Stamp: 21.08.17
Scales: AS SHOWN
Drawing No.: 80509137-01-001-C237
Rev.: C

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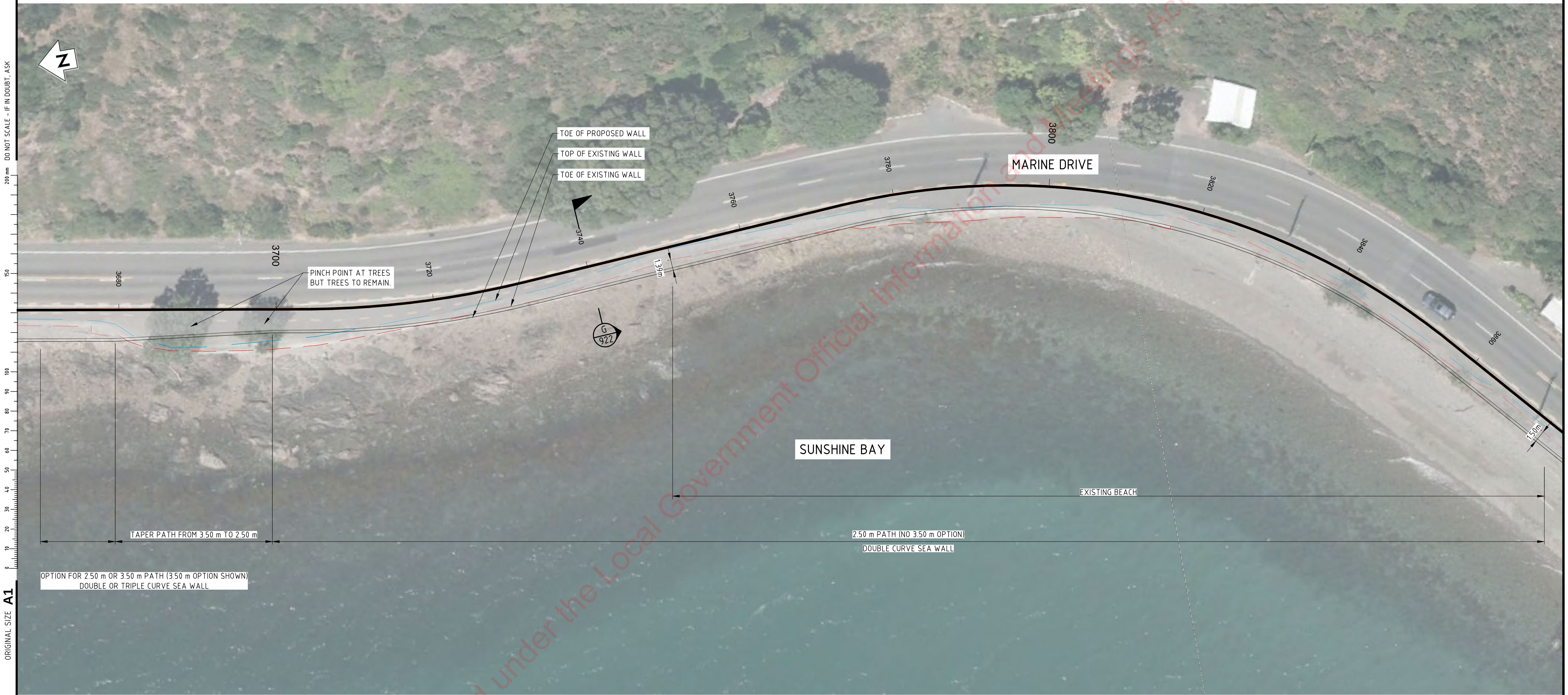

DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1

Last modified: Aug 21 2017 By Phillip Cook

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REV	REVISIONS	DRN	CHK	APP	DATE
C	FOR REVIEW - MANY SHEETS ADDED, MANY SHEETS RE-NUMBERED	PJ COOK	JP		08/17

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CAD REVIEW
DESIGN CHECK
DESIGN REVIEW
APPROVED **NOT APPROVED**
PROF REGISTRATION:

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Client: HUTT CITY TE AWA KAIRANGI

HUTT CITY COUNCIL
EASTERN BAYS SHARED PATH - DBC

PLAN - MCA0
SUNSHINE BAY STATION 3680 - 3860

Status Stamp: **FOR REVIEW**
Date Stamp: **21.08.17**
Scales: 1 : 250 (A1)
Drawing No.: 80509137-01-001-C238
Rev.: C

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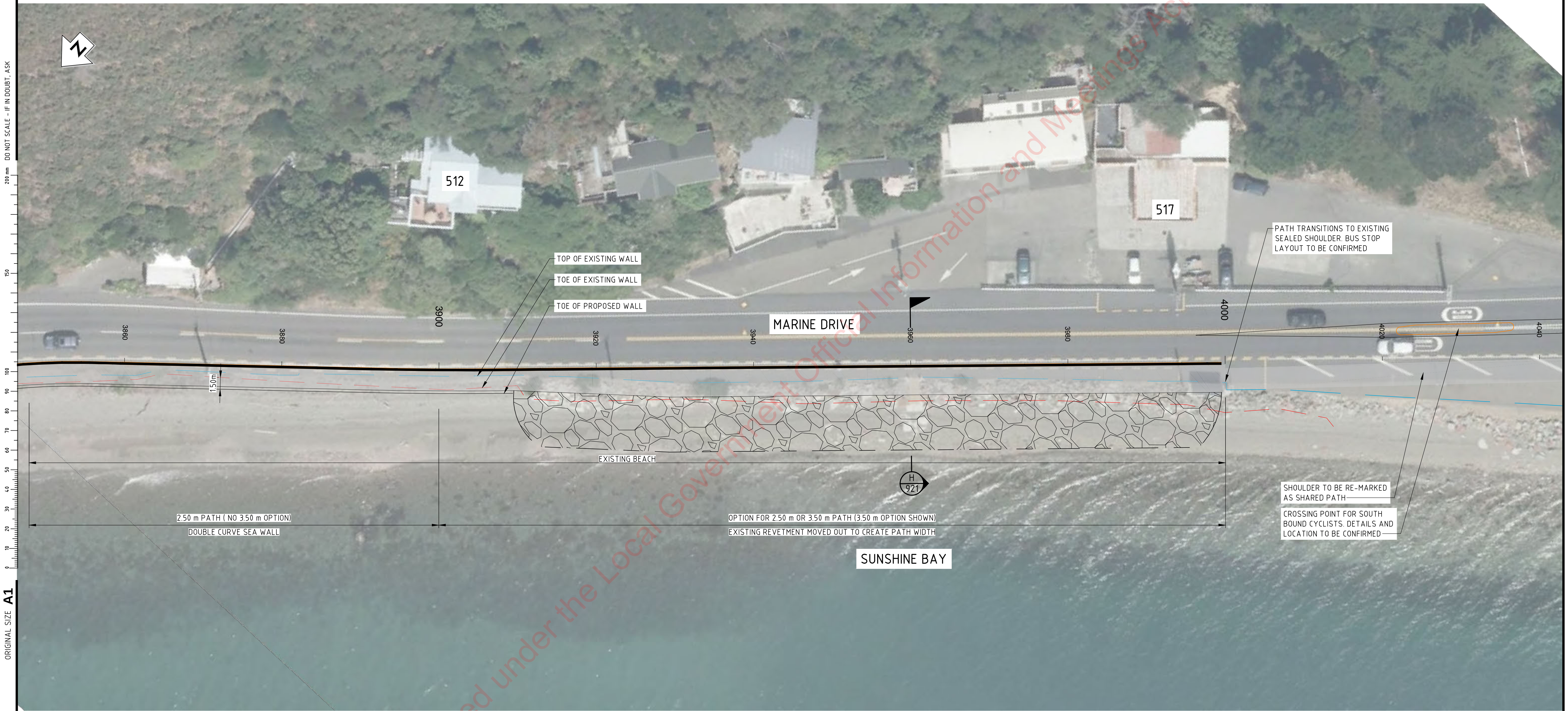

DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1

Last modified: Aug 21 2017 By Phillip Cook

NOT FOR CONSTRUCTION

REV	REVISIONS	DRN	CHK	APP	DATE
C	FOR REVIEW - MANY SHEETS ADDED, MANY SHEETS RE-NUMBERED	PJ COOK	JP		08/17

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CAD REVIEW
DESIGN CHECK
DESIGN REVIEW
APPROVED
PROF REGISTRATION:

NOT APPROVED

MWH. now part of Stantec

Client: HUTT CITY TE AWA KAIRANGI

HUTT CITY COUNCIL
EASTERN BAYS SHARED PATH - DBC

PLAN - MCA0
SUNSHINE BAY STATION 3860 - 4040

Status Stamp: FOR REVIEW
Date Stamp: 21.08.17
Scales: 1 : 250 (A1)
Drawing No. 80509137-01-001-C239
Rev. C

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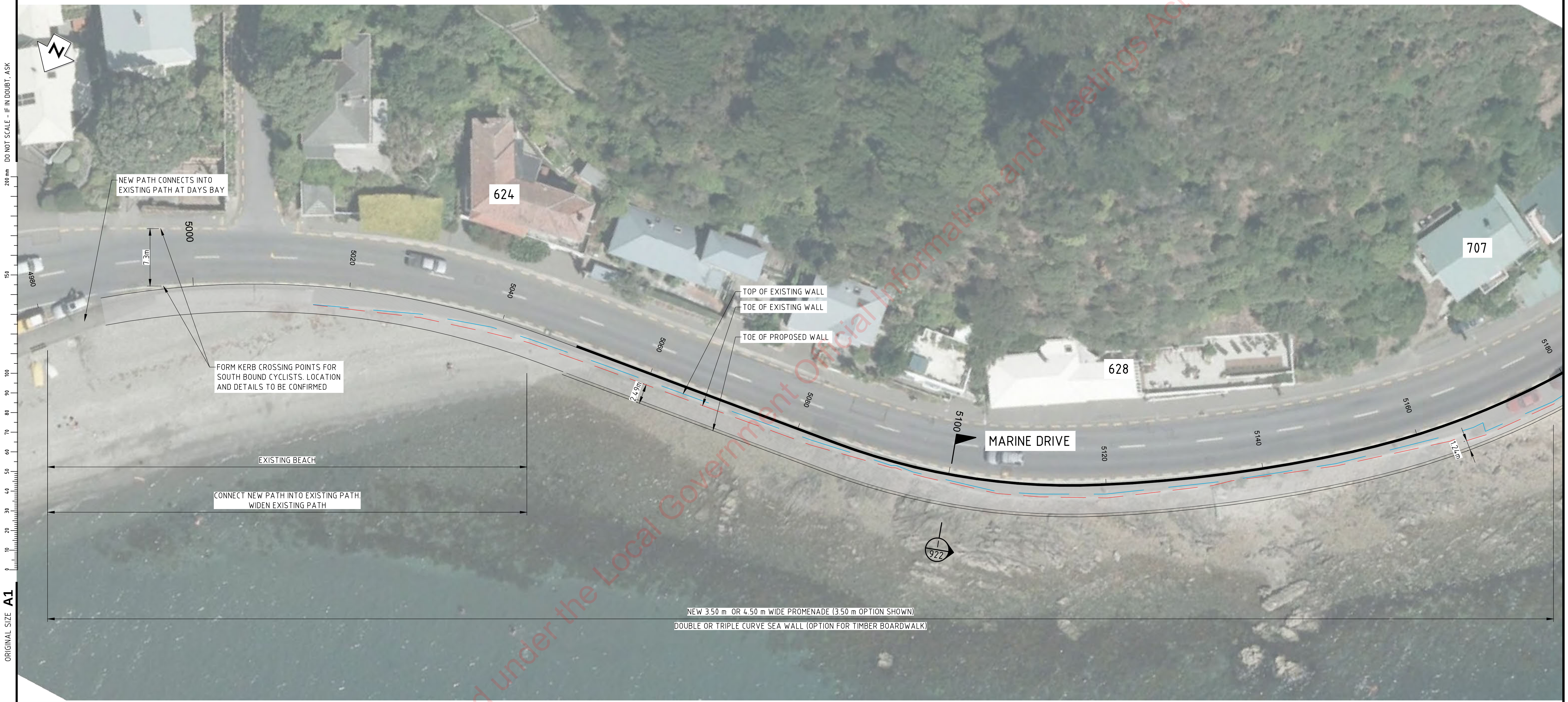

DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1

Last modified: Aug 21 2017 By Phillip Cook

NOT FOR CONSTRUCTION

REV	REVISIONS	DRN	CHK	APP	DATE
C	FOR REVIEW - MANY SHEETS ADDED, MANY SHEETS RE-NUMBERED	PJ COOK	JP		08/17

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APPROVED
PROF REGISTRATION

NOT APPROVED

MWH. now part of Stantec

Client: HUTT CITY TE AWA KAIRANGI

HUTT CITY COUNCIL
EASTERN BAYS SHARED PATH - DBC

PLAN - MCA0
WINDY POINT STATION 4980 - 5180

Status Stamp: FOR REVIEW

Date Stamp: 21.08.17

Scales: AS SHOWN

Drawing No. 80509137-01-001-C240

Rev. C

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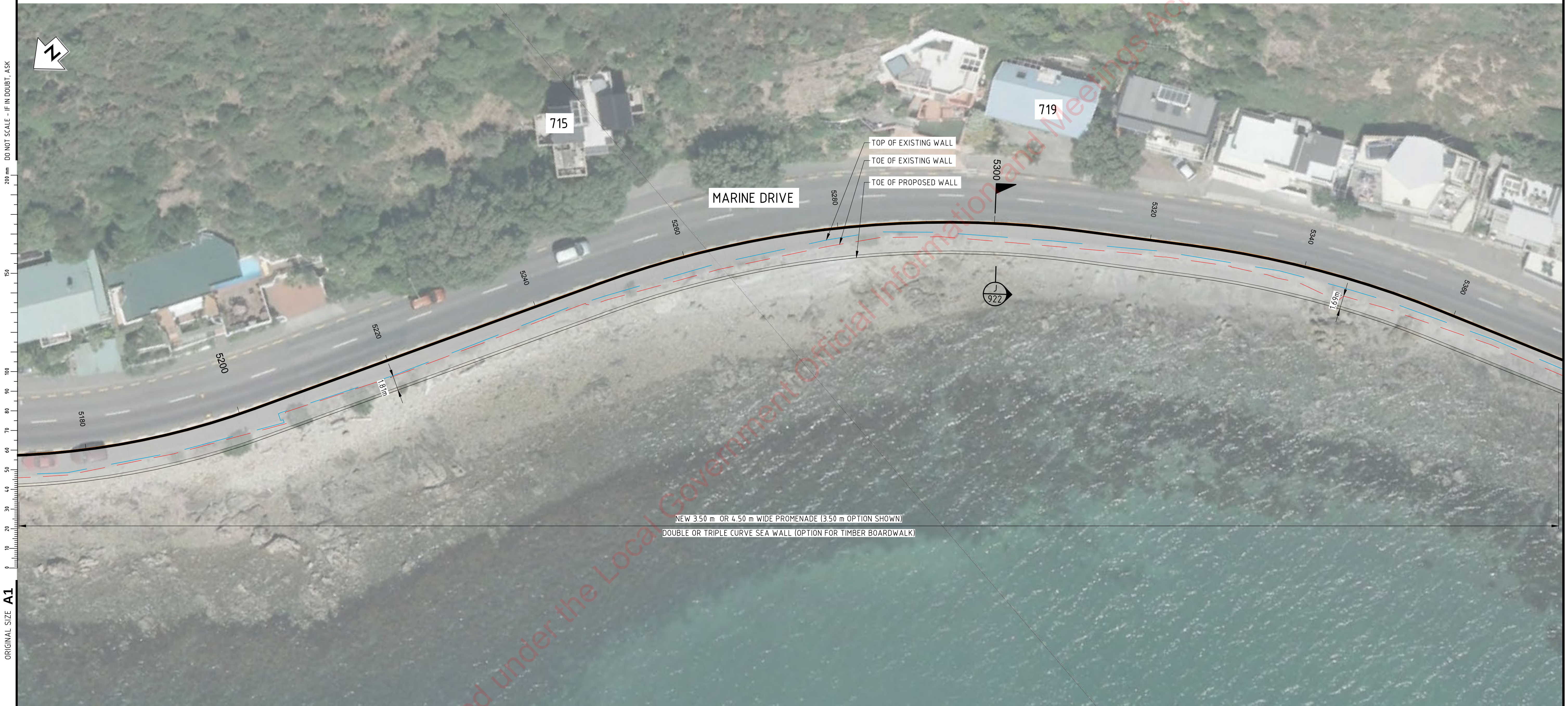

DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1

Last modified: Aug 21 2017 By Phillip Cook

NOT FOR CONSTRUCTION

REV	REVISIONS	DRN	CHK	APP	DATE
C	FOR REVIEW - MANY SHEETS ADDED, MANY SHEETS RE-NUMBERED	PJ COOK	JP		08/17

SURVEYED
DESIGNED
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CAD REVIEW
DESIGN CHECK
DESIGN REVIEW
APPROVED
PROF REGISTRATION:

NOT APPROVED

MWH now part of Stantec

Client: HUTT CITY TE AWA KAIRANGI

HUTT CITY COUNCIL
EASTERN BAYS SHARED PATH - DBC

PLAN - MCA0
WINDY POINT STATION 5180 - 5360

Status Stamp: FOR REVIEW
Date Stamp: 21.08.17
Scales: AS SHOWN
Drawing No.: 80509137-01-001-C241
Rev.: C

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DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1

NOT FOR CONSTRUCTION

REV	REVISIONS	DRN	CHK	APP	DATE
C	FOR REVIEW - MANY SHEETS ADDED, MANY SHEETS RE-NUMBERED	PJ COOK	JP		08/17

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PROF REGISTRATION:	

MWH now part of Stantec

Client: HUTT CITY TE AWA KAIRANGI

HUTT CITY COUNCIL
EASTERN BAYS SHARED PATH - DBC

PLAN - MCA0
WINDY POINT STATION 5360 - 5500

Status Stamp: FOR REVIEW
Date Stamp: 21.08.17
Scales: AS SHOWN
Drawing No.: 80509137-01-001-C242
Rev.: C

Last modified: Aug 21 2017 By Phillip Cook

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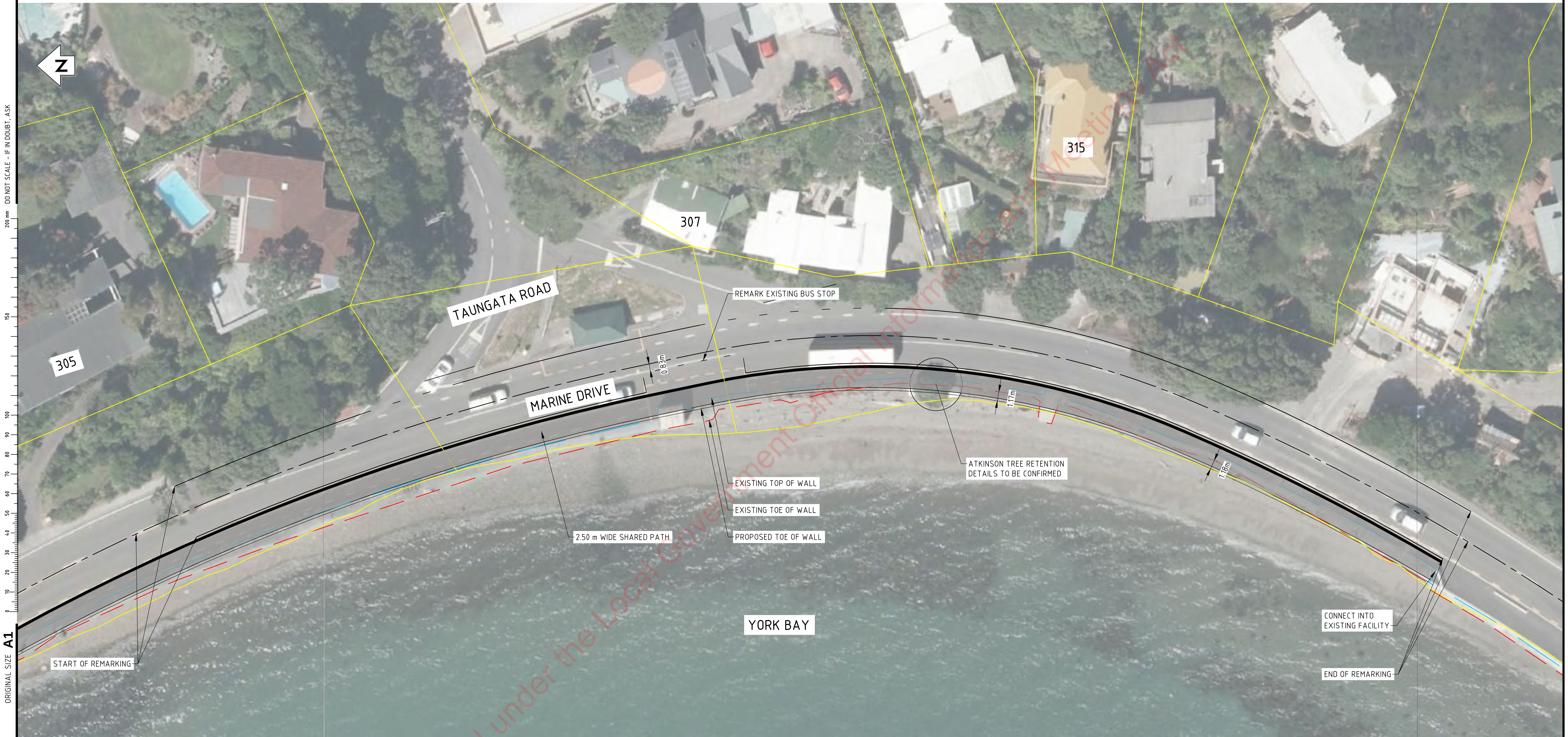

ORIGINAL SIZE A1

DO NOT SCALE - IF IN DOUBT, ASK

Last modified: Aug 25 2017 By Graeme Corin

NOT FOR CONSTRUCTION

REV	REVISIONS	DRN	CHK	APP	DATE

SURVEYED
DESIGNED
DRAWN
CAD REVIEW
DESIGN CHECK
DESIGN REVIEW
APPROVED
PROF REGISTRATION:

NOT APPROVED

MWH now part of Stantec

Client: HUTT CITY TE AWA KAIRANGI

HUTT CITY COUNCIL
EASTERN BAYS SHARED PATH - DBC

PLAN YORK BAY REMARKING
SKETCH

Status Stamp: WORKING PLOT

Date Stamp

Scales: AS SHOWN

Drawing No. 80509137-01-001-SK019

Rev. A

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DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1

Last modified: Aug 25 2017 By Graeme Corin

NOT FOR CONSTRUCTION

REV	REVISIONS	DRN	CHK	APP	DATE

SURVEYED	
DESIGNED	
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CAD REVIEW	
DESIGN CHECK	
DESIGN REVIEW	NOT APPROVED
APPROVED	
PROF REGISTRATION:	

MWH. now part of Stantec

Client: HUTT CITY TE AWA KAIRANGI

HUTT CITY COUNCIL
EASTERN BAYS SHARED PATH - DBC

PLAN YORK BAY REMARKING
TRACKING SKETCH

Status Stamp: WORKING PLOT
Date Stamp
Scales: AS SHOWN
Drawing No. 80509137-01-001-SK020
Rev. A

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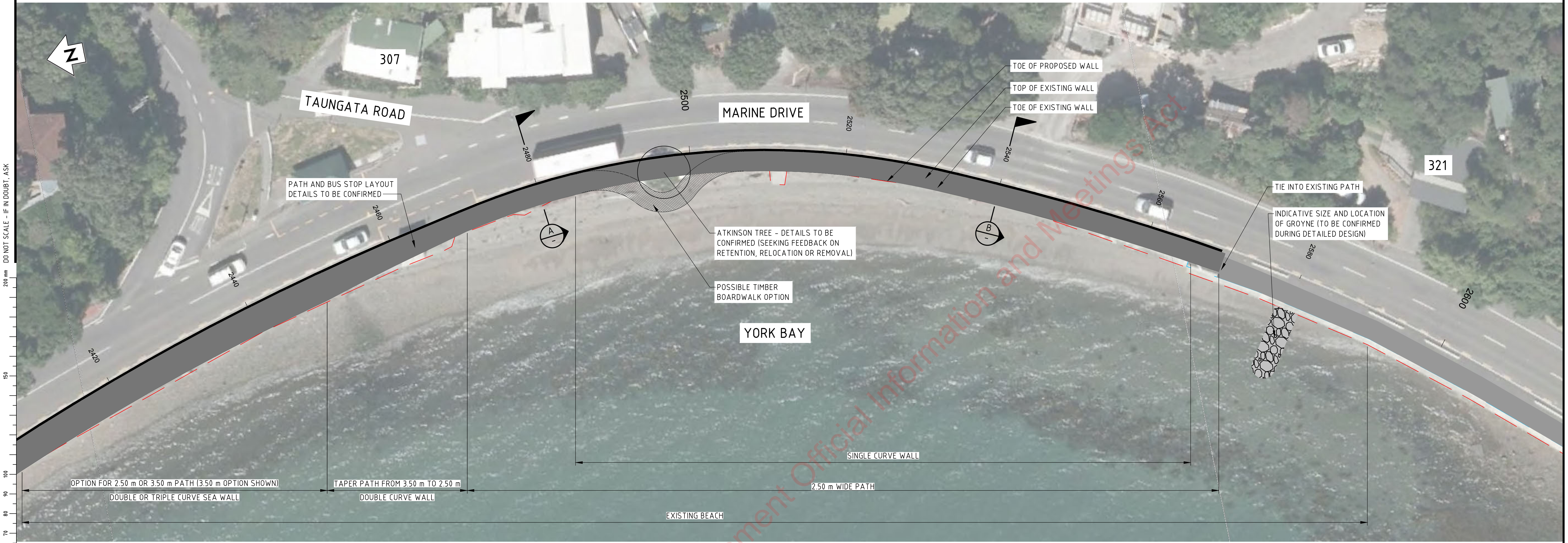
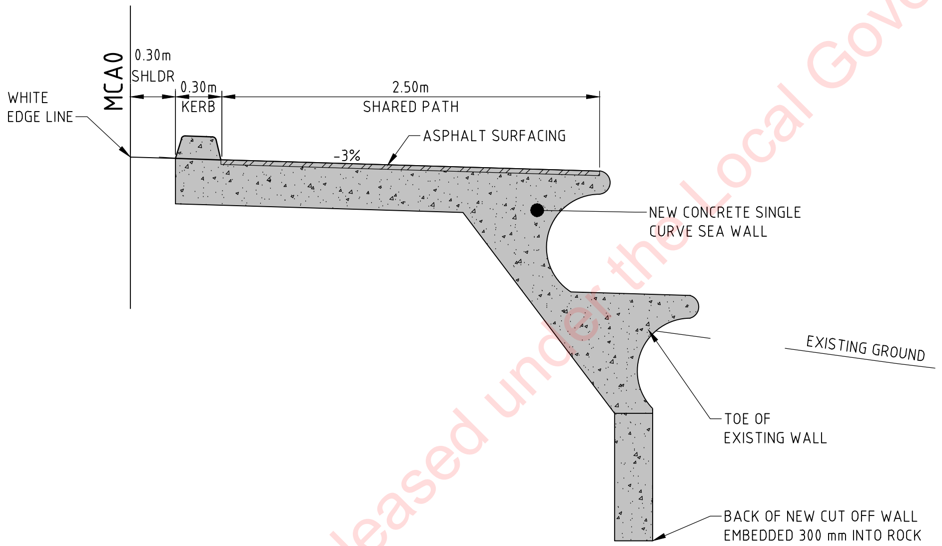
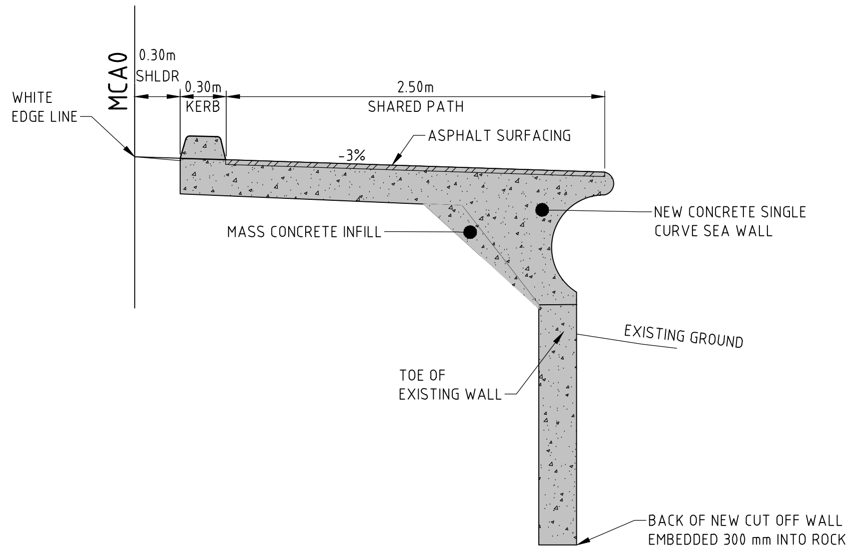


PLAN
SCALE 1 : 250



SECTION A
SCALE 1 : 25



SECTION B
SCALE 1 : 25

THIS OPTION TO REPLACE DRAWINGS C230 & C231 IF THE PREFERRED OPTION.

DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1

Last modified: Aug 22 2017 By Philip Cook

NOT FOR CONSTRUCTION

REV	REVISIONS	DRN	CHK	APP	DATE
B	FOR REVIEW	PJC	JP		08/17

SURVEYED
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CAD REVIEW
DESIGN CHECK
DESIGN REVIEW
APPROVED NOT APPROVED
PROF REGISTRATION:

MWH. now part of Stantec

Client: HUTT CITY TE AWA KAIRANGI

HUTT CITY COUNCIL
EASTERN BAYS SHARED PATH - DBC

PLAN - MCA0
YORK BAY 2.50 m OPTION

Status Stamp: FOR REVIEW
Date Stamp: 21.08.17
Scales: AS SHOWN (A1)
Drawing No. 80509137-01-001-SK007
Rev. B

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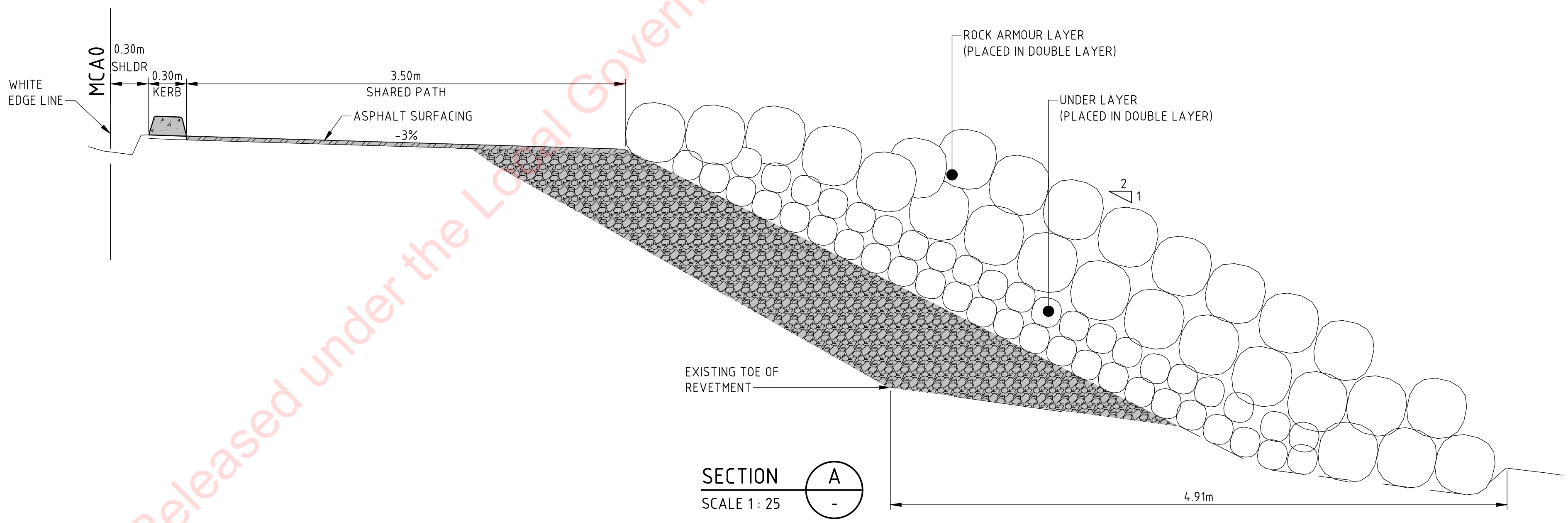
PLAN
SCALE 1 : 250



SECTION A
SCALE 1 : 25

THIS OPTION TO REPLACE DRAWING C233 IF THE PREFERRED OPTION.

NOT FOR CONSTRUCTION

REV	REVISIONS	DRN	CHK	APP	DATE
B	FOR REVIEW	PJC	JP		08/17

SURVEYED
DESIGNED
DRAWN
CAD REVIEW
DESIGN CHECK
DESIGN REVIEW
APPROVED
PROF REGISTRATION:

NOT APPROVED

MWH. now part of Stantec

Client: HUTT CITY TE AWA KAIRANGI

HUTT CITY COUNCIL
EASTERN BAYS SHARED PATH - DBC

PLAN MCA0
MAHINA BAY STATION 2900 - 3080 (REVETMENT OPTION)

Status Stamp: FOR REVIEW
Date Stamp: 21.08.17
Scales: AS SHOWN
Drawing No.: 80509137-01-001-SK009
Rev.: B

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ORIGINAL SIZE A1

Last modified: Aug 22 2017 By Philip Cook

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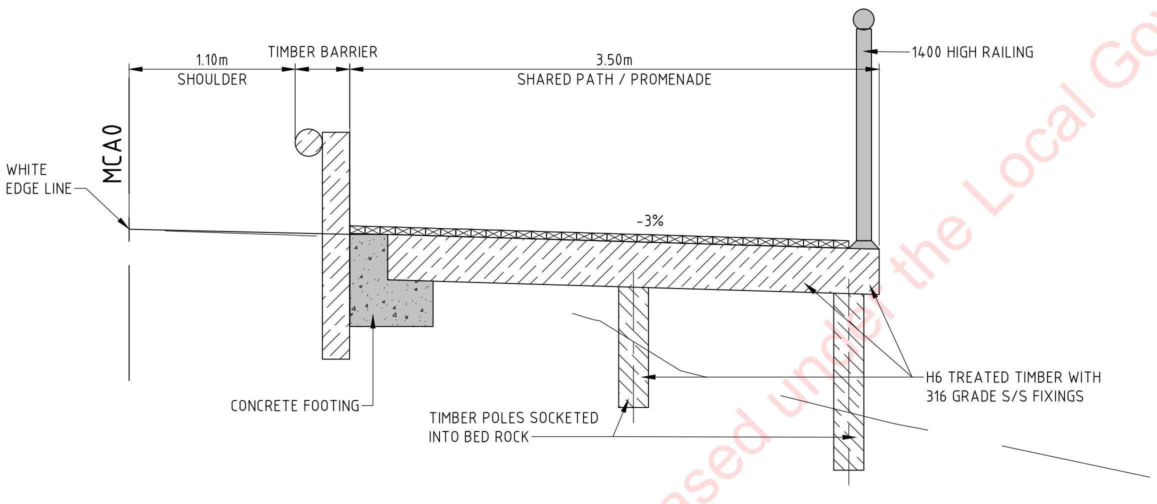
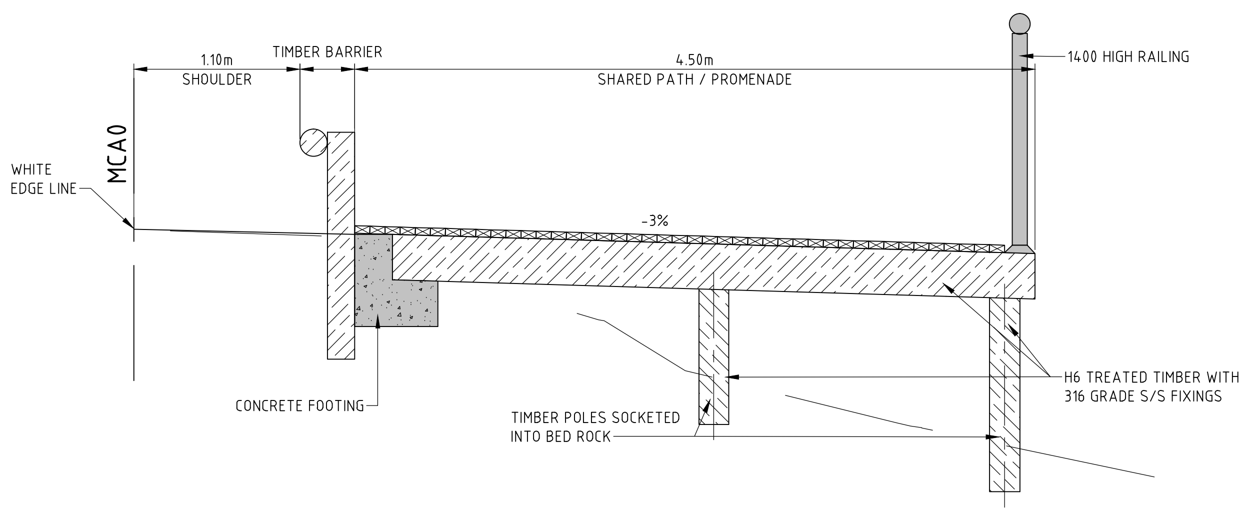
PLAN
SCALE 1 : 500



TYPICAL SECTION 3.50 m OPTION
SCALE 1 : 25



TYPICAL SECTION 4.50 m OPTION
SCALE 1 : 25

THIS OPTION TO REPLACE DRAWINGS C240, C241 & C242 IF THE PREFERRED OPTION.

