Annexure 1: Construction and Operational Noise

Nigel Lloyd

WELLINGTON AIRPORT RUNWAY EXTENSION

Peer Review of Noise Reports

Introduction

1 My full name is Nigel Robert Lloyd, and I am an acoustical consultant.

2 I have been engaged by the Greater Wellington Regional Council (**GWRC**) and Wellington City Council (**WCC**) to peer review the various technical reports submitted with the application for the extension of the runway at Wellington International Airport (**The Airport**), and to consider the issues they raise from the perspective of noise (and vibration).

Qualifications and Experience

3 I am an acoustical consultant with Acousafe Consulting & Engineering Limited, a position I have held since 1985. I have a degree in mechanical engineering gained at the University of Wales, University College Cardiff in 1976.

4 Prior to my current position, I was employed by the Industrial Acoustics Company in the UK as an acoustical consultant between 1977 and 1980 and then spent five years as the Department of Labour noise control engineer in New Zealand, advising the safety inspectorates on occupational noise management and control. I have a total of 39 years' experience as a noise control engineer/acoustical consultant.

5 I advised the local residents association (**RANAG**) on the Wellington International Airport District Plan appeal in 1997 and have advised Manukau City Council on Auckland Airport for the Operative Plan, and Palmerston North City Council and Rotorua District Council on their airport plan provisions respectively.

6 In 2011, I advised the Ministry of Education during the appeals on the Queenstown District Plan Change for the Queenstown Airport.

7 In 2004, I advised Corrigan Commercial Ltd on an appeal by Wellington International Airport Ltd against the establishment of an apartment building in the Miramar Suburban Centre (ENV

W105/04). Over the years, I have been involved in advising on individual new dwelling/extension applications regarding aircraft noise insulation requirements.

8 I advised WCC on the original resource consent application for Moa Point Wastewater Treatment Plant and advised during the design and construction of the plant. I am still involved in undertaking regular compliance noise monitoring for the plant including night-time (2am) monitoring at Kekerenga Street.

9 I advised Auckland Council on Topic 45 of the Proposed Auckland Unitary Plan during the hearing process, including proposed plan provisions for Ardmore Airport, Auckland International Airport, Whenuapai Airbase, North Shore Airfield, Kaipara Flats Airfield (near Warkworth), and Parakai Airfield (near Helensville).

10 I am a Member of the Acoustical Society of New Zealand.

Involvement with the Proposal

11 In February 2016 Acousafe Consulting and Engineering Ltd was engaged by GWRC and WCC to undertake a preliminary review and provide pre-application comments regarding noise effects associated with the Wellington International Airport (**The Airport**) proposed runway extension.

12 Following receipt of the application and assessment of environmental effects I recommended that further information be sought from the applicant regarding inconsistencies in Technical Report 10 about ambient noise levels. This information was sought from the applicant in the GWRC letter dated 20 May 2016. Information was also sought about compliance with the Proposed Natural Resources Plan (**PNRP**) as well as the Operative Regional Coastal Plan (**RCP**). The applicant was asked about the weightings that had been given to the options of delivery of fill by sea compared by road. This was with a view to assessing the consequent reduction of truck noise that delivery by sea would provide.

13 Subsequent to receiving the Mitchell Partnership reply dated 13 June 2016, I sought further clarification in my email of 15 June 2016 (GWRC email of 16th June to the applicant) regarding inconsistencies I perceived between the information being provided and the original Table 6 of AECOM's Technical Report 10. In their memorandum dated 27 June 2016, AECOM explained

the inconsistencies between the new data and the original data in Table 6 (where AECOM had made some new assumptions about construction noise since those in Technical Report 10) and also provided a separate table setting out average background sound level measurements. When I asked Mr Humpheson of AECOM about the background sound level table he indicated that the LA90(0100-0600) for Wednesday 11-03-2015 was incorrect.

14 I have read the draft report of Dr Michael Steven advising Councils on the impacts on recreation usage and I rely on that report to the degree I set out below.

