Memo

From	**Dr Fleur Matheson, Aquatic Biogeochemist, Programme Leader Aquatic Rehabilitation & Protection, NIWA, PO Box 11-115 HAMILTON.**
To	Caroline Van Helderen, Hutt City Council, C/- Stantec, PO Box 13-052, Armagh, CHRISTCHURCH.
Date	29 July 2019
Subject	**Mitigating the effects of the Eastern Bays Shared Path Project on seagrass in Lowry Bay, Wellington Harbour.**

Stantec has requested that NIWA prepare a short memorandum responding to Section 8a of S95 Letter WGN19031 & RM190124 from Greater Wellington Regional Council (GWRC) dated 29 May 2019 relating to the Eastern Bays Shared Path Project application.

Under Section 8a, GWRC considers that the mitigation measures outlined in the application are insufficient to protect or restore seagrass in Lowry Bay. The three seagrass beds in this bay are the only remaining representatives of this habitat in Wellington Harbour. The Council would like to see further consideration given to monitoring and mitigating the impact of sedimentation and changes in hydrodynamics from the Shared Path Project on the seagrass beds.

The Shared Path Project proposes to reclaim some of the upper foreshore in Lowry Bay for construction of the shared path and to subsequently undertake beach nourishment downslope of the construction zone. In the Vegetation and Fauna Assessment of Environmental Effects (VFAEE) (Overmaars 2019) it was considered that: *"Seagrass beds are potentially at risk during construction from partial burial when extending the seaward toe of the existing beach during the placement of beach nourishment sediments, and from turbidity in excess of the ambient turbidity from release of fines. Post-construction, they are at risk of partial burial from movement of the beach profile and flattening of its slope in response to coastal processes"*.

Stantec has subsequently advised that the final design of the beach nourishment will be undertaken so as to fully avoid the seagrass meadows (i.e., no physical encroachment) and the final design must be approved by GWRC.

In relation to potential effects of beach nourishment and altered hydrodynamics on turbidity, the Coastal Physical Processes Assessment (Ellis 2019) concludes that the risk of turbidity exceeding ambient conditions during wave conditions or Hutt River floods is negligible-low and that the beach will adjust to a natural profile over a period of weeks to months.

The mitigation measures proposed in the VFAEE were as follows:

- Separation and disposal offsite of silts and clays in beach excavation sediments.
- Use of beach nourishment sediments that are similar or slightly coarser than *in situ* sediments, that will maintain the existing profile without spreading onto seagrass beds.
- Excluding fine sediments from beach nourishment sediments; and undertaking beach nourishment in winter when seagrass metabolism is least active.

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Furthermore, the mitigation measures proposed in the Beach Nourishment Report (Tonkin & Taylor 2019) to avoid impacts on seagrass and other marine ecology were as follows:

In relation to burial of seabed adjacent to the nourishment during construction:

- Carrying out the beach nourishment over the winter months where sea grass beds are not growing significantly.
- Selecting sand/gravel gradings that match or are coarser than the *in situ* sediment which encourages onshore movement of sediment, rather than offshore.
- Forming the high tide construction bench with a slightly over-steepened profile.
- Only depositing as much sediment on the bench as can be transferred along the placement area in the day of placement.
- Forming and shaping a steeper profile within the existing beach footprint.
- Placing imported beach sediment along the entire designated placement area rather than in one discrete location.

In relation to turbidity in the coastal marine area during construction:

- Selecting sand/gravel from a marine source that limits the potential release of minerals and fines typical of land based sources.
- Selecting sand/gravel gradings that match or are coarser than the *in situ* sediment and restrict the proportion of finer material.
- Forming the high tide construction bench with a slightly over-steepened profile so that the existing beach sediment are more exposed to typical wind and wave action.
- Only transferring and shaping the beach profile during lower tide levels.

In relation to burial of seabed adjacent to the placement area during beach profile adjustments:

- Selecting sand/gravel gradings that are slightly coarser than the *in situ* sediment and a reasonable proportion of gravels results in a slightly steep natural beach slope for the same wave conditions and also encourages smaller rates of offshore movement of sediment (e.g., 10% coarse gravels, 70% medium gravels, and 20% sands and fine gravels ± 2 to 3%).
- Placing imported beach sediment along the entire designated placement area rather than in one discrete location.

In addition to the above I recommend the following to ensure protection of the seagrass:

- Marking out the location of the seagrass beds (with a series of small bright marker pegs around the perimeter) to ensure that construction crews are clear about their whereabouts during works activities.
- Monitoring of the seagrass beds before and after construction activities to confirm that there is no net loss of seagrass extent and cover resulting from any unforeseen physical encroachment of beach nourishment materials into the beds, increased turbidity or altered hydrodynamics. Note that any monitoring should account for natural seasonal fluctuations in seagrass extent and cover. Seagrass beds tend to senesce (i.e., naturally decline in extent and cover) during autumn and winter. So if “before” monitoring occurs in winter, then “after” monitoring should also take place in winter. Recommended monitoring includes mapping the perimeter of each seagrass bed and assessing the average plant cover within each bed immediately before works commence, immediately after works have been completed and at a further interval thereafter,

probably one year after works completion to ensure no impact as the beach nourishment materials move and settle throughout the bay.

- If a net seagrass loss does occur, then it may be possible for seagrass to recover naturally over time provided that the loss is relatively minor and the factor that caused the loss is transient (e.g., temporarily elevated turbidity above ambient conditions) and does not persist in the longer term. In my experience, the New Zealand seagrass species, *Zostera muelleri*, is quite hardy and can regenerate relatively quickly after minor/moderate physical disturbance provided growing conditions are otherwise suitable (see Dos Santos et al. 2013, Matheson et al. 2017). If losses are more substantial and natural recovery does not seem to be occurring then assisted restoration using small scale transplantation could be attempted (see Matheson et al. 2017). However, this approach would require that the factor/s that caused the seagrass loss had been ameliorated and a suitable donor site would be required to provide material for transplanting. Ideally a suitable donor site would be identified within the same waterbody but a nearby local source (e.g., Porirua Harbour) might also suffice in this case where no other seagrass remains in Wellington Harbour.

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References

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