NOT FOR CONSTRUCTION

REV	REVISIONS	DRN	CHK	APP	DATE
B	FOR REVIEW	PJC	JP		08/17

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DRAWN
CAD REVIEW
DESIGN CHECK
DESIGN REVIEW
APPROVED
PROF REGISTRATION:

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MWH. now part of Stantec

Client: HUTT CITY TE AWA KAIRANGI

HUTT CITY COUNCIL
EASTERN BAYS SHARED PATH - DBC

PLAN - MCA0
WINDY POINT STATION 5020 - 5420 TIMBER BOARDWALK OPTION

Status Stamp: FOR REVIEW
Date Stamp: 21.08.17
Scales: AS SHOWN
Drawing No.: 80509137-01-001-SK010
Rev.: B

ORIGINAL SIZE A1
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Last modified: Aug 22 2017 By Philip Cook

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Appendix D Community Consultation Summary Report

Appendix E Concept Plans – Recommended option

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ORIGINAL SIZE A1

Last modified: Sep 19 2017 By Graeme Corin

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REV	REVISIONS	DRN	CHK	APP	DATE
D	PRELIMINARY DESIGN	GC	JP		19.09.17
C	FOR REVIEW - MANY SHEETS ADDED, MANY SHEETS RE-NUMBERED	PJ COOK	JP		08/17

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CAD REVIEW	
DESIGN CHECK	
DESIGN REVIEW	
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PROF REGISTRATION:	

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Client: HUTT CITY TE AWA KAIRANGI

HUTT CITY COUNCIL
EASTERN BAYS SHARED PATH - DBC

PLAN - MCA0
POINT HOWARD SORRENTO BAY STATION 480 - 720

Status Stamp	PRELIMINARY
Date Stamp	19.09.17
Scales	1 : 250 (A1)
Drawing No.	80509137-01-001-C220
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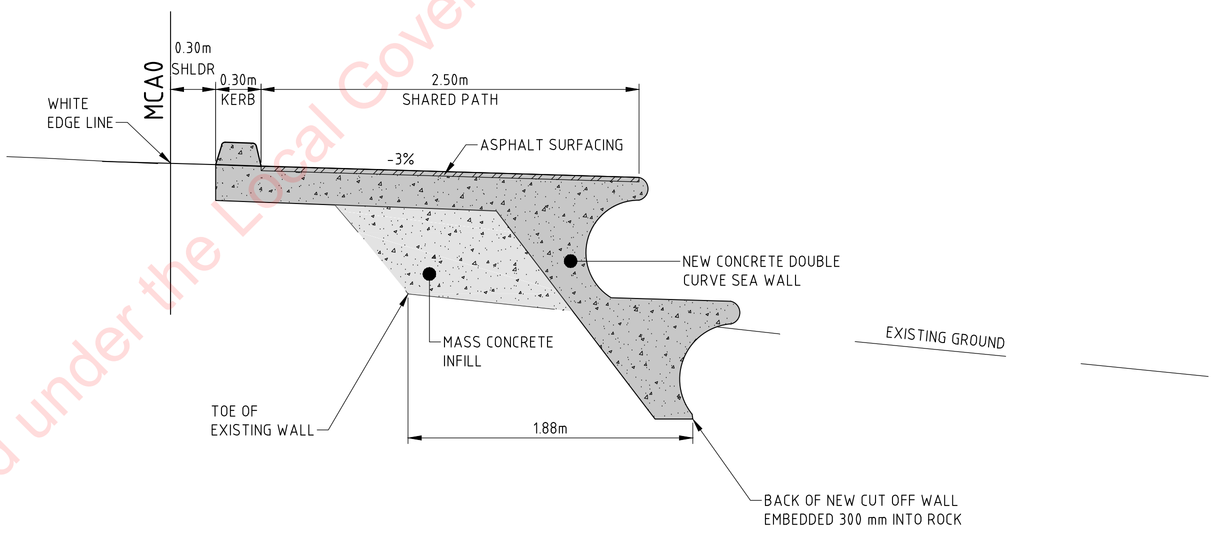

SECTION A -
SCALE 1 : 25

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ORIGINAL SIZE A1

Last modified: Sep 19 2017 By Graeme Corin

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REV	REVISIONS	DRN	CHK	APP	DATE
D	PRELIMINARY DESIGN	GC	JP		19.09.17
C	FOR REVIEW - MANY SHEETS ADDED, MANY SHEETS RE-NUMBERED	PJ COOK	JP		08/17

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CAD REVIEW
DESIGN CHECK
DESIGN REVIEW
APPROVED **NOT APPROVED**
PROF REGISTRATION:

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Client: HUTT CITY TE AWA KAIRANGI

HUTT CITY COUNCIL
EASTERN BAYS SHARED PATH - DBC

PLAN - MCA0
POINT HOWARD SORRENTO BAY STATION 720 - 900

Status Stamp: **PRELIMINARY**
Date Stamp: **19.09.17**
Scales: 1 : 250 (A1)
Drawing No.: 80509137-01-001-C221
Rev.: D

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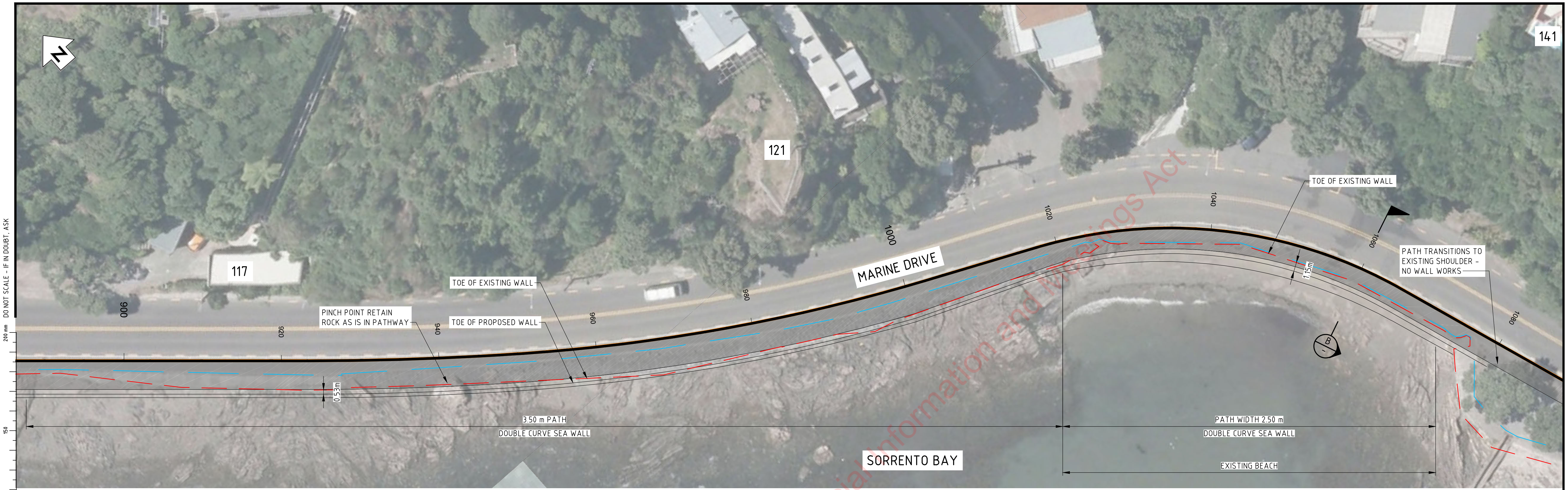

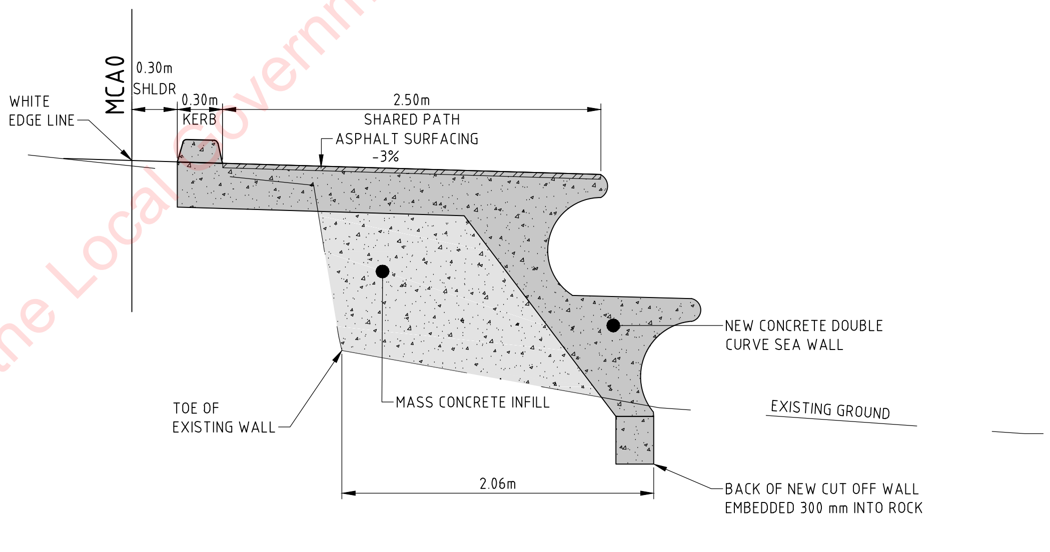

SECTION B
SCALE 1 : 25

DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1

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REV	REVISIONS	DRN	CHK	APP	DATE
D	PRELIMINARY DESIGN	GC	JP		19.09.17
C	FOR REVIEW - MANY SHEETS ADDED, MANY SHEETS RE-NUMBERED	PJ COOK	JP		08/17

SURVEYED
DESIGNED
DRAWN
CAD REVIEW
DESIGN CHECK
DESIGN REVIEW
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PROF REGISTRATION:

NOT APPROVED

MWH now part of Stantec

Client: HUTT CITY TE AWA KAIRANGI

HUTT CITY COUNCIL
EASTERN BAYS SHARED PATH - DBC

PLAN - MCA0
POINT HOWARD SORRENTO BAY STATION 900 - 1080

Status Stamp: PRELIMINARY
Date Stamp: 19.09.17
Scales: 1 : 250 (A1)
Drawing No.: 80509137-01-001-C222
Rev.: D

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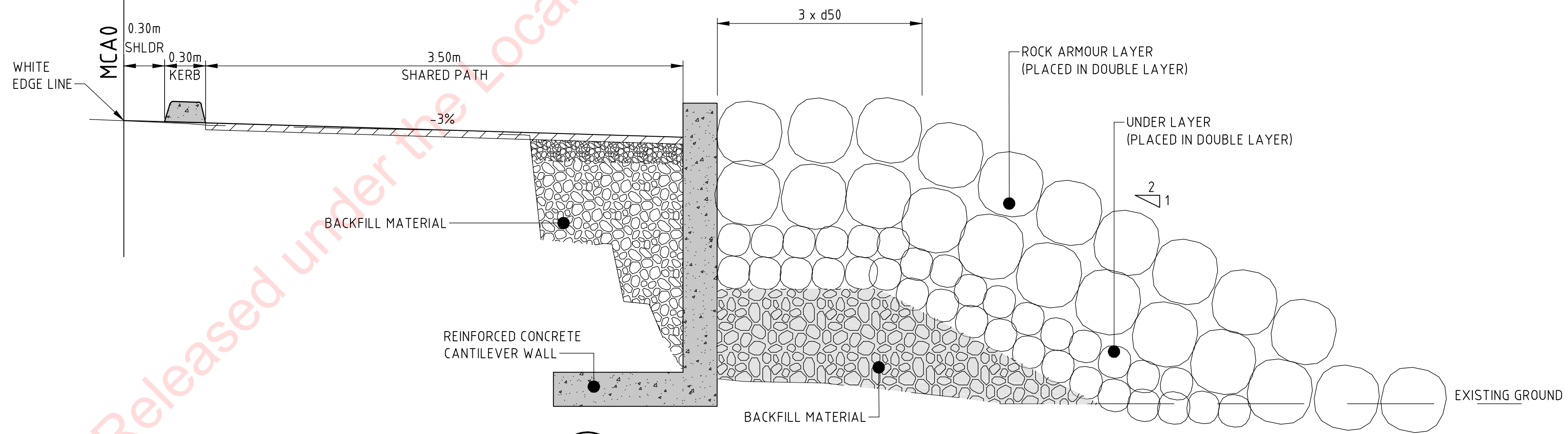

SECTION C
SCALE 1 : 25

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ORIGINAL SIZE A1

Last modified: Sep 19 2017 By Graeme Corin

NOT FOR CONSTRUCTION

REV	REVISIONS	DRN	CHK	APP	DATE
D	PRELIMINARY DESIGN	GC	JP		19.09.17
C	FOR REVIEW - MANY SHEETS ADDED, MANY SHEETS RE-NUMBERED	PJ COOK	JP		08/17

SURVEYED
DESIGNED
DRAWN
CAD REVIEW
DESIGN CHECK
DESIGN REVIEW
APPROVED NOT APPROVED
PROF REGISTRATION:

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Client: HUTT CITY TE AWA KAIRANGI

HUTT CITY COUNCIL
EASTERN BAYS SHARED PATH - DBC

PLAN - MCA0
POINT HOWARD - LOWRY BAY STATION 1060 - 1260

Status Stamp: PRELIMINARY
Date Stamp: 19.09.17
Scales: AS SHOWN
Drawing No. 80509137-01-001-C223
Rev. D

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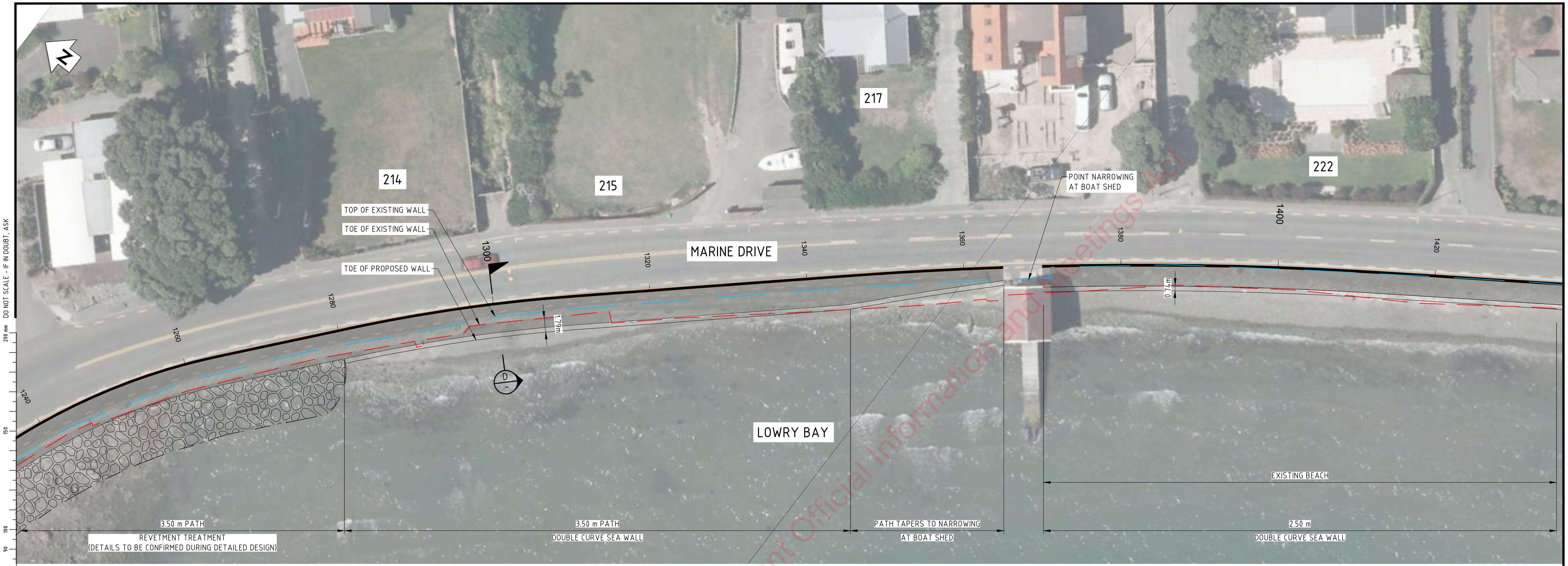

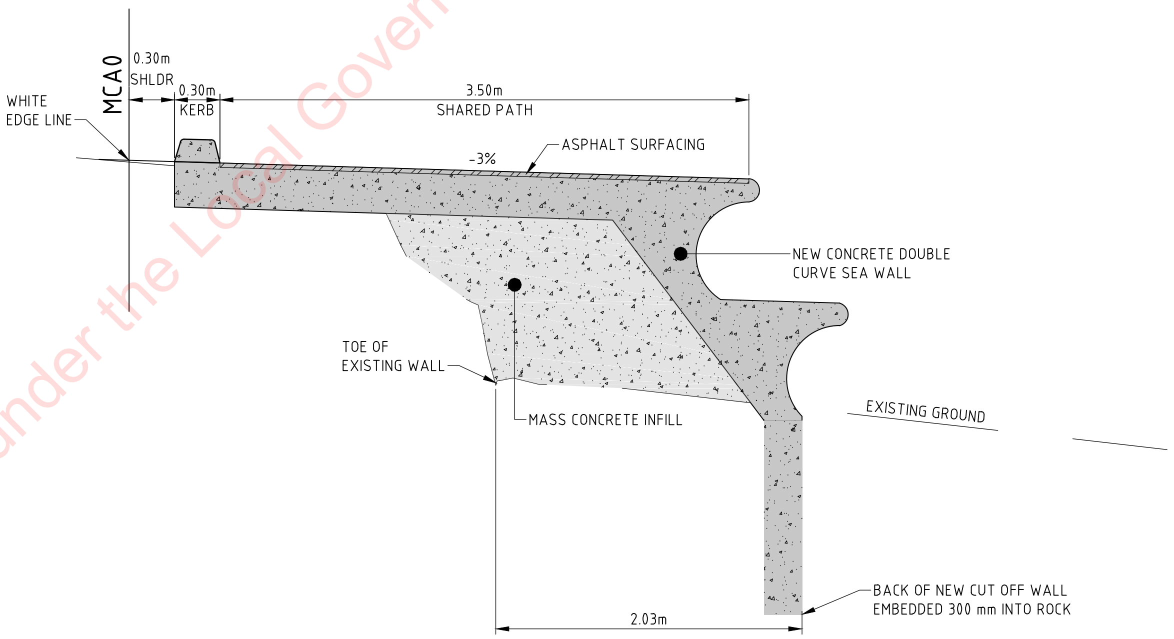

SECTION D
SCALE 1 : 25

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ORIGINAL SIZE A1

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D	PRELIMINARY DESIGN	GC	JP		19.09.17
C	FOR REVIEW - MANY SHEETS ADDED, MANY SHEETS RE-NUMBERED	PJ COOK	JP		08/17

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PROF REGISTRATION:

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Client: HUTT CITY TE AWA KAIRANGI

HUTT CITY COUNCIL
EASTERN BAYS SHARED PATH - DBC

PLAN - MCA0
LOWRY BAY STATION 1240 - 1420

Status Stamp: PRELIMINARY
Date Stamp: 19.09.17
Scales: 1 : 250
Drawing No. 80509137-01-001-C224
Rev. D

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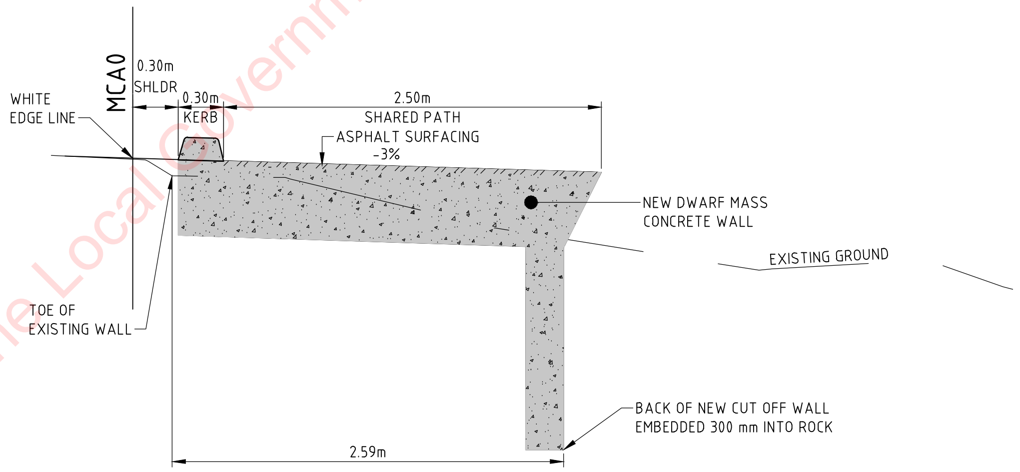

SECTION E
SCALE 1 : 25

ORIGINAL SIZE A1

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REV	REVISIONS	DRN	CHK	APP	DATE
D	PRELIMINARY DESIGN	GC	JP		19.09.17
C	FOR REVIEW - MANY SHEETS ADDED, MANY SHEETS RE-NUMBERED	PJ COOK	JP		08/17

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DESIGNED
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CAD REVIEW
DESIGN CHECK
DESIGN REVIEW
APPROVED
PROF REGISTRATION:

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Client: HUTT CITY TE AWA KAIRANGI

HUTT CITY COUNCIL
EASTERN BAYS SHARED PATH - DBC

PLAN - MCA0
LOWRY BAY STATION 1420 - 1600

Status Stamp: PRELIMINARY
Date Stamp: 19.09.17
Scales: 1 : 250
Drawing No.: 80509137-01-001-C225
Rev.: D

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ORIGINAL SIZE A1

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REV	REVISIONS	DRN	CHK	APP	DATE
D	PRELIMINARY DESIGN	GC	JP		19.09.17
C	FOR REVIEW - MANY SHEETS ADDED, MANY SHEETS RE-NUMBERED	PJ COOK	JP		08/17

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CAD REVIEW
DESIGN CHECK
DESIGN REVIEW
APPROVED **NOT APPROVED**
PROF REGISTRATION:

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Client: HUTT CITY TE AWA KAIRANGI

HUTT CITY COUNCIL
EASTERN BAYS SHARED PATH - DBC

PLAN - MCA0
LOWRY BAY STATION 1600 - 1780

Status Stamp: **PRELIMINARY**

Date Stamp: 19.09.17

Scales: 1 : 250

Drawing No.: 80509137-01-001-C226

Rev.: D

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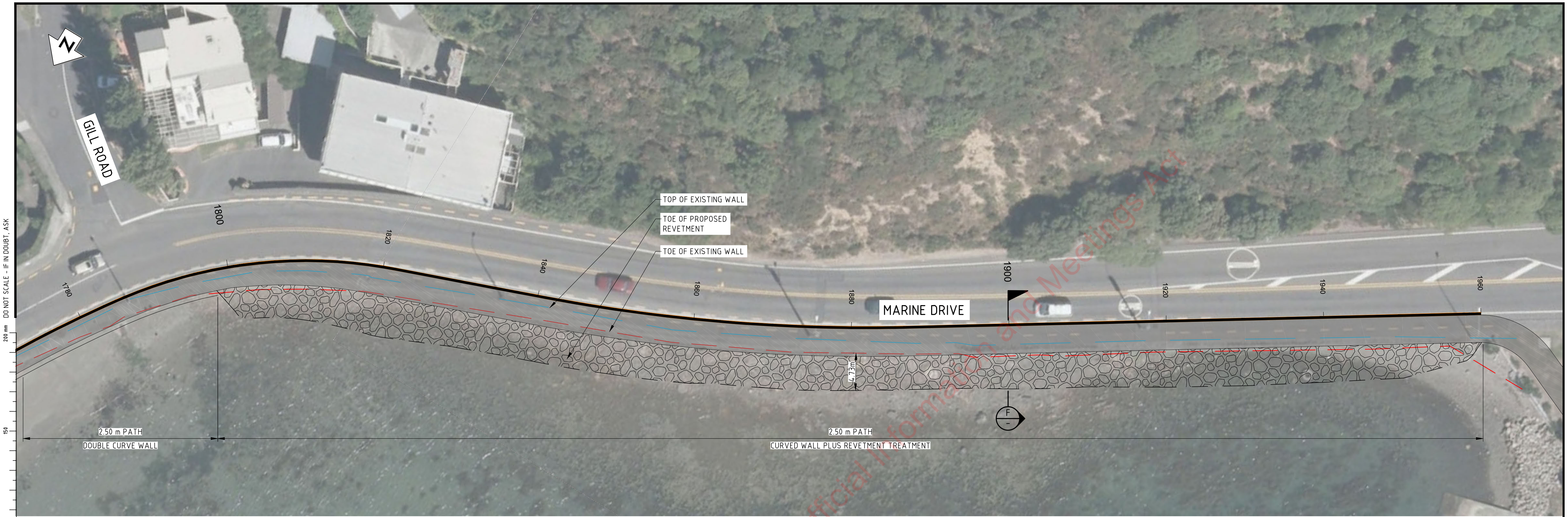

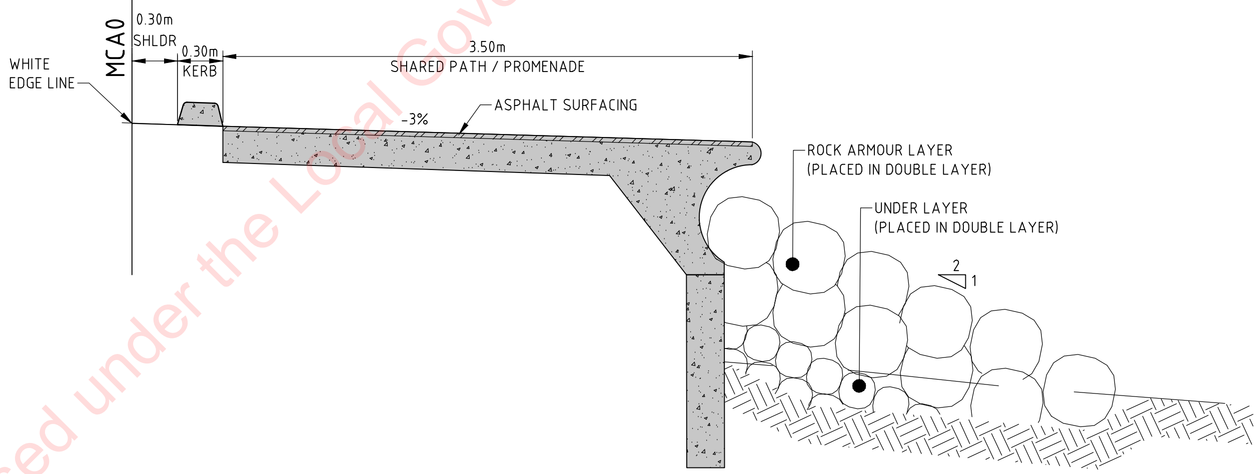

SECTION F / -
SCALE 1 : 25

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ORIGINAL SIZE A1

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REV	REVISIONS	DRN	CHK	APP	DATE
D	PRELIMINARY DESIGN	GC	JP		19.09.17
C	FOR REVIEW - MANY SHEETS ADDED, MANY SHEETS RE-NUMBERED	PJ COOK	JP		08/17

SURVEYED
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DRAWN
CAD REVIEW
DESIGN CHECK
DESIGN REVIEW
APPROVED **NOT APPROVED**
PROF REGISTRATION:

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Client: HUTT CITY TE AWA KAIRANGI

HUTT CITY COUNCIL
EASTERN BAYS SHARED PATH - DBC

PLAN - MCA0
LOWRY BAY - YORK BAY STATION 1780 - 1960

Status Stamp: **PRELIMINARY**
Date Stamp: **19.09.17**
Scales: AS SHOWN
Drawing No.: 80509137-01-001-C227
Rev.: D

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DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1

Last modified: Sep 19 2017 By Graeme Corin

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REV	REVISIONS	DRN	CHK	APP	DATE
D	PRELIMINARY DESIGN	GC	JP		19.09.17
C	FOR REVIEW - MANY SHEETS ADDED, MANY SHEETS RE-NUMBERED	PJ COOK	JP		08/17

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CAD REVIEW	
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DESIGN REVIEW	NOT APPROVED
APPROVED	
PROF REGISTRATION:	

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Client: HUTT CITY TE AWA KAIRANGI

HUTT CITY COUNCIL
EASTERN BAYS SHARED PATH - DBC

PLAN - MCA0
LOWRY BAY TO YORK BAY STATION 1960 - 2140

Status Stamp: PRELIMINARY
Date Stamp: 19.09.17
Scales: AS SHOWN
Drawing No. 80509137-01-001-C228
Rev. D

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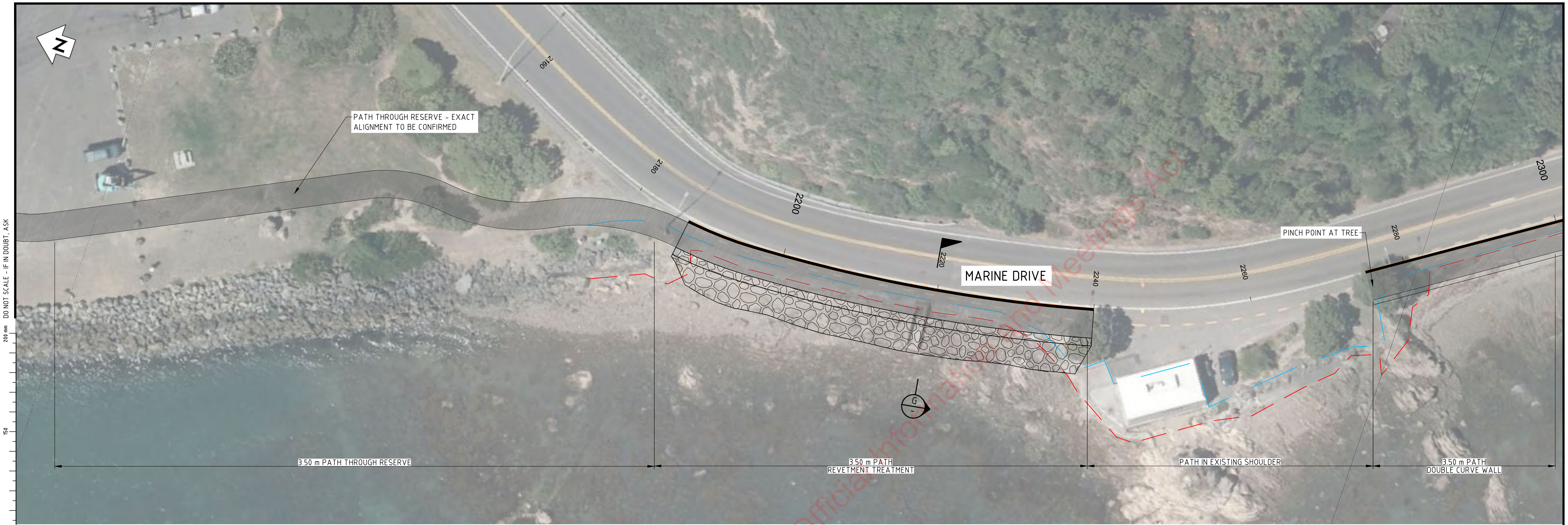

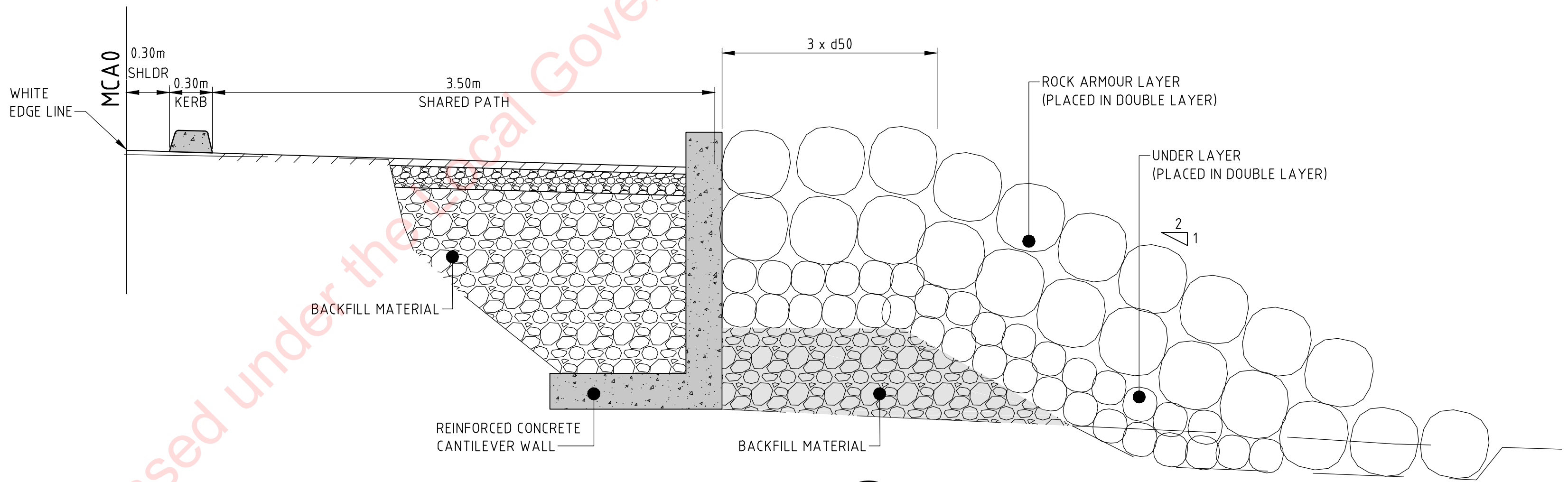

SECTION G -
SCALE 1 : 25

NOT FOR CONSTRUCTION

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C	FOR REVIEW - MANY SHEETS ADDED, MANY SHEETS RE-NUMBERED	PJ COOK	JP		08/17

SURVEYED
DESIGNED
DRAWN
CAD REVIEW
DESIGN CHECK
DESIGN REVIEW
APPROVED
PROF REGISTRATION:

NOT APPROVED

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Client: HUTT CITY TE AWA KAIRANGI

HUTT CITY COUNCIL
EASTERN BAYS SHARED PATH - DBC

PLAN - MCA0
LOWRY BAY TO YORK BAY STATION 2140 - 2300

Status Stamp: PRELIMINARY
Date Stamp: 19.09.17
Scales: AS SHOWN
Drawing No. 80509137-01-001-C229
Rev. D

ORIGINAL SIZE A1
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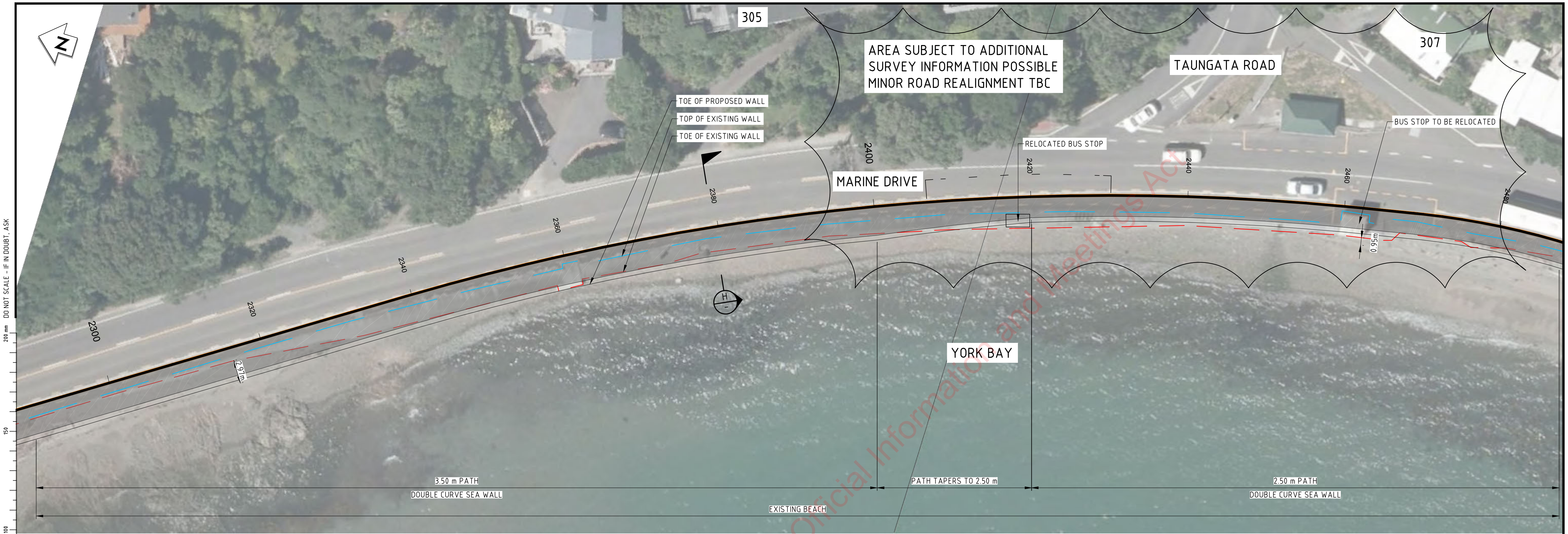