15 I visited the area surrounding the site with GWRC officers and other experts, on the morning of Thursday 30 June 2016. This included the Moa Point residential area and shoreline, the Lyall Bay shoreline, Melrose, Miramar and Strathmore Park, including Kekerenga Street, Ahuriri Street and the walking track above the wastewater treatment plant.

16 The Application Noise Documentation

17 I have reviewed the following reports:

a) The Assessment of Environmental Effects (**The AEE**) which includes an assessment of construction and haulage route effects in Section 7.7 and an assessment of operational noise (post construction under 7.17).

b) The assessment of effects on recreation in Technical Report 6. Wellington International Airport Proposed Extension – Assessment of Effects on Recreation by TRC (**The TRC Report**) dated 25 April 2016.

c) The construction noise assessment in Technical Report 10 of the application prepared by AECOM (**The AECOM Report**).

d) The aircraft noise assessment in Technical Report 26 prepared by Marshall Day Acoustics (**The MDA Report**).

e) The Mitchell Partnerships reply dated 13 June 2016 to Council's Further Information Request dated 10 May 2016.

f) The Mitchell Partnerships reply dated 1 July 2016 which contained:

(a) Attachment 1 - The AECOM Memorandum dated 27 June 2016 which is in response to Council's Further Information Request dated 16 June 2016 relating to predicted noise levels and baseline noise data.

(b) Attachment 3 - The AECOM Memorandum dated 1 July 2016 which is in response to Council's Further Information Request dated 20 May 2016 considering the noise implications of utilising marine based fill materials (barges).

g) The Mitchell Partnerships Memorandum dated 15 July with further clarification of Technical Report 10 (Location of Receivers and Location of Measurements).

18 I identify the areas of exclusion from my direct expertise below:

a) My peer review considers the methodology and approach used by Marshall Day Acoustics in the Operational Aircraft Assessment (Technical Report 26) but I am not an expert in the actual aircraft numbers forecasts. These forecasts have been undertaken by InterVISTAS and I have relied on them.

b) My review does not cover underwater impacts of construction noise (or vibration) on marine life.

c) I note also that the AEE does not consider the impact of vibration effects to be significant. I have not undertaken a separate peer review of the vibration effects but I have recommended a condition for vibration in the event that it does become an issue. Having said that, I am not an expert in environmental vibration.

19 There are two aspects of noise resulting from the proposed runway extension. The first relates to the noise of construction and the second from the changes to the aircraft noise once construction is complete, these are discussed in turn below.

The Regional and District Plan Noise Provisions - Construction

20 Both the RCP and the Wellington City District Plan (**District Plan**) require construction noise to comply with NZS 6803P:1984 *The Measurement and Assessment of Noise from Construction, Maintenance and Demolition Work* (**NZS 6803P**) which was a Provisional Standard. This Standard was superseded and replaced by a full New Zealand Standard NZS 6803:1999 *Acoustics – Construction Noise* (**NZS 6803**).

21 The *general conditions in section 5.7.2 of the* PNRP references *NZS 6802:2008 Acoustics – Environmental Noise* as the standard for measuring and assessing noise, and that any construction activities shall meet the limits specified in Table 1 of *NZS 6803:1999 Acoustics – Construction Noise.* All activities within the CMA are required to meet these noise conditions or adopt the best practicable option to ensure the emission of noise does not exceed a reasonable level (refer to Policy 150 of the PNRP).

