Appendix G: Iain Dawe expert review comments

greater WELLINGTON
REGIONAL COUNCIL
Te Pane Matua Taiao

MEMO

TO Shannon Watson

FROM Dr Iain Dawe

DATE 13 May 2019

FOR YOUR INFORMATION

Eastern Bays shared pathway consent – Assessment of AEE for coastal processes and beach renourishment

I have reviewed the following reports to assess the impacts of the proposed construction works on the coastal process and natural hazards of the eastern harbour bays area:

1. Appendix E - Eastern Bays Shared Path: Coastal Physical Processes Assessment, prepared by NIWA
2. Appendix F - Eastern Bays Shared Path Project: Consent Level Beach Nourishment Design and Effects Assessment, prepared by Tonkin and Taylor
3. Appendix R - Proposed Resource Consent Conditions

On balance I am satisfied there won't be any unintended consequences from coastal hazards (either causing or exacerbating) or interruption of coastal processes from the proposed works, with the exception of the potential for beach renourishment material overwhelming the seagrass beds in Lowry Bay. As stated in the NIWA AEE, this is caveated on the work following best practice construction techniques and detailed design for coastal protection structures.

I am uncomfortable with the extent of reclamation and loss of CMA and would like to see every effort to offset this loss with the recommended mitigation measures, appropriate consent conditions and monitoring and follow up. These types of projects lead to cumulative loss of our coastlines to hard engineered structures. With regards to the seagrass beds, the main recommendation is to ensure a gradual introduction of sediment and with adequate monitoring post nourishment, coupled with adaptive consent conditions that can enable a stop and reassessment of the works if so required.

I will touch on what I consider the six main considerations and potential effects from the project from a coastal hazards and process perspective, covering:

1. Coastal hazard effects including flooding and erosion from wave reflection and overtopping and edge effects;
2. Reclamation and encroachment into the coastal marine area including below MHWS;

3. Potential impacts on nearshore hydrodynamics, sediment transport systems and additional turbidity;
4. Resilience to climate change impacts and sea level rise,
5. Beach renourishment to offset seawall encroachment into the CMA, and:
6. Consent conditions and monitoring.

Coastal hazard effects

Coastal defence structures such as seawalls and revetments have the potential to interfere with coastal processes, particularly wave breaking, runup and dissipation and sediment transport and deposition. This can have unintended consequences that can cause or exacerbate coastal hazards including erosion, overtopping and flooding, unwanted edge effects and result in adverse impacts on the beach.

The proposed new double-curved seawalls will have the effect of reducing overtopping hazard and should have the additional benefit of returning sediment to the beach, rather than it being lost from entrainment in water that overtops the wall.

However, overtopping is still expected to occur in the larger storm events with associated water and debris causing flooding and temporary closure of the shared path and Marine Drive. This is an acceptable compromise to building bigger structures that would require a larger footprint and more vertical height. The adaptive design walls will allow additions at a later date when sea level rise contributes to more regular flooding and closure of the road and pathway.

Edge effects are most noticeable when seawalls terminate adjacent a sandy shoreline. The three main places where this occurs is York Bay, Lowry Bay and Point Howard. In addition, there will be a slight change to wave reflection behaviour, caused by the replacement of existing rock revetments with new double-curved seawalls within the Bays. These effects will be mitigated with appropriately engineered transitions, toe protection and tie-ins to existing structures. The change will have a minimal effect on other seawall sections and beaches as they will be suitably engineered to withstand wave reflection and dissipative forces. Minor effects on the structural integrity of adjacent older seawalls can be managed with appropriate phasing of the construction plan.

In the places where sandy and mixed sand and gravel beaches occur, renourishment will be undertaken to offset some the impacts that occur with the presence of seawalls. This will also provide a measure of additional protection from scouring of the foreshore and toes of the walls.

The coastal hazard assessment looked at these potential effects and concluded that over the length of the project the effects from these were no more than minor. I agree with this assessment.

Reclamation and encroachment

One of the main issues for consideration is the level of reclamation or encroachment into the coast and CMA. The total reclamation for this project is 5500 m^2 (300 m^2 of declamation) of which 3200 m^2 is in the CMA. This is not an insignificant amount of reclamation, but it does occur over 4400 m. This works out at between 1.3 – 1.8 m average seaward encroachment per linear metre - 1.3 m at

seawall upgrades and 1.8 m at new seawall builds. This is over a mix of coastal types from rock shore platforms to road edges, small pocket beaches and existing structures. There will be effects from this and in places they are being offset

The argument is made that the net loss of coastal zone area (the area available for coastal physical processes to occur within) is very small relative to the local scale of each embayment and the Eastern Bays coastal zone and that therefore the net effect is negligible, or in some localised areas no more than minor.

From a coastal hazards and processes perspective, the effects of reclamation will be more pronounced on the small beaches of the Bays as opposed to the rocky shores. The impacts on the beaches are summarised in the coastal hazards section above, but briefly relate to reducing the width of the beach and its ability to absorb wave energy, enhancing runup, overtopping and erosion.

The impacts of this are proposed to be offset by beach nourishment at York Bay, Lowry Bay and Point Howard. This will go some way to reducing these effects to no more than minor, but it will need a monitoring programme to ensure the mitigation remains effective and have a plan to allow beach top-ups if required and if not seen to be conflicting with other ecological goals such as protection of the seagrass beds in Lowry Bay.

Whilst there are renourishments proposed in the biggest bays of the project area, some of the smaller pocket beaches and stretches eg, Mahina Bay, that are not part of the renourishment plans could also benefit from a little material being put in them where there will be some reclamation, to offset potential impacts. This doesn't have to be much more than a seaward translocation of the material that is there, rather than building on top of it and locking it up as part of the construction.

In general I agree with the assessment that these reclamation will have a no more than minor effect, but would recommend appropriate monitoring and follow up to ensure the ongoing success of the offsetting and mitigation.