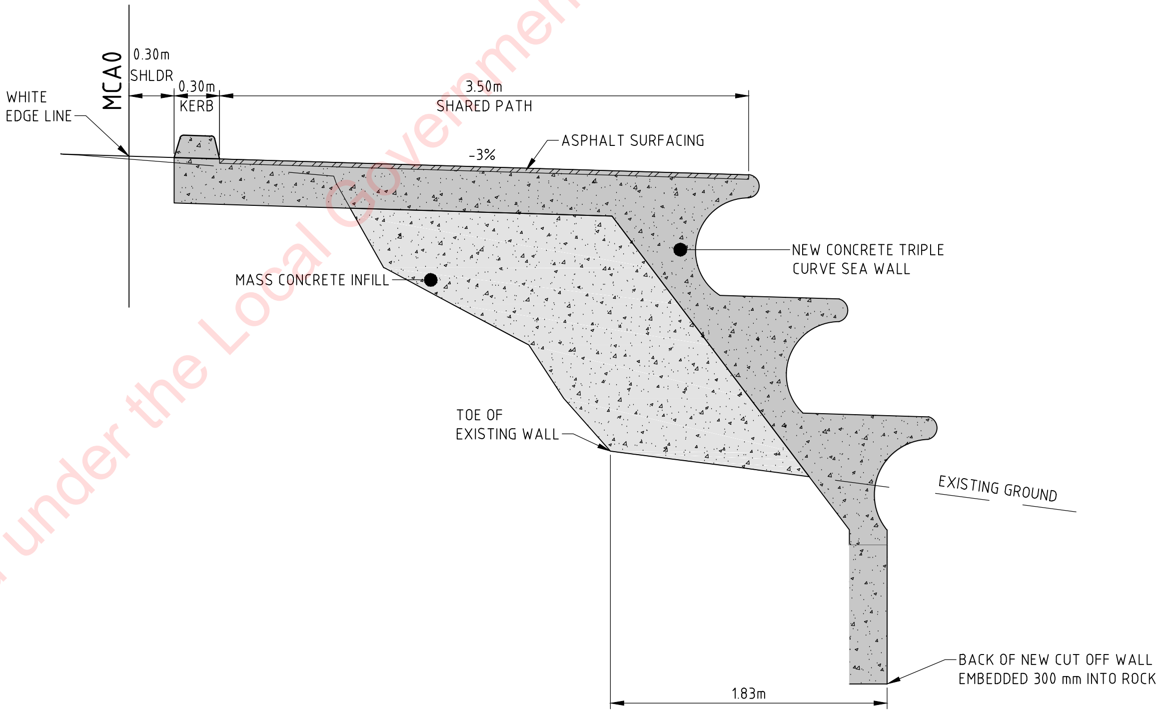

SECTION H
SCALE 1 : 25

DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1

Last modified: Sep 19 2017 By Graeme Corin

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D	PRELIMINARY DESIGN	GC	JP		19.09.17
C	FOR REVIEW - MANY SHEETS ADDED, MANY SHEETS RE-NUMBERED	PJ COOK	JP		08/17

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DESIGN CHECK	
DESIGN REVIEW	
APPROVED	NOT APPROVED
PROF REGISTRATION:	

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Client: HUTT CITY TE AWA KAIRANGI

HUTT CITY COUNCIL
EASTERN BAYS SHARED PATH - DBC

PLAN - MCA0
YORK BAY STATION 2300 - 2480

Status Stamp	PRELIMINARY
Date Stamp	19.09.17
Scales	1 : 250
Drawing No.	80509137-01-001-C230
Rev.	D

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ORIGINAL SIZE A1

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REV	REVISIONS	DRN	CHK	APP	DATE
D	PRELIMINARY DESIGN	GC	JP		19.09.17
C	FOR REVIEW - MANY SHEETS ADDED, MANY SHEETS RE-NUMBERED	PJ COOK	JP		08/17

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CAD REVIEW	
DESIGN CHECK	
DESIGN REVIEW	**NOT APPROVED**
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PROF REGISTRATION:	

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Client: HUTT CITY TE AWA KAIRANGI

HUTT CITY COUNCIL
EASTERN BAYS SHARED PATH - DBC

PLAN - MCA0
YORK BAY STATION 2480 - 2680

Status Stamp: **PRELIMINARY**
Date Stamp: **19.09.17**
Scales: 1 : 250
Drawing No.: 80509137-01-001-C231
Rev.: D

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D	PRELIMINARY DESIGN	GC	JP		19.09.17
C	FOR REVIEW - MANY SHEETS ADDED, MANY SHEETS RE-NUMBERED	PJ COOK	JP		08/17

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CAD REVIEW
DESIGN CHECK
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APPROVED
PROF REGISTRATION:

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MWH now part of Stantec

Client: HUTT CITY TE AWA KAIRANGI

HUTT CITY COUNCIL
EASTERN BAYS SHARED PATH - DBC

PLAN - MCA0
YORK BAY TO MAHINA BAY STATION 2680 - 2873

Status Stamp: PRELIMINARY
Date Stamp: 19.09.17
Scales: AS SHOWN
Drawing No.: 80509137-01-001-C232
Rev.: D

ORIGINAL SIZE A1
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PLAN
SCALE 1 : 250

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ORIGINAL SIZE A1

Last modified: Sep 19 2017 By Graeme Corin

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REV	REVISIONS	DRN	CHK	APP	DATE
D	PRELIMINARY DESIGN	GC	JP		19.09.17
C	FOR REVIEW - MANY SHEETS ADDED, MANY SHEETS RE-NUMBERED	PJ COOK	JP		08/17

SURVEYED
DESIGNED
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CAD REVIEW
DESIGN CHECK
DESIGN REVIEW
APPROVED NOT APPROVED
PROF REGISTRATION:

MWH now part of Stantec

Client: HUTT CITY TE AWA KAIRANGI

HUTT CITY COUNCIL
EASTERN BAYS SHARED PATH - DBC

PLAN - MCA0
MAHINA BAY STATION 2900 - 3080

Status Stamp: PRELIMINARY
Date Stamp: 19.09.17
Scales: AS SHOWN
Drawing No. 80509137-01-001-C233
Rev. D

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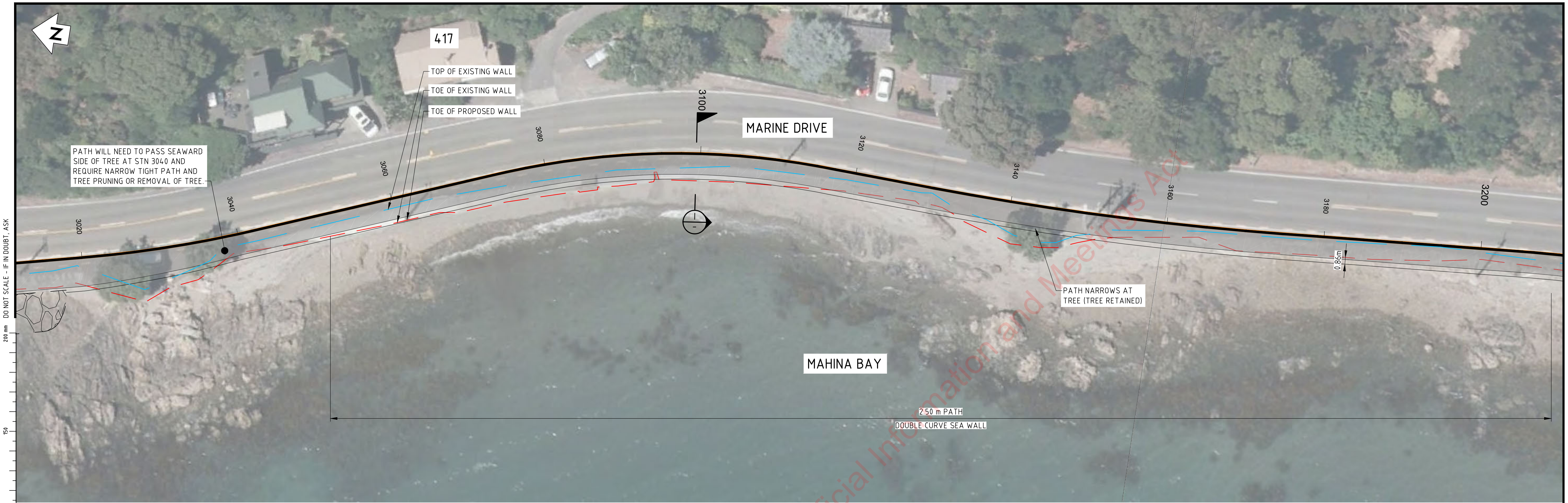

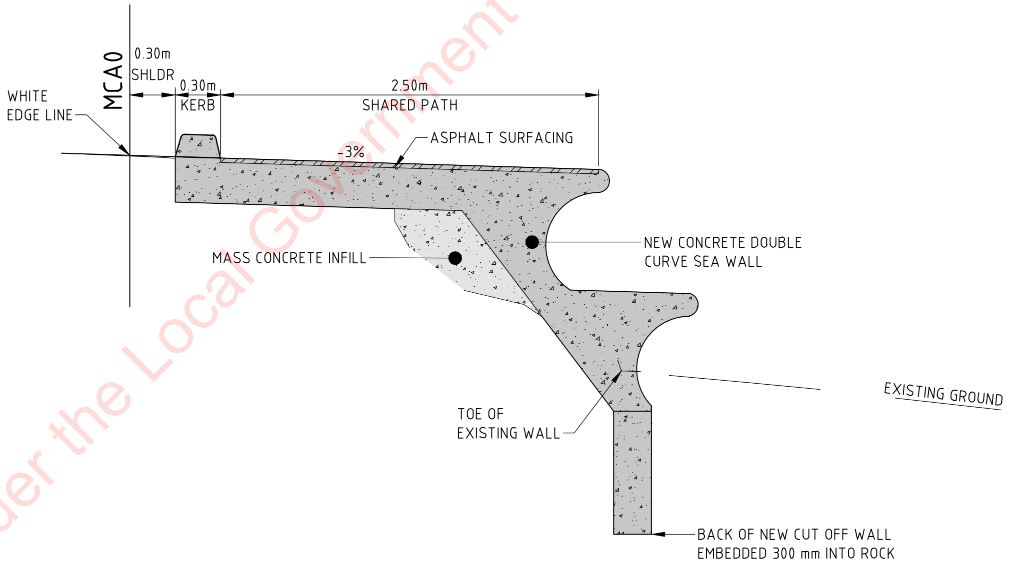

SECTION 1
SCALE 1 : 25

DO NOT SCALE - IF IN DOUBT, ASK

ORIGINAL SIZE A1

Last modified: Sep 19 2017 By Graeme Corin

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REV	REVISIONS	DRN	CHK	APP	DATE
D	PRELIMINARY DESIGN	GC	JP		19.09.17
C	FOR REVIEW - MANY SHEETS ADDED, MANY SHEETS RE-NUMBERED	PJ COOK	JP		08/17

SURVEYED
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CAD REVIEW
DESIGN CHECK
DESIGN REVIEW
APPROVED
PROF REGISTRATION:

NOT APPROVED

MWH now part of Stantec

Client: HUTT CITY TE AWA KAIRANGI

HUTT CITY COUNCIL
EASTERN BAYS SHARED PATH - DBC

PLAN - MCA0
MAHINA BAY STATION 3020 - 3200

Status Stamp: PRELIMINARY
Date Stamp: 19.09.17
Scales: 1 : 250 (A1)
Drawing No. 80509137-01-001-C234
Rev. D

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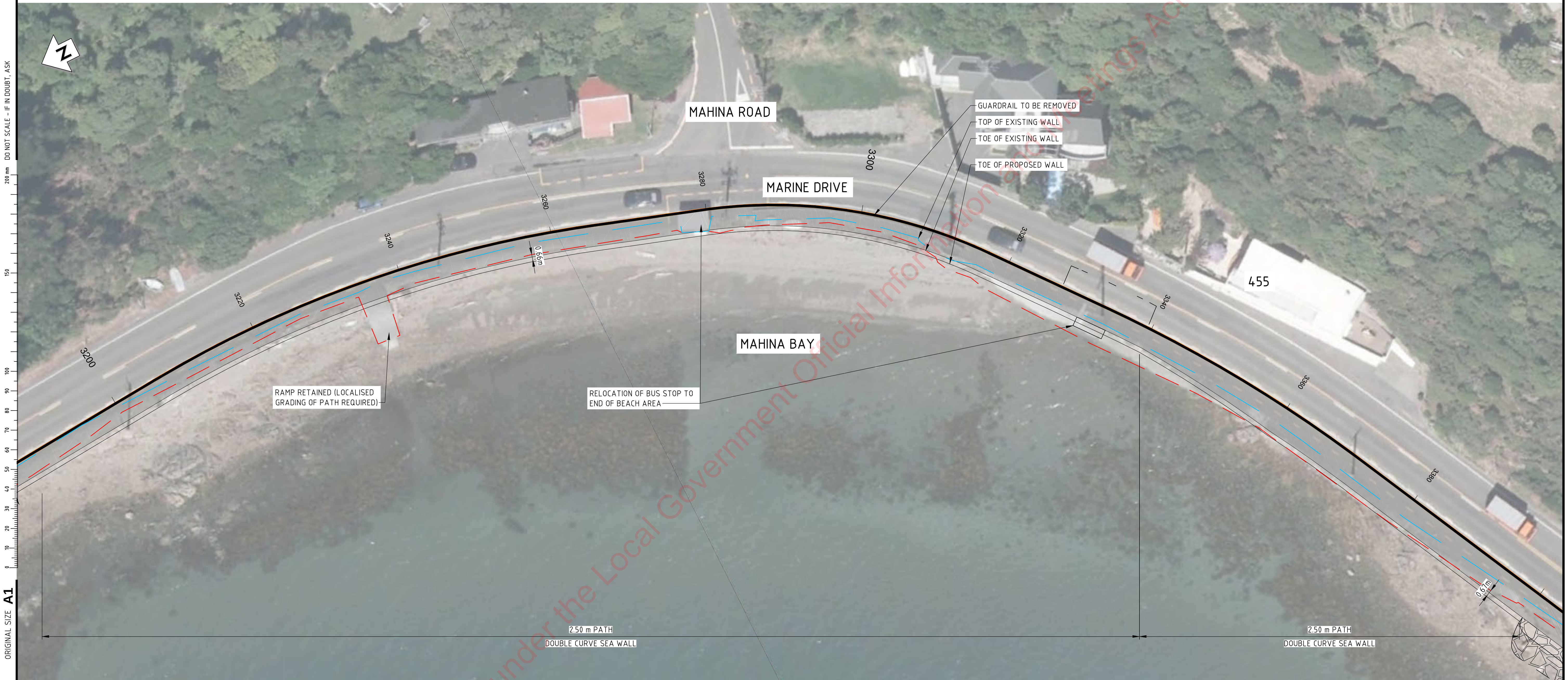

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ORIGINAL SIZE A1

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REV	REVISIONS	DRN	CHK	APP	DATE
D	PRELIMINARY DESIGN	GC	JP		19.09.17
C	FOR REVIEW - MANY SHEETS ADDED, MANY SHEETS RE-NUMBERED	PJ COOK	JP		08/17

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PROF REGISTRATION:	

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Client: HUTT CITY TE AWA KAIRANGI

HUTT CITY COUNCIL
EASTERN BAYS SHARED PATH - DBC

PLAN - MCA0
MAHINA BAY STATION 3200 - 3380

Status Stamp: **PRELIMINARY**

Date Stamp: **19.09.17**

Scales: 1 : 250 (A1)

Drawing No. 80509137-01-001-C235

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HUTT CITY COUNCIL
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PLAN - MCA0
MAHINA BAY TO SUNSHINE BAY STATION 3360 - 3540

Status Stamp: PRELIMINARY
Date Stamp: 19.09.17
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EASTERN BAYS SHARED PATH - DBC

PLAN - MCA0
MAHINA BAY TO SUNSHINE BAY STATION 3540 - 3680

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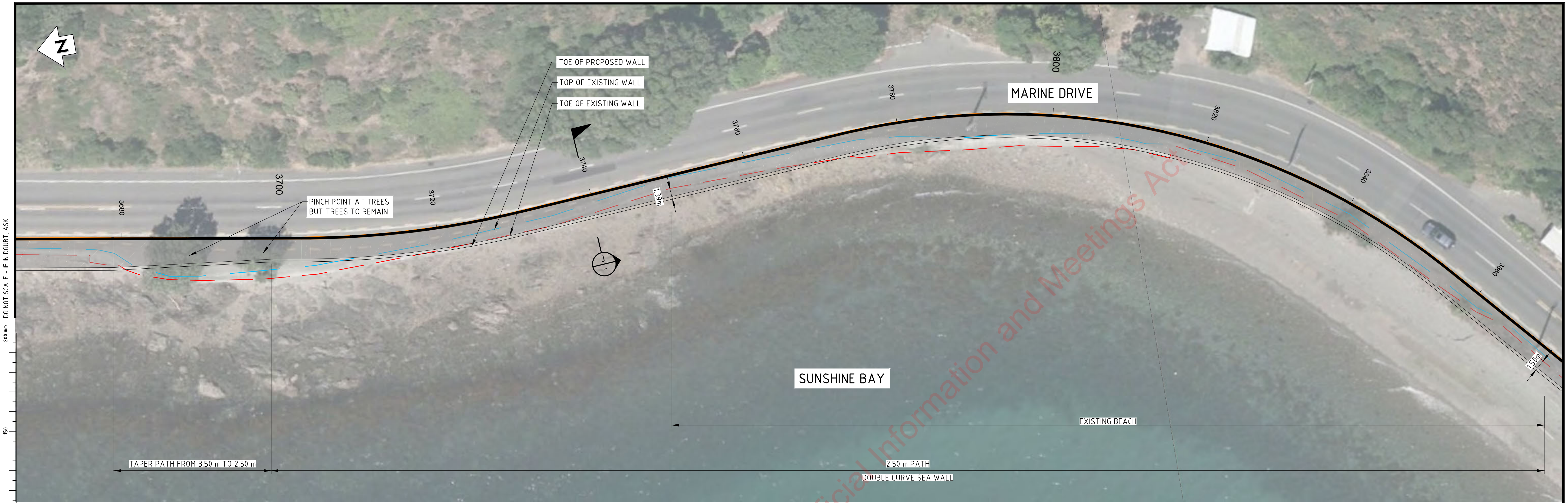

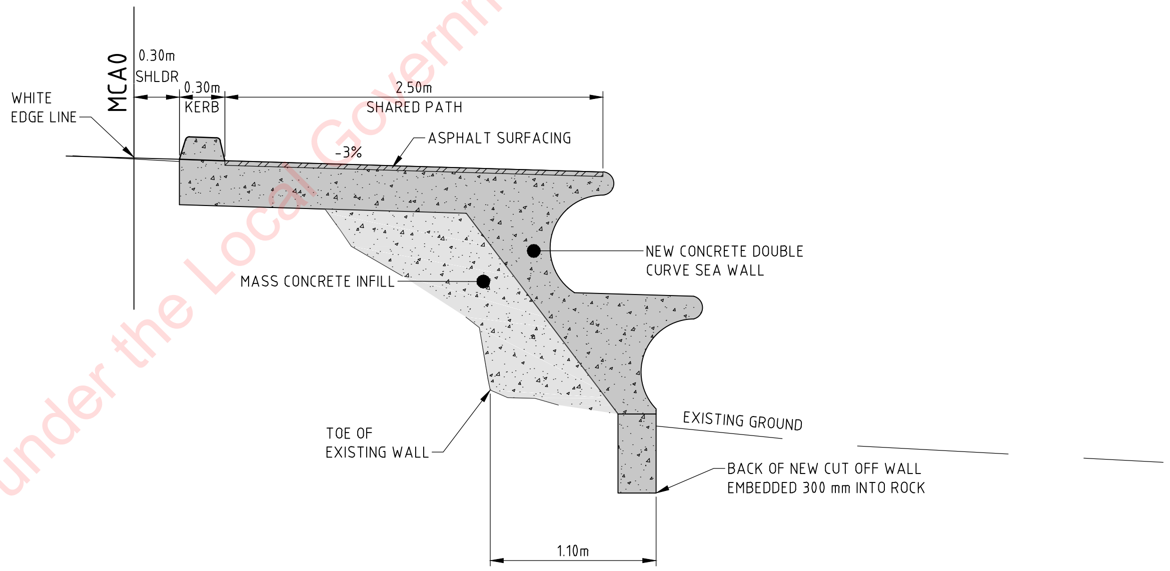

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HUTT CITY COUNCIL
EASTERN BAYS SHARED PATH - DBC

PLAN - MCA0
SUNSHINE BAY STATION 3680 - 3860

Status Stamp: PRELIMINARY
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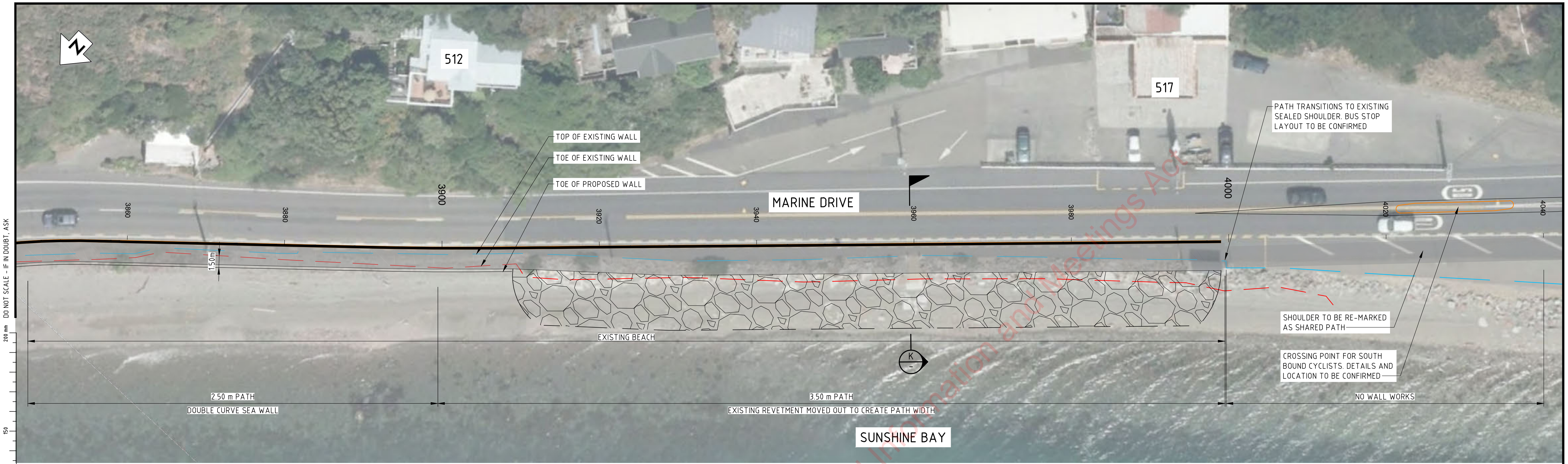

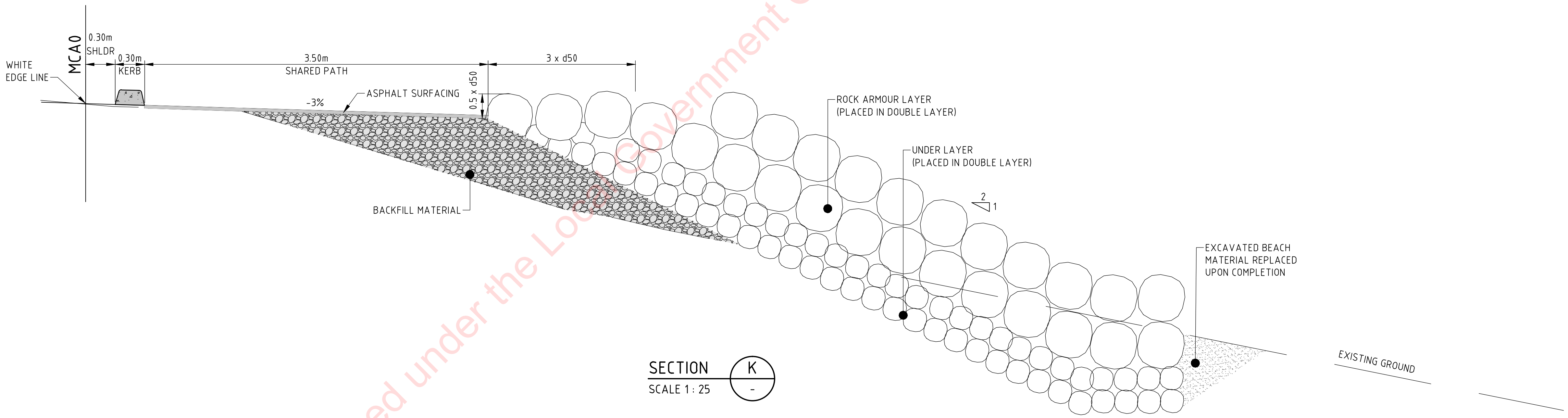

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PLAN - MCA0
SUNSHINE BAY STATION 3860 - 4040

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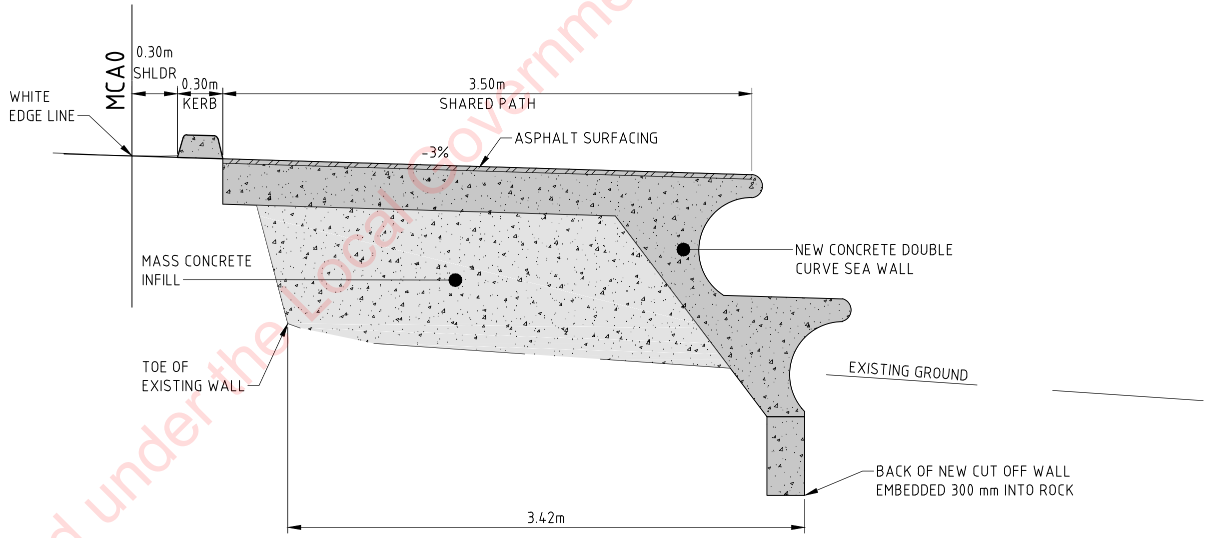

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EASTERN BAYS SHARED PATH - DBC

PLAN - MCA0
WINDY POINT STATION 4980 - 5180

Status Stamp: PRELIMINARY
Date Stamp: 19.09.17
Scales: AS SHOWN
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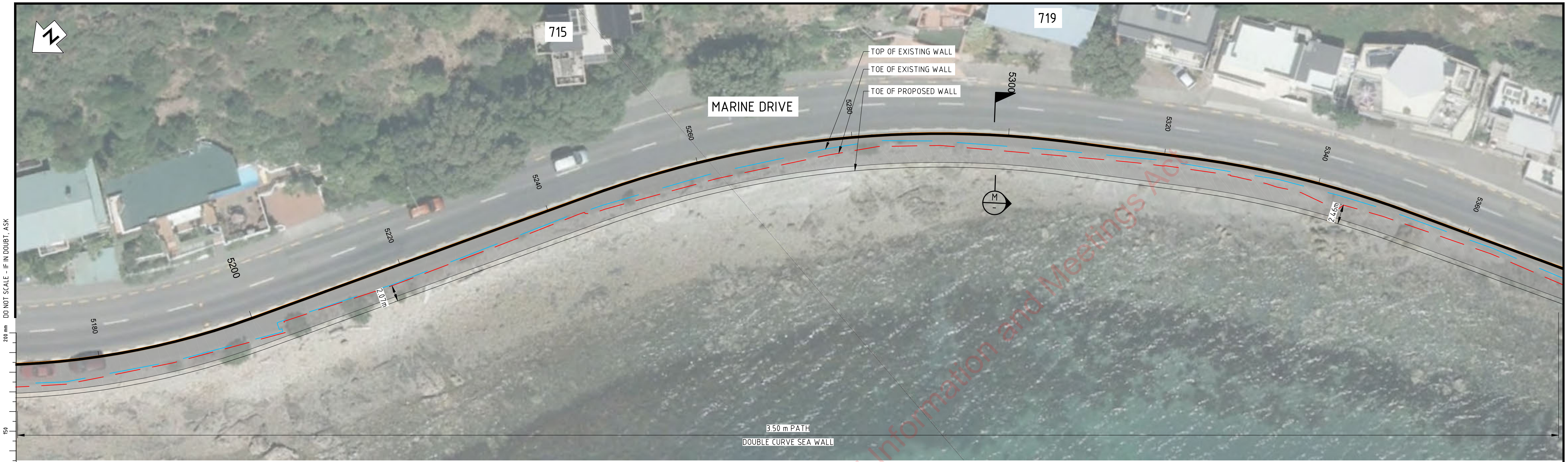

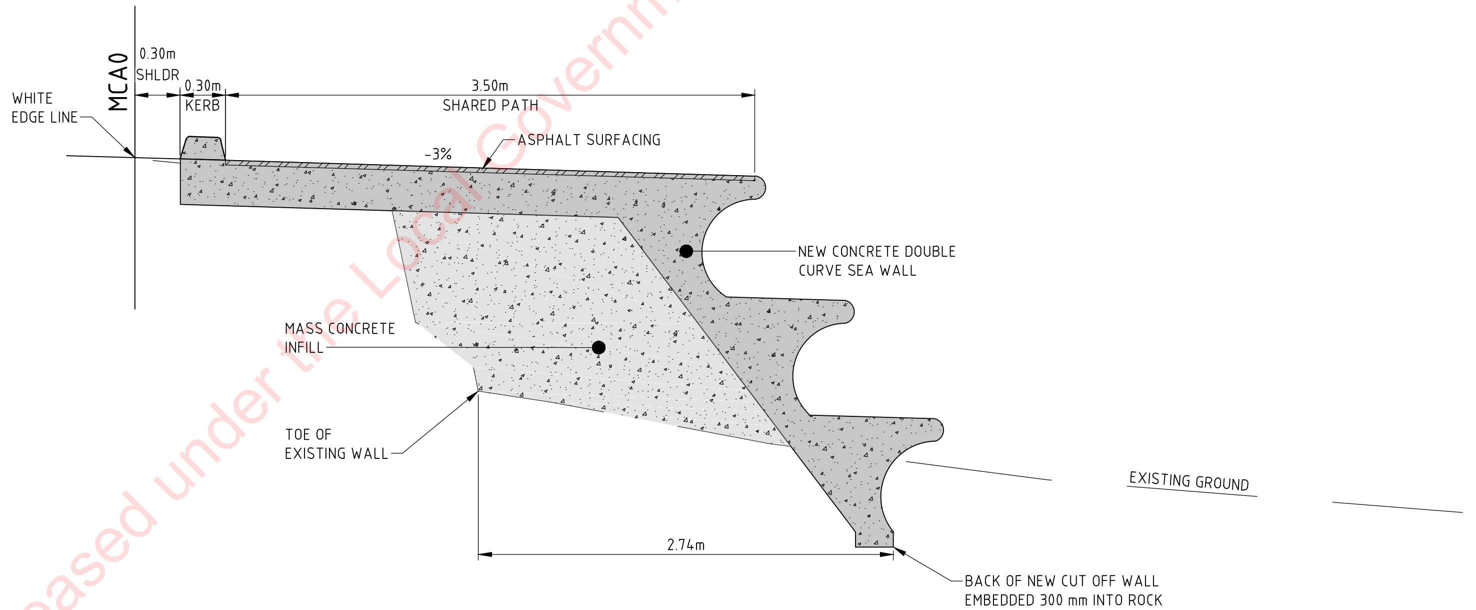

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EASTERN BAYS SHARED PATH - DBC

PLAN - MCA0
WINDY POINT STATION 5180 - 5360

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EASTERN BAYS SHARED PATH - DBC

PLAN - MCA0
WINDY POINT STATION 5360 - 5500

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Appendix F Consenting Strategy

DRAFT CONSENTING SCOPE

EASTERN BAYS SHARED PATH

PREPARED FOR: HUTT CITY COUNCIL

September 2017

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QUALITY STATEMENT

PROJECT MANAGER

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PROJECT TECHNICAL LEAD

s7(2)(a) [redacted]

PREPARED BY

s7(2)(a) [redacted]

Sign 00/08/2017

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REVISION SCHEDULE

Rev No.	Date	Description	Signature or Typed Name (documentation on file)			
			Prepared by	Checked by	Reviewed by	Approved by
3	30/8/2017	Working Draft	s7(2)(a) [redacted]			
4	19/9/17	Amendment to consenting timeframe				

Glossary

Enter Term	Enter Definition
CIA	Cultural Impact Assessment
DBC	Detailed Business Case
HCC	Hutt City Council
GWRC	Greater Wellington Regional Council
IBC	Indicative Business Case
LoS	Level of Service
MCA	Multi-Criteria Analysis
NZCPS	New Zealand Coastal Policy Statement
PNRP	Proposed Wellington Region Natural Resources Plan
RCP	Regional Coastal Plan for the Wellington Region
RMA	Resource Management Act 1991
RPS	Regional Policy Statement for the Wellington Region
SLUR	Selected Lan Use Register

Hutt City Council

Eastern Bays Shared Path

CONTENTS

LIST OF TABLES

LIST OF FIGURES

APPENDICES

APPENDIX A Rules Assessment

APPENDIX B Application Framework

VOLUME 1: REPORT

B.1 INTRODUCTION

B.2 DESCRIPTION OF WORKS

B.3 EXISTING ENVIRONMENT

B.4 PROJECT CONSULTATION

B.5 REASONS FOR THE APPLICATION

B.6 ASSESSMENT OF ENVIRONMENTAL EFFECTS

B.7 STATUTORY FRAMEWORK

B.8 NOTIFICATION ASSESSMENT

B.9 CONCLUSIONS

VOLUME 2: TECHNICAL REPORTS

VOLUME 3: PLAN SETS

1. Introduction

1.1 Purpose

The purpose of this report is to identify the 'consent' requirements for the Eastern Bays Shared Path and to outline the information that will be necessary to support the consent applications. The approach taken in the report has been to ensure that:

- The purpose, relevant principles and requirements of the Resource Management Act 1991 (RMA), are achieved, with a focus on the Regional Coastal Plan for the Wellington Region and the Proposed Natural Resources Plan
- The project's environmental effects are properly scoped, appropriately assessed and effectively managed
- The consent processes are appropriately aligned with the future staging of the project
- The consent applications are developed in a manner that takes into account that the consent outcomes need to:
  - Be practicable to implement
  - Provide for contractor flexibility and innovation.