22 I would note that Table 1 of NZS 6803:1999 referred to in section 5.7.2 of the PNRP is not a table of noise limits but is a list of symbols and terms used in the Standard. The relevant table is actually Table 2 which I include as follows:

Table 2 – Recommended upper limits for construction noise received in residential zones and dwellings in rural areas

Time of week	**Time period**	**Duration of work**					
		Typical duration (dBA)		**Short-term duration (dBA)**		**Long-term duration (dBA)**	
		L_{eq}	L_{max}	L_{eq}	L_{max}	L_{eq}	L_{max}
Weekdays	0630-0730	60	75	65	75	55	75
	0730-1800	75	90	80	95	70	85
	1800-2000	70	85	75	90	65	80
	2000-0630	45	75	45	75	45	75
Saturdays	0630-0730	45	75	45	75	45	75
	0730-1800	75	90	80	95	70	85
	1800-2000	45	75	45	75	45	75
	2000-0630	45	75	45	75	45	75
Sundays and public holidays	0630-0730	45	75	45	75	45	75
	0730-1800	55	85	55	85	55	85
	1800-2000	45	75	45	75	45	75
	2000-0630	45	75	45	75	45	75

Table 3 – Recommended upper limits for construction noise received in industrial or commercial areas for all days of the year

Time Period	Duration of work		
	Typical duration	Short-term duration	Long-term duration
	L_{eq} (dBA)	L_{eq} (dBA)	L_{eq} (dBA)
0730-1800	75	80	70
1800-0730	80	85	75

23 The runway construction will mostly occur in the CMA, to which the RCP and the PNRP applies. There are land based depots and stockpile areas provided for in the proposal and other land-based excavation works (such as the removal of the small hill between Freight Drive and Stewart Duff Drive). These are outside the CMA.

24 The AECOM Report sets out the provisions of the RCP which, under 14.1.3(5), direct that construction noise "will meet standards specified in Table 1 of NZS 6803P:1984". There is a typographical error in the RCP in this regard (it refers to "198" instead of "1984").

25 In 3.10 Definitions, under *Noise Emission Levels*, the District Plan separately identifies noise from construction, maintenance and demolition activities, including those associated with the urgent repair of utilities to maintain continuity of service, on any site or on any road as needing to comply with, and be measured and assessed using, the recommendations of NZS 6803P:1984. When WCC regulate construction noise under the District Plan it is general policy to not have specific rules around construction noise, but rather, to control unreasonable noise through s16 of the RMA, and to use the NZS 6803P:1984 standard recommended noise limits as a baseline on what is reasonable.

26 As stated above, the provisional 1984 version of the Construction Noise Standard has been replaced with a full 1999 version. The limits are ostensibly the same between the two Standards except the 1999 version replaces the previously used L_{10} descriptor with L_{Aeq}. I agree with the applicant when I consider that the later 1999 full version of NZS 6803 Standard is the most appropriate one to use in this circumstance.

27 Table 2 of NZS 6803:1999 recommends upper limits for levels of construction noise received in residential areas and Table 3 recommends limits for industrial or commercial areas. As such, there is nothing specific in NZS 6803:1999 that relates to the CMA or its users.

28 NZS 6803:1999 provides (7.2.5) for the limits in Table 2 to be used to protect other specific noise sensitive activities at certain hours of the day. The emphasis for the use of the CMA for recreation is primarily on daytime and the predictions are that the limits in Table 2 can be met at all times during the daytime, with a reasonable margin of safety. I would consider that some exceedance, within reason, would be acceptable in waters close to the construction area and, say, at the southern end of Moa Point Road. However, it would be reasonable to expect 70 dB