Coastal processes, hydrodynamics and sediment transport

The potential impacts from seawalls on coastal processes, sediment transport and hydrodynamics have been partly covered in the reports and previous sections. Briefly, building a structure in the CMA can push it into deeper water or cause deeper water at high tide and or interfere with wave runup and dissipation. This can cause a change in wave dynamics and sediment transport along the coast and is mainly a problem for the clastic (sand and gravel) beaches and will potentially result in sediment moving offshore slightly as it readjusts to a new equilibrium. The recurved seawalls will probably benefit the foreshore by retaining more sediment in the coast and prevent loss of material out of the system from overtopping. Nearshore transport impacts will be negligible.

The AEE considered the effects on coastal hydrodynamics (ie, waves and currents) and sediment transport processes to be no more than minor. It was considered there was the potential for moderate localised effects within some of the bays related to beach access ways acting like groynes and trapping sediment on one side and causing starvation on the other side. This is proposed to be mitigated by

providing access points at the ends the beach and careful design of the configuration to minimise interruption of sediment transport pathways.

With regards to the potential for the release and reworking of fines by the presence of additional coastal protection works through changes to nearshore hydrodynamics, it was considered to have a minimal effect on nearshore sedimentation rates or suspended sediment concentrations within each bay and the wider Wellington Harbour.

In summary I agree with the overall assessment of the effects being no more than minor. It was recommended by NIWA that a beach management plan be developed with monitoring of the shape and volume of the foreshore with cross-section profiles taking place within each bay before and after construction. This information could then be used to guide adaptive decision making should effects start to appear more than minor. I support this recommendation.

Resilience and climate change

It was stated in the AEE that climate change and sea level rise, will have an increasing and ongoing impact on the east harbour bays. The primary effect will be an increasing frequency of wave overtopping events, and eventually more direct flood events, on the back of rising sea level and land subsidence. Climate change will also alter the physical drivers of storm surge and waves. These changes will contribute to an ongoing risk from coastal hazards to Marine Drive and the shared path.

It was argued this project will provide a benefit of delaying the adverse effects of sea level rise by upgrading the coastal defence structures and increasing the sediment volume within the nourished bays. Ultimately sea level rise will impact on this whole coastline and over the next couple of decades we will see the gradual loss of the beaches and greater impact on the structures and road with more overtopping and flooding and longer road closures.

This project will allow some "buy some time" for Hutt City Council to develop and implement a long term climate change strategy. I agree with this sentiment and that preferably this will be in conjunction with Greater Wellington Regional Council.

Renourishment

The beach nourishment is proposed only along those parts of the shoreline where there are existing high tide beaches at York Bay, Lowry Bay and Point Howard as per table 1.

Table 1: Beach length and minimum proposed nourished length

Bay	Effective Beach Length (m)	Linear Length Nourished (m)	Volume Imported* (incl. 1.3 x overfill) m3	Placed Volume with Linear Placement After Consolidation	Expected Average Volume (m3/lin.m)
Point Howard	120	80	1,600	15.4	10.3
Lowry Bay	450	160	3,200	15.4	5.5
York Bay	150	80	1,200	11.5	6.2

TOTAL	**720**	**320**	**6,000**	-	-

I support the proposed renourishment of these beaches as a way to offset some of the reclamation and impacts on coastal processes from the reduction in beach width. There is a puzzling statement in the assessment that the renourishment is just for amenity purposes. It should be seen as being more than just for amenity. It needs to be recognised for offsetting beach loss and restoration of ecosystems. This is an important recognition because the monitoring and follow up need to be linked to a commitment to reassess and top up the nourishment if warranted, ie, providing it is not causing unintended impacts elsewhere eg, on the seagrass beds.

I agree with the AEE that there is no risk to coastal processes such as erosion, wave reflections, wave overtopping or longshore drift during placement of nourished material as the beach will adjust to the natural profile over a period of weeks to months. Dispersal and aggradation of sediment in deposition areas and long term spread between bays will be at the rate of natural processes, with negligible change to beach slope (therefore reflection/overtopping) and sand composition.

As stated in the reclamation section, some of the smaller pocket beaches not part of the renourishment plans eg, Mahina Bay, could benefit from a little additional material being put in them where there will be some reclamation to offset partial loss of the beach. This could be addressed as part of the construction management plans assessed on a case by case basis during the construction phase. In particular, it needs to be specified in the construction plans that beach sediments are not to be used (as far as practicable) as construction materials eg, backfill, and should be kept aside and retained in the beach system. Because the seawalls will truncate the beach slightly and push the beach further seaward into slightly deeper water, it may be necessary to compensate for this by topping up the sediments with a little additional fill if appropriate from the stock of material being used in the nourishment of the other bay.

Consent conditions and monitoring

I support the consent conditions suggested the beach process AEE report by NIWA. There was however, a difference between monitoring conditions in the NIWA report and the monitoring conditions report as copied below:

Monitoring Condition C.6 (NIWA report Appendix - E)

> *"HCC shall develop a beach management plan which includes monitoring of beach volume via 6 monthly beach profiles (or equivalent elevation surveying techniques) for 5 years in each bay. This is to ensure the actual effect on beach sediment processes are in line with the expectations for generally minor redistribution of beach material and minor changes to beach volume, as well as confirm whether the beach nourishment has been successful in maintaining the same beach area as Eastern Bays Shared Path: Coastal Physical Processes Assessment 109 at present day. The surveying shall commence before construction begins and continue for 5 years after construction ends in each bay. The surveys shall include cross-shore transects from Marine Drive to 3 m below Chart Datum, and at 50 m spacings along each beach. The survey resolution should be of sufficient*

detail to identify significant changes in grade and the presence of key features such as rocky reefs, stormwater outlets, stairs and access ways, as well as determining a MSL shoreline contour. This survey information shall be interpreted after year 2 and year 5 by an experience coastal scientist to assess the changes to see whether the beaches are approaching a new equilibrium in line with expectations, and make recommendations on the requirement for ongoing monitoring, or if the monitoring could cease. However, in the unlikely event that the 2nd year assessment indicates that unanticipated erosion is occurring (i.e. beach in disequilibrium), the beach nourishment consent will still be active (and other bays may be still under construction) and HCC may be able to easily top-up the beach with more fill to compensate for erosion losses. These assessment reports shall be provided to the Greater Wellington Regional Council within 2 months of each survey."