For the purposes of this report, the term 'consent' relates to those approvals required under resource management and related legislation (such as the Heritage New Zealand Pouhere Taonga Act 2014). It does not address Building Act requirements or engineering approvals which may be required at a later stage in the project.

1.2 Project Background

The completion of an Eastern Bays Shared Path is a key component of Hutt City Council (HCC) transport strategies and is a key project in providing a safe and integrated network for commuting and recreational purposes under the current strategy 'Walk and Cycle the Hutt 2014 – 2019'.

Significant work has already been undertaken on this project.

This work includes the development of initial designs which were dependent on the replacement of existing seawalls with a modern structure. The proposed structure was intended to be more effective at reflecting wave energy, thus reducing potential overtopping during storm events. These designs allowed for the provision of a shared path on top of the structure. However, recent seawall structural assessments have indicated that the complete replacement of the existing wall is not economically justified. This is because many sections still have over 20 years residual life. As a result it has been concluded that a cycleway cannot be provided on the basis of continuous seawall replacement.

The Eastern Bays Shared Path Indicative Business Case (IBC)[1] developed options for a shared path connection that is not dependent on the complete continuous replacement of the existing seawalls. The options have been developed and assessed to identify one or two options for further consideration in a Detailed Business Case (DBC) and to be taken further into the consenting stage.

1.3 Options

A Multi-Criteria Analysis (MCA) was undertaken on five options. Options have been developed around the treatment of the seawalls and the width of the shared path, with a 2.5m and 3.5m width facility being considered.

- 2.5m facility: Meeting minimum standards for a shared path of 2.5m, this width of path is more in-keeping with the standard that should be provided; however such a minimum width would require a more significant amount of physical work and therefore can be expected to increase the physical works cost.

[1] Eastern Bays Shared Path Indicative Business Case, Stantec

- 3.5m facility: The highest standard width option considered, providing a 3.5m width facility throughout. This width would provide a good level of service in terms of width, easily allowing enough space for opposing cyclists to pass or for space for pedestrians or families to walk.

The options are currently being presented to the community. The feedback from the community will be assessed against the technical input to determine a preferred option which will proceed to resource consent.

1.4 Project Elements

Notwithstanding the option selected, the Eastern Bays Shared Path involves several elements which may trigger the need for a consent. These are:

- The construction of new seawalls
- The addition to or alteration of the existing seawalls
- The placement of rock riprap to protect the seaward side of the seawalls
- Encroachment onto the foreshore
- Occupation of land or foreshore/seabed by the shared path and its various support structures
- Potential disturbance of or damage to sites and features of ecological, heritage or archaeological value
- Earthworks, including the disturbance of the foreshore, to enable the construction of the seawalls and other support structures
- Ancillary discharges associated with the construction of the seawalls.

The assessment of regulatory context which follows is based on this list of project elements.

Figure 1-1: Map of the project area

2. Regulatory Context

2.1 Introduction

This section reviews the regulatory context under which consents may be required for the Eastern Bays Shared Path. A key focus is on relevant Resource Management Act policy statements and plans, namely:

- the New Zealand Coastal Policy Statement
- the Regional Policy Statement for the Wellington Region
- the Regional Coastal Plan
- the Proposed Natural Resources Plan
- the Hutt City District Plan
- the National Environmental Standard for assessing and Managing Contaminants in Soil to Protect Human Health.

The aim of this section is to identify rules which trigger consent requirements and to identify assessment and information requirements arising from those rules and related objectives and policies.

2.2 New Zealand Coastal Policy Statement

Policy 10 of the New Zealand Coastal Policy Statement (NZCPS) provides a strong direction in relation to reclamation of the coastal marine area. The policy directs that reclamation should be avoided unless four conditions are met. These are:

- land outside the coastal marine area is not available for the proposed activity
- the activity which requires reclamation can only occur in or adjacent to the coastal marine area (CMA
- there are no practicable alternative methods of providing the activity
- the reclamation will provide significant regional or national benefit.

It is considered that the Eastern Bays Shared Path meets these conditions. This is because land outside the CMA is not available and therefore the reclamation can only occur in the CMA, there is not practicable alternative and the pathway will be provide significant regional benefit. It will be critical that the application provides detailed support to this conclusion.

Where a reclamation is determined to be a suitable use, Policy 10 sets out form and design matters to which particular regard must be had. These matters are:

- climate change, including sea level rise, over no less than 100 years
- the shape of the reclamation and, where appropriate, whether the materials used are visually and aesthetically compatible with the adjoining coast
- the use of materials in the reclamation, including avoiding the use of contaminated materials
- providing public access, including providing access to and along the coastal marine area at high tide
- the ability to remedy or mitigate adverse effects on the coastal environment
- whether the proposed activity will affect cultural landscapes and sites of significance to tangata whenua
- the ability to avoid consequential erosion and accretion, and other natural hazards
- the extent to which the reclamation and intended purpose would provide for the efficient operation of (among other things) coastal roads.

Policies 11, 13 and 15 provide very strong direction in relation to the protection of indigenous biodiversity, preservation of natural character and natural features and landscapes. Policy 17 sets out mechanisms that should be applied to ensure that historic heritage in the coastal environment is protected. Policy 18 recognises the value of public open space in and adjacent to the CMA. Its sets out a range of mechanisms to provide for such spaces. Specific assessments of the matters covered in all 5 policies will need to be addressed in the application.

Policy 19 recognises the public expectation for walking access to and along the coast. The Eastern Bays Shared Path will enhance the opportunity to walk along the coast from Point Howard to Windy Point. It may however be perceived to restrict access to the beach in certain locations. Both the positive and potential negative effects of the shared path in relation to walking access to the coast should be addressed in the application.

Finally Policy 27 sets out strategies for protecting significant existing development from coastal hazard risk. The alterations to the existing seawalls and the new seawalls will need be to be assessed in relation to this policy.

2.3 Regional Policy Statement for the Wellington Region

This review of the Regional Policy Statement for the Wellington Region (RPS) focuses on the provisions relating to the coastal environment and public access. Depending on the final detail of the option for which consent is sought, the provisions of other sections of the RPS may also need to be addressed in the application.

The Coastal Environment section of the RPS identifies four resource management issues. These are:

1. Adverse effects on the natural character of the coastal environment.
2. Coastal water quality and ecosystems - discharges to the coast are adversely affecting the health of coastal ecosystems, the suitability of coastal water for recreation and shellfish gathering, mauri and amenity.
3. Human activities have modified and continue to interfere with natural physical and ecological coastal processes. For example, seawalls alter sediment movement along beaches and estuaries and can cause erosion problems in some areas and deposition problems in others.
4. Public access to and along the coastal marine area - public access to and along the coastal marine area is not always provided, or has been provided in places where people cannot take advantage of it. Even where physical access is available, it is not always possible if access ways are not well maintained.

Issues 1, 3 and 4 are of particular relevance to the applications for the Eastern Bays Shared Path. These issues and the associated objectives and policies will need to be addressed in the assessment of effects and statutory assessment in the application.

2.4 Regional Coastal Plan for the Wellington Region

The objectives and policies of the Regional Coastal Plan for the Wellington Region (RCP) relating to reclamation raise similar issues to the provisions in the NZCPS. In particular, consideration needs to be given to the need for the reclamation2 to occur in the CMA.

The reclamations likely as part of the shared path would fall under rule 1 of the RCP and would therefore be a full discretionary activity. Section 5.4 of the RCP sets out in detail the matters which need to be included a resource consent application for reclamations. These have been considered in section 2.9 below and in the draft table of contents included in Appendix B.

Provisions relating to structures are contained in section 6 of the RCP. Like those relating to reclamations, these provisions required alternatives to be impracticable or to have a greater adverse effect on the environment. Further the provisions require that coastal hazards, including sea level rise are factored into the design.

Rules are set out in Appendix A.

[2] Definition in the RCP - Reclamation and Reclaiming mean the permanent infilling of the foreshore or seabed with sand, rock, quarry material, concrete, or other similar material, where such infilling results in a surface (usable for any purpose) which is greater than 2 metres in width above the level of MHWS, and includes any embankment, but does not include any structure above water where that structure is supported by piles, or any infilling where the purpose of that infilling is to provide beach nourishment.

2.5 Proposed Wellington Region Natural Resources Plan (PNRP)

The PNRP was notified on 31 July 2015. It consolidates the existing regional plans for Wellington into one regional plan and introduces a new suite of objectives, policies, rules and other methods. Ultimately the PNRP will replace the operative regional plans.

Objectives and policies are outlined in Appendix B.

There are policies in the PNRP specific to seawalls. Policy P139 states that the construction of a new seawall is inappropriate except where the seawall is required to protect:

- existing, or upgrades to, infrastructure, or
- new regionally significant infrastructure,

and in respect of the above:

- there is no reasonable or practicable alternative means, and
- suitably located, designed and certified by a qualified, professional engineer, and
- designed to incorporate the use of soft engineering options where appropriate.

"Reclamations" defined in the PNRP[3], unlike that in the RCP does not refer to a spatial limit, and can therefore be considered to be more restrictive as it refers to "dry land".

There are a number of relevant rules, however those of note are Rules 165 and 166 which apply to the additions/alterations and new seawalls in this area. In summary any works on the seawalls will require a resource consent. In terms of these rules, the works can be done either as a controlled activity or a discretionary activity.

- Controlled activity - any addition shall add no more than 5m in horizontal projection and 1m in vertical projection to the structure; the addition shall not extend any further seaward than the existing seawall.
- Discretionary activity – new seawall or any addition that is not a controlled activity under Rule R165 is a discretionary activity.

However, works on the seawalls may be considered non-complying activities given the Schedule 5 habitats. PNRP Schedule F5 is a list of habitat types with significant indigenous biodiversity values. There is no map showing where these habitat types are found in the Wellington region in the PNRP. Therefore as part of an AEE, an applicant would determine what habitat type they are undertaking the activity in (e.g. rocky reef) and if they discover one of the habitat types featured in Schedule F5, they will be subject to the rules for activities in sites of significance[4].

Any application for a non-complying activity will have to meet the Section 104D RMA "threshold test" of either the effects being minor or being not contrary to the relevant objectives and policies.

2.6 Hutt City Council District Plan provisions

Rules in the Hutt City District Plan associated with the proposal, relate to historic buildings, trees and contaminated sites. The Skerrett Boatshed (1906) at Lowry Bay is a listed historic building (Heritage Listing #3580) and identified on Map C6 of the District Plan, requiring protection. 'Atkins Tree' in York Bay is not listed as a notable tree but has local interest. It has been identified in the landscape assessment to be relocated (closer to the bus shelter which is also to be relocated).

There is a SLUR site (SN/03/188/02) in Marine Drive, Sunshine Bay (Sunshine Service Station). Disturbing soil during construction that has a history of contamination can lead to adverse effects on human health. A consent under the National Environmental Standard for assessing and Managing Contaminants in Soil to Protect Human Health (NES) may be required.

3 Reclamation in the coastal marine area means the creation of dry land and does not include coastal or river mouth protection structures such as seawalls or revetments, boat ramps, and any structure above water where that structure is supported by piles, or any infilling where the purpose of that infilling is to provide beach nourishment.

4 Pers comm GWRC

2.7 Other Matters

Marine and Coastal Area 2011[5] has replaced the Foreshore and Seabed Act 2004 which addresses rights conferred by customary marine tile. Under s62 (3) before a person may lodge an application that relates to a right conferred by a customary marine title order or agreement, that person must notify the applicant group about the application; and seek the views of the group on the application[6]. Clarity was sought with GWRC for another project (Seaview wastewater overflows for Wellington Water Ltd).

2.8 Summary of the Resource consent requirements

This section identifies the consents that may be required in relation to:

- Resource consents under the operative and proposed Regional Plans which authorise the additions or alterations to existing seawalls, the construction of new seawalls, the occupation of the seabed and ancillary disturbance and discharges.
- Resource consents under the District Plan. There may be a need to shift a heritage building.
- Resource consents under the National Environmental Standard for assessing and Managing Contaminants in Soil to Protect Human Health (NES). There is a SLUR7 site in Marine Drive, Sunshine Bay (Sunshine Service Station). Disturbing soil during construction that has a history of contamination can lead to adverse effects on human health. This is unlikely but will be confirmed when the detailed design is completed.
- Authorisations under the Heritage New Zealand Pouhere Taonga Act 2014 to uncover, remove and destroy archaeological.

Other approvals under, for the example the Reserve Act, may be required, but in advance of detailed design and further assessment are not able to be identified.

A detailed rules assessment is set out in Appendix A.

The table below sets out the summary of resource consents requirements for the shared path.

To insert when the preferred option has been selected and detailed design is complete

2.9 Application for a resource consent

An application for a resource consent for any activity reclaiming/structures on the foreshore or seabed shall, where relevant, include[8]:

- A description of the activity including the methods and materials to be used
- Adequate information to accurately show the area proposed to be reclaimed, including its size and location, and the portion of that area (if any) to be set apart as an esplanade reserve under section 246(3) of the Act
- A description of the foreshore or seabed to be reclaimed, including fauna and flora, sediment type, and suitability as a foundation for any reclamation and/or retaining wall
- A description of the coastal marine area adjacent to the proposed reclamation/structures, including the physical character, ecological values, tangata whenua values, and existing activities
- A statement of the reasons why reclamation/structures is necessary, and the consequences of the application not being granted. This should include a description of the proposed uses of the reclaimed area and an evaluation of alternatives both within and outside of the coastal marine area

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5 http://www.legislation.govt.nz/act/public/2011/0003/latest/DLM3213379.html?search=qs_act%40bill%40regulation%40deemedreg_marine+and+coastal_resel_25_h&p=1

6 Applicant group is Te Atiawa ki te Upoko o te Ika a Maui Potiki Trust (Contact: Te Rira Puketapu teri@atiawa co.nz)

7 Selected Land Use Register (SLUR) – potentially contaminated land http://mapping.gw.govt.nz/GW/GWpublicMap_Mobile/?webmap=f22ef8fe34f1487fb652e52d9e7fc169

8 Section 5.4 of RCP http://www.gw.govt.nz/assets/Plans--Publications/Regional-Coastal-Plan/Regional-Coastal-Plan-incorporating-removal-of-RCAs-April-2011.pdf

- If the reclamation/structures is adjacent to land outside of the coastal marine area, a description of land uses in the area, and any appropriate objectives and policies contained in the district plan(s) for the adjacent land area
- A description of the final external appearance of the reclamation/structures
- A statement of the period of time to complete the work associated with the activity
- A statement that the reclamation/structures has been designed using current engineering practices, and appropriate allowance has been made for the effects of sea level rise, waves and currents, and earthquakes
- A statement detailing any consultation with any person or organisation that might be affected by the proposal, including, in particular, tangata whenua
- A statement of all other resource consents or approvals that the applicant may require from any consent or approval authority in respect of the activity to which the application relates, and whether or not the applicant has applied for such consents or approval
- An assessment of any actual or potential effects that the activity may have on the environment, and the ways in which any adverse effects may be mitigated. Such an assessment shall be:
  - in such detail as corresponds with the scale and significance of the actual or potential effects that the activity may have on the environment
  - prepared in accordance with the Fourth Schedule of the Act
- Any other information that is necessary to understand the application.

2.10 Archaeological Authorities

The project area is a highly modified environment and no sites of cultural of archaeological importance have been identified in the area[9]. But it is possible that there may be archaeological sites given the historic occupation of the area. There is an identified heritage building - Skerrett Boatshed at Lowry Bay.

A Heritage New Zealand Authorisation is required to modify heritage buildings, or to undertake physical works if during construction archaeological sites are discovered.

[9] Hutt City District Plan

3. Technical Assessments

The table below sets out some of the environmental issues to be considered by the technical experts in their assessments to support the applications identified in Section 2. It takes account of the direction in the key objectives and policies described above in the requirements of s88 and the Fourth Schedule of the RMA.

This table needs to read in conjunction with the Statutory Assessment in Appendix A which also sets out actions or further information that will need to be addressed in the technical assessments.

When the preferred option is selected this will be updated and specific information requirements will be linked to the relevant technical expert.

Table 3-1: Assessment Requirements

Assessment Requirements		Relevant work currently underway	Responsibility
Option assessment	The resource consent application will need to show that the reclamations / structures are necessary taking account of the conditions set out in RMA policy.	Option's assessment process (MCA)	Technical Team
Cultural Impacts	Reclamation/structures may have adverse effects on spiritual and cultural values, and result in the loss of traditional resources. Examples of sites which could have their values adversely affected through reclamation are tauranga waka, mahinga maataitai, waahi tapu and taonga raranga. The use and development of structures may result in tangata whenua being restricted in their access to, and use of, sites of cultural significance (for example, harvesting maataitai).	Final Cultural Impact Assessment completed June 2016	Raukura Consultants s7(2)(a) [redacted]
Landscape/ Visual Effects	Reclamation/structures may adversely affect natural character, particularly in those areas with limited human modification, and will prevent the natural functioning of physical and biological processes. Features of reclamations which can impact on natural character include: • the 'engineered appearance' of the new shoreline • the poor choice of facing material from an aesthetic viewpoint • the hardening of the shoreline Views to and from the coastal marine area may be lost or compromised as a result of the erection or placement of structures. Lights on structures in, on, or over the coastal marine area may cause a nuisance or danger to people from glare. Opportunity to remove redundant structures.	Visualisations Assessment	s7(2)(a) [redacted] Drakeford Williams s7(2)(a) [redacted]
Access/ Recreation effects	Reclamation/structures may result in alienation of the shoreline with a consequential loss of, or restrictions to, public access to and along the coastal marine area. Structures and their use may result in loss of, or restrictions to, public access to and along the coastal marine area. Structures such as slipways and jetties can improve some types of public access to the coastal marine area (usually boating or fishing access) while still restricting other types of access to and along the coastal marine area (such as walking, swimming, etc.)	Assessment	s7(2)(a) [redacted]

Assessment Requirements		Relevant work currently underway	Responsibility
	New structures can have both positive and adverse effects on the recreational use of the coastal marine area.		
Terrestrial Ecological Assessment	Reclamation/structures removes foreshore and seabed from the coastal marine area with consequential permanent loss of habitat and biological productivity. Structures can also provide new habitat of a different character. Structures may also prevent the natural functioning of physical and biological processes. Reclamation/structures may have short term construction effects, such as: • effects on benthic fauna and flora from sediment discharges • effects on surrounding uses from construction works, transportation of fill, noise and dust • effects on water quality.	Assessment	s7(2)(a) [redacted] EOS Ecology s7(2)(a) [redacted]
Avifauna Ecology	Reclamation/structures removes foreshore and seabed from the coastal marine area with consequential permanent loss of habitat and biological productivity. Structures may also prevent the natural functioning of physical and biological processes. Lights on structures in, on, or over the coastal marine area may adversely affect wildlife, for example, roosting and nesting birds. Reclamation/structures may have short term construction effects, such as: • effects on benthic fauna and flora from sediment discharges • effects on surrounding uses from construction works, transportation of fill, noise and dust • effects on water quality.	Assessment	s7(2)(a) [redacted] Sustainability Solutions Ltd s7(2)(a) [redacted]
Coastal Processes	Reclamation/structures alters shoreline shape with consequential effects on wave energy, tidal flows, salinity, and sediment transport processes. Rising sea level may also have adverse effects on structures. Opportunity to remove redundant structures.	Assessment	s7(2)(a) [redacted] NIWA s7(2)(a) [redacted]

Assessment Requirements		Relevant work currently underway	Responsibility
Urban Design	Reclamation/structures may result in alienation of the shoreline with a consequential loss of, or restrictions to, public access to and along the coastal marine area. Views to and from the coastal marine area may be lost or compromised as a result of the erection or placement of structures. There is a need to recognise that the coastal marine area is a finite resource and that the number of suitable sites for some structures is limited. Both structures and space must be utilised efficiently. Use of structures for purposes for which a coastal location is not necessary may preclude a future use by activities needing a coastal site.	Assessment	s7(2)(a) [redacted]
Engineering	Reclamation/structures alters shoreline shape with consequential effects on wave energy, tidal flows, salinity, and sediment transport processes. Reclamation/structures may result in alienation of the shoreline with a consequential loss of, or restrictions to, public access to and along the coastal marine area. Opportunity to remove redundant structures;	Concept Designs	s7(2)(a) [redacted] Engineers Stantec
Amenity	Reclamation/structures may have short term construction effects, such as: • effects on surrounding uses from construction works, transportation of fill, noise and dust	Assessment	s7(2)(a) [redacted]

A draft Table of Contents for resource consent applications and Assessment of Effects on the Environment is set out in Appendix B.

4. Risk Associated with Consenting

The following risks are associated with the consenting stage:

- Community - Objections to proposals from the community.

  Key mitigation measures is to undertake robust community consultation, seek feedback and where possible incorporate community concerns into the proposals.

- Alternatives Assessment – inadequate assessment of alternatives.

  Key mitigation measures are ensuring multi-disciplinary inputs to the alternatives assessment and engaging with GWRC as part of this process

- Application Documents – inadequate documentation resulting in the application being determined by GWRC to be 'incomplete'. This is specifically associated with limited data on the breeding habits of the little blue penguin.

  Key mitigation measures are closely aligned to those above, i.e. ensuring multi-disciplinary inputs and engagement with GWRC. Furthermore, the research on penguin behaviour planned during October will provide greater clarity on behavioural patterns that would be incorporated into a Penguin Mitigation Plan (a suggested condition of the consent).

- Assessment of Effects – potential failure to identify all relevant environmental effects.

  Key mitigation measures are again as above, as well as community and iwi engagement during the preparation of the application.

- Natural Resources Plan – potential inability to meet the requirements of the PNRP and to the chance that the PNRP will be amended at a late stage in this consent application process (or preparing for the hearing).

The key mitigation measure is for the project team to work closely with GWRC.

5. Next Steps

At this point it is recommended that the following tasks are the basis of the implementation of the consent strategy for Eastern Bays Shared Path.

In the table below the tasks have been outlined, and includes the order and timing of these tasks.

Table 5-1: Recommended consent scoping tasks

Task		Start date	Due date
	Prepare the Engagement Plan	Completed	
	Determine approach to input of Maori cultural values into Alternative Assessment and Cultural Impact Assessment (CIA)		
	Identification of Alternatives		
	Development and assessment of Alternatives (MCA)		
	Public Consultation on Options		
	Analysis of Feedback from community		
	Prelim design for technical experts (with understanding that the design in vicinity of York Bay may change slightly depending on the outcome of the investigations – see task below)		20 Sept 2017

Task		Start date	Due date
	Agreement of DBC by HCC and confirm option to be consented	20 Sept 2017	29 Sept 2017
	Confirmation of approach to consent parameters (duration, notification, conditions etc) based on Preferred Option – Update Consenting Strategy	19 Sept 2017	29 Sept 2017
	Prepare activity description and application structure (to be refined when York Bay design is confirmed)	25 Sept 2017	29 Sept 2017
	Further detailed investigations – landward side in York Bay & penguin survey	15 Sept 2017	31 Oct 2017
	Refinement of design based on investigation on landward side in York Bay – remaining alignment to be the same. Update reports where necessary.	20 Sept 2017	20 Oct 2017
	Technical experts to provide draft reports to planner to prepare initial Assessments of Environmental Effects (AEE)	20 Sept 2017	31 Oct 2017
	Iteration of technical inputs/AEE	31 Oct 2017	10 Nov 2017
	Draft Conditions	31 Oct 2107	10 Nov 2107
	Finalise Technical Reports	20 Sept 2017	17 Nov 2017
	Draft application document and AEE	17 Nov 2017	24 Nov 2107
	Review of AEE and application document by technical experts – provide comments	24 Nov 2107	1 Dec 2017
	Finalise Application Documents	1 Dec 2017	8 Dec 2107
	Final review by client	8 Dec 2017	15 Dec 2107
	Consent Application Lodgement	**15 Dec 2017**	**22 Dec 2107**
	Notification	End Jan 2018	End Feb 2018
	Public Submissions close		End Feb 2018
	Summary of Submissions	End Feb 2018	End March
	Hearing		Early April
	Decision		Early June (assuming no appeals)
	Commence Construction		End June/July

References

Appendices

Appendix A Statutory Assessment

The activities associated with the project include reclamation, extensions and alterations, demolition and replacement of the existing seawall, the construction of a new seawall, and ongoing maintenance and repair of the seawalls. This version is a draft rules assessment which will be updated when the preferred option has been selected and detail designs are available.

Rules Assessment

Relevant Rule (s)	Assessment	Consent Required	Actions/Further information required
Regional Coastal Plan			
Rule 1 and 4 – Reclamation of the CMA	Definition in the RCP - Reclamation and Reclaiming mean the permanent infilling of the foreshore or seabed with sand, rock, quarry material, concrete, or other similar material, where such infilling results in a surface (usable for any purpose) which is greater than 2 metres in width above the level of MHWS, and includes any embankment, but does not include any structure above water where that structure is supported by piles, or any infilling where the purpose of that infilling is to provide beach nourishment. Give consideration as to whether Rule 1 has been triggered. Rule 1 deal with Large reclamations outside the Commercial Port Area - Any activity reclaiming foreshore or seabed outside the Commercial Port Area which equals or exceeds 1 hectare; or extends 100 or more metres in any direction; or is an incremental reclamation connected to or part of another reclamation. If it doesn't trigger Rule 1 then works will be assessed under Rule 4. Discretionary Activity.	Coastal Permit Discretionary Activity	Will need to know the area of reclamation being undertaken.
Rule 6 – Maintenance, repair, replacement, extensions, additions, and alterations to structures, provided it complies with conditions (Permitted Activity)	Rule 6 (4) cannot be complied with, as the structure is in the Hutt Valley Aquifer Zone and will disturb the seabed at a depth of greater than 0.5 metres. The seawall will comply with the limits to disturbance described in condition (3), however the rock rip rap structure will not comply with this structure. A coastal permit is required under Rule 13 as a Controlled Activity, provided the it is contained within the form of the existing structure or adds no more than, whichever is the smaller of 20% to the plan or cross sectional area of the structure; or 10 metres in horizontal projection and 3 metres in vertical projection, it otherwise defaults to a Discretionary Activity under Rule 25.	Coastal Permit Discretionary Activity	Construction methodology – can the new structure be defined as maintenance, replacement, extensions, additions or alterations.
Rule 7 – Removal or demolition of structures (Permitted Activity)	Rule 7(2) cannot be complied with, as the structures are in the Hutt Valley Aquifer Zone and disturbance of the seabed for any required piles or excavation will be at a depth greater than 0.5 metres. Rule 7 permitted conditions cannot be met, therefore a coastal permit is required under Rule 14, as a Controlled Activity, noting that the activity does not require any blasting or other destruction of bedrock on the foreshore or seabed.	Coastal Permit Controlled Activity	Construction methodology – depth of earthworks required.
Rule 13 – Maintenance, repair, replacement, extensions, additions and alterations to structures	Rule 13 applicable provided conditions can be met. Rule 13 requires the alteration of an existing structure adds no more than 20% to the plan or cross sectional area of the structure or 10m in horizontal projection and 3m in vertical projection (whichever is smaller). Controlled Activity		Construction methodology – extent and depth of the structures.
Rule 14 – Removal or demolition of structures	Provided conditions can be met. The matters of control are the duration of the consent, the information and monitoring requirements, the administrative charges payable, the extent and nature of the disturbance of the foreshore or seabed, and the extent and nature of any part of the structure which is to remain in the coastal marine area. Controlled Activity	Coastal Permit Controlled Activity	Assessment of effects on the environment.
Rule 16 – Occupation by structures of land in the CMA	No rule which allows occupation in the CMA as a permitted activity. Therefore, it is a controlled activity under Rule 16. Controlled Activity	Coastal Permit Controlled Activity	

Relevant Rule (s)	Assessment	Consent Required	Actions/Further information required
Rule 18 - Structures more or less parallel to mean high water springs	These structures are solid (1), will extend more than 1000 metres in length (2) and are proposed for an area outside of an Area of Significant Conservation Value (3). Discretionary Activity	Coastal Permit Discretionary Activity	Detailed design – are the structures solid and will they extend more than 1000m in length.
Rule 40 - Other activities involving the destruction, damage, or disturbance of foreshore or seabed outside Areas of Significant Conservation Value	This construction of the rock rip rap does not meet condition 3 of Rule 6, so this rule applies. The installation of the rock rip rap and foundations for seawalls will involve to the disturbance foreshore or seabed, and are not provided for in Rules 28-39 or Rule 43. Therefore Rule 40 applies. Discretionary Activity	Coastal Permit Discretionary Activity.	
Rule 53 - Stormwater (Permitted Activity) Rule 56 – Other discharges of water (Permitted Activity)	Give consideration as to whether this rule is triggered. Rule 53 covers any discharge of stormwater into the CMA from any paved surface or any other structure is a permitted activity as long as it complies with the conditions set out in the rule. Permitted Activity	To be determined	Will the stormwatre discharge result in erosion or any effects on the water.
Rule 61 – Possible discharge of sediment to the CMA during construction	Give consideration as to whether this rule is triggered. Discretionary Activity	To be determined	Will there be any discharge of sediment during construction.
Proposed Natural Resources Plan			
Rule R68 – All other discharges	The discharge of water of contaminants into water that is not covered by the other rules in the plan. Discretionary Activity.	Coastal Permit Discretionary Activity	Assessment of environmental effects of stormwater discharge and any sediment runoff associated with construction.
Rule R99 - Earthworks	The discharge of stormwater into water or onto or into land where it may enter water from earthworks of a contiguous area up to 3,000m2 per property per 12 month period is a permitted activity, provided the conditions are met. Permitted Activity	To be determined	Will the earthworks create erosion, will the area be stabilised within six months after completion, what water quality effects are there.
Rule R149 – Maintenance or repair of structures (Permitted Activity)	Rule R149 is unable to be complied with, as (f) cannot be met as the proposed rip rap will extend further out than the existing structure. A coastal permit is required under Rule R153 as a Discretionary Activity, as the rock riprap is unable to meet all conditions.	Coastal Permit Discretionary Activity	
Rule R150 – Minor additions or alterations to structures (Permitted Activity)	Rule R150 (l) is unable to be met as excavation is required greater than 0.5m. A coastal permit is required under Rule R153 as a Discretionary Activity as the rock riprap is unable to meet all conditions.	Coastal Permit Discretionary Activity	
Rule 152 – Removal or destruction of structures (Permitted Activity)	The removal of the existing seawall is unable to meet the following permitted conditions: (g) the removal or demolition shall not disturb more than $10m^3$ of the foreshore or seabed (h) the structure or part of the structure is completely removed from the coastal marine area. The area of disturbance will total more than $10m^3$. The existing seawall maybe reused and would need to be stockpiled on road reserve and sorted into material size. Therefore the complete removal from the CMA is unable to be achieved.	Coastal Permit Discretionary Activity	

Relevant Rule (s)	Assessment	Consent Required	Actions/Further information required
	A coastal permit is required under Rule R153, as a Discretionary Activity.		
Rule R153 – removal or demolition of a structure	Permitted activity criteria (R152) cannot be met therefore is a discretionary activity Restricted Discretionary Activity	Coastal Permit Restricted Discretionary activity	Visual amenity, effects of disturbance, lighting and noise, and navigational safety.
Rule R161 – New structures, additions or alterations to structures outside sites of significance (Discretionary Activity)	The rock rip rap and seawall foundations are not permitted under Rules R156, 157, 155 or prohibited under Rule R159 therefore this rule applies.	Coastal Permit Discretionary activity	
Rule R163 Replacement of structures or parts of structures (Permitted Activity)	The proposed new seawall structure has a functional need to be located in the CMA to protect people and property and there is no change of the use of the structure. However subsections (j) and (k) cannot be met as the structure will not have the same or lesser footprint or dimensions as the original structure. The current seawall extends to the high tide mark and the replacement seawall is proposed to extend to beyond the low tide mark, representing an increase in places of approximately 4m as a design requirement to provide for a wider rod surface for pedestrians and cyclists. A coastal permit is therefore required under Rule 164, as a Discretionary Activity.	Coastal Permit Discretionary Activity	
Rule R165 – Additions or alterations to existing seawalls (Controlled Activity)	The replacement seawall will be constructed outside the footprint of the existing seawall in many cases. While Rule R165 can be complied with in some locations, subsection (g) may not be able to be met in many locations as the seawall will be extended into the foreshore; subsection (h) cannot be met (for same reasons as above). Subsection (h) cannot meet the following condition of Section 5.7.2 - *"there is no disturbance of the foreshore or seabed to a depth greater than 0.5m below the seabed or foreshore within the Hutt Valley Aquifer Zone shown on Map 30".* Excavations in many cases will occur greater than 0.5m below the seabed or foreshore. A coastal permit will be required under Rule R166 as a discretionary activity.	Coastal Permit Discretionary Activity	
Rule R166: Seawalls outside sites of significance – discretionary activity	Works within the footprint of the existing seawall will be a controlled activity. Works outside the footprint of the existing seawall will be a discretionary activity under Rule 166.		
Rule R167: Seawalls inside sites of significance – non-complying activity	A new seawall, or the addition to or alteration or replacement of an existing seawall, and the associated use of the structure inside a site or habitat identified in Schedule C (mana whenua), Schedule F4 (coastal sites), Schedule F5 (coastal habitats) or Schedule J (geological features) in the coastal marine area including any associated: (a) occupation of space in the common marine and coastal area, and (b) disturbance of the foreshore or seabed, and (c) deposition in, on or under the foreshore or seabed, and (d) discharge of contaminants, and (e) diversion of open coastal water that is not a controlled activity under Rule R165 or a discretionary activity under Rule R166, is a non-complying activity. **Schedule C** (mana whenua) - sites of importance to Taranaki Whanui (Schedule C4) Map 6 – no sites of importance identified **Schedule E**1 (heritage structures), Schedule E2 (wharves and boatsheds) or Schedule E3 (navigational aids) – Point Howard Wharf is on the edge of the project area and may be affected; Skerret Boatshed (Lowry bay) is within the project area. **Schedule F4** (coastal sites) – no sites identified in project area.	Coastal permit Non-complying Activity	

Relevant Rule (s)	Assessment	Consent Required	Actions/Further information required
	Schedule F5 (coastal habitats) – see email explanation from GWRC (3/7/17)[10] **Schedule J** (geological features) – no sites identified **Schedule K** (surf breaks) – no sites identified Works within the footprint of the existing seawall will be a controlled activity. Works outside the footprint of the existing seawall will be a discretionary activity under Rule 166. Works not a controlled activity under Rule R165 or a discretionary activity under Rule R166, is a non-complying activity.		
Rule R 182 – Occupations of space by a structure owned by a network utility operator (Permitted Activity)	Occupation by a structure existing before the date of notification of the PNRP is permitted. In places where the rock rip rap is still in approximately the same location as existing, it complies with this rule.	No resource consent required	
Rule R188 – Minor disturbances (Permitted Activity)	Rule R188 (i) cannot be met as an excavator will be used - motorised machine will disturb sand and shingle during construction of these structures. A coastal permit is therefore required under Rule R194 as a Discretionary Activity.	Coastal permit Discretionary Activity	
R194 – Disturbance or damage	R188, R191 and R193 not met therefore R194 applies. Discretionary activity		
Hutt City District Plan			
7A 2.1 – Recreational activities and ancillary activities.	For the sections within the general recreation zone the installation of a cycle path is a permitted activity as it is a recreational activity. This will need to comply with the permitted activity conditions relating to setbacks, height, building coverage and size of structures, and lighting. Permitted Activity.		Will the path be lit and the size and location of the path.
14C 2.1 Noise	All construction, demolition, and maintenance work shall comply with NZS 6803P "Measurement and Assessment of Noise from Construction, Maintenance and Demolition Work". Permitted Activity.		Will the construction noise levels comply with this.
14F 2.3 – Demolition of relocation of a historic building	This is a Discretionary Activity.	To be determined.	Will the heritage building be relocated.
14 I 2.1.1 - Earthworks	One of the permitted activities condition is a maximum volume of 50m3 solid measure per site. If it does not comply with this then it will require resource consent as a Restricted Discretionary Activity.	To be determined.	Total volume of earthworks.

