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11/05/17

Submission/Response to Brett Beamsley's Letter 28/4/17

In the matter of: **Lyttleton Port Company Limited**

Applicant

and

in the matter of: applications CRC172455, CRC172522, CRC172456, and CRC172523 to undertake channel deepening
dredging and maintenance dredging in Lyttleton Harbour

My name is David Boone. I am not an Oceanographer, Marine Engineer, nor am I an Environmental Lawyer - I am a surfer. Through my 20+ years surfing, I have travelled extensively across 4 continents while fulfilling maximum enjoyment within the Surf. Although I do not hold any official qualifications within the aforementioned areas, I have a keen understanding of how surf breaks work through personal experience, self-taught mechanics within surf break science as well as extensive guidance from relevant professional Advisory entities. I have sat on the Surfbreak Protection Society Committee since Sept 2015 and have been active in the Surfing Community in several areas around the country. It is my passion for the Ocean that has brought me here before you today. In this moment, I speak for the 10s of thousands of residents and annual visitors of Christchurch that share similar quality-of-life viewpoints relevant to the natural recreational amenities that are in grave danger from this project in its current proposal - Christchurch City's surf breaks.

Enclosed is a reply as official evidence to Mr. Beamsley's response dated 28/4/17. The response was constructed by SPS' technical advisor eCoast. It is the Surfbreak Protection Society's view that the MetOcean report and Mr. Beamsley's work reflects severe inadequacies and a poor understanding of how surf breaks work, therefore the project greatly threatens Sumner and Taylor's Mistake surf breaks. For these reasons, SPS opposes the application outright in its current proposal.

Enclosure:



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10 May 2017
Attn: Michael Gunson
Surfbreak Protection Society

Dear Michael,

Re: eCoast Review: Summary and Response Evidence of Brett Beamsley (modelling)

The following letter discusses the responses provided by Brett Beamsley concerning a review by eCoast of MetOcean Solution's report entitled "Existing and post sediment disposal nearshore wave dynamics and potential effects on inshore surfing conditions". Mr Beamsley uses 7 sub headings in the Summary and Response document. The same sub headings have been used here for consistency. However, Mr Beamsley does not address all the concerns raised in the previous review, including those relating to water quality, the lack of higher order numerical modelling, and, that the report, despite it's claims, provides no guidance in terms of adaptive management.

Unrealistic disposal of material

1. Mr Beamsley believes that modelling a sediment disposal feature with vertical sides and a flat top (a cuboid) is realistic. This scenario is impossible in real life. Unconsolidated material does not become disposed of with vertical walls. A comprehensive study would have at least considered a representative angle of repose of the spoil (how steep a slope this material can sustain before collapse) and use this information to construct a bathymetric feature that would be as-close-to-real-life as possible. The inadequacy of the method is clear in both his original and supplementary modelling output, where the significant differences in wave height are localised and relate back to the unrealistic corners of this rectangular, cuboid feature.
2. Mr Beamsley also feels that the modelled scenarios are a 'worst case scenario'. If this were a comprehensive assessment then all realistic scenarios should have been considered, which would also include a much wider range of surfing conditions and an assessment of the surf breaks, neither the Summary and response or the original report considers the character of the surf breaks in the area.

Whether the models are conservative

3. Mr Beamsley reiterates that he believes simulating a **mound** as a cuboid is realistic. The issue is considered in Paragraph 1.
4. To address the oversight of not including both capital and maintenance disposal mounds, Mr Beamsley undertook additional modelling scenarios. Despite these efforts, it is not possible to make a comparison between Mr Beamsley's original evidence and the supplementary modelling as the line plots do not consider the same parameter. In Mr Beamsley's original evidence he considered **significant wave height** for separate capital and maintenance disposal mounds; in the supplementary modelling considers capital and maintenance disposal mounds together but presents changes to wave **direction**. This inconsistency makes it impossible for a third party to evaluate the results.
5. Despite the inconvenience described in Paragraph 4, we can see from Figure 2 and 3 of the supplementary modelling that there are significant changes in wave direction close to some of the surf breaks. Changes of up to 10° have been reported. While these changes do not look very large on the exaggerated axes used in the comparisons plots (i.e. they consider directions from 0° to 150°), they are not insignificant, especially considering that the measurements are extracted in the nearshore and close to where waves start breaking.
6. Surfing waves can be evaluated in terms of a peel angle. The peel angle is the angle between the unbroken wave face and the trail of the wave break point, and is directly related to the rate at which a wave breaks (Walker, 1974; Hutt et al., 2001; Figure 1). Peel angles for surfing laterally along a wave range from 27° to 70° . Changes of almost 10° are reported in the supplementary modelling output. This represents a significant threat if these changes are considered directly applicable. For example, if we consider a surf break with a characteristic, mean peel angle of 35° , and the incident wave angle changes by 10° , the waves may now be characterised by a slower, lower performance wave ($35^{\circ} + 10^{\circ} = 45^{\circ}$); or, a wave that is no longer surfable as it is too fast ($25^{\circ} + 10^{\circ} = 35^{\circ}$). This is a worst case scenario, but either outcome may result in loss of surfing amenity value. Surf breaks are sensitive resources, and in the case of the original report and summary document, the Christchurch surf breaks have not been considered in this context.