Monitoring Condition 52 (Monitoring conditions report)

"The consent holder shall undertake monitoring of beach volume via 6 monthly beach profiles (or equivalent elevation surveying techniques) to ensure the actual effect on beach sediment processes is in line with the expectations for generally minor redistribution of beach material. The surveying shall commence prior to the Commencement of Construction, and continue for 2 years after construction in that bay is completed. This survey information shall be interpreted at the end of the 2 year period in that bay by an experienced coastal scientist and made available to the Wellington Regional Council.

In the first instance, monitoring condition 52 needs to state that there should to be an immediate post-nourishment survey as a baseline so it can be assessed how the sediment has moved from placement and from the pre-construction beach profile.

With regards to the difference in the length of time suggested for the post-nourishment beach surveys (ie, 5 vs 2 years), a compromise may need to be reached between these two recommendations that balances efficiency and the need to allow sufficient time to capture the changes the beach will undergo as it reaches a new equilibrium. This may require some conferencing between the experts at NIWA and T&T, but three years may strike this balance.

The inner harbour bays have a much lower wave energy environment than the open coast, and sedimentary changes take longer to occur because of this, but at the same time, they also have much smaller beaches with smaller foreshores and sediment volumes. The wave energy reaching the east harbour beaches is predominantly wind waves driven by the weather and climate. Three years should allow a reasonable length of time to capture a range of wind events, storms and seasonal variations that will generate incident wave energy enough to redistribute the sediments across the Bays of the project and allow the beaches time to adjust to the new regime.

Conclusions and recommendations

In summary I am satisfied that the project proposal can satisfy the test of no more than minor effects on coastal processes and hazards providing the work is constructed according to the plans and follows best practice construction methods and design for coastal protection structures.

My recommendations as discussed above pertain to the construction methodology and consent monitoring:

1. Survey immediate post-nourishment and construction and then every six months for three years with an assessment after 12 months, 24 months and 36 months to check on seagrass beds and general distribution of the sediment. It may be worthwhile caucusing this with the experts at NIWA, T&T and Stantec.

2. Include a condition that enables adaptive management to halt works and re-assess if it appears any effects with more than minor impacts are occurring at the construction sites.

3. May need to take advice from the ecologist about the renourishment in Lowry Bay and introduce that in two stages so as to manage the potential effects on the seagrass beds.

4. Include a condition for the construction methodology to minimise the amount of beach sediments that are incorporated into the beach encroachment. In particular, it needs to be specified in the construction plans that beach sediments are not to be used (as far as practicable) as construction materials eg, backfill, and should be kept aside and retained in the beach system. To this aim, it may be beneficial where appropriate to provide a small top up to materials pushed seaward in places like Mahina Bay that are not included in the renourishment plans.

Dr Iain Dawe
Senior Policy Advisor (Hazards)
Environmental Policy

DD: (04) 830-4031
iain.dawe@gw.govt.nz

Ainslee Brown

From: Iain Dawe
Sent: Wednesday, 24 July 2019 5:24 PM
To: Shannon Watson
Subject: RE: Eastern Bays Shared Path project: Further Information Request (s92) and s95E RMA - WGN190301 & RM190124

Hi Shannon,

Yes my questions have been addressed

Thanks
Iain

Dr Iain Dawe | Senior Policy Advisor (Hazards)
Greater Wellington Regional Council | *Te Pane Matua Taiao*

From: Shannon Watson
Sent: Monday, 22 July 2019 5:09 p.m.
To: Roger Uys; Hamilton, Catherine; Head, Jeremy; Iain Dawe; Evan Harrison
Cc: Megan Oliver; Jo Frances; Parvati Rotherham; Sharyn Westlake; Angus Gray
Subject: FW: Eastern Bays Shared Path project: Further Information Request (s92) and s95E RMA - WGN190301 & RM190124

Hi all

The first part of the Eastern Bays Shared Path request for further information has come in for consideration while the more complicated matters (seagrass and effects on penguins) are being worked through. The consent will remain on hold under s92 of the Resource Management Act until ALL of the information has been provided and confirmed as appropriately addressing the information requested.

Megan – your concerns will be addressed in the second part of the further information response expected early August.

Everyone else - Can you please review the attached response and confirm whether or not the concerns you identified in your original assessments have been addressed by the applicant (I have attached the s92 request for ease of reference). If they have not been addressed can you please advise:

- Any areas of concern that have been addressed by the response
- Any areas of concern not appropriately addressed by the response
- what further information you require for remaining concerns to be 'closed out' and the format in which you would like this information to be provided

It would be appreciated if you could review the final response and provide any comments back to me within **5 working days (30 July 2019).** Please let me know ASAP if you are not able to meet this timeframe.

Please give me a call if you have any questions.

Shannon Watson | Kaitohutohu / Resource Advisor, Environmental Regulation

GREATER WELLINGTON REGIONAL COUNCIL
Te Pane Matua Taiao

Shed 39, 2 Fryatt Quay, Pipitea, Wellington 6011 | PO Box 11646, Manners St, Wellington 6142
T: 04 830 4461

From: Van Halderen, Caroline <Caroline.VanHalderen@stantec.com>
Sent: Monday, 22 July 2019 11:45 AM
To: Shannon Watson <Shannon.Watson@gw.govt.nz>; Dan Kellow <Dan.Kellow@huttcity.govt.nz>
Cc: Povall, Jamie <Jamie.Povall@stantec.com>; Simon Cager <Simon.Cager@huttcity.govt.nz>
Subject: Eastern Bays Shared Path project: Further Information Request (s92) and s95E RMA - WGN190301 & RM190124

Hi Shannon and Dan

I refer to your letter dated 29 May 2019 requesting further information under section 92(1) from both Greater Wellington Regional Council (GWRC) and Hutt City Council (HCC) and for an additional request for affected party approval under s95E from GWRC.