Hutt City District Plan Zones and Overlays

- General Recreation
- Hill Residential
- General Residential
- Historic Place

[10] PNRP Schedule F5 is a list of habitat types with significant indigenous biodiversity values. There is no map showing where these habitat types are found in the Wellington region in the PNRP. Therefore as part of an AEE, an applicant would determine what habitat type they are undertaking the activity in (e.g. rocky reef) and if they discover one of the habitat types featured in Schedule F5, they will be subject to the rules for activities in sites of significance. Pers comm GWRC

Relevant Objectives and Policies of Relevant Legislation

Objectives	Policies
New Zealand Coastal Policy Statement	
Objective 1 To safeguard the integrity, form, functioning and resilience of the coastal environment and sustain its ecosystems, including marine and intertidal areas, estuaries, dunes and land.	**Policy 10 Reclamation and de-reclamation** The policy directs that reclamation should be avoided unless four conditions are met: land outside the coastal marine area is not available for the proposed activity; the activity which requires reclamation can only occur in or adjacent to the coastal marine area (CMA); there are no practicable alternative methods of providing the activity; and the reclamation will provide significant regional or national benefit. Where reclamation is considered appropriate consideration of the effects on climate change, the aesthetics, avoiding the use of contaminated materials, providing public access, the impact of cultural landscapes and sites of significance to tangata whenua, and avoiding erosion and other natural hazards.
Objective 2 To preserve the natural character of the coastal environment and protect natural features and landscape values	**Policy 11 Indigenous biological diversity** To protect indigenous biological diversity in the coastal environment.
Objective 3 To take account of the principles of the Treaty of Waitangi, recognise the role of tangata whenua as kaitiaki and provide for tangata whenua involvement in management of the coastal environment.	**Policy 13 Preservation of natural character** To preserve the natural character of the coastal environment and to protect it from inappropriate subdivision, use, and development. Recognise that natural character is not the same as natural features and landscapes or amenity values.
Objective 4 To maintain and enhance the public open space qualities and recreation opportunities of the coastal environment.	**Policy 15 Natural features and natural landscapes** To protect the natural features and natural landscapes (including seascapes) of the coastal environment from inappropriate subdivision, use, and development.
Objective 5 To ensure that coastal hazard risks taking account of climate change, are managed.	**Policy 17 Historic heritage identification and protection** Protect historic heritage in the coastal environment from inappropriate subdivision, use, and development.
Objective 6 To enable people and communities to provide for their social, economic, and cultural wellbeing and their health and safety, through subdivision, use, and development.	**Policy 18 Public open space** Recognise the need for public open space within and adjacent to the coastal marine area, for public use and appreciation including active and passive recreation, and provide for such public open space.
	Policy 19 Walking access Recognise the public expectation of and need for walking access to and along the coast that is practical, free of charge and safe for pedestrian use.
	Policy 27 Strategies for protecting significant existing development from coastal hazard risk. In areas of significant existing development likely to be affected by coastal hazards, the range of options for reducing coastal hazard risk that should be assessed.
Regional Policy Statement for the Wellington Region	
Objective 3 Habitats and features in the coastal environment that have significant indigenous biodiversity values are protected; and Habitats and features in the coastal environment that have recreational, cultural,	**Policy 4:** Identifying the landward extent of the coastal environment – district plans **Policy 22:** Protecting historic heritage values – district and regional plans

historical or landscape values that are significant are protected from inappropriate subdivision, use and development.	**Policy 24:** Protecting indigenous ecosystems and habitats with significant indigenous biodiversity values – district and regional plans
	Policy 26: Protecting outstanding natural features and landscape values – district and regional plans
	Policy 28: Managing special amenity landscape values – district and regional plans
	Policy 35: Preserving the natural character of the coastal environment – consideration
Objective 4 The natural character of the coastal environment is protected from the adverse effects of inappropriate subdivision, use and development.	**Policy 3:** Protecting high natural character in the coastal environment – district and regional plans
	Policy 36: Managing effects on natural character in the coastal environment – consideration
Objective 6 The quality of coastal waters is maintained or enhanced to a level that is suitable for the health and vitality of coastal and marine ecosystems.	**Policy 5:** Maintaining and enhancing coastal water quality for aquatic ecosystem health – regional plans
	Policy 40: Safeguarding aquatic ecosystem health in water bodies – consideration
Objective 7 The integrity, functioning and resilience of physical and ecological processes in the coastal environment are protected from the adverse effects of inappropriate subdivision, use and development.	**Policy 37:** Safeguarding life supporting capacity of coastal ecosystems – consideration
Objective 8 Public access to and along the coastal marine area, lakes and rivers is enhanced (objective 8 is shared for the coastal environment and fresh water).	**Policy 53:** Public access to and along the coastal marine area, lakes and rivers – consideration

Appendix B Suggested Application Framework

VOLUME 1: REPORT

B.1 INTRODUCTION

B.1.1 PROJECT CONTEXT

B.1.2 STRUCTURE OF APPLICATION

B.1.3 PROJECT LOCATION

B.1.4 PROJECT OVERVIEW

B.2 DESCRIPTION OF WORKS

B.2.1 OVERVIEW OF WORKS

B.2.2 SEAWALL TREATMENTS

B.2.3 NEW AND REPLACEMENT SEAWALLS

B.2.4 CONSTRUCTION METHODOLOGY

B.2.5 STAGING OF WORKS

B.3 EXISTING ENVIRONMENT

B.3.1 HISTORICAL AND CULTURAL SETTING

B.3.2 SOCIAL AND ECONOMIC SETTING

B.3.3 COASTAL ENVIRONMENT

B.3.4 LANDSCAPE AND VISUAL

B.3.5 ECOLOGY

B.3.6 AVIFAUNA

B.4 PROJECT CONSULTATION

B.4.1 COMMUNITY

B.4.2 TANGATA WHENUA AND OTHER MĀORI INTERESTS

B.4.3 STAKEHOLDERS

B.4.4 WRITTEN APPROVALS

B.5 REASONS FOR THE APPLICATION

B.5.1 RULES ASSESSMENT

B.5.2 PERMITTED ACTIVITIES

B.6 ASSESSMENT OF ENVIRONMENTAL EFFECTS

B.6.1 EFFECTS ON CULTURE AND HERITAGE

B.6.2 EFFECTS ON INTERTIDAL ECOLOGY

B.6.3 EFFECTS ON AVIFAUNA

B.6.4 EFFECTS ON AMENITY AND RECREATION

B.6.5 EFFECTS OF COASTAL PROCESSES

B.6.6 CONSTRUCTION EFFECTS

B.6.7 POSITIVE EFFECTS

B.7 STATUTORY FRAMEWORK

B.7.1 RELEVANT RESOURCE MANAGEMENT PLANNING DOCUMENTS

B.7.2 OTHER RELEVANT MATTERS

B.7.3 PART 2 ASSESSMENT

B.8 NOTIFICATION ASSESSMENT

B.8.1 PUBLIC NOTIFICATION

B.8.2 LIMITED NOTIFICATION

B.8.3 SPECIAL CIRCUMSTANCES

B.8.4 NOTIFICATION SUMMARY

B.9 CONCLUSIONS

VOLUME 2: TECHNICAL REPORTS

VOLUME 3: PLAN SETS

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Appendix G Environmental and Social Responsibility Screen

ENVIRONMENTAL AND SOCIAL RESPONSIBILITY SCREEN V2.FEBRUARY 2016

NZ TRANSPORT AGENCY
WAKA KOTAHI

Use to assess options in the Indicative Business Case

Use this screen to identify opportunities and risks and assess options for state highway projects. Complete the screen for each option to distinguish them from one another or bundle options where appropriate. Screen results will signal where technical assessments are required and provide a written record to support the alternatives assessment required for statutory applications. For further assistance contact the EUD Team.

Additional instructions and content, including information sources, to help complete the screen can be found on the Highways Information Portal Screen pages here

Decide how many times screen should be filled out (Group Options) ▶ Answer screen questions using project information and suggested information sources ▶ Refer to screen questions explanation, particularly if you answered yes to any of the questions ▶ Complete page 2 of screen ▶ Incorporate page 2 text in IBC assessment of options table (Background and MCA)

PROJECT LOCATION:	PROJECT PURPOSE:	DATE:	OPTION DESCRIPTION:
Eastern Bays, Lower Hutt	The objectives for this project are to:	20/09/2017	• Identify a preferred option to take forward to consenting.

CATEGORY		QUESTION	ANSWER		USEFUL INFORMATION SOURCES
GENERAL	G1	What is the zoning of adjacent land? Are there any encumbrances on the land? e.g. Maori Reserve or other reserve/covenants	Rural ☐ / Industrial ☐ / High density residential ☐	Commercial ☐ / Residential ☒ / Parks/open space ☒	District/Unitary Plan Zoning Maps
	G2	Does the option disturb previously undisturbed land?	Y ☐	N ○	
	G3	What is the construction timeframe?	>18 months ☐	<18 months ○	
NATURAL ENVIRONMENT	NE1	Are there any outstanding/significant natural features (e.g. geological or geothermal)/landscapes?	Y ☐	N ○	NZTA MapHub Environmental and Social Risk Map- Natural Environment
	NE2	Will the option affect the coastal marine area, wetlands, lakes, rivers, streams or their margins?	Y ☐	N ○	Regional Plan Maps and Schedules
	NE3	Will the option affect areas of the conservation estate, or areas of known significance for biodiversity or known habitats of uncommon or threatened species?	Y ☐	N ○	District Plan Maps and Schedules
	NE4	Is the option in an area of potential hazard risk e.g. fault lines, significant erosion, flooding, sea level rise etc?	Y ☐	N ○	Department of Conservation
	NE5	Will more than 0.5 hectares of vegetation be removed?	Y ☐	N ○	
		What type?			
CULTURAL AND HISTORIC HERITAGE	CH1	Are there sites/areas of significance to Maori within 200m of the area of interest?	Y ☐	N ○	Iwi; NZTA MapHub Environmental and Social Risk Map- Culture and Heritage
	CH2	Are any recorded, scheduled or listed archaeological sites within 200m of the area of interest?	Y ☐	N ○	Heritage New Zealand List; NZ Archaeological Association
	CH3	Are any scheduled, listed or other important heritage buildings/ structures within 200m of the area of interest?	Y ☐	N ○	District Plan Maps and Schedules
	CH4	Will the option affect the setting of any historic building/structure or archaeological site?	Y ☐	N ○	Regional Plan Maps and Schedules; IPENZ Heritage List
	CH5	Is a group of archaeological sites or an area of historic built environment (even partially) within 200m of the area of interest?	Y ☐	N ○	NZTA GIS predictive models
HUMAN HEALTH	HH1	What is the One Network Road Classification?	National ☐ / Arterial ☐	Regional ☐ / Collector ☒	NZTA MapHub Environmental and Social Risk Maps- Human Health and Community which includes:
	HH2	Is the area of interest designated as a non-compliant airshed?	Y ☐	N ○	- Designated airsheds (including one network classification)
	HH3	Are there medical sites, rest homes, schools, child care sites, residential properties, maraes or other sensitive receivers located within 200m of the area of interest?	Y ☐	N ○	- Highly sensitive receivers; Regional Council Contaminated sites Team
	HH4	Does land use within 200m of the area of interest include industrial sites, chemical manufacturing or storage, petrol stations, vehicle maintenance, timber processing/treatment, substations, rail yards, landfills or involve other activities that may result in ground contamination?	Y ☐	N ○	
		OR Are there HAIL or SLUR (contaminated) sites within 200m of the area of interest?	Y ☐	N ○	
SOCIAL	S1	Does the option affect access to community facilities i.e. libraries, open space etc (either temporarily or permanently)?	Y ☐ / Which?	N ○	NZTA MapHub; Project Team; District Plan Maps
	S2	Does the option affect community cohesion and accessibility including vehicular connectivity on the local road network?	Y ☐	N ○	Council and Community Strategy Documents
URBAN AND LANDSCAPE DESIGN	ULD 1	Are there opportunities to enhance infrastructure for, and/or improve access to, public transport and/or active modes of travel such as as walking and cycling?	Y ☐	N ○	NZTA MapHub Environmental and Social Risk Map- Natural Environment (Scenic Routes)
	ULD2	Does the option enhance the development potential of adjacent land where appropriate?	Y ☐	N ○	Regional Land Transport Plan; Project Team
	ULD3	Is the option located on a themed highway? Is the option part of or near a national cycle or walking route?	Y ☐	N ○	Strategies and District Plan
	ULD4	Are there opportunities to enhance the urban character, landscape character and visual amenity?	Y ☐	N ○	

Answers and Comments	Refer to screen questions explanation to help complete this part.

1. **Summarize the potential environmental and social risks/impacts associated with this option. Consider short and long term risks and impacts.**

NATURAL ENVIRONMENT:	The shared path will require the reconstruction of the seawall in parts to accommodate the width needed for the pathway. Reclamation/encroachment of the foreshore is to be avoided where possible. Sections of seawall will need to be built outside the existing footprint of the current seawalls with some reclamation required. Affects on the coastal marine environment need to be assessed. Potential effects may also be to nesting sites of little penguins (east of Marine Drive). Temporary effects may be the release of fine sediments and risk of the release of water contaminated with cementious-based products.
CULTURAL AND HISTORIC HERITAGE:	Due to their orientation and location at the entry to the harbour, the Eastern Bays have a long history of use, initially by Māori who occupied kāinga in the sheltered bays and more substantial pā on the headlands, and later by early European settlers who drove stock along the coast between the Hutt Valley and the Wairarapa. The Skerrett Boatshed (1906) at Lowry Bay is a listed historic building (#3580) and must be retained. The foreshore is used for shell fish gathering and proposed works could affect access to the beach areas. Any new excavation of the foreshore embankments in preparation for seawall construction has the potential to unearth archaeological sites (middens).
HUMAN HEALTH:	The construction of a shared path for cycling and walking has wide health benefits associated with outdoor activity. Encouraging cycling also has positive health outcomes as it reduces the adverse effects of vehicle emissions. However, traffic safety is a concern to cyclists and additional cyclists could create further safety issues, particularly where conflicts take place (at accessways, intersections, parking areas). There is a possibility that more cyclists will increase driver awareness around the presence of cyclists (the safety in numbers effect). There is a SLUR site (SN/03/188/02) in Marine Drive, Sunshine Bay (Sunshine Service Station). Disturbing soil during construction that has a history of contamination can lead to adverse effects on human health.
SOCIAL:	The main positive social impacts generated by this proposed design is the improvement in safety for the wider cycling community (either current or future), and the recreational/tourist opportunities. Improved and safe access to community facilities (such as schools, reserves and beaches) by improving the ability to cycle and walk will be a positive effect. Positive social impacts are also expected with health benefits from increased cycling and reduced CO_2 emissions. Negative social impacts are minimal but could include driver frustration at having to negotiate increasing numbers of cyclists - particularly those driving on the seaward side.

The responses above will be used in the IBC assessment of options summary table: MCA of the Option.

URBAN AND LANDSCAPE DESIGN:	Each bay has a unique identity, the cumulative product of the settlement pattern and the bay landform. The development of a shared facility offers the opportunity to: Create a promenade in places and enhance the experience of the panoramic views out across the harbour; Include artwork/landscape features to reflect the history of the area; Urban design themes could be introduced to define different areas based on their functions (ie. retail, recreational, Ferry). "Atkins Tree" in York Bay is not listed as a notable tree but has been identified in the landscape assessment to be relocated (closer to the bus shelter which is also to be relocated). These local features will be retained and incorporated into the urban design framework for the shared path.

Incorporate the relevant comments from above into the economy, social and geography sections of the IBC assessment of options summary table.

2. **What are the environmental, social integration, landscape design or urban design benefits or opportunities presented by this option? Particularly record opportunities that could be lost if not considered early in the design process.**

Cycling is clearly recognised as an opportunity to play a greater role in providing additional transport system capacity, particularly in urban areas. This mode of transport needs to be assessed within the wider suite of transport options for the region (linkages with other cycleways/walkways and public transport hubs - buses, ferries, rail).
While the driver for reconstructing the seawalls under this project is for the utilisation of the shared path, the challenge of addressing the issues of rising sea-levels is a consideration also. Roads around the perimeter of the harbour are known to be vulnerable and at risk of flooding. Any works need to consider opportunities to build in future resilience if possible, for example by considering adaptability of the seawall in future to protect adjacent areas from flooding.

3. **Are there any impacts, risks or opportunities which require preliminary technical assessments to help understand risks or opportunities? Is further information required to support the development of the detailed business case or can it be left until the detailed business case/pre-implementation?**

Further assessments on penguin habitats is recommended.

Completed by	Caroline van Halderen & Jamie Povall	
Reviewed by NZTA Project Manager		
Incorporated results into IBC assessment of options summary table?	Yes	No

Appendix H Economic Assessment

Eastern Bays Cycleway

1 Introduction

This economic evaluation has been undertaken for Hutt City Council (HCC) in accordance with the NZ Transport Agency's (Transport Agency) Economic Evaluation Manual (EEM 2016) using a customised version of the simplified procedures. The economic analysis for the project has included the following benefits;

- Health and environmental benefits for a cycling facility;
- Safety benefits for a cycling facility;
- Travel time benefits for a cycling facility; and
- Health and environmental benefits for a walking facility.

The initial stage of the economic assessment compares the two options in order to see which performs better and then a final evaluation is completed on the recommended option.

2 Assumptions and Sources

2.1 General Information

The following assumptions have been made in the economic analysis;

- Time Zero is July 2017 with a 40-year evaluation period and a 6% discount rate.
- Project opening year is 2020.
- Construction time of 24 months to account for the uncertainty around staged implementation.
- Option 3.5m wide facility, is assumed to act as a separated facility. Option 2.5m wide facility, is treated as an on-road facility.
- The latest 2016 update factors were applied for travel time and facility benefits. The 2014 update factor for crashes was applied[1],

2.2 Volumes and Demand

The following assumptions have been made in the economic analysis regarding user volumes, growth rate and demand.

It must be noted that the base assumptions were generated on limited survey data and made prior to further count surveys expected to be conducted by HCC in 2017/18. When the additional surveys are conducted, a review of the existing users can be made. This will also help to justify the estimated user numbers as well as to understand whether the future users appear appropriate.

- A base of 100 pedestrians walking an average of 2.0km has been adopted. It considers that the Ferry service in Days Bay would provide a firm base of pedestrians each day. The normal pedestrian trip length in Wellington is 1.0km, but given the geographical constraints, it is estimated to be longer for this locality.
- A new user base of 40 pedestrians has been adopted from Walbran[2], where a Porirua City Council (PCC) representative informed that is the number they typically get for a standard new facility. This new pedestrian user base of 40 new pedestrians has been scaled up to 50 (+25%) for the

[1] The 2016 crash cost update factor is 1.03 due to a re-calculation of crash costs throughout the EEM, however the EEM has not yet updated the base cost benefits for any of the cycle formulas, therefore the 2014 crash update factor was adopted.
[2] HCC Shared Path Funding Application (Walbran, 2015)

2.5m Option and to 60 (+50%) for the 3.5m Option, to reflect the improving level of service by the different Options.

- A base of 77 cyclists per day has been calculated based on existing survey count data (partial days) from Sorrento Bay in March 2015. Counts were completed during two weekday morning periods (Tuesday 10th and Thursday 12th; 6:30am – 9:00am) and a mid-morning weekend day (Saturday 7th; 10:00am – 12:00pm). The manual counts were then converted based on the Cycle Network and Route Planning Guide (CNRPG) methodology to provide an equivalent AADT for the section.
- User costs are adopted from Table A4.1(a) of the EEM. For this project, a weighted average user cost has been calculated based on an estimated split of users across recreational, commuting and work travel purposes, as outlined in Table 2-1 below.

Table 2-1: Estimated Value of Time

	Assumed % Split	Value of Time (ped & cyc)
Recreational	80%	$4.25
Commuting	15%	$6.60
Work travel purpose	5%	$21.70
W. Average	**100%**	**$5.48**

- The EEM cycle demand tool (Worksheet A20.1 of EEM) was used to predict new users. The new cyclists generated by this tool were estimated to be those in the immediate Eastbourne catchment (buffer areas are only calculated at 50% in size to cater for the harbour).
    - This equates to approximately 80 new cyclists for both options for local users.
    - It is envisaged that a significantly more users will come from further afar, in a recreational capacity, to cycle around the Great Harbour Way cycleway and other planned new cycleways[3].
    - The standard buffer area calculation of 80 new cyclists is therefore assumed to account for all the commuter and work related cyclists, but only a small fraction of the recreational cyclists.
    - Each Option has a varying degree of attraction due to the width capacity provided, with key assumptions outlined in Table 2-2 below.
        - For Option 2.5m, it has been assumed that the buffer area or local calculated cyclists (80) would account for 50% of the total cyclists envisioned to use the facility, including all of the commuters (15%), work travel purpose (5%) and 30% of the recreational cyclists. Therefore a further 80 recreational cyclists are assumed to come from 'further afar', as noted above.
        - For Option 3.5m, due to the increased attractiveness, the buffer area or local calculated new cyclists (80) is assumed to account for 40% of the total cyclists envisioned to use the facility. Therefore, if the 80 'new' users generated by the cycle demand tool equates to 40%, there is an estimated additional 120 users per day that are recreational users from further afar.

[3] Other Greater Wellington projects include i.e. Wainuomata Hill and the Beltway.

Table 2-2: Option User Splits

	Assumed % Split	Option 2.5m Local users	Option 2.5m Recreational (Wider users)	Option 3.5m Local users	Option 3.5m Recreational (Wider users)
Recreational	80%	30%	50%	20%	60%
Commuting	15%	15%	0%	15%	0%
Work travel purpose	5%	5%	0%	5%	0%
W. Average	**100%**	**50%**	**50%**	**40%**	**60%**

- The NZTA Research Report 340[4] was used to calculate the appropriate growth rates. Based on Census data, presented in Figure 1 below, a 4.5% growth in cyclist trips to work was recorded Hutt City between 2006 and 2013.
  - The Lower Hutt City growth has been used instead of the higher Eastbourne rate as a conservative approach (4.5% instead of 9.2%). This background cycling rate equates to a cycle growth rate of 6.2% for an on-road facility (Option 2.5m) and 9.2% for a separated facility (Option 3.5m) based on RR340 methodology.
  - As these growth rates are considered high, the following growth rates have been adopted to account for uncertainty:
    - **Opening to 15 years:** 9.2% (Option 3.5m), 6.2% (Option 2.5m)
    - **Year 15-30:** 4.5% growth, both options, reflecting census growth trends (Hutt City)
    - **Year 30 onwards:** 2.1% growth, both options, reflecting census national growth trends
- A pedestrian growth rate of 1.0% has been adopted. Hutt City pedestrian growth was -0.9% between 2006 -2013 census data. Wellington pedestrian growth was 1.6%, so a conservative 1.0% was adopted for the economics.

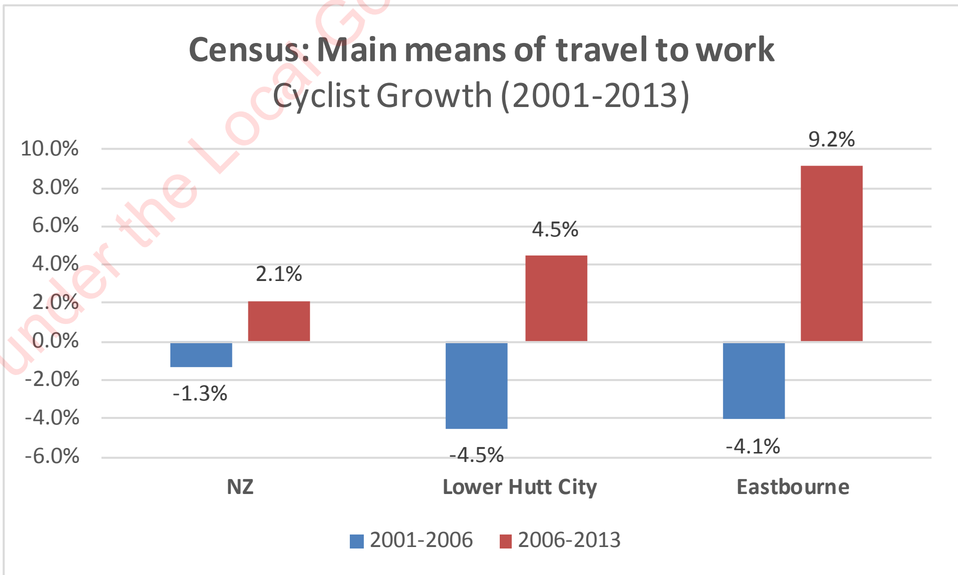

Figure 1: Census - Cycling to work growth

[4] Research Report 340: Estimating Demand for New Cycling Facilities in New Zealand (NZTA, 2007)

2.3 Benefits

- The length of the cycling facility is taken as 6.1 km, which is the distance from the bottom of the facility (near Wellesley College) to Marchbanks Street, where the existing coastal path ends. The adopted length however has been assumed to be a weighted average between the local users making average trips (3.0 km) and wider recreational users making longer trips (capped at 6.1 km to be conservative). This results in a weighted average cyclist trip length of 4.55 km.
- The do-min cyclist travel speed of 13 km/h was adopted from Google Maps, with a slightly faster travel speed of 15 km/h used for the 2.5m Option and 18 km/h used for the 3.5 m Option as the wider facilities provide improved cycling LoS.
- The length of walking facility benefits is based on 2.0 km

2.4 Costs of Do Minimum and Options

Annual maintenance costs of the do-min include the items below. The maintenance costs of the Options are a decreasing percentage of the do-min costs based on the amount of wall constructed.

- $3,510 p.a for the contracted fortnightly sweep
- Average of $8,200 p.a for afterhours sweeping
- Average $3,000 p.a. for other wall repairs

Walbran[5] states that a June 2013 storm event cost HCC $280,000 (confirmed by HCC) and that these events could expect to occur every three years with sea level rises. This evaluation adopts the same storm cost; however, is much more conservative by estimating the frequency at every ten years. The options cost is reduced by the same percentages applied to maintenance costs, as each increasing option has a greater percentage of new, more resilient walls constructed.

A GHD report based on the remaining life of sections of seawall was used for periodic costs in the do-min and option. As some alternatives replace more of the wall than others, these then needed lesser amounts of wall to replace in the 40 year period.

2.4.1 Option Costs

Option costs adopted for the economic evaluation are outlined in the Table 2-3. Note that the reported BCR adopts the Expected Estimate.

Table 2-3: Cost Summary

	Base Estimate (Total physical works)	Expected Estimate (Incl. contingency)	Expected Estimate + 25%
Option 2.5m	$8.4M	**$10.5M**	$13.1M
Option 3.5m	$10.5M	**$13.1M**	$16.4M

[5] HCC Eastern Bays Road Resilience Funding Application (Walbran, 2015)

2.5 Economic Analysis Summary

The results of the economic evaluation are presented in Table 2-4.

Table 2-4: Economic Evaluation

	Option 2.5m	Option 3.5m
Facility Benefits	$11.5M	$16.5M
Travel Time Benefits	$1.5M	$1.9M
Safety Benefits	$0.6M	$0.8M
NPV Total Benefits	$13.6M	$19.1M
NPV Costs	$7.6M	$9.7M
BCR	***1.8***	***2.0***
FYRR	7%	7%

An incremental analysis of the options showed Option 3.5 m had an incremental BCR of 2.6 when compared to Option 2.5 m. As the incremental BCR is greater than 1.0, Option 3.5 m is preferred economically.

3 Recommended Option

The recommended option for this project is Option 3.5 m. Once it was recommended a more detailed cost estimate was performed which now feeds back into this final analysis of the option. The new estimated cost of Option 3.5 m has changed the BCR and FYRR from the prior analysis, due to the change in construction cost.

3.1 Economic Analysis Summary

The results of the economic evaluation are presented in Table 3-1.

Table 3-1: Economic Evaluation

	Facility Benefits	Travel Time Benefits	Safety Benefits	NPV Total Benefits	NPV Costs	**BCR**	FYRR
	$16.5M	$1.9M	$0.8M	$19.1M	$10.7M	***1.8***	6%

The new estimated cost of the project has risen from $13.1M to 14.3M after a more detailed assessment. This in turn has reduced the BCR from 2.0 in the initial assessment to 1.8. The FYRR has also reduced from 7% to 6%.

3.2 Sensitivity

A range of sensitivity testing was undertaken for Option 3.5 m, the results are outlined in Table 3-2 below.

Table 3-2: Sensitivity Testing

Option 3.5m Sensitivity	Sensitivity - Low		Base BCR		Sensitivity - High	
	Low BCR	Note	Base BCR	Note	High BCR	Note
Capital Costs	1.4	Expected Estimate + 25% ($17.9)	1.8	Expected Estimate ($14.3M)	2.4	Base Estimate ($11.3m)
Cyclist Volumes	0.7	80 new users: assume 100% are local users and no wider attraction	1.8	201 new users: assume 40% local and 60% wider recreational users	2.8	321 new users: assume 25% local and 75% wider recreational users
Cyclist Growth	1.3	2.1% (NZ growth 2006-2013)	1.8	9.2% (0-15yr) 4.5% (15-30) 2.1% (30+)	2.2	9.2% (as per RR340
Construction Time / Staged Implementation	1.7	48 months	1.8	24 months	1.8	12 months
Pedestrian Growth	1.8	0%	1.8	1%	1.8	2%
Pedestrian Volumes	1.7	+20 new peds	1.8	60 new peds	2.2	200 new peds
Travel Time Benefits (Cyclist Speed)	1.8	13 km/h (do-min)	1.8	18 km/h	1.8	20 km/h
Resilience – Storm recurrence interval	1.8	15 year recurrence	1.8	10 year recurrence	1.9	5 year recurrence

The sensitivity results show the BCR is most sensitive to:

- Changes in cyclist volume and growth assumptions
- Cost estimate

The range of sensitivity testing does show that the BCR of the 3.5m Option is robust in the 1-3 cost-benefit appraisal band under the NZ Transport Agency's Investment Assessment Framework (IAF) criteria.

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EASTERN BAY SHARED PATH INDICATIVE BUSINESS CASE

REPORT

Hutt City Council

December 2016

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QUALITY STATEMENT

PROJECT MANAGER	PROJECT TECHNICAL LEAD
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s7(2)(a) [redacted]

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7/12/16

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REVISION SCHEDULE

Rev No	Date	Description	Signature or Typed Name (documentation on file)			
			Prepared by	Checked by	Reviewed by	Approved by
0.1	Draft	Initial draft	s7(2)(a) [redacted]			

Hutt City Council

Eastern Bay Shared Path Indicative Business Case

CONTENTS

LIST OF TABLES

LIST OF FIGURES

APPENDICES

Glossary of Terms

Term	Definition
BCR	Benefit Cost Ratio
CES	Community Engagement Strategy
CIA	Cultural Impact Assessment
DBC	Detailed Business Case
FYRR	First Year Rate of Return
HCC	Hutt City Council
IBC	Indicative Business Case
IAP2	International Association for Public Participation
ILM	Investment Logic Mapping
IO	Investment Objectives
LoS	Level of Service
MCA	Multi-Criteria Analysis
MSQA	Management, Surveillance and Quality Assurance
pNRP	Proposed Wellington Region Natural Resources Plan
SLUR	Selected Land Use Register
UCF	Urban Cycleways Fund

Executive Summary

Project Background

The completion of an Eastern Bays Shared Path has been a regular part of Hutt City Council (HCC) strategies and is a key project in providing a safe and integrated network for commuting and recreational purposes under the current strategy “Walk and Cycle the Hutt 2014 – 2019”.

Initial designs for a shared path were dependent on the replacement of existing seawalls with a modern structure which is more effective at reflecting wave energy, thus reducing potential overtopping during storm events. These designs allowed for the provision of a shared path on top of the structure.

Recent seawall structural assessments have indicated that complete replacements are not economically justified with many sections still having over 20 years residual life, therefore a cycleway cannot be provided on the basis of continuous seawall replacement.

The Eastern Bays Shared Path Indicative Business Case (IBC) has developed options for a shared path connection that is not dependent on the complete continuous replacement of the existing seawalls. The options have been developed and assessed to identify one or two options for further consideration in a Detailed Business Case (DBC). The HCC needed sufficient technical information to enable robust decisions to be made and wanted to avoid unnecessary technical analysis which would be better suited to later phases of project development.

Project Objectives

The objectives for this project are to:

- Identify one or two options for further consideration in the DBC that will address the provision of a safe and continuous shared path.
- Secure NZ Transport Agency and key stakeholder endorsement of the preferred option(s) for further investigation.

Project Area

The IBC focuses on investment that improves the safety for pedestrians and cyclists on Marine Drive between:

- Point Howard and the northern end of Days Bay.
- The southern end of Days Bay (Windy Point) to Eastbourne (Muritai Road / Marine Parade intersection).

Stakeholder Engagement

Stakeholders were engaged with during the Indicative Business Case in helping to generate alternatives and to understand reactions to options and proposals.

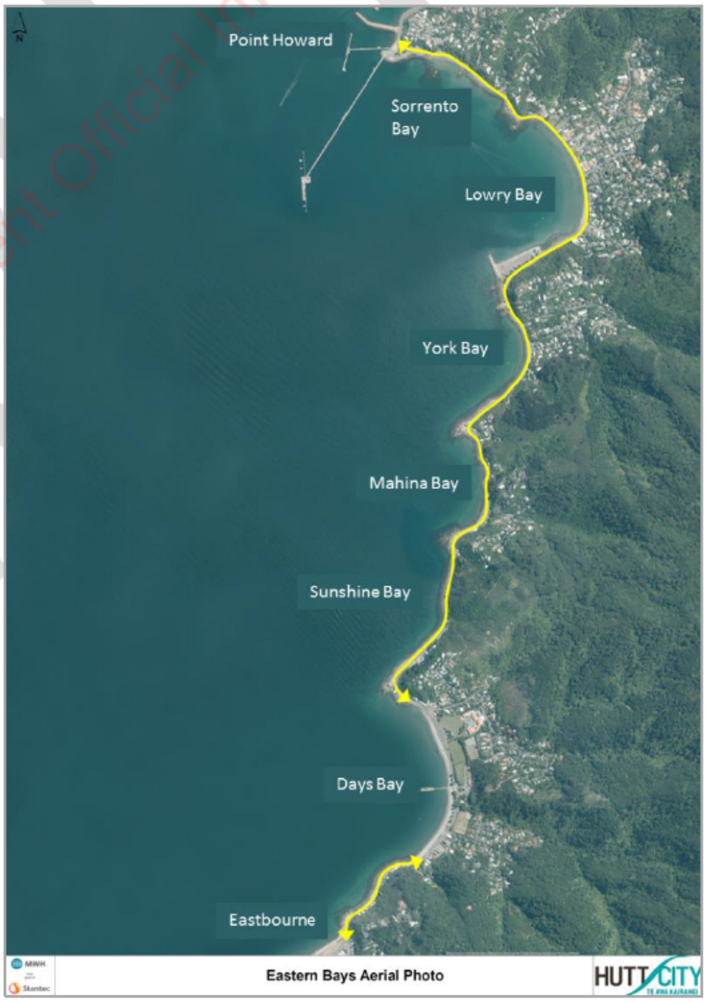


Figure 0-1: Eastern Bays Project Area

Problems, Opportunities and Constraints

A facilitated objectives, constraints and opportunities stakeholder workshop was held on 8 September 2016 with representatives from the core project team, client representatives, NZ Transport Agency representatives (Planning & Investment and cycleway specialist), as well as community group representatives.

The project team and stakeholder panel identified and agreed the following key problems and opportunity:

- **Problem 1**: "Safety of current path and lack of separation prevents walking and cycling and the subsequent health, environmental and economic effects."
- **Problem 2**: "Current facility is at increasing risk of closure and damage from storms and sea level rise and there is no alternative route."
- **Opportunity 1**: "The upgrade of the Eastern Bays Shared Path has the opportunity to reinvigorate and enhance the Eastern Bays tourist economy by attracting visitors including long distance cyclists."

The following percentages represent the level of importance given to the problems i.e. with a limited budget and assuming only one problem can be addressed by this project, how should the available budget be spent?

Overall the **percentage split has been agreed** as:

- Problem 1/ Opportunity 1: 70%
- Problem 2: 30%

The **benefit statements** for the Eastern Bays Shared Path project are presented below:

- Safer journeys for pedestrians and cyclists
- An increased number of pedestrians and cyclists
- Increased availability of the pedestrian and cycle route

The **investment objectives** have been created from these problem and benefit statements and are further detailed in the options assessment section (Section 5).

Constraints

There are a number of constraints and features that were considered while identifying and evaluating options for a shared path, including the following:

- Seawall life
- Road widths
- Existing beaches
- Trees and important structures (such as boat sheds)
- Parking
- Property

Options Development

The options development process includes consideration of a number of components – guiding principles, previous work and proposed improvements, consideration of treatment options (i.e. the methods available to provide additional width), and ultimately, consideration of the general width of the facility to be provided.

This IBC does not specifically identify the exact treatment to be used throughout the entire project length, but determines which treatments should be rejected as unsuitable, and which are appropriate for further consideration at the DBC stage. More importantly, the key outcome of the IBC being to identify the most suitable facility width to take into DBC stage investigations.

Possible Treatment Options

To consider engineering treatment options an MWH internal workshop took place on Wednesday 12th October 2016, where a team of project experts comprising a structural engineer, an engineering geologist and a geometric designer considered possible treatment options.

At this stage of the investigation, the intent was to identify all potential treatments to ensure a robust approach and that treatment options were not dismissed too early without adequate consideration.

Fourteen possible treatment options were considered, including their characteristics, benefits, constraints and possible applications. Four of the possible 12 treatments have been rejected from further consideration and the remaining eight treatments are listed below:

- Carriageway Reallocation
- Placed Rock Revetment
- Double Curved Seawall
- Single Curved Seawall
- Vertical Cantilevered Concrete Wall
- No Fines Concrete Blocks
- Mass Concrete to Existing Pitched Seawall
- Dwarf Mass Concrete Wall

Facility Widths

Further to the consideration of possible treatments, a key component of the IBC is to determine a suitable width for the facility. It is recognised that a single inflexible set width for the entire facility may not be necessary or appropriate given site constraints and specific requirements; however a 'general' desirable minimum width should be established as part of this IBC.