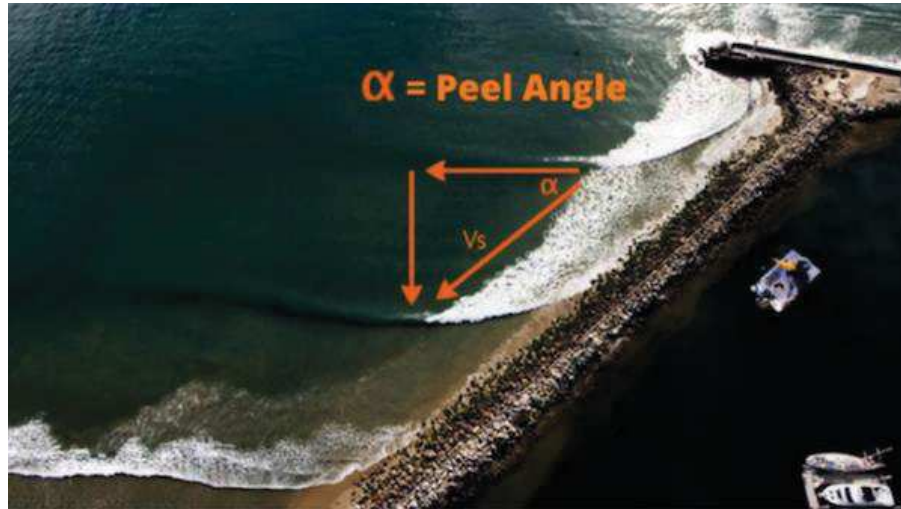


Figure 1. Annotated aerial photograph to show a waves peel angle (Image courtesy of <http://www.surfparkcentral.com>).

7. Mr Beamsley does not consider the cumulative impact of year upon year of maintenance dredging to have an effect on surfing conditions. It is this type of view point, with very little appreciation for the existing environment that resulted in process of Port Otago's expansion being halted. The results of year upon year of maintenance dredge spoil disposal at Aramoana was considered detrimental to the surf break. On the advice of eCoast, from listening to the surf community, these impacts were identified and disposal was halted. At this point the surf breaks could be monitored, assessed properly, and beneficial management decisions could be made. A holistic understanding of the environment is required to effectively manage a natural resource.
8. If dredge material will move quickly away from the disposal site it is possible this material could head shoreward from the disposal sites, and in toward Taylors Mistake and Sumner as a first port of call. If Mr Beamsley is correct in saying the cumulative effects at the disposal ground are negligible because the dredge material is mobile, then cumulative effects on the surf breaks themselves may well be experienced. This has been observed at Mount Maunganui, Bay of Plenty, where year upon year of maintenance dredge disposal resulted in the beach becoming over filled with material and surfing wave quality decreasing.

Morphological features and settings

9. Paragraph 17 argues that waves at the 3 m depth contour are expected to be no different than those at the 6 m depth contour. Extracting data from the same longshore

locations, but closer to shore, would not have been a difficult exercise to perform to show this. Regardless, the point stands that the 6 m depth contour is not in or close to the surf zone or the surfing area.

10. Concerning Paragraph 18 of Mr Beamsley's summary and response, he has failed to respond to the point being made. eCoast's review included "*the results do not allow for a simple evaluation to changes in wave direction (both offshore and in the nearshore)*". Mr Beamsley's response is that "*all modelling undertaken includes changes in wave directions due to refraction/diffraction*". The numerical model capability was not under question, here we are concerned with the quality and fashion in which data is presented; with only qualitative, visual comparisons available from the directional wave spectra data; and no other wave direction data being presented.
11. Paragraph 19 of Mr Beamsley's response states "*that the surf spots along the Christchurch shoreline are predominantly beach breaks with no hard structures, and rely on local rips and banks to form surf spots*". It is unsure how these conclusions have been reached without proper characterisation. A simple check of Moorse and Brunskill (2004) and other New Zealand surf guides (e.g. www.nzsurguide.co.nz) show that:

- Taylors Mistake hosts not only a renowned beach break, but also a wave that breaks off the rocks at the southern end of the beach and waves that breaks off Whitewash Head to the north. Taylors Mistake is also considered very significant to the local surfing community as it provides very different surfing conditions, a higher performance wave, compared to the rest of the coast (<http://www.stuff.co.nz/the-press/news/hills-and-harbour/9546243/Taylors-Mistake-tops-for-surf>).
- Sumner Bar breaks on the ebb tidal delta deposited at the tidal inlet of the Estuary of the Heathcote/Avon Rivers /Ihutai. Ebb tidal deltas are very sensitive morphological features, the shape and form of which are dependent on both tide and wave conditions. Surfing also occurs on sand bars associated with Cave Rock and Shag Rock; and it is likely that sand banks in the area are dependent on the orientation of the marginal flood channel associated with the tidal inlet.
- At New Brighton, there are various beach breaks, however surfing options are also directly associated with pier.
- South Shore is another surf break area associated with the more complex dynamics of the Heathcote/Avon Rivers /Ihutai Estuary.