Please find the attached memorandum outlining our responses to the requested information under the headings that are set out in your letter. Where necessary we have added more detail under a series of annexures attached to the memorandum.

Please note that further investigations are currently being undertaken on shoreline foragers, penguins and seagrass. We are planning to get a response to you early in August.

I have also attached a written approval form from CentrePort as requested. HCC Parks will provide comments during the internal feedback process. We have yet to receive written approval from Mr and Mrs Thomas and will follow up with them again.

Ngā Mihi | Kind regards,

Caroline van Halderen
B Town and Regional Planning, MNZPI
Senior Planner

Direct: +64 4 381 5716
Mobile: +64 277742409

Stantec New Zealand
Level 13, 80 The Terrace
Wellington, 6011 New Zealand

greater WELLINGTON
REGIONAL COUNCIL
Te Pane Matua Taiao

Shed 39, 2 Fryatt Quay
Pipitea, Wellington 6011
PO Box 11646
Manners Street
Wellington 6142
T 04 384 5708
F 04 385 6960
www.gw.govt.nz

IN CONFIDENCE
By email

31 January 2020

File Ref: HZRD-2-416

Shannon Watson
GHD
Level 2, Grant Thornton House
215 Lambton Quay
Wellington 6011

Tena koe Shannon,

I write in response to your email dated 21 January 2020 requesting a formal response to matters arising from submissions to the Eastern Bays Shared Pathway consent application.

In particular you asked me to respond to matters requiring expert advice relating to submission points covering aspects of the project related to; mitigation structure design, beach renourishment, loss of beach, climate change and resilience, alternative approaches and monitoring. The points I have responded to specifically are contained within submissions from the following parties:

1.	Submitter No. 12	Kathleen and Jeff Hobbs
2.	Submitter No. 18	Lorraine Girvan
3.	Submitter No. 31	Carole Hobbs
4.	Submitter No. 53	Jo Cullhane
5.	Submitter No. 63	John Arnold Butt
6.	Submitter No. 66	Michael Sheridan
7.	Submitter No. 73	Janet Hay
8.	Submitter No. 80	East Harbour Environmental Association Incorporated
9.	Submitter No. 117	Megan Turner
10.	Submitter No. 158	Sally Bain
11.	Submitter No. 159	Te Aranui O Pōneke, The Great Harbour Way Trust
12.	Submitter No. 161	Department of Conservation
13.	Submitter No. 163	Ruth Gilbert
14.	Submitter No. 164	Graeme Lyon
15.	Submitter No. 179	Geoffery Rashbrooke
16.	Submitter No. 128	Janice Heine

17.	Submitter No. 168	Richmond Esmond Atkinson
18.	Submitter No. 173	Carol Lough
19.	Submitter No. 177	Judith Lawrence
20.	Submitter No. 190	Bruhlmann Gertrud (Trudi)

My responses are set out by theme and include a summary of the main points raised in the submissions that I comment directly on.

1. Seawall design (incl. beach access)

1.1 Submission points summary

1.1.1 A number of submissions express concern that the proposed design will not reduce the incidences of overtopping, flooding and deposition of sand, gravel, driftwood and debris on the road and consequently will not prevent road closures. Some people felt because the walls were being pushed seaward it could result in more airborne spray.

1.1.2 Some submissions made note of the materials used in the design and thought there was too much use of concrete, that the structures were too large, or that they shouldn't use revetments for fear of boulders ending up on the road.

1.1.3 There were concerns that the recurve design may cause scouring of the beach and that seawalls cause wave deflection that makes swimming and boating less enjoyable.

1.1.4 Some people expressed concerns about the cost of the project.

1.1.5 There is a general concern that seawalls and revetments limit access to the beach.

1.2 Response

1.2.1 Sub-standard design

Marine Drive and a number of houses that have been built immediately landward and in some cases seaward of the road, are very low lying and close to the coastal marine environment (CMA) and naturally prone to coastal hazards. There are a limited range of options available to mitigating these hazards and these have been assessed and weighed against a range of criteria to develop a design that meets as many of these criteria as practicable, whilst being pragmatic and cost effective.

When it comes to preventing overtopping and coastal flooding from waves and storm surge it boils down to two main options: Large scale hard engineered options that are wide and high enough to prevent wave overtopping or; extensive beach renourishment to push the mean water level seaward and create a wide buffer between the land and sea that can absorb wave energy and hold back high water levels.

The decisions involved in this project are a balance between a range of criteria (both needs and values) including; financial cost, environmental impacts, impacts on access to the beach, visual amenity, public access, hazard mitigation and road maintenance, resilience to climate change and sea level rise.

The chosen design is a moderate mix of hard engineering (seawalls and revetments) and soft engineering (beach renourishment) to satisfy these criteria and minimise the footprint of the structures and effects on the environment. In order to prevent waves and spray overtopping, the revetments and seawalls would have to be both higher and wider which would reduce public access and amenity, involve considerably more reclamation of the coastal marine environment and be substantially more expensive. The beaches in the Bays are modest, with small sediment inputs and large scale renourishment programmes to build out the shoreline would be out of character with the natural amenity and cause smothering of the nearshore environment that impact on nearshore ecology.

1.2.2 Choice of materials

As discussed above, the decisions involved in this project are a balance between a range of criteria. The materials for the hard engineering aspects of this project are limited to rock and concrete because the proximity of infrastructure to the CMA requires robust durable materials that can withstand the impacts from coastal storms. Soft engineering options are limited by the small scale nature of the beaches that would be out of character to implement extensive coastal nourishment programmes.

1.2.3 Recurve seawall design

The recurve seawall is designed to reduce wave overtopping and return water to the beach. The design will cause no more or less scouring than would occur with a purely vertical wall. All seawalls cause some degree of scouring at the toe of the structure. This is because they interrupt the natural flow of swash across the foreshore and cause swash/wave reflection and reduce sediment deposition on the foreshore. This also causes the beach to be wetter for longer throughout the tide cycle that makes the beach more susceptible to erosion and scouring. This is the trade-off for using seawalls and between protecting infrastructure at the coast or effecting some sort of retreat and allowing the beach to operate naturally.