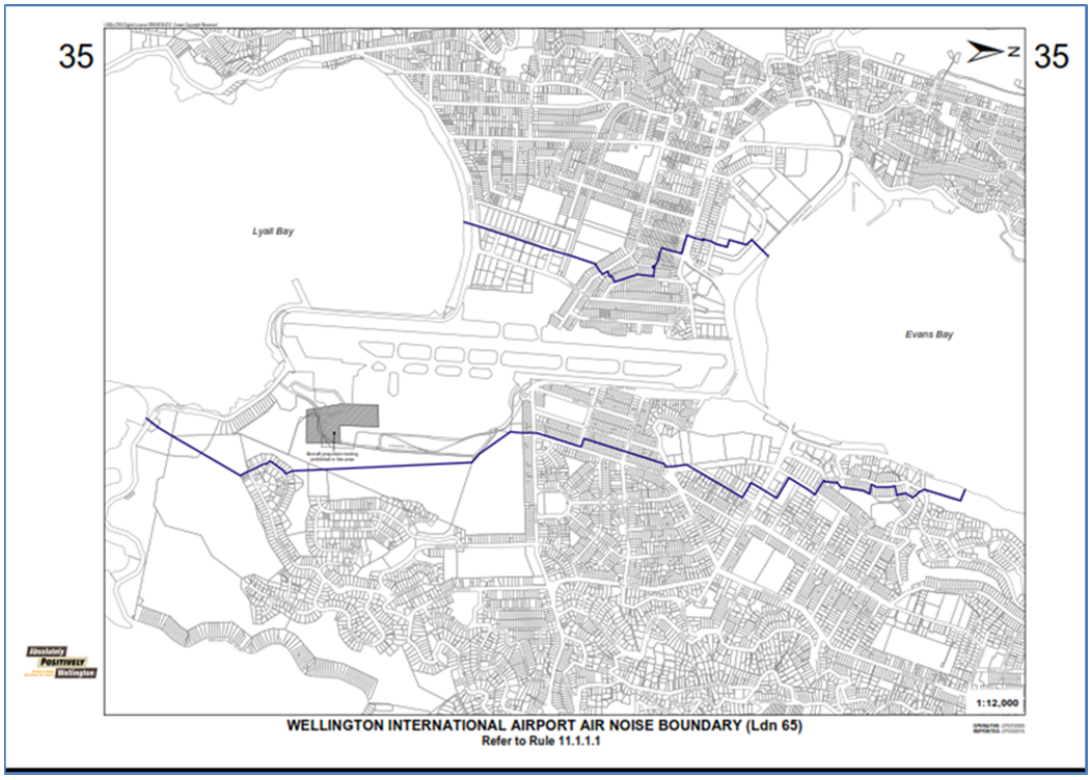
L_{Aeq} and 85 dB L_{Amax} (0730 to 2000 hrs) construction noise limits to be met at Lyall Bay Beach to protect people using the beach during the day. After 2000 hrs NZS 6803 applies the night-time noise limits (45 dB L_{Aeq} and 75 dB L_{Amax}). These are too strict to use to protect late evening beach goers. However, these noise limits will apply at nearby residential areas providing a defacto protection for beach and surf users during the late evening.

29 I concur with the approach taken in the Application (and in the AECOM Report) that NZS 6803:1999 *Acoustics - Construction Noise* provides appropriate recommended guideline limits for construction works and I also agree with the AECOM Report that the extended nature of the proposed works (up to 48 months) means that those guideline limits should be treated conservatively. I consider that these limits can be applied at residential dwellings, commercial properties and a limit of 70 dB L_{Aeq} and 85 dB L_{Amax} (0730 to 2000hrs) at Lyall Bay beach to protect beach users. This control will also protect surfers using Lyall Bay (to a slightly lesser degree) who will normally be closer to the beach than to the construction works.

30 I do not consider that the construction noise limits should be applied to construction traffic on roads. I discuss construction traffic later in my report and I consider that construction traffic noise can be appropriately controlled using a traffic management plan

The District Plan Airport Noise Provisions

31 Turning to aircraft noise; the applicant does not seek to alter the District Plan airport noise restrictions to accommodate the proposed runway extension project. Chapter 11A of the District Plan contains the airport noise rules and this section is included as Appendix C of the MDA Report. Rule 11.1.1.1.1 (See Appendix A) requires airport operations to be managed to ensure that the rolling 90 day average 24 hour night-weighted sound exposure does not exceed a Day/Night Level (L_{dn}) of 65 dBA outside the Air Noise Boundary (**ANB**) shown on District Plan Map 35.