Therefore the options considered, along with the reasoning with the associated widths are shown below.

Option 1 – Only replace seawall with less than 5 years remaining life: This is the 'do-minimum' option and is considered more of a comparison than a realistic option for delivery as it would leave in place sections of the route where there is insufficient width for the passage of a pedestrian or cyclist.

Option 2 – 1.5m facility: Considered as the lowest standard facility and an 'absolute minimum'. Whilst this would improve the existing level of service (LoS) for path users, the increase in LoS would be limited and the path would not meet minimum standards. Such a low standard would necessitate less physical works and have affordability benefits. Similarly, it could potentially be further upgraded in future, and so is considered as a lower standard solution at this stage.

Option 3 – 2.0m facility: Slightly wider than the minimum consideration but still less than ideal level of service for users. Passing cyclists would still be a concern at this width.

Option 4 – 2.5m facility: Meeting minimum standards for a shared path of 2.5m, this width of path is more in-keeping with the standard that should be provided; however such a minimum width would require a more significant amount of physical work and therefore can be expected to increase the physical works cost.

Option 5 – 3.5m facility: The highest standard width option considered, providing a 3.5m width facility throughout. This width would provide a good level of service in terms of width, easily allowing enough space for opposing cyclists to pass or for space for pedestrians or families to walk. This width meets the Austroads standard for a recreational shared path facility.

Options Assessment

High Level Cost Estimation

To undertake the cost estimation it was necessary for the project team to develop an itemised cost estimate for each option. As the specific treatment type for each location on each option has not yet been selected, this makes estimation of the costs challenging. To overcome this, the project team developed design solutions that propose a multitude of different treatment types for each option, based on the team's best judgement. The cost estimates for each of the options are provided in the adjacent table.

Table 0-1: Expected Cost Estimates

Option	Expected Estimate
Option 1 – Replace < 5 years remaining	$4.3M
Option 2 – 1.5m facility	$7.3M
Option 3 - 2.0m facility	$9.0M
Option 4 - 2.5m facility	$11.0M
Option 5 - 3.5m facility	$15.0M

The table above shows the expected estimates and includes traffic management, preliminary and general, service relocations, design, MSQA and environmental compliance. A 50% contingency allowance is also included given the limited information available at this stage of project development, including details of environmental mitigation costs which could prove significant.

Multi-Criteria Analysis

A Multi-Criteria Analysis (MCA) was undertaken on the five options in a workshop setting. The attendees included the core project team, plus specialist consultant advisors (such as a structural engineer, ecologist, planning & consenting expert), client representatives, NZ Transport Agency representatives and community group representatives.

The criteria, scores and weightings used in the MCA Assessment were agreed by all workshop participants.

The MCA assessment has been undertaken both with and without costs included in the overall assessment process. The figures below show the outcomes, with the lower scoring options being preferred i.e. a lower score represents less issues or impacts.

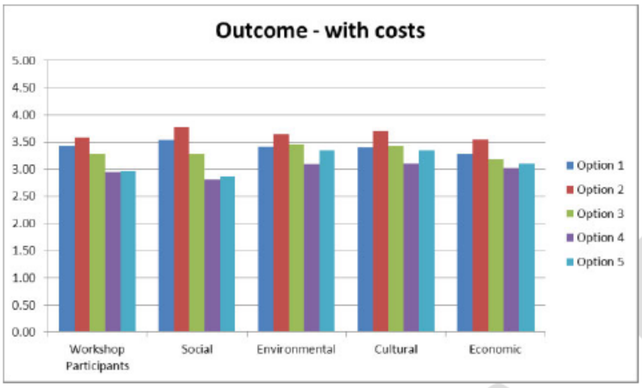
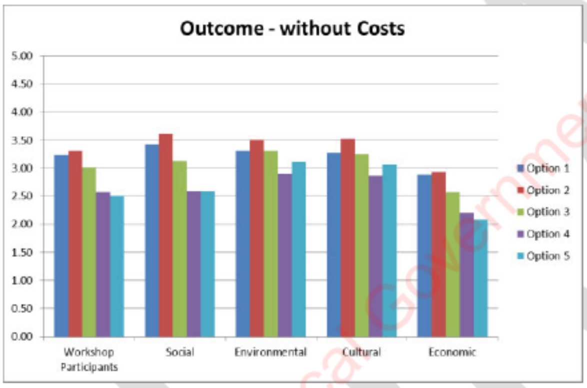


Figure 0-2: MCA Analysis Results – with and without cost. Lower scores indicate better performance.



It can be clearly seen from the MCA charts that Option 4 and Option 5 are favoured, by some margin, in the participant weighting system (both with and without costs included). In all other weighting systems the Option 4 and Option 5 still remain favoured, though the margin of difference to the other options is reduced.

Alignment with Investment Objectives

The agreed investment objectives for the project are reproduced below:

Table 0-2: Project Investment Objectives

Benefit	Measure	Baseline	Target	By When
To improve safety for pedestrians and cyclists	By increasing the perception of safety, as measured by the community survey	From 34% in 2014	To 50%	By 2019

Benefit	Measure	Baseline	Target	By When
To increase the numbers of pedestrians and cyclists	N/A	From approx. 125[1] per day in 2015	To 250 per day	By 2019
To increase the availability of the route	By reducing the total number of hours the road is swept (response / emergency sweeping only)	From 81 hours (5 year average, per year)	To 70 hours per year (average)	By 2021 (3 year rolling average, per year)

An assessment of the five options against the three benefits above has been undertaken:

Table 0-3: Option Alignment to Investment Objectives

Benefit	Opt 1	Opt 2	Opt 3	Opt 4	Opt 5
To improve safety for pedestrians and cyclists	Limited achievement	Limited achievement	Achieves Objective	Achieves Objective	Achieves Objective
To increase the numbers of pedestrians and cyclists	Fails to achieve	Fails to achieve	Limited achievement	Achieves Objective	Achieves Objective
To increase the availability of the route	Fails to achieve	Fails to achieve	Limited achievement	Limited achievement	Achieves Objective

The above assessment against objectives is somewhat subjective and a matter of opinion – however the trend moving left to right across the options showing greater achievement of the investment objectives appears reasonable.

Economic Assessment

This economic evaluation has been undertaken for HCC in accordance with the NZ Transport Agency's Economic Evaluation Manual (EEM 2016) using a customised version of the simplified procedures.

Table 0-4: Economic Evaluation Summary

	Opt. 1	Opt. 2	Opt.3	Opt.4	Opt.5
BCR	*3.2*	*2.6*	*2.8*	*2.6*	*2.5*

Community Engagement

As per Stakeholder Engagement Plan, Community Engagement has been undertaken through different means on several occasions.

Most members of the public are supportive of the Eastern Bays Shared Path project.

The predominantly preferred options are option 4 and 5 with a preferred widths of 3.5m and preferred minimum widths of 2m or 2.5m. There was some references to having some flexibility and having va iable widths to avoid losing beaches, boat ramps and trees.

Most people indicated they would use the path for recreational and commuting trips regularly.

Recommended Option and Next Steps

Based upon the outcome of the community consultation, the MCA process, alignment to objectives and to a lesser extent, economic analysis, the following is recommended:

[1] AM peak period cycling volumes have been input to the NZTA formula which gives an estimation of cyclist AADT being 77. Peak period pedestrian counts (17 users) have also been used to give an approximate existing use of a total of 125 cyclist and pedestrian users per day.

Both Option 4 and Option 5 should be progressed through to Detailed Business Case stage for more detailed assessment and analysis, prior to selecting the single preferred option as part of the DBC process.

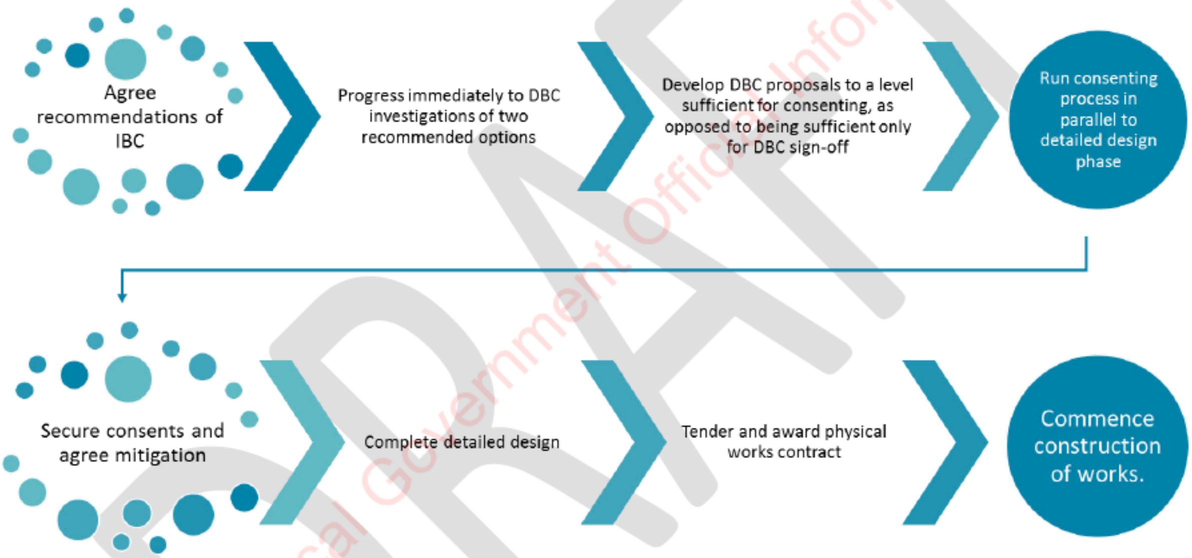
At this stage, it is not advisable to select only one option because there is no clear reason to do so and both are feasible, hence they should both be selected for further assessment during the DBC phase.

The key risks moving forward with the preferred options include cost, construction disruption, public support and acceptance, consenting and timing.

Additionally some statutory approval requirements need to be considered during the next project stage.

In terms of **affordability**, the expected cost estimate for the two recommended options are $11.0M and $15.0M at this IBC stage. Currently HCC has allocated $9M in funding to the Eastern Bays Shared Path. On this basis, it is possible that there is a funding / affordability gap that needs to be resolved. It is recommended that the most appropriate options are taken through to DBC stage and funding conversations continue concurrently to ensure the projects keeps progressing given the tight delivery timeframes.

The next steps in the process are:



1 Project Background

The completion of an Eastern Bays Shared Path has been included in past Hutt City Council (HCC) strategies and is a key project in providing a safe and integrated network for commuting and recreational purposes under the current strategy "Walk and Cycle the Hutt 2014 – 2019".

The project is considered part of the Great Harbour Way/Te Aranui o Pōneke which is a walking and cycling route around Te Whanganui-a-tara, the harbour of Wellington from Fitzroy Bay in the east to Sinclair Head in the west.

Initial designs for a shared path were dependent on the replacement of existing seawalls with a modern fit-for-purpose structure which is more effective at reflecting wave energy, thus reducing potential overtopping during storm events. These designs allowed for the provision of a shared path on top of the structure.

Recent seawall structural assessments have indicated that complete replacements are not economically justified with many sections still having over 20 years residual life. Several sections however are considered to have less than 5 years and will be programmed for replacement to a modern fit-for-purpose structure.

The Eastern Bays Shared Path Indicative Business Case (IBC) will develop options for a shared path connection that are not dependent on the complete continuous replacement of the existing seawalls. The options have been developed and assessed to identify one or two options for further consideration as part of developing the Detailed Business Case (DBC). The HCC needs sufficient technical information to enable robust decisions to be made and wishes to avoid unnecessary technical analysis which would be better suited to later phases of project development.

1.1 Project Objectives

The objectives for this project are to:

- Identify one or two options for further consideration in the DBC that will address the provision of a safe and continuous shared path.
- Secure NZ Transport Agency and key stakeholder endorsement of the preferred option(s) for further investigation.

1.2 Project Area

The IBC shall focus on investment that improves the safety for pedestrians and cyclists on Marine Drive between:

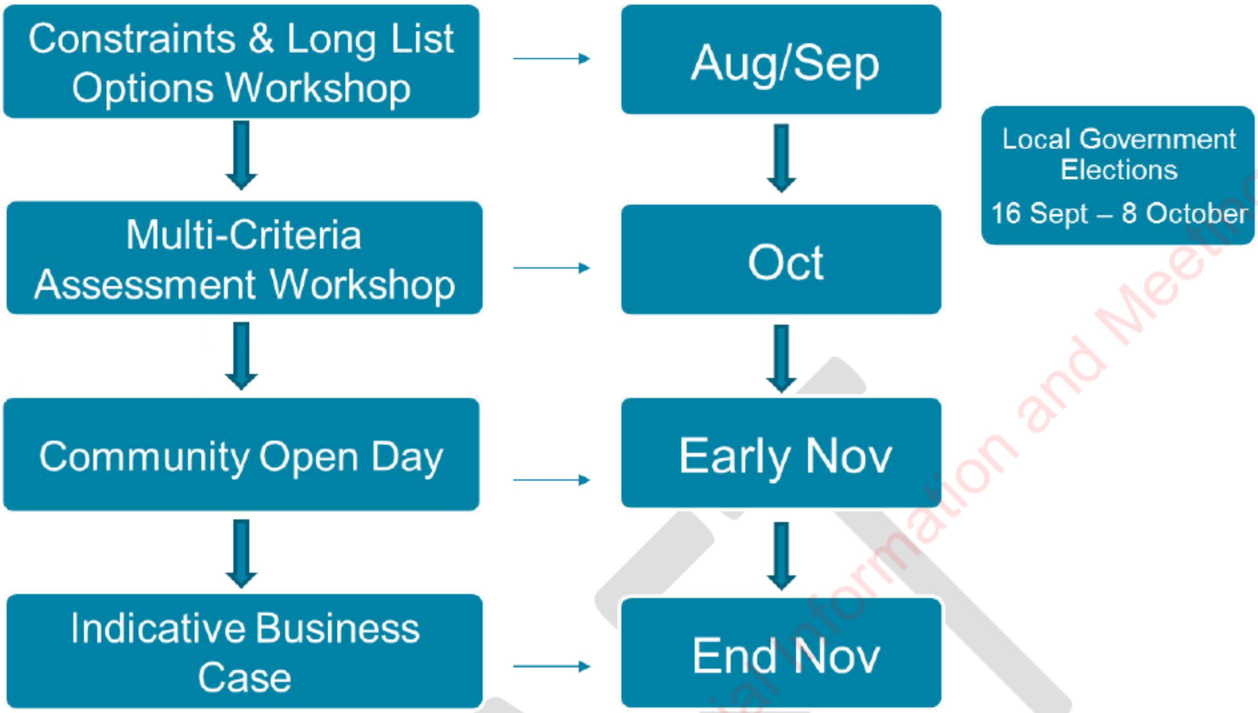
- Point Howard and the northern end of Days Bay.
- The southern end of Days Bay (Windy Point) to Eastbourne (Muritai Road / Marine Parade intersection).

Marine Drive is a Minor District Distributor road which carries between 6,000 – 8,000 vehicles per day and is the only road access to the residential eastern bay suburbs. The road is located adjacent to the coastal environment which winds its way around several headlands and bays between Point Howard and Eastbourne with a posted speed of between 50kph to 70kph.

Between Point Howard and Windy Point, except for Days Bay, there are very limited safe facilities for pedestrians while cyclists are expected to use the road shoulder, which is more often than not very narrow, non-existent, or vehicular lane. In certain limited short locations a shared path exists on the seaward side, these are predominantly in areas where new seawalls have been constructed therefore allowing provision of this facility, or where considerable width already exists.

Figure 1-1: Map of the project area

1.3 Project Timeline



1.4 Methodology

Initial Pre-workshop: The main Strategic Case work begins with a review of the problems – calling on the evidence already available. A brief Investment Logic Mapping (ILM) exercise with HCC will consider the Strategic Case and draft the problem and benefit statements. It involves the HCC and Investor Partners only.

Constraints & Long List Options Workshop: Site visit of the project area, constraints identification and problem definition. Discuss and confirm what has been seen on the visit and record any new constraints the group has identified. Then develop and discuss the problems and benefits and seek buy-in from all parties. Investment objectives (IO) will be developed purely from the problems and benefit statements to ensure that the IOs focus on the right areas. Development and agreement of a long list of potential options for the Eastern Bays path.

Multi-Criteria Analysis Workshop: A Multi-Criteria Analysis (MCA) exercise with key stakeholders to reduce the long list down to a short list for more detailed assessment before identifying one or two options for further consideration as part of developing the DBC.

Community Open Day: Invite local people and others with an interest in the project to view the options and provide feedback.

IBC: Preparing the IBC and feeding back outcomes and decisions to all those involved.

1.5 Work Completed To Date

1.5.1 Graeme McIndoe (1998) – Design Guide

This document was prepared with the Eastern Bays Marine Drive Steering Group (representatives from resident's groups and council officers) and looked at various design features to protect and contribute to the unique character of the area.

1.5.2 GHD (2009) Shared Path Design Development

A concept design was developed for implementing a seaward side shared path connecting the Eastern Bays. This culminated in the construction of a section of trial shared path, in York Bay, in 2011.

1.5.3 Via Strada (2012) – Marine Drive Separated Patch Safety Audit

The audit states that during the site visit two comments were made by 'locals' to the auditor:

> "This is the best thing that happened along here."
>
> "This is the most dangerous thing I have ever seen."

This indicates the polarity that exists around the new separated shared path. It indicates a very emotive response to this new facility.

1.5.4 Eastbourne Community Survey (2014)

In 2014 the Eastbourne Community Board conducted a survey of Eastbourne and the Bays to gauge the wellbeing and satisfaction of the residents and to identify issues of importance to the community. A total of 624 local people responded to the survey (17% of residents 15 years and over). The most important issue identified was the completion of the Eastern Bays shared walk/cycle way. There were comments around the walk/cycle way being "unsafe" and while a high number of respondents currently use the walk way, people also stated that the current standard of the walk/cycle way deterred them from using it. The walk/cycle way was named as the one thing they would like to see in the Eastbourne and Bays area (81 people).

1.5.5 Walbran Transport Analysis (2015) – Shared Path Funding Application

The report references the community input from the Eastbourne Community Survey and focuses on the support the local community have to complete the path. The report also includes a high level economic analysis.

1.5.6 GHD (2015 / 2016) Pre-Application Engagement

A Cultural Impact Assessment (CIA) for the application has been conducted and recommended that local Māori "are consulted over a suitable element in the development that gives recognition of the Māori connection with this site." Port Nicholson Block Settlement Trust were given the opportunity to comment on the CIA. Ngāti Toa are very interested in ecological outcomes and Waiwhetu Marae are very positive about the project overall.

Pre-application engagement was conducted with Greater Wellington Regional Council and Resource Consent Planners at HCC.

1.6 Alignment to Existing Strategies

1.6.1 Walk and Cycle the Hutt (2014 – 2019)

The Eastern Bays shared path is featured in the plan as a prioritised key route. The plan states:

"Our principal aim is to encourage more people to cycle and walk more often and further, for commuting and recreational purposes. Engagement with the community clearly shows a desire for Council to increase the priority given to active travel and build new and improved facilities at a faster rate. Safety is cited as a major concern for most people."

Key factors identified in the plan are to provide travel choice, provide a connected network and to have safe and accessible walking and cycling options that are easy, convenient, attractive and pleasurable for all types of user.

Objectives include:

- Safe and integrated networks for commuting and recreational purposes
- High quality facilities for pedestrians and cyclists
- Safety and positive promotion – 'it's cool to walk or ride a bike'

1.6.2 Hutt City Council Long-Term Plan (2015)

Detailed in the Long-Term Plan for cycling projects: The city-wide Cycle Network Development (The Beltway) will be accelerated with $4.5 million allocated in the next four years, the Eastern Bays Shared Path has $9 million allocated (2015 – 2021/22) and the Wainuiomata Hill Shared Path has $5.5 million allocated (2015 – 2017). Community feedback is shown below:

Table 1-1: HCC Long Term Plan Consultation Summary

	Support it		Do not support it		Don't mind either way		Unsure / Don't know	
Eastern Bays Shared Path	231	62%	66	18%	56	15%	22	6%
Acceleration of cycle network upgrade programme	257	70%	38	10%	58	16%	14	4%

1.6.3 Wellington Regional Transport Plan 2015

Eastern Bays shared path is identified as a gap in the aspirational network of regionally significant cycling corridors for the Wellington region. In this plan, the Eastern Bays shared path is part of the aspirational utility/ recreational route.

Network Development is the first of four priorities of the Wellington Regional Plan. This includes "improving the strategic cycle network safety and addressing significant infrastructure gaps".

Furthermore, the Wellington Regional Transport Plan 2017 states that:

"Cycling corridors that make up the regional cycling network should be developed to provide options for less experienced or lower skilled riders. However, these corridors must also provide options for more experienced cyclists who may wish to travel at greater speeds."

"The regional cycling network should ideally have some degree of separation from traffic. Where full separation is not achievable, partially separated lanes, on-road lanes or quieter parallel routes should be provided. Ultimately the choice of facility will be subject to practical constraints and best-practice guidance."

1.6.4 Great Harbour Way/ Te Aranui o Pōneke (Issues and Opportunities Analysis, 2009)

The Eastern Bays shared path forms part of the Great Harbour Way – Te Aranui o Poneke, which aims to develop "a safe continuous route for pedestrians and cyclists around the perimeter of Port Nicholson, Wellington Harbour, with potential connections into the wider regional cycling and walking networks."

It also states that development options for the Eastern Bays section include:

- Potential to construct the path off Marine Drive using space within Lowry Bay car park and boat launch area. The car park would also benefit from internal planting to enhance its value as a destination rather than just as a large expanse of sealed vehicle space.
- In line with HCC policy wherever possible (incorporated with seawall extension) the seaward hard shoulder be widened, retained free of car parking and separated from carriageway by marker posts.

2 Stakeholder Engagement Plan

The Eastern Bays Shared Path Stakeholder Engagement Plan sets out, and records, the stakeholder and community engagement activities planned for the Eastern Bays Shared Path IBC (the project).

This section summarises the content of the Stakeholder Engagement Plan[2] for the Eastern Bays Shared Path project and identifies who the stakeholders are; their level of interest, and how and when they will be engaged throughout the project. In addition, it sets out the purpose and objectives for engagement.

The inputs gained from stakeholder engagement and the outputs achieved are incorporated into this report, including in the following sections:

- Section 3 includes information on the Problem, Opportunities and Constraints Stakeholder Workshop undertaken.
- Section 5.2 includes information on the MCA Stakeholder Workshop.
- Section 6 includes information and outcomes of the community consultation, including the community open day.

2.1 Purpose of Engagement

The main purposes for engaging are to generate alternatives (stakeholders) and to understand reactions to options and proposals (community). Relationship building is a secondary purpose – we want to achieve better outcomes for the IBC. With each group of stakeholders, we will:

- Set out expectations
- Be clear and genuine about the appropriate level of engagement
- Let stakeholders know what they can and can't influence
- Close the loop with stakeholders to ensure they understand decisions and outcomes.

2.2 Engagement Objectives / Goals

Hutt City Council needs the stakeholder and public engagement to:

- Gather information that will allow relevant opportunities, constraints and risks to be identified and scoped
- Gather information on the values and priorities of key stakeholders and the community and expand on the reasons for their position
- Provide opportunities for key stakeholders to influence the direction of the investment proposal
- Strengthen existing relationships and maintain open and honest dialogue with key stakeholders and the community.

2.3 Significance and Engagement Policy

2.3.1 Significance

This project is not deemed as being of significance. The threshold and criteria in the policy are not triggered. The matter has been signalled in the HCC LTP and there have been a number of other consultations that have given the community an opportunity to give their views on the shared path.

2.3.2 Community Engagement Strategy (CES)

During this project, the principles as set out in the strategy will be followed:

INVOLVING – Hutt City Council will reach out to a wide range of people to have their say

GENUINE – Hutt City Council will undertake meaningful, open engagement in good faith

SUSTAINING – Hutt City Council will foster long term beneficial connections with our community

[2] Produced by MWH, September, 2016

2.3.3 Level of Engagement

The framework that will be used for the engagement activities for this project is the IAP2 Public Participation Spectrum. This involves assessing and communicating with stakeholders and the public to the appropriate level of engagement: inform, consult or involve.

When conducting engagement, HCC identifies fives main types of community engagement. These are: information, consultation, deciding together, acting together and supporting community initiatives.

The IAP2 levels of engagement have been applied to the identified stakeholders and interested parties – see Table 2-1 below. This project falls under the '**consultation**' type of engagement

2.4 Target Audiences and Channels

2.4.1 Groups to be engaged

Stakeholder engagement runs throughout the IBC. There are three groups to consider:

Investor Partners – Greater Wellington Regional Council, Hutt City Council, the NZ Transport Agency and the Urban Cycleway Funding Team (this group will be key to the project's success)

Key Stakeholders – i.e. Government departments; local iwi; key community groups

Public/Community.

Elected members will be kept informed at various stages, but within the limits of the Local Government Elections that will be taking place during the course of this project.

2.4.2 Methods of Engagement

A variety of channels have been used a various parts of the project to engage those identified:

- **Workshops** - As set out in Section 1.4 Methodology, there have been two main workshops with investor partners and key stakeholder representatives. Council staff have been involved in selecting the members of those to be invited.
- **Community Board Memo** – To provide updates and invite representatives to workshops.
- **Existing Community Meetings** – To provide updates.
- **Community open day** – Invitations to the local community to view the short list of options and give feedback. This is also an opportunity for the local community to gather information about the project. Refer to Section 6 of this report for further information.
- **Website** - Hutt City Council's current consultation webpage to be used.
- **Consultation Material** - A variety of consultation material to be developed.
- **Media Releases** - Working with the Hutt News and the Eastbourne Herald to advertise the open day.

Table 2-1 identifies the stakeholder groups, the level of interest they have in the project and to what level they will be engaged and by what channels.

Table 2-1: Level of engagement with stakeholders and potential channels

Stakeholder	Level of Interest	Level of Engagement	Channels
Elected Representatives (Ward and Board); Eastbourne Community Board	High	Consult	Item on their meeting agenda; memos; client email updates and copies of the media releases
Hutt City Council staff	High	Involve	Workshops
Steering Group	High	Involve	Representatives will be invited to the workshops
NZ Transport Agency	High	Involve	Workshops
Greater Wellington Regional Council	Medium	Involve	Workshops
Mana Whenua – Taranaki Whānui, represented by the Port Nicholson Block Settlement Trust	Medium	Consult	Face-to-Face meeting

Stakeholder	Level of Interest	Level of Engagement	Channels
Residents and businesses on affected streets	High	Consult	Email; Open Day; Website
Interest groups – such as Hutt Cycle Network	High	Consult	Email; Open Day; Website
Community groups – such as Eastern Community Committee; Eastern Bays Consultation Group	High	Consult	Email; Open Day; Website
Local Schools	Medium	Consult	Email; Open Day
Media	Medium	Inform	Media Release

2.5 Key Messages

The key messages used in the Eastern Bays Shared Path project are as follows:

- Completing Eastern Bays Shared Path is a high priority for HCC as they want to provide a safe and connected network.
- This path is important to the local community. Eastern Bays communities have highlighted the project as the most important issue in the area (Eastbourne Community Board Survey, 2014)
- Initial designs for a shared path were dependent on the replacement of existing seawalls and a shared path on top of the structure. Not all the seawall needs replacing.
- This project will develop options for a shared path connection that is not dependent on the complete continuous replacement of the existing seawalls. We will be holding key stakeholder workshops to identify options.
- Options will be short listed and presented to the community. In October, we want to gather feedback from the public on these options
- The options will go through more detailed assessment before one or two options are identified for further consideration.
- Hutt City Council will consider these preferred option(s) and are seeking to secure NZ Transport Agency endorsement and funding.

2.5.1 Analysis of feedback

Feedback was captured at the workshops and community open day and fed back to the project team. Comments and views received are incorporated throughout this report and will also feature in a supporting consultation report and stakeholder engagement register.

A copy of the consultation report will be made available on the council's website and will be communicated widely. A summary of 'we asked; you said; we did' will be prepared and sent to those who have been involved throughout the project to ensure we close the loop with interested parties.

2.6 Roles and Responsibilities

The following key personnel have been responsible for the successful stakeholder engagement of the eastern bay Shared Path IBC project.

- **Stakeholder engagement** - Project Manager, Simon Cager (HCC), has been responsible for approving all engagement and being the 'front face' of all stakeholder engagement activities and the quoted officer in media releases. Simon was supported by [redacted](MWH), [redacted] (MWH), [redacted] (MWH) Alma Andrews (HCC, Mana Whenua), Selina Simcox (HCC) and [redacted](MWH) in the development of plans, messaging and materials.
- **Mana Whenua engagement** - Kaitakawaenga Kaupapa Māori, Alma Andrews (HCC), with support from [redacted](HCC) and [redacted](MWH).
- **Media management** - Selina Simcox[redacted](HCC) with identified spokesperson and final sign off from Simon Cager.

- **Development of communication and engagement materials** - [redacted] drafted communication materials with inputs from the project team. Final sign-off was given by Simon Cager.
- **Recording of engagement activities** – All team members. Collated by [redacted] (MWH)
- **Reporting** - [redacted] produced monthly consultation reports.

2.7 Evaluation

Following the engagement it is useful the note down any learnings:

- What went well?
- What did not work or was missing?
- What could be done differently next time?
- Any follow-up required.

2.7.1 Measures of success

Hutt City Council will have identified one or two preferred options to take through to a further stage of investigation. These options will be agreeable to the key stakeholder and local community. Key stakeholders and the community will have had opportunity to influence the decision and will feel listened to. Relationships will have been strengthened. We will know we are successful when we have:

- Reached all identified stakeholders
- The quality of input reflects an understanding of issue
- We heard from affected groups such as cyclists and walkers
- Mana whenua feel they have been appropriately consulted and their input has been considered
- Feedback is positive and supportive.

3 Problems, Opportunities and Constraints

A facilitated objectives, constraints and opportunities stakeholder workshop was held on 8 September 2016 to:

- agree on problem statements and themes for investment objectives;
- capture known constraints and opportunities; and
- identify a long list of options for investigation.

The attendees included the core project team, client representatives, NZ Transport Agency representatives (Planning & Investment and cycleway specialist), as well as community group representatives.

This section discusses the problems and opportunities, benefits and constraints that have been identified by the study team and key stakeholders for the Eastern Bay Shared Path.

3.1 Problems and Opportunities

At the workshop, the project team and stakeholder panel identified and agreed the following key problems and opportunity:

- **Problem 1**: "Safety of current path and lack of separation prevents walking and cycling and the subsequent health, environmental and economic effects."
- **Problem 2**: "Current facility is at increasing risk of closure and damage from storms and sea level rise and there is no alternative route."
- **Opportunity 1**: "The upgrade of the Eastern Bays Shared Path has the opportunity to reinvigorate and enhance the Eastern Bays tourist economy by attracting visitors including long distance cyclists."

The following sections detail and elaborate on these problems and the opportunity.

3.1.1 Problem 1: "Safety of current path and lack of separation prevents walking and cycling and the subsequent health, environmental and economic effects."

The **cause** of this problem is the safety of the current facilities.

The **effect** of this problem is that it inhibits walking and cycling.

The **consequence** of this problem is supressed health, environmental and economic effects.

3.1.1.1 Cause: Safety of current path

The existing facilities feel unsafe for most users. This is demonstrated by the respondents to the Eastbourne Community Survey 2014[3], who predominantly (60%) rated the facilities as "unsafe" or "very unsafe", as shown in Table 3-1.

Table 3-1: How safe survey respondents rate the existing Eastern Bays walking and cycling facilities

Safety of existing facility	Percentage of survey respondents	Number of respondents
Very safe	1 %	7
Mostly safe	33 %	206
Unsafe	**43.5 %**	**270**
Very unsafe	**16.5 %**	**102**
No response	6 %	39
	100 %	624

[3] Eastbourne Community Board, 2014

Source: Eastbourne Community Survey 2014[1]

The key issues attributing to the perceived safety issues were identified by the stakeholder group as follows:

- lack of continuity through the corridor, including
  - some very narrow road/ path sections;
  - wider sections used for parking
  - virtually no existing cycling facilities on the landward side of the road; and
  - existence of obstacles.
- the lack of separation from vehicles, including
  - speed of traffic;
  - difference in travel speeds; and
  - type of traffic (including buses).

It was also noted that vehicle drivers can feel uncomfortable when passing cyclists or pedestrians. Additionally, anecdotal evidence suggests that the frequent buses which travel along the corridor can intimidate vulnerable users.

It is noted that there has not been a large number of recorded crashes involving pedestrians and cyclists for the study length; there has only been one crash involving a cyclist in the previous five years (causing a minor injury). However, this does not mean that the route is safe; it is more likely an indicator that there is a reluctance to use the route and that those that do use it pay particular care to their safety.

There have been a total of 35 recorded crashes on Marine Drive in the project extents (including Days Bay). Of these crashes 12 resulted in minor injury, 1 serious and 1 fatality.

Interestingly, the route is categorised as follows:

- Collective Risk[4]: Medium
- Personal Risk[5]:
  - Point Howard to North of Days Bay: Medium
  - Days Bay to Eastbourne: Medium High

The risk categories don't specifically focus on pedestrian and cyclist risk, nevertheless they are included along with all road users.

3.1.1.2 Effect: Preventing walking and cycling

Evidence indicates that the existing facilities are currently not well utilised with a limited number of pedestrians and cyclists known to travel between the bays.

Pedestrian and cyclist counts were undertaken in Sorrento Bay in March 2015. This determined that:

- 9 pedestrians and cyclists were counted on a Saturday morning between 10am and 12pm.
- 45 pedestrians and cyclists were counted on a Tuesday morning between 6:30am and 9am
- 43 pedestrians and cyclists were counted on a Thursday morning between 6:30am and 9am

On average this is only 7 users per direction per hour. This low level of use is supported by the results of the Eastbourne Community Survey 2014[6] which noted that 54% of the respondents felt deterred from using the existing infrastructure due to its current standard.

Additionally the survey found that just over 10% of the respondents use the facility daily, and more than 25% never use it, as shown in Table 3-2.

[4] Collective Risk is a measure of the number of high severity crashes that have happened per kilometre of road per year
[5] Personal Risk is a measure of the number of high severity crashes that have happened per 100 million vehicle kilometres of travel on the road
[6] Eastbourne Community Board, 2014

Table 3-2: How often survey respondents use the existing Eastern Bays walking and cycling facilities

Use of existing facility	Percentage of survey respondents	Number of respondents
Daily	13 %	78
Weekly	25 %	157
Monthly	32 %	201
Never	27 %	168
No response	3%	20
	100 %	624

Source: Eastbourne Community Survey 2014[1]

3.1.1.3 Consequence: Suppressed health, environmental and economic effects

The NZ Transport Agency document entitled "Benefits of investing in cycling in New Zealand communities" lists the benefits of active modes as including:

- more liveable towns and cities
- improved conditions for travelling within towns and cities
- stronger local economies
- reduced costs for councils
- less impact on the environment, and
- healthier and more productive people.

Accordingly, the safety of the current facility is preventing these benefits being realised. More information about these benefits can be found within the above document.

3.1.2 Problem 2: "Current facility is at increasing risk of closure and damage from storms and sea level rise and there is no alternative route."

The **cause** of this problem is the lack of protection of the walking/cycling facility from the sea and that there is no alternative route.

The **effect** of this problem is that the road is at increasing risk of closure and damage.

The **consequence** of this problem is residents or visitors may be stranded and not be able to reach their destination.

3.1.2.1 Cause: Lack of protection of the facility from the sea and no alternate routes

The existing facilities (both the roadway and the limited walking & cycling facilities) have limited protection from the sea. Whilst seawalls are present along much of the route, many of these are coming to the end of their remaining life.

Hutt City Council commissioned an assessment of 3150 metres of the existing seawalls between Point Howard and the start of Days Bays in March 2016. This assessment found that almost 25% of the existing seawalls have a remaining life of less than 5 years, which equals about 700 metres. An additional 200 metres (or 5%) are anticipated to be due for replacement in the next 5 to 10 years, as shown in Table 3-3.

Table 3-3: Summary of remaining life of seawalls between Point Howard and Days Bay

Remaining life	Length (metres)	Percentage
0 - 5 years	720	23%
5 - 10 years	200	6%
11 - 20 years	80	3%
21 - 50 years	1030	33%
51 - 100 years	1120	36%
Total	**3150**	**100%**

Source: GHD Seawalls Condition Assessment, March 2016

In addition, whilst the seawalls may be protecting the asset from being destroyed, they do little to stop storm and high tide events affecting the usability of the route as many of the sea walls do not redirect wave energy back into the harbour; the waves continue to crash over the road.

