greater WELLINGTON
REGIONAL COUNCIL
Te Pane Matua Taiao

File No: WGN160274; SR357837
19 July 2016

Wellington International Airport Limited
C/- Lane Neave
PO Box 2331
Christchurch 8140

For: Amanda Dewar

Dear Amanda

Further information request under section 92(1) of the Resource Management Act 1991

Thank you for the letter dated 1 July 2016 which responded to questions raised by Greater Wellington Regional Council (GWRC) and Wellington City Council (WCC) on 16 June 2016. The information provided now forms part of the consent documentation for the resource consent application to construct and operate a proposed airport runway extension at Wellington International Airport.

This letter outlines areas where there are still information gaps regarding your consent application and additional questions that have come out of GWRC/WCC reviewing the consent application and further information.

Traffic effects

On 11 July 2016 a meeting was held between the applicant and WCC to discuss traffic effects of the proposal. This meeting was attended by Mike Brown (WIAL), John Kyle (Mitchell Partnerships) and Mark Georgeson for the applicant, and Soon Teck Kong (Traffic), Peter Daly (Planner), and Bill Stevens (Team Leader) for the WCC.

Following on from this meeting, the key concerns of the WCC traffic advisors are listed below:

- Traffic Safety effects, particularly speed, along the transport route include checking current lane widths and lateral clearance from parked vehicles, opposing traffic flow along two-way carriageway (Vivian St, Mt Vic Tunnel, Basin Reserve, busier section of Onepu Rd), safety at high risk areas near pedestrian crossings, community centres, college, shopping area and intersections due to extra stopping distances required for HPMV (fully laden and empty).

- Traffic Amenity effects over the haulage route for the construction timeframe. In particular, these traffic amenity concerns relate to the following matters:

- Impacts on individual road users, including motorists, cyclists, and pedestrians along the transport haulage routes.
- The impacts on residents along the haulage route
- Impacts on the general public in terms of discomfort & quality of life that may arise from the transport of material along the haulage routes.

Note: this may overlap with any social impact assessment work that may have been undertaken, and any assessments with respect to noise & dust emissions.

In regards to those matters above, the following information is considered necessary to adequately assess the traffic effects of the proposal. Please provide an assessment that adequately addresses the following matters:

1. Traffic Safety effects throughout the overall transport route, in particular, what are the crashes, types and trends along the transport route during the haulage times (TDG - Table 4 truck related crashes only), confirming the stopping distances for fully laden and empty HPMV, identify high risk areas for crashes such as intersections, pedestrian crossings (zebra) and major accesses, and determine the lane widths and lateral clearances along the route in particular opposing traffic flows.

2. Further analysis as to how daytime traffic can be shifted through the airport route (i.e. the night time transport route). This analysis should cover 100% of daytime haulage traffic along the proposed night-time route, and include details of the traffic volumes throughout the airport precinct (during weekdays and weekends), and what routes they are taking (which may involve detailing traffic volumes at different sections in the internal airport roading network over the period of construction). The analysis should also include information on existing traffic demand along this route over the weekdays and weekends, existing roading capacity, effects of heavy haulage use on other Airport users, potential safety implications and mitigation measures required for public safety.

3. Comparison of the traffic effects of using Bridge Street & Onepu Road, including: route distance, affected properties, intersections crash history/safety issues, estimated travel time, speed management/control etc.

4. Assessment of the transport haulage route should also include NZTA road corridor (eg Vivian St, Mt Vic Tunnel, Basin Reserve) and WCC roads so that the effects for the entire haulage route are determined and assessed.

5. How the above amenity effects, outlined above, are to be addressed

Modelling and effects on surfing amenity

6. On 8 July 2016 a teleconference was held between Simon Mortenson (DHI, applicant's expert) and Dr Derek Goring (Mulgor Consulting Ltd, GWRC's expert) to discuss the model used by the applicant to determine impacts on surfing from the proposed runway extension. In

summary, DHI confirmed that there will be no difference between data used in the applicants model, which is based on wave spectra in the North Sea (Joint North Sea Wave Project, JONSWAP), and locally sourced wave spectra collected from the Baring Head buoy 8 kilometres Southeast of Lyall Bay.

Dr Goring has subsequently compared the outputs from a model using data from 20 wave events in 2015 and parameters used by the applicant's model (see memorandum dated 8 July 2016 enclosed). The analysis showed that predicted wave height was similar; however the wave period was on average 8% greater when using JONSWAP versus the locally sourced wave spectra. Given that wave period is a measure of good surf conditions (i.e. a short period can often mean "messy" surf conditions) this discrepancy needs to be investigated further to assess potential effects the proposed runway extension may have on surfing in Lyall Bay.