WELLINGTON INTERNATIONAL AIRPORT AIR NOISE BOUNDARY (Ldn 65)
Refer to Rule 11.1.1.1

WHO Guidelines

32 The World Health Organisation has extended its 1999 environmental noise recommendations[1] with 2016 guidelines on night noise[2].

33 The 1999 WHO Guidelines recommend that, to protect against sleep disturbance effects, inside limits should be based on a combination of 30 dB $L_{Aeq(8hr)}$ and 45 dB L_{Amax}. These translate to outside levels of 45 dB $L_{Aeq(8hr)}$ and 60 dB L_{Amax}, allowing a 15 dB reduction through ventilating windows.

34 The 2016 guidelines consider long term (1 year) average night L_{Aeq} which it calls L_{night}. The guidelines recognise that the relationship between $L_{night\text{-}outside}$ and sleep effects is not straightforward because short-term effects are mainly related to maximum levels per event inside the bedroom ($L_{Amax,inside}$). A summary of effects and threshold limits of effects is set out in Table 5.2 of the 2016 guidelines. The threshold for sleep effects such as sleep quality and well-being are stated to be in the range 40-42 $L_{night\text{-}outside}$ with a threshold for complaints at 35 dB $L_{night\text{-}outside}$. Health effects, such as hypertension and myocardial infarction, start to occur at a threshold of 50 $L_{night\text{-}outside}$. Note that these are yearly averages.

35 For single events, biological effects such as EEG awakening and onset of motility occur at noise levels of 32-35 dB $L_{Amax,inside}$. Waking up too early in the morning has a threshold of 42 dB $L_{Amax,inside}$ according to the 2016 WHO Guidelines. Note that these are L_{Amax} inside thresholds.

36 The WHO guidelines imply that the NZS 6803:1999 night-time noise limits need to be treated as maximum limits and should not be relaxed.

Construction Activity Noise

37 The Foreword of NZS 6803:1999 reinforces that the generally acceptable level of intrusive noise in the community is assessed under the provisions of NZS 6802. It goes on to identify that construction noise is outside the scope of that Standard because it usually cannot be kept within the specified limits. The Standard states "*although this may mean that the noise is*

[1] WHO Guidelines for community noise. World Health Organization, Geneva. 1999
[2] WHO Night Guidelines for Europe, WHO Regional Office for Europe, Denmark. 2016.

undesirable, it is not necessarily unreasonable when all of the relevant factors are taken into consideration. Construction noise is an inherent part of the progress of society".

38 I note that, in his submission, Mr Stan Andis takes '*the strongest possible exception to this statement*'. He considers that there are no guidelines or exceptions written into any Construction Noise Standard or District Plan Rule that would provide for '*progress of society*' to take priority over excessive construction noise impacts. The point is that the construction noise limits are significantly greater than the normal day to day guideline limits (found in NZS 6802). It is the less strict noise limits in the construction noise standard (than NZS 6802) which recognise that construction noise might be *undesirable* but which may not be *unreasonable* in the circumstances.

39 Critically, the Foreword in NZS 6803:1999 then goes on to state that communities will usually tolerate a higher noise level on the basis that it is of limited duration, is no louder than necessary and occurs within appropriate hours of the day. The construction works associated with the runway extension are going to be challenging for the community because they will take a number of years to complete and need to take place at night because of the operational requirements of the airport. The location of the site also makes it impossible to apply normal noise control strategies (e.g. noise barriers are impractical).

40 There are two main aspects of construction noise from the proposed runway extension:

a) Noise associated with the construction and support activities (mainly occurring at the southern end of the airport), and

b) Noise associated with the transportation of construction materials and fill on local roads and on the State Highway.

41 Section 4 of the AECOM Report discusses the ambient noise monitoring locations that were selected near to the airport. The monitoring locations include the nearest residential locations to the runway extension (and some further afield), recreation sites, and sites near to the potential truck access roads (See Appendix B of this report).