Based on the seawall conditions assessment, only 14% of the existing seawall between Point Howard and Days Bay are redirecting wave energy back into the sea. This is summarised in Table 3-4.

Table 3-4: Summary of redirecting sea walls between Point Howard and Days Bay

Redirecting seawalls (metres)	450	14%
Non redirecting seawalls (metres)	2700	86%
Total	**3150**	**100%**

Source: GHD Seawalls Condition Assessment, March 2016

In the Eastern Bays, reducing the number of road c osures and obstructions is particularly important because there are no alternative routes and residents are trapped on either side of the closure or obstruction. Longer term or repeated closures would impact on accessibility of the Eastern Bays and, if not mitigated, could reduce the attractiveness of these bays to residents.

3.1.2.2 Effect: Current facility is at increasing risk of closure and damage

Road closures in recent years have been very limited, predominantly due to HCC's well organised maintenance regime, which is set up to clean obstructed infrastructure of debris at the earliest possible time to minimise impacts to residents. Similarly, damage to the seawall has also been fairly infrequent in recent years.

The two sets of evidence for consideration for risk of damage and closure are as follows:

- Closures or damage requiring sweeping to remove debris and open the road: *Between 2012 and 2016, there have been an average of 81 hours per annum of emergency sweeping required along Marine Parade.*
- Closures of damage requiring HCC maintenance contractors to undertake repair work to the seawall: *Since June 2010, there have been 6 incidents recorded that have required seawall maintenance. Works have included improvements to the seawall, damage to the road shoulder and edging.*

However, this low level of closure is not expected to continue.

Some of the stakeholders have raised that climate change is likely going to worsen the impacts of storm events on the existing infrastructure in the medium to long term. Whilst this is not confirmed, there is a risk of increasing impacts through storm events on existing and proposed future infrastructure[7].

Overall, larger more frequent storm events, coupled with the current state of the seawalls is likely to result in a significant increase in the number of times the route is affected or closed.

[7] This project will consider the protection of any new assets and the people using the asset. However, this project does not specifically address issues caused by sea level rise.

3.1.2.3 Consequence: Residents or visitors may be stranded and not be able to reach their destination

Due to the fact that there are no other alternative road routes, the consequences of the route being closed are significant for residents and visitors.

3.1.3 Opportunity 1 "The Eastern Bays Shared Path has the opportunity to reinvigorate and enhance the Eastern Bays tourist economy by attracting visitors including long distance cyclists."

The upgrade and completion of the Eastern Bays Shared Path provides significant economic opportunities for businesses in Days Bay, Eastbourne and the smaller bays by attracting visito s including long distance cyclists.

The facility would be part of the Great Harbour Way and could also link to other regional walking and cycling facilities including the Hutt River Trail and the Rimutaka Incline.

Eastbourne Days Bay Action Group (EDBAG) has vision of a promenade/shared path between Days and Eastbourne connecting the Ferry to the Village. If this was undertaken as part of this project, it could attract many more pedestrian visitors to the bays.

The NZ Transport Agency "Benefits of investing in cycling in New Zealand communities" document states that *good cycling infrastructure also attracts people to visit. Reports from Hastings indicate that visitors are being attracted to the area because of its cycling opportunities and many local businesses are reporting significant growth. More bike-friendly towns and cities would also encourage visitors from the New Zealand Cycle Trail, who spend money in local communities.*

Further it was noted that there is an opportunity for the facility to provide space for recreation as well as movement. Spaces could be created for stopping, viewing, fishing, food gathering or eating.

3.1.4 Description of Percentage Splits

The percentages represent the level of importance given to the problems i.e. with a limited budget and you could only fix one problem with this project, how would you choose to spend the available budget?

As there is currently no regular repair work occurring on the road (i.e. from sea wave action related undermining) – from a climate change point of view, then the weighting for this Problem is lower.

Given the overlap between Problem 1 and Opportunity 1, the two have been combined, incorporating the economic benefits into a safer higher standard and therefore more desirable and utilised facility. Overall the percentage split has been agreed as:

- Problem 1/ Opportunity 1: 70%
- Problem 2: 30%

3.2 Benefits

The benefit statements for the Eastern Bays Shared Path project are presented below:

- Safer journeys for pedestrians and cyclists
- An increased number of pedestrians and cyclists
- Increased availability of the pedestrian and cycle route

3.3 Investment Objectives

The investment objectives are a vital part of the business case process. They:

- Express the outcomes sought from investment
- Help direct and guide the study process
- Provide the basis for appraisal of alternatives and options

The investment objectives have been created from the problem and benefit statements and are summarised in Table 3-5 below:

Table 3-5: Draft Investment Objectives

Benefit	Measure	Baseline	Target	By When
To improve safety for pedestrians and cyclists	By increasing the perception of safety, as measured by the community survey	From 34% in 2014	To 50%	By 2019
To increase the numbers of pedestrians and cyclists	N/A	From approx. 125[8] per day in 2015	To 250 per day	By 2019
To increase the availability of the route	By reducing the total number of hours the route is swept (response / emergency sweeping only)	From 81 hours (5 year average, per year)	To 70 hours per year (average)	By 2021 (3 year rolling average, per year)

These investment objectives were further developed and agreed with HCC and NZTA prior to the option evaluation process.

3.4 Constraints

Key constraints within the corridor are summarised below, and should be read in conjunction with the spatial mapping included in Appendix A.

3.4.1 Seawall Life

The remaining life of the seawalls is an important consideration. There is a large difference in residual life of the existing seawalls throughout the project extent. While some sections have less than 5 years life, others have greater than 80 years. There is little continuity either, with adjacent sections fluctuating greatly.

If a section of seawall has limited remaining life, replacing that section is more cost-effective than replacing sections that do not currently require it.

3.4.2 Road Widths

The road width between the landward side property boundary, and the seaward side pavement edge varies throughout. In some locations this is far greater than others. In a similar fashion, the existing seaward side shoulder width varies throughout the extent, from almost zero width beyond the edgeline to upwards of 3m (particularly in the York Bay section that was installed with a new seawall and shared path facility).

3.4.3 Existing Beaches

Retention of the existing beach areas is very important for the local community. Options for the shared path should attempt to avoid incursion onto the beach areas which could reduce the already limited space available for beach recreation.

This is an important community consideration and therefore options will need to show what can and cannot be achieved in terms of beach encroachment, prior to a decision being made on recommended options.

3.4.4 Trees and important structures (such as boat sheds)

There are a number of trees and seaward side structures that should be considered as project constraints. The Social and Environmental Screen did not identify that any of the trees are protected; however there are known community attachments and there is expected to be a general unwillingness to

[8] AM peak period cycling volumes have been input to the NZTA formula which gives an estimation of cyclist AADT being 77. Peak period pedestrian counts (17 users) have also been used to give an approximate existing use of a total of 125 cyclist and pedestrian users per day.

see removal. Tree removal would need to be clearly justified and potentially require replacement planting if deemed essential.

A number of structures exist on the seaward side and a shared path will need to be carefully managed in how it passes and interacts with these structures. Two examples of these are shown below.

Figure 3-1: Bus stop, York Bay

Figure 3-2: Boat shed and launch, Lowry Bay

3.4.5 Parking

There is limited parking in most locations along Marine Drive and at times it can be heavily oversubscribed. Where possible, parking should be retained; however it is recognised that available space is significantly constrained and parking may need to be sacrificed to provide the shared path.

3.4.6 Property

There is no desire to purchase property to deliver the shared path. Therefore the project will be delivered using land available within the existing road corridor, or by winning additional width through the design of the seawall (where a replacement seawall is provided).

3.4.7 Summary

There are a number of constraints and features which need to be considered when identifying and evaluating options for a shared path.

These are currently being mapped and will be incorporated into subsequent versions of this report.

4 Options Development

The options development process included a number of components – guiding principles, previous work and desired improvements, consideration of treatment options (i.e. the methods available to provide additional width), and ultimately, consideration of the general width of the facility to be provided.

This IBC will not specifically identify the exact treatment to be used throughout the entire project length, but will determine which treatments should be rejected as unsuitable, and which are appropriate for further consideration at the DBC stage. More importantly, the key outcome of the IBC will be to identify the most suitable facility width to take into DBC stage investigations. This is the most important consideration. The specific treatment options to achieve this, will be refined further during the next stage of investigation.

4.1 Guiding Principles of Options Development

As part of the option development, the wider project team, including community group representatives, were asked to provide recommendations on key or desirable characteristics that a shared path should endeavour to provide.

The following high level design principles were discussed, but it was recognised that it would be challenging for any option to meet all the principles identified. Nevertheless the identification of these features will assist in option identification and assessment. It was also recognised that some of these features would be points of detail that would not be considered or addressed at this early stage of investigation, but that it was still worthwhile to discuss at the early stage for consideration by the project team.

- Consistency in width and surface throughout
- York Bay solution is a good starting point
- Minimum width should cater for two cyclists going in opposite directions
- A shared path is desired
- Single side contraflow shared path, rather than unidirectional on each side of the road
- Parking – cater for the wider community – but lesser priority than the facility itself
- Avoid encroachment on the beaches if possible
- Consider realigning the centre line on the roads to gain additional space
- Retain trees along the route as much as possible
- Avoid legal speed reductions on road – it's been considered previously
- Fencing is undesirable on the seaward side
- Consider options for separating path from traffic lanes
- Avoid point obstacles
- Consider crossing points for accessing the facility
- Accessible for all wheels (e.g. skateboards, scooters, wheelchairs)

4.2 Preferred Final Long Term Option

4.2.1 Previous Final Preferred Option

The previous work undertaken on the project[9] between 2009 and 2015 considered the provision of a single or double curved redirecting seawall as the most appropriate design solution for creating a shared path solution.

An excerpt of the previous concept design work undertaken is shown below:

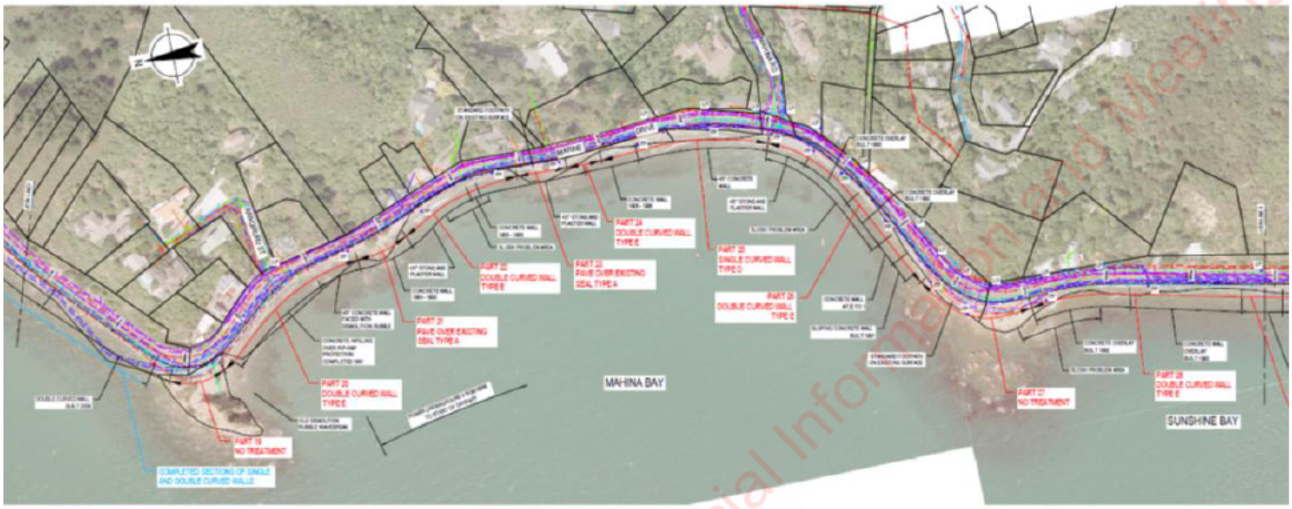


Figure 4-1: Example of previous shared path design undertaken by GHD Consultants

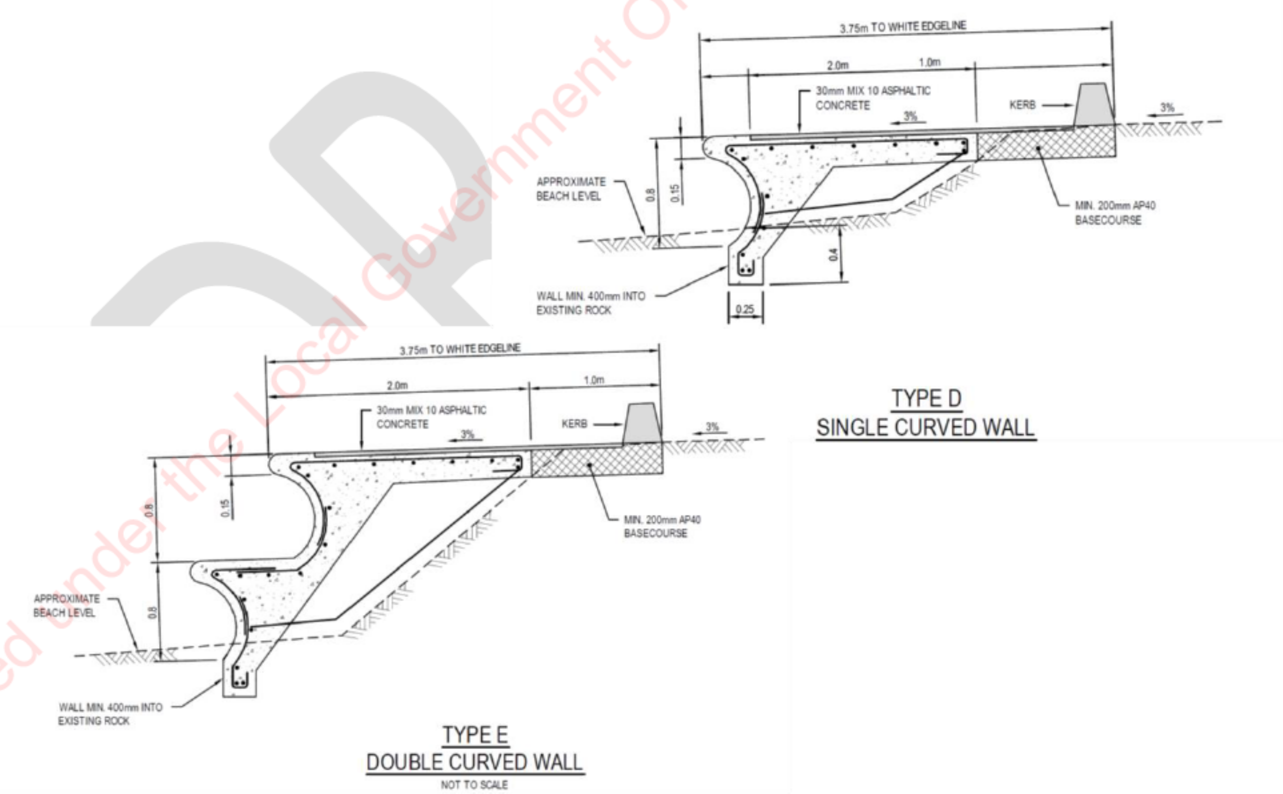


Figure 4-2: GHD Consultants design drawing of single and double curve redirective seawall

[9] By GHD Consultants and culminating in various technical reports and a concept design for a shared footpath/cycleway.

4.2.2 Assessment of Previous Final Preferred Option

The project team have considered the previous solution and this is considered a reasonable and acceptable 'long term' design solution for providing a seaward side shared path along the project length.

Conversely, it is not necessarily considered the only solution for achieving additional width and this IBC is required to consider alternative options that have different levels of effects and costs to ensure that a suitable assessment of alternatives has been undertaken. Further, consideration of different options will ensure that there is some flexibility within the solutions and that affordability is considered early in the process.

4.3 Existing Seawall Condition

Before this IBC was commenced, considerable previous assessment work had been undertaken on the seawall condition between Point Howard and the northern end of Days Bay. The assessment work was provided by HCC and has not been checked or verified as part of this investigation – however there are no indications that the work is not accurate and cannot be relied upon.

The seawall condition data is provided in Appendix B.

The previous seawall condition assessment undertaken, covered the extent between Point Howard and Days Bay. The geographical scope for the IBC also includes the additional 400-500m between the southern end of Days Bay and the northern end of Eastbourne. Therefore as an additional element of work to supplement the IBC, a visual inspection was also undertaken for this section, so that it can be included in the option considerations.

4.4 Possible Treatment Options

4.4.1 Introduction

To consider treatment options an MWH internal workshop took place on Wednesday 12 October 2016, where a team of project experts comprising a structural engineer, and engineering geologist and a geometric designer considered possible treatment options.

At this stage of the investigation, the intent was to identify all potential treatments as opposed to just treatments that were likely to be favoured; this was to ensure a robust approach and that treatment options were not dismissed too early without adequate consideration.

Fourteen possible treatment options were considered and these are briefly described below, along with whether the treatment has been accepted as a possible application moving forward or rejected (and not subject to further consideration).

An example of the types of treatment are shown in the sketched figures below:

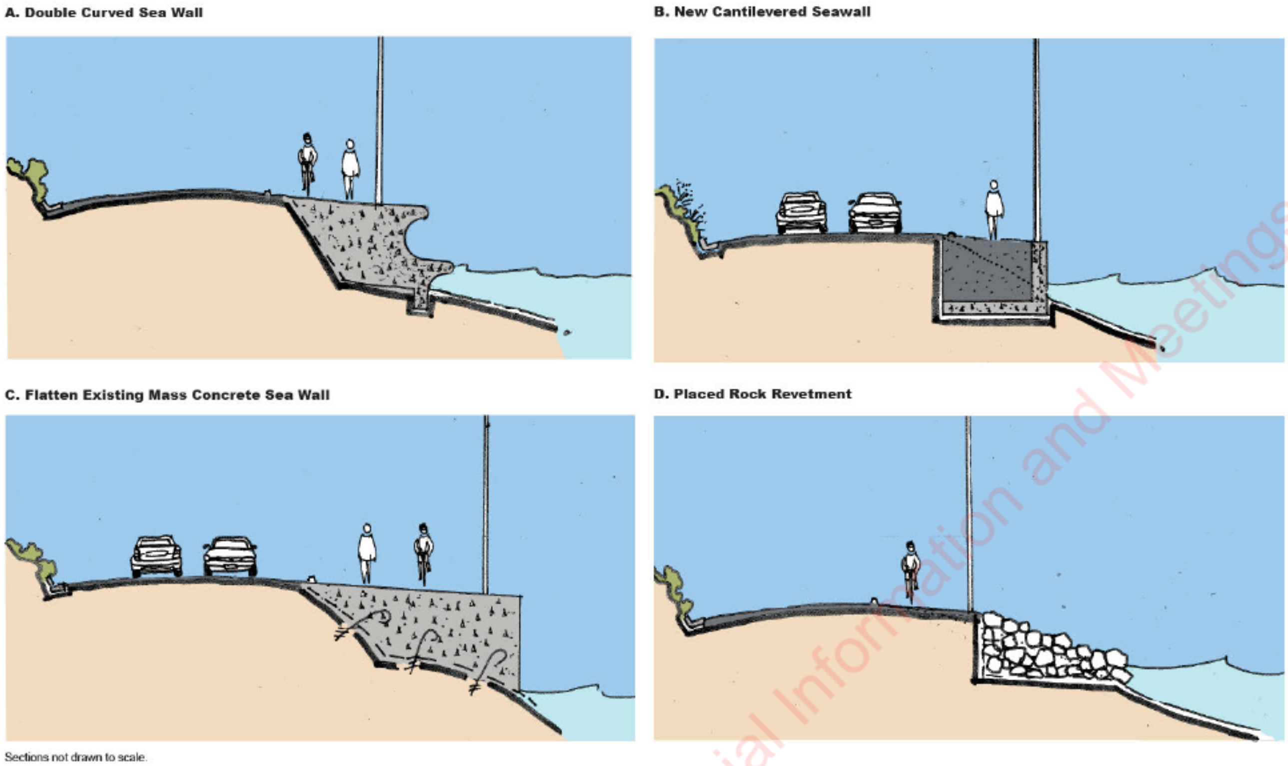


Figure 4-3: MWH sketched cross sections of possible treatment options

Further sketch details of treatments are provided in Appendix C.

4.4.2 Carriageway Reallocation

Characteristics	• Reallocates the existing road width • Narrowing of traffic lanes or shoulders
Benefits and constraints	• Avoids new seawall works • Lower costs • Only possible where existing space permits
Possible applications	• Where existing road space is available • Unable to be applied extensively in Eastern Bays project due to limited widths available
Accepted / Rejected?	• Accepted

4.4.3 Placed Rock Revetment

Characteristics	• Rock 'rip-rap' placed to provide additional width and protection against wave action
Benefits and constraints	• Lower costs • Requires extensive widths (encroaching into beach or ocean) • Commonly used as seawall type solution
Possible applications	• Most locations except beaches
Accepted / Rejected?	• Accepted

4.4.4 Double Curved Seawall

Characteristics	• Double curved concrete seawall
Benefits and constraints	• Reflects wave energy • Robust solution, long design life • Consistent with other sections of Eastern Bays • Encroachment • High cost • Can be increased in height
Possible applications	• Most locations
Accepted / Rejected?	• Accepted

4.4.5 Timber Walkway

Characteristics	• Timber piles & deck
Benefits and constraints	• Low cost • Lower design life / durability
Possible applications	• Limited applications due to design life / durability concerns
Accepted / Rejected?	• Rejected

4.4.6 Single Curved Seawall

Characteristics	• Single curved concrete seawall
Benefits and constraints	• Reflects wave energy • Robust solution, long design life • Consistent with other sections of Eastern Bays • Encroachment • High cost • Can be increased in height
Possible applications	• Most locations
Accepted / Rejected?	• Accepted

4.4.7 Vertical Cantilevered Concrete Wall

Characteristics	• Cantilevered concrete wall with mass fill behind
Benefits and constraints	• Keyed into existing pavement structure • Robust solution, long design life • Reduced encroachment • High cost • Does not reflect wave energy
Possible applications	• Numerous locations including beaches
Accepted / Rejected?	• Accepted

4.4.8 Gabions / Reno Mattress

Characteristics	• Stone filled wired baskets
Benefits and constraints	• Very poor durability in marine environment • Moderate cost • Does not reflect wave energy
Possible applications	• Very limited
Accepted / Rejected?	• Rejected

4.4.9 No Fines Concrete Blocks

Characteristics	• Coarse concrete blocks with no reinforcing or fine materials (porous)
Benefits and constraints	• Moderate durability in marine environment • Moderate cost • Does not reflect wave energy • Aesthetically limited
Possible applications	• Most locations
Accepted / Rejected?	• Accepted

4.4.10 Sheet Piles

Characteristics	• Driven sheet piles with mass fill behind
Benefits and constraints	• Poor durability in marine environment • High cost • Does not reflect wave energy
Possible applications	• None
Accepted / Rejected?	• Rejected

4.4.11 Timber Pole Wall

Characteristics	• Driven timber poles with mass fill behind
Benefits and constraints	• Poor durability in marine environment • Low cost • Does not reflect wave energy
Possible applications	• Very limited
Accepted / Rejected?	• Rejected

4.4.12 Mass Concrete to Existing Pitched Seawall

Characteristics	• Re-profiling the existing pitched seawall with additional mass concrete and dowels to form a vertical seawall face gaining additional width
Benefits and constraints	• May encroach on perceived beach width if existing shallow angle seawall is covered with beach materials • Medium cost • Does not reflect wave energy • Reliant on existing seawall being structurally sound
Possible applications	• In location where existing seawall is pitched
Accepted / Rejected?	• Accepted

4.4.13 Dwarf Mass Concrete Wall

Characteristics	• Small vertical faced wall
Benefits and constraints	• Can limit encroachment on beach • Width gain is limited • Does not reflect wave energy • Not reliant on structural soundness of existing seawall structure
Possible applications	• Where proposed vertical face will not exceed 0.5m
Accepted / Rejected?	• Accepted

4.5 Treatments Summary

In summary, 4 of the possible 12 treatments have been rejected from further consideration for the reasons outlined in the tables above.

The remaining 8 treatments are still considered feasible for consideration. The specific treatment to be used at all locations will be dependent upon the preferred width selected for the route. This will be undertaken at DBC stage once a preferred width has been confirmed through the IBC process.

4.6 Facility Width

4.6.1 Guiding Principles

Some key principles were established during the optioneering exercise. The first of these was that, where a seawall had less than 5 years remaining life, then it should be replaced with a new fully redirective single or double curved seawall, as this type of treatment has been used already within parts of York Bay and the northern part of Lowry Bay, and is considered a good long term solution.

The above principle was not applied where a seawall was being replaced within a beach area, as this would likely encroach onto the useable beach area. Instead alternative options would need to be considered.

The second design principle related to avoiding unnecessary works – meaning that if sufficient width was already available in the seaward side road shoulder for the required width for that option, then no seawall upgrade or widening would be proposed. For example if the option required a minimum width of 2.0m and the existing shoulder for a length was 2.3m, then no works would be proposed for that section.

4.6.2 Option Description

Further to the consideration of possible treatments, a key component of the IBC is to determine a suitable width for the facility. It is recognised that a single inflexible set width for the entire facility may not be necessary or appropriate given site constraints and specific requirements; however a 'general' desirable minimum width should be established as part of this investigation.

The options considered, along with the reasoning are described below[10]:

- **Option 1 – Replace only seawall with less than 5 years remaining life**: This is the 'do-minimum' option and is considered more of a comparison than a realistic option for delivery because it would leave in place sections of the route where there is insufficient width for the passage of a pedestrian or cyclist.
- **Option 2 – 1.5m facility:** Considered as the lowest standard facility and an 'absolute minimum'. Whilst this would improve the existing level of service (LoS) for path users, the increase in LoS would be limited and the path would not meet minimum standards. Such a low standard would necessitate less physical works and have affordability benefits. Similarly, it could potentially be further upgraded in future, and so is considered as a low standard solution at this stage.

[10] It should be noted that the stated widths are minimum widths for the facility throughout and so if the existing shoulder width is wider than the option minimum, it would not be reduced - it is acknowledged that this approach would result in an inconsistent facility width, which may need further consideration at DBC stage to ensure suitable transitions between widths.

- **Option 3 - 2.0m facility:** Slightly wider than the minimum consideration but still a less than ideal level of service for users. Passing cyclists would still be a concern at this width.
- **Option 4 - 2.5m facility:** Meeting minimum standards for a shared path[11] of 2.5m, this width of path is more in-keeping with the standard that should be provided; however such a width would require a more significant amount of physical work and therefore can be expected to increase the physical works cost.
- **Option 5 - 3.5m facility:** The highest standard width option considered, providing a 3.5m width facility throughout. This width would provide a good level of service in terms of width, easily allowing enough space for opposing cyclists to pass or for space for pedestrians or families to walk. This width meets the Austroads standard for a recreational shared path facility.

Plans of the options are included as Appendix A.

4.6.3 Options Not Considered

- **Less than 1.5m wide**: No facility less than 1.5m was considered, such as providing a minimum of 1.0m throughout, on the basis that 1.5m is already substandard (and arguably unsuitable / inappropriate), and so adequately covers off the consideration of alternatives at the lower end of the spectrum. The cost outlay for a 1.0m facility would not be expected to generate many benefits and would be unlikely to meet project objectives.
- **3.0m wide**: Initially this was considered as an option to be investigated and assessed. Ultimately it was discounted and not considered further. Working through the options there appeared little difference between 3.0m and 3.5m in terms of locations where physical works were required i.e. there were very few sections where 3.0m was already achievable and would require no physical work – so costs for the options were very similar, and so there was little to differentiate.
- **Greater than 3.5m width**: This option was not considered as 3.5m is satisfies the desirable width for a recreational shared path. Additional width would commensurate cost increases that may inhibit affordability. Similarly, the recently completed section of shared path at York Bay would become out of context if the facility was much wider than 3.5m, and there is no desire to provide further upgrade to the improved York Bay section. Nonetheless, it is recognised that there could be a desire to provide some specific sections at greater than 3.5m width, where there may be a need for additional width for congregating, or for enhanced urban design and movement functions (such as between Days Bay and Eastbourne).

4.7 Site Features

The Eastern Bays project length between Point Howard and Eastbourne contains various notable features including beaches and points, fluctuating road widths and varying road and shoulder widths throughout. Footpath provision on the landward side is also highly variable.

Street lighting is provided, mainly on the landward side, but not exclusively. Power poles are sporadic throughout on both sides of the road, and will need to be relocated or undergrounded to allow for the shared path.

There are also a variety of other features that require consideration such as boat sheds, property accesses, trees, features or interests / memorials, bus stops and car parking.

These features have been observed and recorded by the project team when observing the site either on foot, bicycle, motor vehicle or from aerial and street view imagery.

The drawings contained within Appendix A include details of the approximate beach extents, notable features, seawall condition (remaining life), road widths and seaward side shoulder widths.

[11] Austroads Aspects of Cycling Guides Table 7.6 notes that a local access path should be 2.5m desirable width, however this could be considered a recreational path which should have a desirable minimum width of 3.5m.

5 Options Assessment

5.1 High Level Cost Estimation

To undertake the cost estimation it was necessary for the project team to develop an itemised cost estimate for each option. As the specific treatment type for each location on each option has not yet been selected this makes estimation of the costs more challenging. To overcome this, the project team developed design solutions that proposed a multitude of different treatment types for each option.

For each option, the project team walked the entirety of the site and collectively agreed a suitable treatment for providing the necessary width for each option. A 'one size fits all' approach was not used for each option as this was considered unrealistic. Instead a number of treatments were used on each option, based on the team's best judgement, to provide a reasonable level of confidence in cost estimation. The treatments included: new double and single curved seawall, new mass concrete to flatten existing pitched seawall, revetment treatment and dwarf walls. These are just some of the treatment methods considered in Section 4.3 but all of the treatment methods that have not been rejected as being unsuitable will continue to be considered during the DBC phase.

The cost estimates for each of the options are provided below:

Table 5-1: Expected Cost Estimates

Option	Expected Estimate
Option 1 – Replace < 5 years remaining	$4.3M
Option 2 – 1.5m facility	$7.3M
Option 3 - 2.0m facility	$9.0M
Option 4 - 2.5m facility	$11.0M
Option 5 - 3.5m facility	$15.0M

The monetary figures from the table above are the expected estimates and include items for traffic management, preliminary and general, service relocations, design and MSQA and environmental compliance. A 50% contingency allowance is also included given the limited information available at this stage of project development. Further this high level of contingency is advisable as no information is currently available on environmental mitigation costs which could prove significant.

Full cost estimates are provided in Appendix F.

5.2 Multi-Criteria Analysis

5.2.1 Process

A MCA was undertaken on the five options in a workshop setting on 7 November 2016. The attendees included the core project team, plus specialist consultant advisors (such as a structural engineer, ecologist, planning & consenting expert), client representatives, NZ Transport Agency representatives (Planning & Investment and cycleway specialist), as well as community group representatives.

The options were supplied separately to all of the group in advance of the MCA to allow time for preparation and consideration.

A loose framework was proposed for the MCA workshop in advance, but the process was kept flexible to allow refinement and improvement during the workshop.

The intent of the process was to ensure an adequate cross section of views were presented and a broad range of issues and considerations put forward.

A number of criteria for assessment were also supplied in advance of the workshop and these are described below.

5.2.2 Criteria

The criteria below were initial suggestions for consideration:

- **Safety** – this focuses on how safe the facility is likely to operate in a practical sense. It is not the perception of safety that users may have, but the actual likely level of safety the facility is expected to offer to users.
- **Attractiveness** – considers the likely attractiveness for users, and specifically how well the facility is likely to be considered by prospective users i.e. how well would the option draw new users to it?
- **Resilience** – this covers multiple factors such as whether the seawalls are redirecting, height, protection for the road structure and ability to be increased in height in future.
- **Upgrade Potential** – this looks at the potential for further upgrade in future and will be particularly relevant for sections that are not subject to any works, or are widened by an interim amount and could require further widening in future to achieve a consistent shared path.
- **Durability** – Consideration of the level of robustness and long term protection that the facility offers, from weather events and wave action.
- **Ecology** – this criterion focused on terrestrial and aquatic ecology values.
- **Visual**[12] – this includes visual impacts for the wider community across the road / shared path facility, visual effects for vehicle occupants along Marine Drive and also visual impacts for users of the facility.
- **Consentability** – this will be an assessment of the level of expected difficulty for achieving the necessary resource consents across each option. It is possible that this may be partially or fully covered off adequately via other criteria (such as visual and ecology) but is nevertheless included as a suggested criteria at this stage.
- **Beach Impact** – considers the level of impact on the existing beaches from a community use perspective.
- **Cost** – takes into account the rough order capital construction costs plus contingencies.
- **Cultural / Iwi** – this is a critical criterion that needs full consideration to ensure these inputs are considered. It is noted that there was previous iwi and cultural inputs around the considerable values of the Eastern Bays coastline.
- **Coastal Processes** – considers the impact of the proposed works on the marine environment and processes such as coastal erosion and movement of materials.

After further consideration it was decided that a number of these criteria would be removed for the following reasons:

- **Cultural / Iwi** – following an initial discussion with a cultural advisor, a decision was made that any options that are shortlisted following the MCA workshop would be discussed with Iwi representatives to determine the level of acceptability, prior to progressing to DBC phase.
- **Coastal Processes** – limited information is available on specific proposed treatments at all locations and so coastal processes will be fully considered at the DBC stage.

[12] The visual expert was unable to attend the MCA workshop, but provided scoring and commentary after the workshop.

5.2.3 Scoring Method

The option scoring system that was used during the MCA process was agreed by all workshop attendees and is as follows:

Table 5-2: Agreed MCA Scoring Method

Score	Description
1	The option presents few difficulties on the basis of the criterion being evaluated, taking into account reasonable mitigation proposals. There may be significant benefits in terms of the attribute.
2	The option presents only minor areas of difficulties on the basis of the criterion being evaluated, taking into account reasonable mitigation proposals. There may be some benefits in terms of the attribute.
3	The option presents some areas of reasonable difficulty in terms of the criterion being evaluated. Mitigation is not readily achievable at reasonable cost, and there are limited apparent benefits.
4	The option includes some extensive areas of difficulty in terms of the criterion being evaluated, which outweigh perceived benefits. Mitigation is not readily achievable.
5	The option includes major difficulties / issues in terms of achieving the project on the basis of the criterion being evaluated.