Therefore, please model a wave scenario (shown in Table 5-2 of Technical Report 11) with the measured spectral shape and compare these results with the same run using JONSWAP spectrum. Please submit your results and provide justification to GWRC as to whether the findings validate the surfing effects assessment in your consent application and/or outline further modelling that is required to understand the potential effect the proposed runway extension may have on surf conditions.

7. It appears locally sourced wave spectra were not used in the OPTISURF model which was used to predict whether the proposed wave focussing structure would mitigate/enhance surfing amenity in Lyall Bay. What impact does the absence of local wave climate data in the OPTISURF model have on the validity of the results? Please provide evidence similar to that requested in Question 6 to justify your answer.

Date information required

For the above information to be considered in WCC and GWRC reports on the consent application, please provide the above information by **26 July 2016**. If this is unachievable please advise a reasonable timeframe when the information will be provided or that you refuse to provide the requested information.

Processing of your application

The time period relating to the provision of information requested in this letter will not stop the consent processing clock as this is the fourth request made under section 92(1) of the Resource Management Act.

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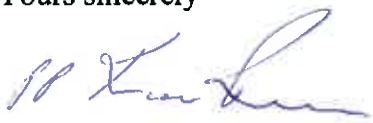
Please feel free to contact me on 04 830 4148 or if you have any questions or concerns.

Yours sincerely



Jude Chittock
Senior Resource Advisor, Environmental Regulation

Copy to: Peter Daly email: Peter.Daly@wcc.govt.nz

July 8, 2016

Airport Runway Extension:

Report on Meeting with DHI

Introduction

On 8-Jul-2016, a telecom meeting was held between Simon Mortensen of DHI and Derek Goring of Mulgor Consulting Ltd (MCL). The purpose was to discuss issues related to the wave spectra that were used as boundary conditions in the surf impact modelling.

Background

DHI has used JONSWAP spectra for deriving the boundary conditions for their Boussinesq model whose results are used in the surf impact modelling. MCL questioned why they used spectra based on the limited fetch of the North Sea instead of spectra from the Baring Head wave buoy 8 km southeast of Lyall Bay?

Explanation

At the start of the project, DHI requested wave spectra from NIWA, but were told none existed. Yet, when MCL asked NIWA for wave spectra, they were received 24 hours later.
There appears to have been a communication breakdown between DHI and NIWA. Did DHI ask NIWA the right question? Did NIWA understand DHI's question?
The upshot is that instead of using measured spectra, DHI used a best estimate.
The question is: how has this affected the results?

Information Provided

DHI have finally provided the parameters used in their JONSWAP model (they had been asked twice for these). They are: $\gamma = 3.3$, $s_a = 0.07$, $s_b = 0.09$, which are the default values applicable to spectra in the North Sea.

Comparison

Now that the JONSWAP parameters have been provided, a comparison can be made between measured spectra and JONSWAP spectra used in the model, as shown in Figure 1. The areas under the two spectra are the same, as are the periods of the peaks – these are the parameters that define the spectrum. It is the difference in the shape of the spectra that is important:

- The JONSWAP peak is almost 50% higher and is more peaked;
- The JONSWAP spectrum has higher energy at low frequencies, and lower energy at high frequencies.

One way of assessing the effect of these differences is to compare the parameters from the synthesis of these spectra into the time domain – this is actually what is used in the Boussinesq model. For this purpose, time series of 100,000 samples at 0.5 s intervals were generated using random phase and the inverse Fast Fourier Transform (FFT). The time series were then analysed using zero-crossing methods to generate the average of the highest third of the waves, H_s, and its

corresponding period, T_z. This process was repeated several times and the results were found to be same within two decimal points, indicating the simulation was robust.