1.2.4 Project costs

Designing and building infrastructure and mitigation methods at the coast to withstand the impacts from storms, large waves and salt corrosion is expensive. The historical legacy of development around this coast means that the council and infrastructure providers are locked into protecting existing development. This comes at a cost and it must be weighed against the cost of doing nothing or simple maintenance of the status quo, that may end up being more expensive in the long run.

1.2.5 Restriction of public access

The design criteria for this project require materials and structures that can withstand the impacts from coastal storms and impacts from large waves. There is a trade-off between protecting infrastructure and providing safe walking and cycling access along Marine Drive and access to the shoreline. The more steps and access points through a seawall or revetment there are, the lesser its effectiveness because these become conduits for water and debris to flow through during storms. Because of this, access points also require more frequent maintenance because they are more susceptible to damage from coastal storms.

2. Beach renourishment

2.1 Submission points summary

2.1.1 There was a desire for additional beach nourishment to occur in places including Mahina and Okiwi Iti Bay.

2.1.2 Some submitters felt that the nourishment will not be effective and that over time the beaches will diminish in volume in part because there will be no follow up maintenance or that the renourishment material will be eroded.

2.1.3 Some submitters believe the gravels in the nourishment material will be preferentially sorted to the surface and upper parts of the foreshore where they will reduce the enjoyment of recreational beach users.

2.1.4 There is concern that the nourishment in Lowry Bay will impact on and potentially smother the seagrass community.

2.1.5 Some submitters were unhappy about the change in colour and texture of the imported material and that this will impact on amenity values.

2.2 Response

You asked me to make a qualified comment on the likely success of beach nourishment as proposed (ie, will the material used for renourishment remain in place to the extent necessary to consider it successful) and any recommendations that could be adopted by the applicant to further enhance the likelihood of successful renourishment noting that, at this stage HCC have not offered to undertake ongoing renourishment of the beaches.

2.2.1 Additional beach nourishment

Beach nourishment can be an effective method for offsetting loss of beach from encroachment and providing amenity that also acts as a natural defence against erosion and flooding. The scale and spatial extent of a nourishment is governed by the feasibility of nourishing to ensure material isn't unduly lost from the system (ie, coastal processes), the ability to source suitable sediments and related costs and effects on backshore, inter-tidal and nearshore ecology.

It may be feasible to increase the amount and locations where nourishment occurs in this project, as per some submitter's requests, but it will require further examination to ensure that there is material available and that it won't impact on coastal ecology such as the seagrass meadow in Lowry Bay.

2.2.2 Beach nourishment ineffective

The fact that beaches presently exist along the Bays, is proof that they are able to withstand the effects of waves and currents and storms without being completely eroded. This is unlikely to change if they are renourished or topped up with additional material.

Under sea level rise there will be a gradual loss of the beaches along the Bays of this project, starting with the loss of beaches at high tide and moving to complete loss at all stages of the tide. This is inevitable where the backshore is fixed with hard engineered structures that prevent the natural

migration of the foreshore inland in response to a change in the environment from climate change and sea level rise.

The other process that leads to a slow loss in beach volume is attrition of beach gravels under wave breaking and swash flow where the input of fresh sediments from longshore transport is very low.

Both these effects can be offset with beach renourishment, but in the medium term will require maintenance to top-up the volume of the beaches. In this way, the recreational amenity of the beaches can still be enjoyed. In the longer term as the sea level rises, other options will be required to prevent the complete loss of the beaches along the Bays.

2.2.3 Gravels

The sorting of gravels and sands in a beach is controlled by a range of factors, including the composition percentages of sands and gravels in the sediment, the wave exposure and tide range. After storms, it is not uncommon to see patches of sand and/or gravel preferentially sorted into stringers or placers along the shoreline. Usually, in the ensuring days and weeks these are sorted back into a more homogeneous mix.

If the composition of the beach sediments are dominated by gravels, they will be more prevalent in the foreshore and for longer, particularly after storms. If the composition of the sediments has more sand then they will tend to bury the gravels.

Mixed sand and gravel beaches in a micro-tidal environment such as Wellington Harbour, that has a tide range of only 0.85 m, will remain a homogeneously mixed. This is evidenced by the existing situation along the beaches of the eastern Harbour shoreline. Some beaches that have a mixed range of sediments do get preferentially sorted with gravels sorted into the upper foreshore and sands into the lower foreshore, creating a low tide terrace. But these beaches generally have a large tide range and a moderately energetic wave environment that acts to sort the sediments regularly throughout the tide cycle.

2.2.4 Nourishment causing smothering

There is the potential for some beach renourishment sands to be transported down into the nearshore and cover some of the seagrass meadows in Lowry Bay. The risk of this can be managed by close monitoring the renourishment to ensure that it doesn't cause smothering. In the mixed sand and gravel beaches, the sediments tend to remain in the foreshore, and be transported back and forward along the shore in response to wave activity, rather than be transported on and offshore into the nearshore as happens on swell dominated, open coast sandy beaches.

2.2.5 Nourishment colour and texture

The sediments that make up the beaches along the Bays are mostly greywacke sands and gravels derived from local rivers and streams, the erosion of rocky outcrops and headlands, colluvium from slips in the escarpment and roading base-coarse and aggregate. The sediments are transported in to the beaches via longshore sediment transport along the Harbour, dominantly from the south, and to much lesser degree from the north. As the sediments are transported along the shore, they experience

attrition into smaller particles and weathering to form the grey-yellow colour typically associated with greywacke sediments. Fresh nourishment material will have a slightly different colour (more grey) and may be slightly coarser in order to enhance its emplacement on the beach, but over time this material with weather to be more yellow in colour and grade into finer sizes.

3. Loss of beach

3.1 Submission points summary

3.1.1 Some submitters were concerned that the structures, including the double and triple curved walls, would cause scouring of the beach and at the toe of the seawalls, thereby undermining the structures and potentially leading to a complete loss of the beach in some places.