42 Unattended readings were undertaken on the front deck at 36A Moa Point Road and attended readings were undertaken at 8 sites around the airport as described in 4.3 (and specifically described in Appendix B of the AECOM Report). These included:

M1 – on the pavement outside 36 Moa Point Road
M2 - Moa Point opposite the layby on the verge nearest the shore line (opposite No.36)
M3 - Dorrie Leslie Reserve, opposite No.290 Queens Drive (on the opposite side of Lyall Bay)
M4 - Beside No.244 Coutts Street (which is at the north western side of the airport runway)
M5 - By the side of No. 23 Bridge Street in Gaudin Street (west of the airport runway)
M6 – Opposite No.10 Bridge Street on open space
M7 – near No.73 Ahuriri Street (at the corner with Kekerenga Street)
M8 – Outside 21 Bunker Way

A map and a photograph of each survey location is included in Appendix B of Technical Report 10. I note that there are some discrepancies between the locations in Appendix B of the Technical Report 10 and the Mitchell Partnership memorandum dated 15 July 2016. The location of M8 is shown to be at the junction of Nuku Street in Appendix 3 but outside 21 Bunker Way in the Mitchell Partnerships Memorandum, and Appendix 3 page B-7 wrongly identifies the location of measurement M1 as outside 26 Moa Point Road rather than 36 Moa Point Road (as is shown in the photograph it references). I do not consider that these inconsistencies make a material difference to the assessment.

43 The unattended readings were for a period of 6 days, including one weekend, and the attended readings were generally of a duration of 15 minutes or 30 minutes during the afternoon of 9 March 2015 and 15 minutes between midnight and 3.12am on 25 March 2015. The notes of Table 4 of the AECOM Report for night-time noise monitoring identified the presence of "*construction noise in distance dominant*". I am aware that there was significant night-time construction work taking place at the airport at the time although there is no link to the construction work being airport related in the reports and memoranda.

44 The sound environment in the area is highly influenced by the airport and the sea. Airport operations generally cease by about 2am but can be replaced by runway resurfacing noise or other night-time construction works taking place at the airport. Aircraft operations start up again before 6am with the first flights leaving after 6am. The sound from the sea depends on

the state of the surf. A significant southerly surf can generate high background sound levels at locations close to the south coast (including at Kekerenga Street and Ahuriri Street which overlook the airport and Lyall Bay beyond). However, the baseline noise data for Moa Point for the 6 days in early March 2015 (AECOM Memorandum dated 27 June 2016) show a good variation in sound measurements. For example, the results for Friday 13 March 2015 show moderately quiet night-time LA90 (0100-0600) background sound level of 31 dB at which time the LAeq was 37 dB. At the other extreme on Sunday 15 March 2016 the night-time LA90 (0100-0600) background sound level was 42 dB with the LAeq was 45 dB.

45 Appendix C of Technical Report 10 also includes noise measurements for the whole year. This shows a wide variation at night-time, when aircraft are not operating for much of the time.

46 Table 5 of the AECOM Report summarises the Long Term (6 day) readings for 36A Moa Point Road. The descriptor is L_{Aeq}. As part of a request for further information (dated 20 May 2016) I recommended to GWRC and WCC that the background sound (L_{A90}) results from the monitoring be obtained. The L_{A90} is the sound level that is equalled or exceeded for 90% of the time and generally representative of the baseline sound level that exists between noise events i.e. the quieter times. At Moa Point Road, at night, the L_{A90} measurements are representative of surf sounds, which can vary considerably. These background sound levels are important because they allow a judgement to be made of the intrusiveness of an introduced noise (such as construction noise). If the introduced noise is significantly greater than the background sound level, then it may become intrusive.