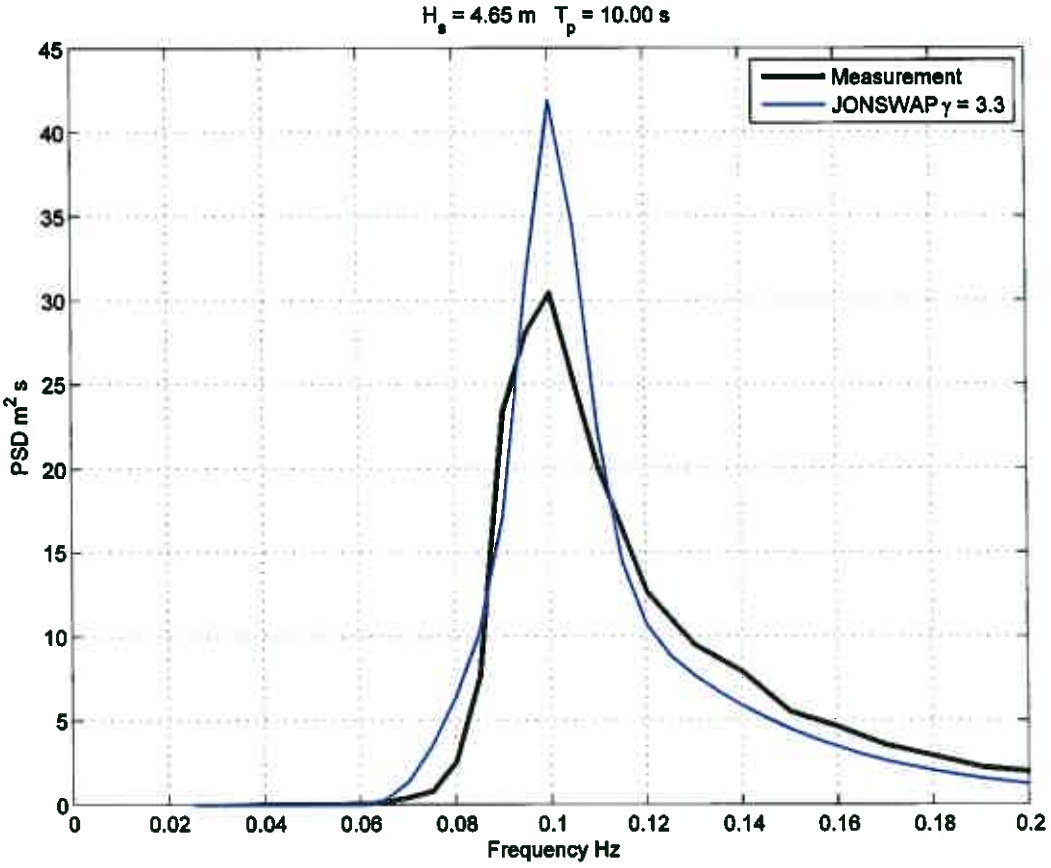


Figure 1. Comparison between a typical Baring Head spectrum and the JONSWAP spectrum used in DHI's model.

Table 1 shows the results of this analysis for the 20 events in 2015 when the wave heights exceeded 3 m. On average, the wave height is 1% larger with JOSWAP which is considered insignificant. However, the period is 8% longer with JONSWAP, with differences up to 2.4 s. This results from the higher energy at low frequencies in the JONSWAP spectrum, as noted above.

Table 1. Comparison of wave height and period from synthesised wave records derived from measured and JONSWAP spectra.

Event	Wave Height m		Wave Period s	
	Measured	JONSWAP	Measured	JONSWAP
06-Feb-2015	4.01	4.04	9.29	10.32
17-Mar-2015	4.47	4.47	8.66	9.31
15-Apr-2015	5.24	5.35	11.31	12.41
30-Apr-2015	4.72	4.80	10.04	11.67
16-May-2015	5.10	5.12	9.35	9.80
22-May-2015	2.96	3.00	7.95	8.46
26-May-2015	5.31	5.40	12.54	14.32
04-Jun-2015	4.21	4.23	8.78	9.34
13-Jun-2015	3.78	3.78	10.71	10.93
14-Jun-2015	3.81	3.85	13.99	14.30
22-Jun-2015	4.46	4.50	9.08	10.35
01-Jul-2015	2.89	2.94	11.95	14.33
09-Jul-2015	4.59	4.62	8.98	9.31
19-Jul-2015	5.40	5.45	9.41	9.81
30-Jul-2015	4.47	4.52	8.88	9.32
07-Sep-2015	4.64	4.73	10.09	12.37
11-Sep-2015	3.93	3.97	8.05	8.50
22-Sep-2015	3.94	3.97	7.90	7.79
05-Oct-2015	3.83	3.89	10.83	11.67
18-Nov-2015	3.42	3.47	9.48	9.80

Conclusion

In the discussion with DHI, they maintained that the differences in the spectra would have no effect on the results. MCL questioned whether this was correct or whether it would have only a minor effect, but DHI were adamant that there would be **no** effect.

In their report, DHI say that as a result of development, surfable rides will be reduced by 14-29% for Middle Beach, 18-27% for West Beach, and 4-8% for The Corner.

These are quite small percentages and MCL believes that an average overestimation of 8% in wave period is likely to have some effect on these results. Therefore a model run should be carried out with the measured spectral shape for one of the Scenarios listed in Table 5-2 of their report and the results compared with the same run using the JONSWAP spectrum. If the results are close to the same, then that would demonstrate that the effect of the different spectra was insignificant and therefore the results and conclusions in the DHI report are valid. However, if the results are more than a few percent different, then all the Boussinesq modelling should be repeated with the correct spectra.

Derek Goring
Mulgor Consulting Ltd
d.goring@mulgor.co.nz