3.1.2 Other submitters were concerned that the project itself would diminish the size of the beaches through reclamation of the foreshore for construction of the seawalls and pathway including at Point Howard Beach.

3.2 Response

3.2.1 Recurved seawalls

The recurve seawall is designed to reduce wave overtopping and return water to the beach. The design will cause no more or less scouring than would occur with a purely vertical wall. All seawalls cause some degree of scouring at the toe of the structure. This is because they interrupt the natural flow of swash across the foreshore and cause swash/wave reflection and reduce sediment deposition on the foreshore. This also causes the beach to be wetter for longer throughout the tide cycle that makes the beach more susceptible to erosion and scouring. This is the trade-off for using seawalls and between protecting infrastructure at the coast or effecting some sort of retreat and allowing the beach to operate naturally. However, the design takes this scouring into account and the structures are built to have foundations that are footed below the depth of scouring that occurs in the beach, and to be tied back landward thereby preventing structural failure. Standard asset monitoring will also pick up natural wear and tear from aging and damages from storms that inevitably occur and ensure that maintenance can be performed before a structure fails completely.

3.2.2 Reclamation

The project does involve a degree of encroachment into the CMA. This is spread out along the shore so that on average it is no more than around 1.0 seaward than the existing footprint of the seawalls. Where there are significant recreational and amenity beaches along the coast it is proposed that sediment renourishment be undertaken to offset this loss.

4. Climate change (incl. resilience)

4.1 Submission points summary

4.1.1 There were some submitters that expressed concern that the shared path will only improve resilience for a finite period and that beach enhancement will only have temporary benefits. Some people expressed the belief that the design is excessive. It was argued that over time due to climate change and sea level rise, it will be become more regularly flooded, the beaches will be lost and ultimately, in the medium to long term it may not be usable and HCC will have to raise the level of the road.

4.1.2 To this end some people argued that the seawalls were based upon incorrect asset life management and that they should be built later in the project to allow for sea level rise.

4.1.3 A number of submitters felt that the infrastructure should be adaptable to future impacts from climate change and sea level rise related hazards.

4.2 Response

4.2.1 Finite resilience

At this stage we know the rate of sea level rise and the likely impacts over the next 30 years (ie the design life of the structures) and can reasonably design the seawalls to withstand these effects and be adaptable to modification at a later date if changes in the climate become more extreme than they are currently tracking.

4.2.2 Incorrect asset management

Effects are occurring now – flooding and sea level rise are already having an impact. We know the current rate of local relative sea level rise we can foreseeably design the structures to account for this whilst retaining a design that is adaptable to future modifications.

4.2.3 Adaptable design

The seawalls are designed to be modular, and can have additional curves and height added to them if required at a future date.

5. Alternate methods/further suggestions (incl. rip-rap islands)

5.1 Submission points summary

5.1.1 A number of submitters suggested that breakwaters, surf breaks, rock rip-rap rock islands or other artificial structures could be constructed to absorb wave energy before it reaches the shore, particularly in the high energy places, obviating the need to build seawalls and reducing impacts from storms and waves on the pathway. Others argued that these structures would also stop gravel movement from blocking drains and pipes and will slow the loss of sand from the beaches, reducing the need for beach nourishment.

5.1.2 One person would like the seawall to continue fully into Sunshine Bay rather than the proposed rock revetment structure.

5.1.3 A number of submitters commented on the desire to see more use of boardwalks, particularly in areas where it becomes too narrow for cyclists and pedestrians to use the pathway safely.

5.2 Response

5.2.1 Rip-rap islands

A number of options exist to reduce the effects of wave energy reaching a shoreline. One of which is an offshore, detached breakwater or reef style structure as suggested by a number of submitters. Two ideas raised by submitters that have been used in coastal management solutions elsewhere are some shore parallel reefs or islands that could be set up in series, or just be a single larger structure and a submerged reef that could be constructed to direct incoming swell into a surfable wave.

For coastal management purposes, detached breakwaters are designed to have two main effects. One is to reduce wave energy reaching the shore and the second and related purpose is to encourage sand build up on the beach. The theory is, they create a lower energy wave shadow in the leeward side of the structure that reduces wave energy reaching the shore whilst at the same time encouraging sand deposition and accretion of the beach. As the beach grows in width, this helps buffer infrastructure from wave impacts and coastal flooding. A further, recreational use can be added to the structure by constructing in such a way as to create a surf wave.

There are two main reasons why such breakwaters would not be suitable for the stretch of coast along the eastern bays. The first is that there is very little sediment accumulation along this shoreline with very small sediment inputs from both longshore currents and from offshore. The Bays can all be considered pocket beaches that are semi-closed cells. Sediment moves around within them depending on the wave conditions, but only small quantities of fresh sediment are making into the cells. The structure would effectively only be operating to reduce wave energy, a function that can be performed by shore based structures. Secondly, it wouldn't stop all wave energy, it would only reduce it. In a storm, the coastal hazards are two-fold; large waves that cause erosion and structural damage and extreme water levels from storm surge that cause flooding and deposition of debris. In other words, a breakwater would still require seawall upgrades to reduce the impacts from flooding. It is also unlikely they would prevent sand and gravel from blocking stormwater outlets.

It is unlikely an artificial surf reef would be successful for its intended purpose along the eastern bays shoreline, because surf reefs require an open coast swell environment to be functional. The eastern bays coast is exposed to wind waves, from the northwest and south. Deeper ocean swell waves are strongly attenuated as they enter Wellington Harbour and have limited presence in the inner reaches of the Harbour. Artificial surf reefs are hugely expensive to develop, implement and maintain and likely to be beyond the budget of this project.