5.2.4 Option Scoring & Summary

Scoring for the options was agreed during the MCA workshop by participants as follows:

Table 5-3: MCA Summary Table: Scoring & Commentary

	Option 1 < 5 years life		Option 2 – 1.5m		Option 3 – 2.0m		Option 4 – 2.5m		Option 5 – 3.5m	
Safety	Unlikely to draw many new users and so little different to existing. Slightly safer in some locations because a new facility would be provided, though fragmented. Could encourage more crossing of the road to get to and from new facility.	4	Improvement on existing with continuous facility provided. Space constraints in many locations making passing difficult and conflicts between users. With additional users at peak periods this could create safety problems however, given it is narrow, users expected to adapt behaviour accordingly - stop to allow passing etc.	4	Improvement on existing situation and good facility for pedestrians. Safety concerns as width could be in 'dilemma zone' for some cyclist users though this is not expected to result in actual injuries to users (instead they would adapt their behaviour).	3	Significant safety improvement for all users. 2.5m facility providing good space for passing other path users. Some congestion during busy peak periods but not considered to be a safety risk.	2	Extremely safe for all users with ample room to pass even in busiest periods.	1
Attractiveness	Very poor and unlikely to be attractive to potential users, either pedestrians or cyclists. No continuity and fluctuating width will be poor for users and unlikely to be much change from existing. Very poor width consistency along route.	4	More attractive than existing situation, particularly for more confident cyclists, but less confident and younger/older may still not want to use. Clear improvement for pedestrians. Concern for congestion / overcrowding in busy / peak summer periods with limited space. Poor width consistency .	3	Step change in level of attractiveness for pedestrian users but not ideal for cyclists. Still tight for busy situation or cyclists to pass with traffic on one side and drop off on other. Despite obvious shortcomings, would still attract new users. Improved width consistency but still not ideal.	3	Step change in level of attractiveness for all users as 2.5m provides reasonable width for a shared path facility. Still a level of constraint here, particularly for cyclists with a drop off on one side and traffic on the other, but very attractive still. Moderate to good width consistency.	2	Extremely attractive to all users, generating most numbers of new cyclists and pedestrians to the facility. Excellent width consistency.	1
Resilience	Scored based on proportion of new seawall and, remaining older seawall: New 3.5m curved seawall: 600m New seawall: 400m Other treatment: 0m Retained wall <20 years life: 400m	4	Scored based on proportion of new seawall and, remaining older seawall: New 3.5m curved seawall: 950m New seawall: 600m Other treatment: 0m Retained wall <20 years life: 250m	4	Scored based on proportion of new seawall and, remaining older seawall: New 3.5m curved seawall: 1250m New seawall: 500m Other treatment: 650m Retained wall <20 years life: 150m	3	Scored based on proportion of new seawall and, remaining older seawall: New 3.5m curved seawall: 1250m New seawall: 1150m Other treatment: 100m Retained wall <20 years life: 150m	3	Scored based on proportion of new seawall and, remaining older seawall: New 3.5m curved seawall: 2300m New seawall: 450m Other treatment: 50m Retained wall <20 years life: 0m	2
Upgrade Potential	This was debated at length but as this could mean width or height for future upgrade, as well as whether upgrading nothing now was actually better as avoided any spend, then agreed that a mid-point score would be applied to all.	3	This was debated at length but as this could mean width or height for future upgrade, as well as whether upgrading nothing now was actually better as avoided any spend, then agreed that a mid-point score would be applied to all.	3	This was debated at length but as this could mean width or height for future upgrade, as well as whether upgrading nothing now was actually better as avoided any spend, then agreed that a mid-point score would be applied to all.	3	This was debated at length but as this could mean width or height for future upgrade, as well as whether upgrading nothing now was actually better as avoided any spend, then agreed that a mid-point score would be applied to all.	3	This was debated at length but as this could mean width or height for future upgrade, as well as whether upgrading nothing now was actually better as avoided any spend, then agreed that a mid-point score would be applied to all.	3
Durability	Less seawall replaced so on a sliding scale score improves.	4	Less seawall replaced so on a sliding scale score improves.	4	Mid-range level of replacement.	3	More seawall replaced so on a sliding scale score improves.	2	More seawall replaced so on a sliding scale score improves.	2
Ecology	Potential construction effects including sedimentation, release of cementitious products, and direct disturbance of habitat effects is minimal and readily managed. Operational effects are unlikely to result in any substantial change in community composition.	3	Potential construction effects including sedimentation, release of cementitious products, and direct disturbance of habitat effects is minimal and readily managed. Operational effects are unlikely to result in any substantial change in community composition.	3	Potential construction and operational effects increase as the width of the pathway increases: greater encroachment into more natural habitats and increased potential for adverse effects during construction. Overall risks are no more than minor.	4	Potential construction and operational effects increase as the width of the pathway increases: greater encroachment into more natural habitats and increased potential for adverse effects during construction. Overall risks are no more than minor.	4	Potential construction and operational effects increase as the width of the pathway increases: greater encroachment into more natural habitats and increased potential for adverse effects during construction. Overall risks are no more than minor.	4
Visual	Requires minimal change to the existing residential character of each bay. The visual effects of the proposed structures are low across the overall Eastern Bays, particularly at the coastal edge with minimal disturbance to the beach. However it does nothing to improve the hodgepodge mix of seawall structures and makeshift improvements which adversely affect the existing visual amenity of residents and road users alike.	4	Retains much of the existing makeshift detailing and mix of materials in combination with a variety of new walls. Every new section of wall creates additional effects in terms of the interface of the new and old structures. The overall lack of cohesion and consistency increases impact of both the new and old walls. In short, this appears to be the worst of all options with little benefit in increased visual amenity and potential adverse effects due to the complexity of integrating the old and new seawall structures.	5	The proposed changes create longer stretches of new seawall and shared path construction. This reduces the variety of structures, simplifying the detailing required to integrate the new seawalls into the existing coastal edge. The final 2.0m shared path is in scale with the existing road corridor although is visibly different from the existing upgraded 3.5m path in York Bay.	3	Similar to Option 3 at a local/bay scale in terms of the number and location of changes to the seawall and shared path. The 2.5m wide shared path extends the overall road corridor without dominating the coastal edge. The proposed works have the potential to integrate with existing seawall and shared path upgrades. Overall the adverse effects of loss of local nuance and identity are balanced against the positive effect of a more cohesive coastal edge and consistent width shared path around the Eastern Bays.	2	Has the potential to establish a single consistent shared path and coastal edge around the Eastern Bays. The width of the path affects the visual amenity of beach users and local residents, as it not only extends further out over the coast but also competes with the road, effectively establishing a third lane of traffic, albeit cycling and pedestrian traffic rather than vehicles. This increased scale of the road corridor removes road users further (in terms of both horizontal distance and height) from the beach and the water.	3
Consentability	Environmental effects of the proposed works on the foreshore and coastal	3	Environmental effects are considered minimal, although consents will still be	3	Environmental effects become progressively adverse as the width	4	Environmental effects become progressively adverse as the width	4	Extensive widening of the pathway will result in	5

	Option 1 < 5 years life		Option 2 – 1.5m		Option 3 – 2.0m		Option 4 – 2.5m		Option 5 – 3.5m	
	marine area are considered minimal, although consents will still be required to undertake maintenance on the existing seawalls. Effects can be easily mitigated.		required to undertake maintenance on the existing seawalls and minor additions to existing structures. Effects can be mitigated.		of the pathway is increased. Requires encroachment onto the foreshore with resulting loss of amenity, increasing risk of contamination during construction. Greater interest from the community and the potential for some objections.		of the pathway is increased. Requires encroachment onto the foreshore with resulting loss of amenity, increasing risk of contamination during construction. Greater interest from the community and the potential for some objections.		significant environmental effects and permanent changes to the foreshore. Requires encroachment onto the foreshore with resulting loss of amenity, increasing risk of contamination during construction. Likely to attract strong objections from sectors of the community, especially the beach users.	
Beach Impact	Scored based on initial high level concept design and expected beach impact: • Encroachment in beach area: 400m • New 3.5m seawall in beach area: 50m	3	Scored based on initial high level concept design and expected beach impact: • Encroachment in beach area: 850m • New 3.5m seawall in beach area: 250m	4	Scored based on initial high level concept design and expected beach impact: • Encroachment in beach area: 1200m • New 3.5m seawall in beach area: 300m	4	Scored based on initial high level concept design and expected beach impact: • Encroachment in beach area: 1200m • New 3.5m seawall in beach area: 350m	4	Scored based on initial high level concept design and expected beach impact: • Encroachment in beach area: 1200m • New 3.5m seawall in beach area: 850m	5
Cost	Range of $3M-6M	2	Range of $6M-9M	3	Range of $6M-9M	3	Range of $9M-12M	4	Range of $12M+	5

5.2.5 Weighting of Criteria

During the MCA workshop the attendees also agreed how each criteria should be weighted relative to the others. This was in recognition that the workshop attendees believed some criteria were more important than others and this should be recognised.

The agreed weightings are as follows, out of a possible 10:

Table 5-4: Workshop participants MCA weightings

Criteria	Weighting
Safety	10
Attractiveness	10
Resilience	6
Upgrade Potential	7
Durability	6
Ecology	8
Visual	7
Consentability	6
Beach Impact	8
Cost	7

5.2.6 Outcome of MCA Process

The MCA assessment has been undertaken both with and without costs included in the overall assessment process.

The figures below show the outcomes, with the lower scoring options being preferred i.e. a lower score represents less issues or impacts.

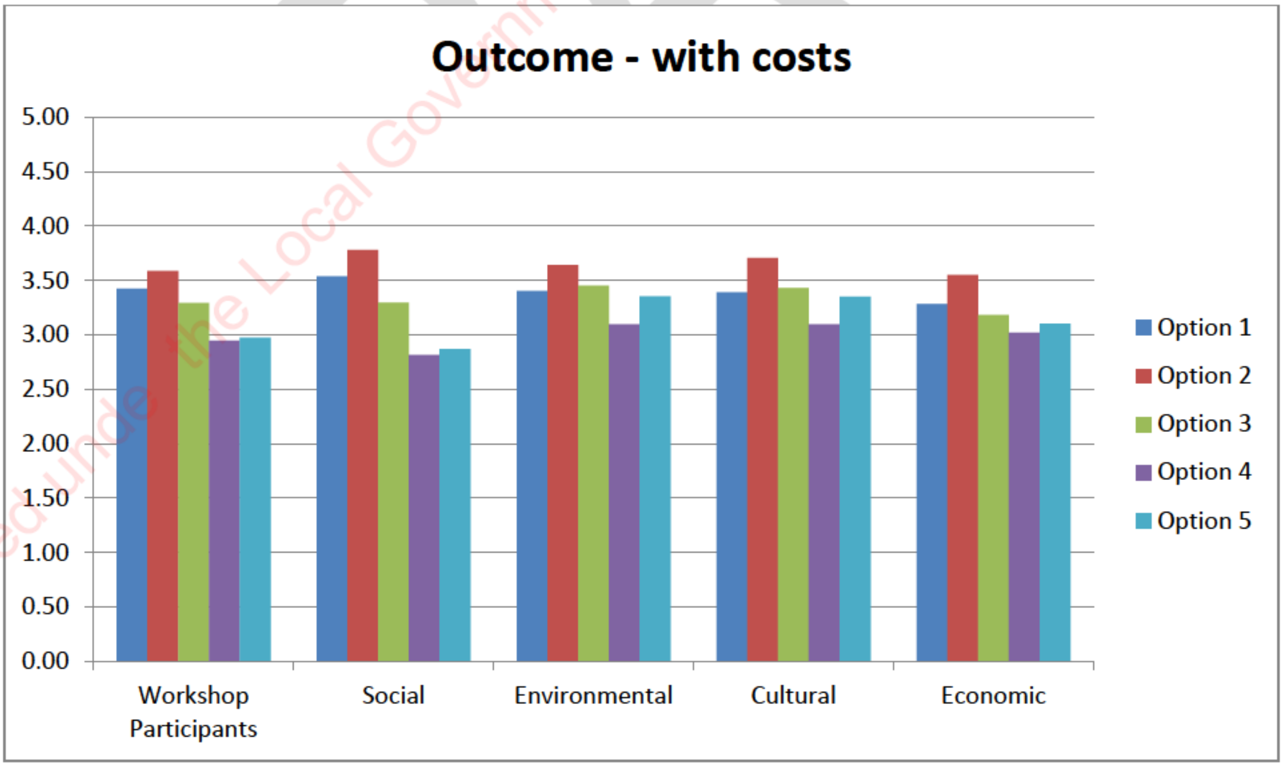


Figure 5-1: Weighted MCA Results (with costs)

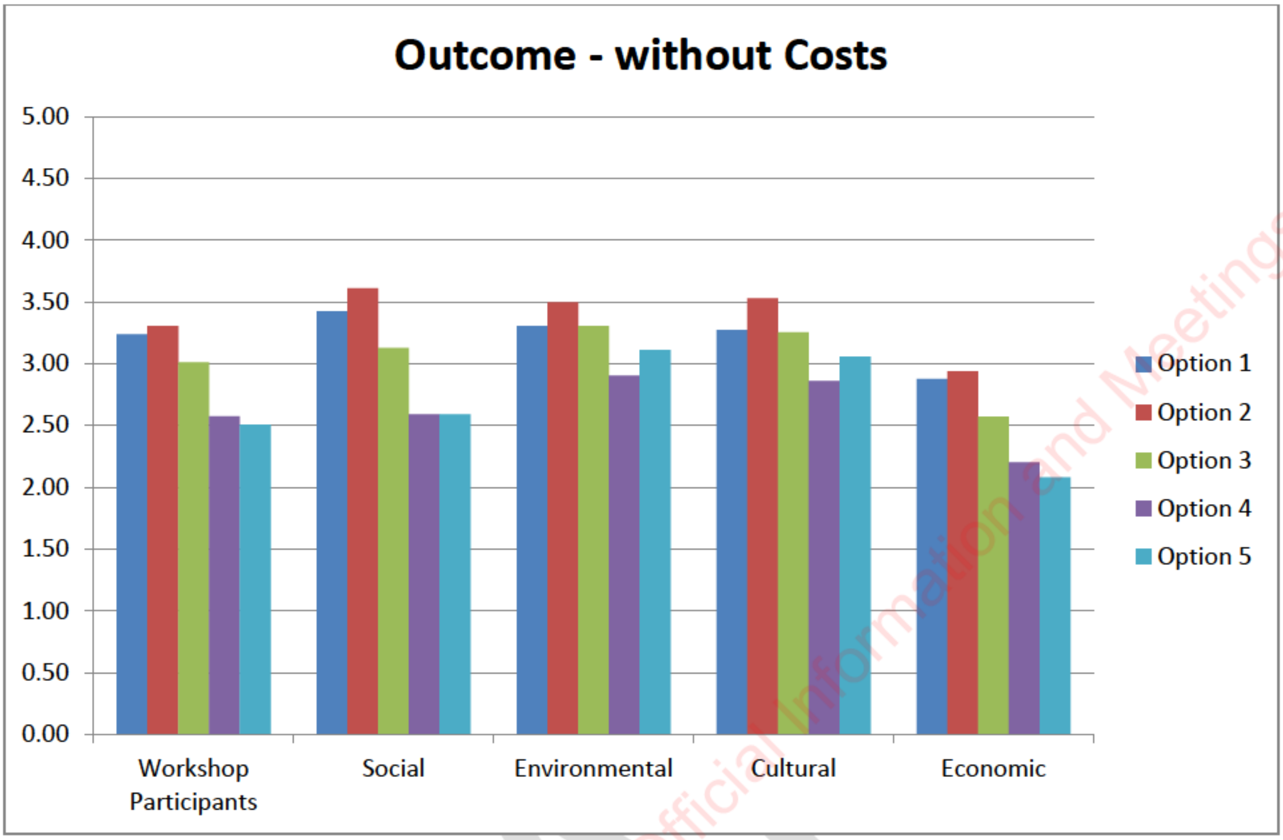


Figure 5-2: Weighted MCA Results (without costs)

The five different classifications shown across the bottom of the charts are the different weighting systems used. 'Workshop Participants' refers to the weightings agreed during the MCA workshop with the full group of attendees. The other four groups, namely *Social, Environmental, Cultural & Economic,* are sensitivity tests where the scoring criteria that align to that group are scored artificially higher, and the other criteria are reduced. This is done to ensure that the participants weighting applied at the workshop is robust, and not inappropriately weighted in such a fashion that vastly different results would be produced if weighted in a different manner.

It can be clearly seen from the MCA charts that Option 4 and Option 5 are favoured, by some margin, in the participant weighting system (both with and without costs included). In all other weighting systems the Option 4 and Option 5 still remain favoured, though the margin of difference to the other options is reduced.

5.3 Alignment with Investment Objectives

The agreed investment objectives for the project are reproduced below:

Table 5-5: Investment Objective Summary

Benefit	Measure	Baseline	Target	By When
To improve safety for pedestrians and cyclists	By increasing the perception of safety, as measured by the community survey	From 34% in 2014	To 50%	By 2019
To increase the numbers of pedestrians and cyclists	N/A	From approx. 125[13] per day in 2015	To 250 per day	By 2019
To increase the	By reducing the total number	From 81 hours (5	To 70 hours per	By 2021 (3

[13] AM peak period cycling volumes have been input to the NZ Transport Agency formula which gives an estimation of cyclist AADT being 77. Peak period pedestrian counts (17 users) have also been used to give an approximate existing use of a total of 125 cyclist and pedestrian users per day.

Benefit	Measure	Baseline	Target	By When
availability of the route	of hours the road is swept (response / emergency sweeping only)	year average, per year)	year (average)	year rolling average, per year)

An assessment of the five options against the three benefits above has been undertaken:

Table 5-6: Option alignment to investment objective

Benefit	Opt 1	Opt 2	Opt 3	Opt 4	Opt 5
To improve safety for pedestrians and cyclists	Limited achievement	Limited achievement	Achieves Objective	Achieves Objective	Achieves Objective
To increase the numbers of pedestrians and cyclists	Fails to achieve	Fails to achieve	Limited achievement	Achieves Objective	Achieves Objective
To increase the availability of the route	Fails to achieve	Fails to achieve	Limited achievement	Limited achievement	Achieves Objective

The above assessment against objectives is somewhat subjective and a matter of opinion – however the trend moving left to right across the options showing greater achievement of the investment objectives appears reasonable.

5.4 Economic Assessment

5.4.1 Introduction

This economic evaluation has been undertaken for HCC in accordance with the NZ Transport Agency's Economic Evaluation Manual (EEM 2016) using a customised version of the simplified procedures. A more detailed explanation of assumptions, results and sensitivity analysis is provided in Appendix D.

5.4.2 Key Assumptions

The following key assumption was made in the economic analysis;

The EEM cycle demand tool (Worksheet A20.1) was used to predict new users. The new cyclists generated by this tool were estimated to be those in the immediate Eastbourne catchment (buffer areas were only calculated at 50% in size to allow for the harbour). This equates to 50 new cyclists for four of the five options. It is envisaged that significantly more users will come from further afar (in a recreational capacity) to cycle around the Great Harbour Way cycleway and other planned new cycleways[14]. The standard buffer process is assumed to account for all the commuter and work related cyclists but only a small fraction of recreational cyclists.

Each option has a varying degree of attraction due to the width capacity provided. Therefore the maximum new users (as only calculated for Option 5) is based on an alignment with the 80% recreational users in the user cost calculation. Assuming that all commuting, work travel users and 5% of the recreational are local users, it leaves 75% of recreational users as coming from 'further afar'. Therefore if the 50 new users generated by the cycle demand tool equates to 25%, then there are another 150 users per day that are recreational.

5.4 3 Economic Analysis Summary

The results of the economic evaluation are presented in Table 5-7.

Table 5-7: Economic Evaluation Summary

	Opt. 1	Opt. 2	Opt.3	Opt.4	Opt.5
NPV Total Benefits	11,032,499	15,386,598	18,121,425	20,776,822	28,260,885
NPV Costs	3,440,446	5,974,304	6,479,825	8,096,037	11,344,264
BCR	***3.2***	***2.6***	***2.8***	***2.6***	***2.5***

[14] Other Greater Wellington projects include Wainuomata Hill, Beltway, etc

	Opt. 1	Opt. 2	Opt.3	Opt.4	Opt.5
FYRR	11%	9%	9%	9%	7%

The results of the incremental BCR are presented in Table 5-8. Options 1 to 5 are also ranked in order of least to most expensive capital costs.

Table 5-8: Incremental BCR Summary

	Opt. 1	Opt. 2	Opt.3	Opt.4	Opt.5
Incremental BCR	3.2	1.7	5.4	1.6	2.3

The incremental BCR shows that the additional benefits for each option (over its predecessor) are greater than the additional costs, and therefore it is worthwhile spending the additional costs.

6 Community Engagement

As per the Stakeholder Engagement Plan, Community Engagement has been undertaken through the following means:

1. Presenting at Eastern Bays Consultation Group Meeting on 5 September 2016
2. Email confirming Open Day & project info
3. Website - http://www.huttcity.govt.nz/Your-Council/Projects/eastern-bays-shared-path/
4. Community Open Day on 19 November 2016

6.1 Community Open Day

On Saturday 19 November 2016 the project team sought views from members of the public at a community open day, held at Eastbourne Library.

Approximately 60 people attended the session to talk to members of the project team and to view the options. Feedback was captured on feedback forms and on post-it notes around the room.

Community feedback was requested on all 5 options as described in Section 4.6.2. The community feedback has been captured in The Open Day Report (MWH, December 2016) and is summarised in Table 6-1.

Table 6-1: Community Open Day Feedback Summary on Path Options

Option	Community feedback summary
Option 1: Replacing the <5 year remaining life seawall This option would look to replace the parts of the seawall that are at the end of their life.	**People told us**: This option is seen as a short-term fix that people won't use. People mentioned that this type of upgrade should be covered under existing maintenance budgets.
Option 2: 1.5m width This option would look to provide a path that is 1.5m wide.	**People told us:** This option is too narrow, and although it would be better than what exists at the moment, it wouldn't cater for both cyclists and walkers.
Option 3: 2m width This option would look to provide a path that is 2m wide.	**People told us**: People viewed this as a minimum, but this option is still considered too narrow.
Option 4: 2.5m width This option would look to provide a path that is 2.5m wide	**People told us**: This option is more acceptable and has support. Concerns around preserving the beaches/trees/boat ramps and the need to include the southern section of Days Bay
Option 5: 3 5m width This option would look to provide a path that is 3.5m wide	**People told us**: This option is widely supported. People see this as a long-term valuable asset. The idea of 'do it once, do it properly' comes through. There are some questions about sea-level, keeping the beaches intact and the cost.

Additionally, the community was asked about their view on problems and issues, use for the path and path widths. The summarised responses are included in Table 6-2.

Table 6-2: Community Open Day Feedback Summary on Problems, Use and Widths

Questions	Community Feedback Summary
What are the problems and issues you know about?	Many people talked about safety concerns. Inconsistency was another issues people raised, the path being too narrow at many points along the route. Sea-levels, storm debris and the seawall were important factors too. People want the project team to think about access to the shared path, minimising impact on the beaches and re-visiting speeds along Marine Drive as well.

What would you use the path for?	Those who answered this question indicated that they would use the path every day for recreation and commuting to school and work. While talking about use – people also referred back to safety.
How wide should the path be?	The majority of people who commented on this question opted for an "as wide as possible" shared path (3.5m). 2m or 2.5m were seen as a minimum. There were some references to having some flexibility and having variable widths to avoid losing beaches, boat ramps and trees.

6.2 Community Engagement Summary

Most members of the public are supportive of the Eastern Bays Shared Path project.

The predominantly preferred options are options 4 and 5 with a preferred widths of 3.5m and a preferred minimum widths of 2m or 2.5m. There was some references to having some flexibility and having variable widths to avoid losing beaches, boat ramps and trees.

Most people indicated they would use the path for recreational and commuting trips regularly.

The full Consultation Report is provided in Appendix G.

7 Recommended Option and Next Steps

7.1 Final preferred option

Based upon the outcome of the community consultation, the MCA process, alignment to objectives and to a lesser extent, the economic analysis, the following is recommended:

Both Option 4 and Option 5 should be progressed through to Detailed Business Case stage for more detailed assessment and analysis, prior to selecting the single preferred option as part of the DBC process.

These two options have greatest alignment with the agreed investment objectives for the project, whilst also being clearly preferred in the MCA process with the weighting applied by the workshop participants. These two options also score well against the other options in the MCA sensitivity testing across the social, environmental, cultural and economic weighted assessments.

The community feedback received also suggests a definite preference for either Option 4 or Option 5.

Lastly, the economic evaluation undertaken identifies a BCR for both options of around 2.5, which, whilst not large, clearly demonstrates a project that results in a positive economic return and is therefore fundable.

At this stage, it is not advisable to only take one option forward as there is no clear distinction between them, hence they should both be selected for further assessment during the DBC phase.

It is worth noting that the final outcome may be a combination of widths when additional work is done on the two preferred options during the DBC phase – because there could be merit in changing the width of the path at key locations, for example, narrower at beaches and sensitive locations, and wider where higher use or stopping and congregating is expected.

7.2 Preferred Option Risk

The key risks moving forward with the preferred options are described below:

- **Cost:** The cost estimation undertaken has been developed based on an elemental, itemised basis. However, there are numerous assumptions included that could create inaccuracies. Furthermore, required mitigation is not yet known and has not been priced. Whilst a sizeable contingency has been included, it is possible cost estimates could be exceeded (threatening affordability).
- **Construction disruption:** Construction of the physical works in many locations will be challenging due to the limited width available. Given this is the only road to the Eastern Bays / Eastbourne managing traffic during construction needs careful consideration.
- **Public support & acceptance:** Public feedback has been generally positive thus far. However, the expectation is that when proposals are worked into greater details and the community can see the exact detail of what is being proposed in all locations, and in particular at sensitive areas, the level of negative feedback is expected to increase. This could result in diverging views within the community, and a challenge to agree on a solution to progress.
- **Consenting:** an initial assessment of the consenting issues and requirements has been undertaken and is described in greater detail in Section 7.3. Given the sensitive nature of this location and environment, the consenting process has the potential to be complex, creating cost and time implications for delivery.
- **Timing:** To capitalise on the availability of Urban Cycleways Funding (UCF) in particular, there is a real need to accelerate the delivery of the DBC, the consenting and the detailed design so that construction can commenced to achieve the spend by the deadline of June 2018. Many of the risks described above have the potential to delay the delivery of the programme and jeopardise funding.

7.3 Statutory Approval Requirements

A Social & Environmental Screen has been undertaken for the project and is included as Appendix E.

The two options selected will require works to the existing seawall, and there are sections of seawall that will need to be extended into the coastal marine area to achieve the width of the shared pathway. The placement of riprap and extensions to the revetments will also require works in the coastal marine area.

Potential effects of the proposed works on the foreshore and coastal marine area are likely to be associated with the following:

- Construction/repair/demolition of the seawalls which may result in the release of fine sediments and the potential release of water contaminated with cementious-based products (temporary effects);
- Public access/occupation to the foreshore (temporary and/or permanent effects);
- Coastal natural processes, including effects on shoreline stability in the vicinity and adjacent areas (permanent effects);
- Natural habitats, such as the nesting sites of little penguins (east of Marine Drive) (temporary and/or permanent effects); and
- Heritage values, such as heritage structures (boatsheds) (temporary effects).

The Wellington Regional Council and Hutt City Council have planning provisions that will need to be met to allow works to be undertaken, where the effects are avoided, remedied or mitigated.

1 Wellington Regional Council Planning Provisions

Wellington Regional Coastal Plan

The seawalls fall within the "Coastal Marine Area" but do not fall within "Areas of significant conservation value." The current Wellington Regional Coastal Plan contains rules relating to activities on, and disturbance of, the foreshore and seabed, structures and discharging contaminants. Of relevance to the shared pathway are rules grouped around structures in the coastal marine area and disturbance of the foreshore.

Rules relate to "structures" and not specific to "seawalls". New rules are being introduced that are specific to "seawalls" (see below).

The Proposed Wellington Region Natural Resources Plan (pNRP)

Rules 165 and 166 apply to the additions/alterations and new seawalls in this area. In summary any works on the seawalls will require a resource consent. The works can be done either as a controlled activity or a discretionary activity.

- Controlled activity - any addition shall add no more than 5m in horizontal projection and 1m in vertical projection to the structure; the addition shall not extend any further seaward than the existing seawall.
- Discretionary activity – new seawall or any addition that is not a controlled activity under Rule R165 is a discretionary activity.

The shared path will require the reconstruction of the seawall in parts to accommodate the width needed for the pathway. Where the seawall toe remains in a similar position, the magnitude of change in habitat type is not great, however where the seawall extends beyond the toe of the wall, the effects will need to be adequately assessed.

2 Hutt City Council District Plan provisions

Rules in the Hutt City District Plan associated with the proposal, relate to historic buildings, trees and contaminated sites. The Skerrett Boatshed (1906) at Lowry Bay is a listed historic building (Heritage Listing #3580) and identified on Map C6 of the District Plan, requiring protection. "Atkins Tree" in York Bay is not listed as a notable tree but has local interest. It has been identified in the landscape assessment to be relocated (closer to the bus shelter which is also to be relocated).

There is a SLUR site (SN/03/188/02) in Marine Drive, Sunshine Bay (Sunshine Service Station). Disturbing soil during construction that has a history of contamination can lead to adverse effects on human health. A consent under the National Environmental Standard for assessing and Managing Contaminants in Soil to Protect Human Health (NES) may be required.

7.4 Funding availability

In terms of affordability, the expected cost estimates for the two recommended options are $11.0M and $15.0M at this IBC stage.

On the basis that largest of these may eventuate and is the higher of the two, $15.0M has been considered as the estimate to test affordability.

Currently HCC[15] has allocated $9M in funding to the Eastern Bays Shared Path. This is 'subject to subsidy funding' and is therefore likely to include the NLTP and UCF share of funding for the project.

On this basis, it is possible that there is a funding / affordability gap that needs to be resolved. It is recommended that the most appropriate options are taken through to DBC stage and funding conversations continue concurrently to ensure the projects keeps progressing given the tight delivery timeframes. This will also allow greater accuracy to be developed around the cost estimate and contingency values.

7.5 Next Steps

The next steps in the process are:

- Agree recommendations of IBC
- Progress immediately to DBC investigations of two recommended options
- Develop DBC proposals to a level sufficient for consenting, as opposed to being sufficient only for DBC sign-off
- Run consenting process in parallel to detailed design phase
- Secure consents and agree mitigation
- Complete detailed design
- Tender and award physical works contract
- Commence construction of works.

[15] Hutt City Council Long Term Plan 2015-2025:
http://iportal.huttcity.govt.nz/Record/ReadOnly?Query=container:%5Buri:3671182%5D%20&Tab=31&Uri=3815345&Page=0

Appendix A Project Plans

Appendix B Seawall Condition

Appendix C Treatment Options

Appendix D Economic Evaluation

Appendix E Social & Environmental Screen

Appendix F Cost Estimates

Appendix G Consultation Report

Investment & strategic case quality assessment

Project manager to complete

Strategic Case information			
Project/activity name	Eastern Bays Shared path Strategic Case	Project Manager / Case Manager	Mayurie Gunatilaka
Region/Council	Hutt City Council	Sponsor	Tony Brennand
Next business case phase	DBC has been completed and project is ready for construction in 18/19	TIO ref. no.	127179
Funding sought for next phase	$14,550,000 for construction from NLTP 18-21 : Funding priority Probable	SAP ref. no.	N/A
2018/19 $ amount	$2,250,000	2020/21 2021/22 2021/22 2022/23 2023/24 $ amount	$3.6M $2.0M $1.8M $2.6M $2.3M
Breakdown of what funds to be used for	Construction of a shared path between Eastbourne and Lower Hutt in the Wellington region. The path follows the only road connection into the residential areas linking to the city centre.		
Total expected project implementation cost	$16.07M	Business plan ref. no.	N/A
Funding source	NLTP / Local Share	FAR %	51%
TIO up to date	Y	Approval delegation/s sought	Approval of Strategic Case
Included in RLTP/ NLTP/ Business plan	Included in RLTP and NLTP		
Significant outcomes	N/A		
Brief description of the decision sought	Approval of Strategic Case		
Significance assessment of the decision	This is to inform that the strategic case was prepared by HCC in 2017 after the IBC stage to meet changing understanding of NZTA expectations for funding decisions. A constructive working relationship with NZTA staff has been in place throughout.		
Previous business case phase applications/ approvals; conditions and status	IBC – $374,314 2015/16 – 2016/7 DBC – $293,000 2016/17 – 2017/18 Pre-implementation – $450,000 2017/18 – 2018/19 There are no conditions on earlier funding approvals registered in TIO.		

Programme/Project linkages – related activities	Eastern bays Shared Path – Great Harbour Way – Construction Eastern Bays Shared Path – Great Harbour Way – DBC – Funding Approved Eastern Bays Shared Path – Great Harbour Way – Implementation – Funding Approved Eastern Bays Shared Path – Great Harbour Way – Indicative Business Case – Funding Approved Eastern Bays Shared Path – Great Harbour Way – Pre-implementation – Funding Approved
Add InfoHub links/ name for all relevant documents	All supporting documents (including this one) can be found on TIO under the project name.

Sponsor – project ready and endorsed

Name	Mayurie Ganatilaka
Signature	NGunathilaka
Date	21/09/2018

SPP / I&F / DP&S to complete

Recommendation and summary	
Strategic alignment assessment summary *SPP and PI*	*SPP and PI* This strategic case considers connectivity between Days Bay heading north to Point Howard and south to Eastbourne along Marine Drive. The route is a primary collector with vehicular traffic volumes of 8,000 vpd. The route is a coastal road with no or limited alternatives along the sections where a shared path facility is provided. As the seawall has been upgraded shared paths have been provided along short lengths. Significant gaps in customer levels of service have been assessed This Strategic Case actively: • Provides a resilient route • Provides safe routes for cyclists and pedestrians • Provides access to activity centres
Assessed by	*SPP* Tony Brennand *PI* Michelle Lewis
Date	24 August 2018

SPP and PI

Recommendation to	Approve
Conditions (if applicable)	No conditions are considered necessary as the project is at construction stage and the Agency has been kept updated on provided feedback throughout the stages.
Reasons for recommendation	The project is aligned with the GPS (2018) outcomes. The project has been advanced to construction stage and has an IAF of Medium. For inclusion in the NLTP 2018-21 an assessed Strategic Case is required. The strategic case has been included in earlier IBCs and DBCs which have been approved.

SPP and PI

Has the strategic case been signed off via a Point of Entry process	No. The Point of Entry process has not been undertaken as this is Strategic Case is seeking retrospective support due to future projects that are connected to the investment and to improve the ability for ease through the funding system for these future projects.
LTV	There are no specific references in the LTV but there are generic high level references to encourage cycling in the region.
Wider government policy or strategy (central or local)	The Hutt City Council has a strategy to develop key three arterial cycle routes that intersect in Lower Hutt to enable access by cycling and walking within and through the city area. The GPS 2018 seeks an increased focus on access to urban areas for economic and social opportunities. This is to ensure that transport and land use planning reduces the need to travel by private motor vehicle and supporting a mode shift for trips in urban area from to low cost modes like walking, cycling and public transport.
Is this part of an overarching Strategic or wider Business Case?	The work is being undertaken following the National Business Case for investing in making cycling a safer and more attractive transport choice.
ILM	A facilitated ILM workshop took place in September 2016. Stakeholders included HCC, NZTA and community groups.
Separate comments by SPP and DP&S (if desired)	*Nothing further to add.*

SPP and PI

Problem/Opportunity statements ***(questions 1-4)***	
Is it clear what the problem is that needs addressing ?	The problems are: • Problem 1 Safety of current path and lack of separation prevents walking and cycling and the subsequent health, environmental and economic effects (70%) • Problem 2 Current facility is at increasing risk of closure and damage from storms and sea level rise and there is not alternative route (30%) These could be made clearer, however at this stage in the project, the intent is clear.
Is there evidence to confirm the cause and effect of the problem?	Evidence is provided qualitative, quantitative and supported by images. The customer LOS is demonstrated as not being met.
Does the problem need to be addressed at this time?	The problem could be addressed at any time, there are no critical reasons for immediate action. HCC has funding in its LTP and has a programme of work in place.
Is the problem specific to this investment	The problem occurs in many locations of similar geographical areas around NZ.

Benefits ***(questions 5-8)***	
Have the benefits from fixing the problem been clearly defined?	The benefit statements are identified from the NZTA National Business Case for investing in making cycling a safer and more attractive transport choice. The benefits are identified as : – Improved safety for cycling – A more efficient transport network, in urban areas – More effective delivery of cycling investment. The benefits are generic and could be improved if they were made specific to the geographical area through which the project traverses.
Will the measures provide evidence that the benefits have been delivered?	The benefits are mapped to measures with baseline data and targets and dates for achieving targets set. The measures assume all else is held stable. The measures enable evidence to be collated that can allow analysts to refine learnings from the investment. Further analysis to correct for auto-correlation would be needed.
Are the measures both attributable and quantifiable to this investment?	See comment in box immediately above. All measures need to be analysed to account for changing factors. The direct reading of measures only provides an indication as it assumes all other factors change as predicted in modelling. This needs further testing at the analysis stage, which is not always undertaken.
Are the benefits of high value to the NZ Transport Agency (furthering its objectives)?	The benefits of: • Improved Safety • Increased multi modal choice • Economic benefits from additional users and recreational use of adjacent land uses • Lower maintenance / emergency works costs. Are firmly grounded in both the GPS and LTMA. They also are consistent with the Agency's Statement of Intent. Consequently they are highly valued by the Agency.
Further separate comments by SPP and PI	*Nothing further to add.*

See https://www.pikb.co.nz/home/monitor-investment-performance/nzta-investment-monitoring-overview/framework-for-investment-performance-measurement/

All assessors as relevant

General assessment	
Scope of activity for funding request *PI*	The provision of a shared facility of 2.5-3.5m width. Varying along the length is acceptable to the community.
Previous applications; conditions and status *PI*	Eastern Bays Shared Path - Great Harbour Way - Pre-implementation $450k 2017/18
Strategic context and regional perspective *SPP*	From a regional perspective there is a desire to promote safe cycling facilities.
Programme/Project linkages *PI*	The Beltway Wainuiomata Shared Path
Strategic fit *PI* *I&F (if relevant)*	High strategic fit.
Benefit and cost appraisal *PI* *I&F (if relevant)*	The DBC has undertaken 24 sensitivity tests with BCR's typically in the range 1.7-2.4. The outliers are BCR of 0.7 if cycle volumes remain low (<80 and are all local users with no wider attraction and 2.8 if cycle volumes are high. This indicates that the volume of cycle users is the key determinant in the scheme achieving a BCR in the >1 range. This could be achieved through targeted TDM at the time of opening and at key times during the year eg start of school, after Christmas, start of spring, when people change house/school.
Risks and opportunities *SPP and PI*	The project should be connected with the GWRC TDM programme to deliver maximum benefit.

See https://www.pikb.co.nz/assessment-framework for Knowledge Base guidance.

Financial checks	
Where's the investment coming from? *I&F*	The walking and cycling improvement will be funded from 452 work category and Walking and cycling activity class. Separate funding applications will be made during the 18-21 NLTP through the standard NZTA process.