The key issue we can draw from the above information is that Mr Beamsley has assumed that Christchurch's surf breaks "rely on local rips and banks", when this is clearly not the case, and again, highlights the fact that even a simple evaluation of the resources has not been made. It should also be noted that both the statement of evidence and summary and response model output show changes to wave climate north of New Brighton (furthest northerly break considered by Mr Beamsley), where there are other established surf breaks that have not been considered.

Wave periods

12. In paragraph 21 it is contested that the effect of short period waves will be negligible for 2 reasons: 1) *"Shorter period waves will be locally generated and as such will not have refracted around Banks Peninsula, and so incident waves at the surfing beaches are less likely to propagate over the disposal ground"*; and 2) *"Shorter period waves will 'feel' the bottom less than longer period waves. The effect of the disposal mounds on incident waves with relatively longer periods (i.e. 11 seconds) will be minor to less than minor. As such it stands to reason that the effect of the offshore disposal mounds on shorter period waves will be smaller again"*. Both statements again show a lack of knowledge concerning Christchurch surf breaks and fundamental coastal processes.
13. Concerning statement 1), while much of the Christchurch coastline surf breaks will be surfable on the swells generated to the south, that have refracted around Banks Peninsula, the premier surf break of Taylors Mistake requires north-easterly swells for optimum conditions. These shorter period swells do not have to be locally generated, but could be delivered from storms further offshore.
14. Concerning statement 2), shorter period waves do not 'feel' the bottom less than longer period waves; longer period waves are more likely to 'feel' the bottom in a greater depth of water. As per eCoast's initial review, a wave with a period of 7 seconds will have a wavelength in excess of 70 m in 20 m of water (approximate depth of the capital disposal site). Waves start to 'feel' the bottom (and therefore refract/diffract and shoal.) where the depth of water becomes less than half a wavelength – in this example 35 m. The disposal ground will affect shorter periods waves.

Surfing conditions

15. Paragraph 23 fails to address the concern that surfable events should not be limited by wind speed and direction. Mr Beamsley is correct in that wind speed and direction will not affect the refraction of waves, but they certainly effect surfing conditions. By

limiting the data using wind speed and direction the methodology may well be excluding conditions that can be considered surfable; and consequently, not considered as one of the surfing events.

16. Mr Beamsley finishes paragraph 23 of the summary and Response with: “*With respect to wave period, see paragraph 22*”. Here we assume Mr Beamsley means paragraph 21 of the same document. If this is the case, it is addressed in here in Paragraphs 12 through 13.
17. Paragraph 24 of the Summary and Response attempts to address the concern for a lack of modelled events from the south. A table of the selected surfing events, similar to Table 3.1 presented in the *Existing and post sediment disposal nearshore wave dynamics and potential effects on inshore surfing conditions* document, but relevant to Site 1 in Figure 3.1 would have shown this. All the reader is left with is a visual, qualitative assessment and comparison of the wave roses presented in Figure 3.1 and Figure 3.2.

Seasonality

18. In paragraph 25 of the Summary and response document it is confirmed that seasonality of the surfing wave climate was not considered. This again shows a lack of attention to detail by not characterising the surf breaks, and would have likely shown that, at a bare minimum, Taylors Mistake requires different incident wave conditions to the majority of the Christchurch surf breaks considered here.

Cumulative effects

19. Paragraph 26.1 of the summary and response considers paragraph 16 of the same document to address the issue of continued disposal of material. Paragraph 16 does not address this point. If Mr Beamsley is considering Paragraph 15 to address the issue, then this is discussed in Paragraphs 7 and 8 of this document. Paragraph 26.2 is also discussed in Paragraphs 7 and 8.
20. In Paragraph 26.3, Mr Beamley does not consider the combined effects of both the proposed mussel farms and the disposal mounds will affect surfing conditions. While the cumulative effects may well be negligible, this aspect was not even officially considered as part of the original report.

While dredge spoil disposal is largely discussed in terms of potential negative impacts, the operations can be viewed as an opportunity to improve surfing conditions and be of benefit to the local surfing community, whilst maintaining the integrity of existing breaks. However, the study presented by MetOcean is certainly not thorough enough to determine this, and does not even consider the option.

A proposal to assist the Port and provide advice on how the local surfing community could benefit from the dredging activity was provide in December 2016. Unfortunately, a response was not received.

In Mr Beamsley's statement of evidence he includes that an assessment on the "shape, power and consistency of surf waves [...] has not been undertaken". This shows that the author understands what should be evaluated in a comprehensive investigation to determine the impacts on surfing wave quality, yet this has been neglected.

It is of some concern that the previous review from eCoast was required to simulate the actual worst case scenario by including both capital and maintenance disposal mounds. In a related report concerning sediment transport for the consent application, it was brought to our attention that the same author neglected to include the effects of wind and waves in simulations, two fundamental components of sediment transport. Given the lack of due diligence, the work completed thus far regarding the potential effects on Christchurch's surf breaks cannot be considered to have been adequately addressed by a surf science expert.

Yours sincerely



Ed Atkin | eCoast Director

References:

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