47 This comparison is less relevant with the L_{Aeq}. Table 7 of Technical Report 10 predicts how the construction works would increase the existing noise. Care needs to be taken in assessing Table 7. While it is useful to know the cumulative noise in the area from all noise sources, it does not allow a direct assessment to be made of how much impact the construction noise will have against the existing ambient sound. This is because the existing ambient sound environment is characterised by high level relatively short term aircraft noise. The characteristic of the introduced construction noise would be more consistent throughout the day compared to the aircraft noise. In the first instance then the construction noise should not be justified because the environment is already noisy, especially when that noise is of an entirely different temporal and frequency characteristic. The L_{Aeq} is the energy average sound level and is significantly influenced by short term high energy noise events (such as aircraft movements). Aircraft

movements are relatively short term and cannot be relied upon to mask other environmental noises, because the other noises will be present for long periods when aircraft noise is absent. This is less of an issue at night once aircraft operations cease and ambient sound levels are not influenced by aircraft noise.

48 I recommend that the appropriate noise limits are those in Table 2 and Table 3 of NZS 6803:1999 rather than a background plus approach.

49 The implication in Technical Report 10 is that Table 7 is a comparison of predicted construction noise with background sound levels. This is not correct in that the comparison is not with background sound but with ambient noise levels. Submitters have also identified this anomaly and I discuss the issue further below where I consider the submission from the Strathmore Park Progressive and Beautifying Association.

50 NZS 6803:1999 (7.2.6) recommends that consideration should be given where there are high background sound levels (a "background plus" approach). In such an assessment the construction noise level is compared to the background sound levels (L_{A90}). Note the background sound level is the L_{A90} not the L_{Aeq}. However, the sound monitoring undertaken by AECOM demonstrates that the background (L_{A90}) sound levels are not high enough to support any relaxation in the NZS 6803 limits. The baseline noise data results for 36A Moa Point Road (L_{A90}) were provided in the AECOM Memorandum dated 27 June 2016. A subsequent correction was made to the LA90(0100-0600) with the corrected data underlined in the following table:

	Tue 10-03-15	Wed 11-03-15	Thu 12-03-15	Fri 13-03-15	Sat 14-03-15	Sun 15-03-15	all days	Ex weekend
LAeq(24hr)	59	63	62	60	62	60	**61**	**62**
LAeq(0630-0730)	59	66	66	63	66	64	**65**	**64**
LAeq(0730-1800)	62	65	64	63	65	62	**64**	**64**
LAeq(1800-2000)	59	65	64	63	60	64	**63**	**63**
LAeq(2000-0730)	*52*	*59*	*57*	56	56	55	**56**	***56***
LAeq(0100-0600)	*43*	*41*	*46*	37	47	45	**44**	***44***
LA90(24hr)	41	43	40	39	45	38	**41**	**41**
LA90(0630-0730)	37	40	41	39	52	36	**41**	**39**
LA90(0730-1800)	45	46	41	44	50	38	**44**	**44**
LA90(1800-2000)	42	44	39	43	44	36	**42**	**42**
LA90(2000-0730)	*37*	*40*	*40*	34	40	38	**38**	***39***
LA90(0100-0600)	*38*	~~*53*~~*37*	*43*	31	38	42	**~~41~~38**	***~~45~~37***

Note – remains to be confirmed by AECOM

51 The L_{A90} sound levels fell to 31 dBA on the night of the 13 March 2015 which shows that there is the potential for ambient sound levels to be moderately quiet at the dwellings on Moa Point Road, even given their proximity to the shoreline. The above table shows that the Moa Point Road background sound levels are fairly constant at around 40 dB L_{A90} throughout the day and night. Because the background sound levels are consistently below the construction noise limits at the various times that they apply then there is no reason why the construction noise limits recommended by NZS 6803:1999 should be adjusted using the background plus approach either using the NZS 6803:1999 (L_{90}) approach or using the L_{Aeq} comparison in the manner that AECOM has wrongly provided for in Table 7 of Technical Report 10.