5.2.2 Sunshine Bay seawall extension

Like a lot of the decision making that is involved in this and similar projects, the decision to retain a revetment in the middle of Sunshine Bay is a pragmatic one taking into account a range of different considerations. The elevation of the carriageway in Sunshine Bay is only 2.0 m amsl, and is easily

overtopped by wave runup because of its exposure to large northwest wind waves that break close to shore. The existing revetment was built to counter this and provide some protection for infrastructure and houses on the other side of the road that is also low-lying. The proposed design is working in with the existing structure and upgrading it, rather than removing it and extending the seawall.

From a coastal processes perspective there's no reason why the seawall couldn't be extended further along Sunshine Bay. It would potentially take up less of the CMA and free up foreshore for recreational beach users. However, it is possible it would require some rip-rap toe protection to help absorb wave runup and reduce overtopping and toe scour. A more detailed opinion on this option would require a coastal engineering assessment. It may be worth checking with HCC and Stantec to get further comment on this this.

5.2.3 Boardwalks

In terms of providing wider access with boardwalks in areas that are constrained and narrow. Boardwalk construction has to be carefully designed in a coastal environment. Cantilevered boardwalks are one way to achieve this, but they have to be heavily engineered to withstand upward forcing wave impacts during a storm. This usually results in a visually obtrusive structure, that overhangs the coastal marine environment (CMA) and requires expensive ongoing monitoring and maintenance. The New Zealand Coastal Policy Statement (NZCPS) still considers this occupation of the CMA.

6. Monitoring

6.1 Submission points summary

6.1.1 Some people were concerned that the monitoring period was not long enough and suggested a longer period was required and that a review should be undertaken after two years to determine whether continuous monitoring is needed. It was argued this would aid the development of additional adaptive designs pathways.

6.2 Response

6.2.1 Monitoring

The proposal is that monitoring is flexible and that it will be for two years with the option to extend that for another 3 years if it is warranted. This should be enough time to allow the new seawalls and beach nourishments to obtain a new equilibrium with the wave and current climate in each bay. As to the longer term monitoring of the effectiveness of the whole project from the impacts of sea level rise and climate change; this would be undertaken through standard asset management processes within Hutt City Council.

greater WELLINGTON
REGIONAL COUNCIL
Te Pane Matua Taiao

Nāku noa, nā

Dr Iain Dawe
Senior Policy Advisor (Hazards)
Environmental Policy

DD: (04) 830-4031
iain.dawe@gw.govt.nz

Copy: Jo Frances

From: Iain Dawe
To: Shannon Watson
Subject: RE: Eastern Bays Shared Path - Memorandum 6 response
Date: Friday, 30 October 2020 10:08:06 AM
Attachments: image001.png
image002.png
image003.png
image004.png

Hi Shannon,

I'm happy with where the monitoring conditions landed

Thanks
Iain

Dr Iain Dawe
Senior Policy Advisor (Hazards and Coasts)
Greater Wellington Te Pane Matua Taiao
021 933 723 | 04 830 4031

From: Shannon Watson <Shannon.Watson@ghd.com>
Sent: Friday, 30 October 2020 10:00 AM
To: Sharyn Westlake <Sharyn.Westlake@gw.govt.nz>; Iain Dawe <Iain.Dawe@gw.govt.nz>; Megan Oliver <meoliver@doc.govt.nz>
Subject: RE: Eastern Bays Shared Path - Memorandum 6 response

Morning team,

Friendly reminder that comments or a brief call to discuss your thoughts about the latest response from the applicant would be really appreciated today please. Given timeframe pressure I need to signal to the applicant ASAP whether there are any unresolved issues that require further discussion or conferencing in advance of the hearing and if possible get some thoughts together about what an appropriate response to mitigate or resolve these outstanding concerns might look like.

I will be at GWRC later this afternoon (2-3) and can come find you for a chat if you are likely to be around if that works better?

Thanks

Shannon Watson
Environmental Planner

GHD
Proudly employee owned
T: +64 04 474 7330 | V: 517330 | F: 04 472 0833 | E: shannon.watson@ghd.com
Level 2, Grant Thornton House, 215 Lambton Quay, Wellington 6011 | www.ghd.com
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From: Shannon Watson
Sent: Friday, 23 October 2020 4:24 PM
To: Roger Uys <Roger.Uys@gw.govt.nz>; catherine.hamilton@wsp-opus.co.nz; Head, Jeremy <Jeremy.Head@wsp.com>; Sharyn Westlake <Sharyn.Westlake@gw.govt.nz>; Iain Dawe <Iain.Dawe@gw.govt.nz>; Megan Oliver <meoliver@doc.govt.nz>
Cc: Anna McLellan <Anna.McLellan@gw.govt.nz>; Dan Kellow (InTouch) <dan.kellow@huttcity.govt.nz>; Michelle Conland <Michelle.Conland@gw.govt.nz>; Helen Anderson <Helen.Anderson@ghd.com>
Subject: FW: Eastern Bays Shared Path - Memorandum 6 response
Importance: High

Hi all

As signalled earlier this week, we have now received the latest response from Hutt City Council on the Eastern Bays Shared Path. The files are too large to send individually but can be found in the file transfer link below:

Login Information

FTP link: https://tmpsftp.stantec.com
Login name: s1104213903
Password: 4480436
Expiry Date: 11/18/2020

Please let me know if you have any trouble accessing the documents.

Note: "Memorandum 6 with appendices" includes the applicants responses to the questions raised in our July 9 Memo and the various appendices highlighted.

Can you please review the latest response as it relates to your field of expertise and provide me with any comments or concerns that you have.

Sharyn/Iain – is there a need to push further for post-storm event monitoring or can this be appropriately captured by other conditions related to ensuring structures are structurally sound (Condition C.12). I note that despite comments from the applicant to the contrary (paragraph 83 of their response), new condition EM19 does not consider monitoring of revetments. Are there any other outstanding concerns that you have with the proposal?

Megan – I expect based on our previous emails that you do not have any significant concerns with the applicant not proposing any monitoring of the effectiveness of the seawall enhancement textures. Are there any other outstanding concerns that you have with the proposal?

Roger – Could you please provide me with your thoughts on the appropriateness of the applicants response regarding the measures by the applicant to avoid adverse effects (iterative changes to the design) and what has now been proposed by the applicant in terms of replacement habitat and the revised conditions to reflect the measures now proposed. **Jamie/Roger** could you please also provide comment on whether the areas proposed for habitat enhancement at Bishops Park and HW Short Park can be considered 'mitigation' (and not an

offset) given located slightly outside of the project area and might not necessarily be considered 'like for like'. This is critical for the gateway test because if considered an offset these areas/measures of habitat enhancement cannot be considered. Is the information provided now suitable for you to make a judgement on the likely level of effects on penguins and coastal birds?

Catherine/Jeremy – Do the changes the applicant has made to the conditions at least give you more comfort regarding the process around the LUDP and BSUDP's and the certification processes? It does not appear we are going to get any further information related to design in advance of the hearing. Any outstanding concerns you have regarding the design (or lack thereof) will therefore likely need to be resolved via expert conferencing and subsequently expert evidence. I think there would be value in setting up a meeting/discussion with the applicant and their landscape expert to discuss your outstanding concerns. As part of this discussion we might not get any further design information but we might be able to set (and agree) some bottom lines or non-negotiables that would give you some more certainty about the worst-case scenario in terms of effects as the project progresses.

-

Timeframes

The applicant is pushing for a December hearing which means timeframes for completion of Officers Reports and pre-hearings processes are extremely tight. Therefore it would be **MASSIVELY APPRECIATED** if you could review the response and get back to me (email is fine) with any questions or concerns **ASAP** but by no later than **Friday 30 October 2020.** Even if you are not able to get a written response back to me it would be appreciated if you could give me a call **before Friday** to discuss any preliminary thoughts and/or concerns so I can signal to the applicant whether any further discussion or resolution of matters is required and what these matters might be. In addition, **if you could please signal your availability if a hearing was to commence in early-mid December (hearing expected to be approx. 2-3 days) that would be appreciated (the applicants proposed programme for hearing dates can be found in Caroline's email below).**

As described in my email earlier this week, once comments have been received and outstanding concerns identified we can work on consolidating comments received during the course of the application into final position statements such that they can be appended to the Officers Reports over the coming weeks.

As always if you have any questions or concerns give me a call.

P.S. Sorry for the late Friday afternoon email I hope you all have a great long weekend!

Kind regards

Shannon Watson
Environmental Planner

GHD
Proudly employee owned
T: +64 04 474 7330 | V: 517330 | F: 04 472 0833 | E: shannon.watson@ghd.com
Level 2, Grant Thornton House, 215 Lambton Quay, Wellington 6011 | www.ghd.com
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From: Iain Dawe
To: Shannon Watson
Subject: RE: EBSP final position statement
Date: Wednesday, 18 November 2020 4:34:37 PM
Attachments: image001.png
image002.png
image003.png
image004.png

Kia ora Shannon,

I have considered these points and reply in highlights

- Comfort with the proposal mitigating the adverse effects on coastal processes such that effects can be considered acceptable. Yes as per my Memo dated 13 May in the conclusions and recommendations
- Thoughts on the likely success of beach nourishment and your confirmation that beach nourishment as proposed is appropriate to maintain (as far as is practicable) existing high tide beach areas/profiles (we have discussed this but I don't seem to have anything in writing from you on this point other than your comments that you see no reason why beach nourishment would not be successful because the beaches are in equilibrium – s42A memo you gave me in February). Yes this is another way of saying the same thing, but I am happy that the beach renourishment will be as stable as the existing beach, because the wave energy and current processes will remain largely the same. Of course there may be natural processes and events that occur that cause erosion and/or a change in the beach that have nothing to do with the renourishment.
- Comfort with the beach nourishment plan condition framework and following up monitoring requirements as proposed. Yes I am happy with this. We had some back and forward about this in June/July via email (I can forward you these if you need them) and I liked the recommendations as outlined in EM.13 and EM.15 for monitoring of the beaches and conditions requiring remedial action if adverse effects appear to be caused by the seawall/revetment protection works.
- Comfort with the condition framework in terms of ensuring seawall design (and transitions) etc will appropriately manage the effects on coastal processes - yes this relates to my overall original assessment in the May 13 memo.

Let me know if this is enough for you to go on

Thanks
Iain

Dr Iain Dawe
Senior Policy Advisor (Hazards and Coasts)
Greater Wellington Te Pane Matua Taiao
021 933 723 | 04 830 4031

From: Shannon Watson <Shannon.Watson@ghd.com>
Sent: Tuesday, 10 November 2020 2:34 PM
To: Iain Dawe <Iain.Dawe@gw.govt.nz>
Subject: EBSP final position statement

Hi Iain

You may have heard that GWRC (E-Reg) have made the decision to commence with a hearing in the week of the 14 December 2020. I am required to have my s42A report submitted on the 20th of November (15 WD before the hearing).

How are you placed over the next few days/week (at worst) to update your position statement/previous commentary on the proposal so that all of your final thoughts and opinions/recommendations can be appended to my s42A?

Of particular importance are your final comments/thoughts on the following matters:

- Comfort with the proposal mitigating the adverse effects on coastal processes such that effects can be considered acceptable
- Thoughts on the likely success of beach nourishment and your confirmation that beach nourishment as proposed is appropriate to maintain (as far as is practicable) existing high tide beach areas/profiles (we have discussed this but I don't seem to have anything in writing from you on this point other than your comments that you see no reason why beach nourishment would not be successful because the beaches are in equilibrium – s42A memo you gave me in February).
- Comfort with the beach nourishment plan condition framework and following up monitoring requirements as proposed
- Comfort with the condition framework in terms of ensuring seawall design (and transitions) etc will appropriately manage the effects on coastal processes

Is this do-able on your end?

Cheers

Shannon Watson
Environmental Planner

GHD
Proudly employee owned
T: +64 04 474 7330 | V: 517330 | F: 04 472 0833 | E: shannon.watson@ghd.com
Level 2, Grant Thornton House, 215 Lambton Quay, Wellington 6011 | www.ghd.com
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