52 The predicted construction noise levels were also updated in the AECOM Memorandum dated 27 June 2016 (in response to the request for further information). This was as a result of the perceived inconsistences in the original response in relation to the difference between the measured background sound levels and the degree to which the predicted construction noise exceeded those limits. This was because the construction noise predictions in Technical Report 10 for stage B and stage E were changed in the further information that was provided in the Memorandum. The following explanation was received from AECOM (with the amended noise level predictions):

For stages B (stone blanket placement) and E (primary armour) revised prediction data was used to reflect a slightly worst case assessment on the usage of the barges and their proximity to the work areas. Only these two stages were altered in comparison to the remaining phases of the development programme. The original data is shown in brackets. The following table summarises this data (Table 6 assessment of Technical Report 10).

Receiver	Establish	A	B	CD	E	FG	H	I	J	K
R1	58	54	*52 (49)*	43	*45 (44)*	43	56	49	56	59
R5	52	48	*46 (43)*	37	*39 (38)*	37	49	43	50	53

53 A map of receiver locations is included as Appendix 3 of this report with R1 being 33 Moa Point Road and R5 being 48 Kekerenga Street.

54 The predicted construction noise levels were also updated in the AECOM Memorandum dated 1 July 1016 (on request) to illustrate the difference in noise level between the transportation and handling of marine based fill and from trucking.

55 The construction noise assessment is variously summarised as Table 6 of Technical Report 10, variations of which are presented in the AECOM Memorandum of 1 July 2016 showing noise predictions for the marine based fill with 30 barges per day and 50 barges per day. Table 6 assesses that, except at Moa Point Road, the Construction Noise Standard limits will be complied with between the hours of 0630hrs and 2000hrs. The noise limits are marginally exceeded at Moa Point Road (by up to 4 dB in Stage K – to construct the airfield pavements) during the early morning 0630hrs to 0730 hrs when the recommended limits are stricter.

56 It is night-time (2000hrs to 0630hrs), Saturdays and Sundays (0630hrs to 0730hrs), and Saturdays and Sundays (1800hrs to 20.00hrs) when the noise limit is 45 dB L_{Aeq} when the predictions in Table 6 of Technical Report 10 are that construction works will cause exceedances at nearly all of the receiver locations (except for Monorgan Road). Stage K is predicted to cause the greatest exceedances at Moa Point (14 dB), but also Kekerenga Street (8 dB) and Ahuriri Street (7 dB). Exceedances would also occur during the Stage 0 (site establishment) – 13 dB exceedance at Moa Point Road and with exceedances predicted at R3, R4, R5, R6, R8, R9, R10 and R11, Stage B (installation of stone blanket) – 14 months – 7 dB exceedance at Moa Point Road, Stage H (reclamation) – possibly 14 months, but variously described as 5 months to 18 months[3], and Stage J (including ground improvement such as

[3] GWRC queried the duration of Stage H and got the following response from the applicant on 17 August 2016:

vibrocompaction) – 8 months. Stage H and Stage J are predicted to have an 11 dB exceedance at Moa Point Road and 5 dB or less at R3, R4, R5, R6, and R11.

57 Further work was then undertaken by AECOM and reported in their Memorandum of 1 July 2016. The conclusion of that memorandum was that *"the above assessment demonstrates that the project's construction noise levels can be met at all dwellings other than those at Moa Point, the actual combination of plant, number and likely duty cycle will only be known when a specialist marine contractor has been engaged"*.

58 The Memorandum makes some sweeping assumptions about reducing noise levels from major plant items (including the 20 tonne dozer) in order for the noise limits to be complied with at Kekerenga Street and I would question the practicability of these assumptions. In addition, the marine based option makes no difference to Stage K (to construct the airfield pavements). Stage K is predicted to generate the highest noise levels of 53 dB L_{Aeq} at Kekerenga Street and 52 dB L_{Aeq} at Ahuriri Street. I fail to see how compliance with the Construction Noise Standards can be achieved at Kekeranga Street and Ahuriri Street with the noise levels that are predicted. I would note that in exceeding the night-time noise limits in the Construction Noise Standard there is an exceedance of the upper recommended guidelines limits for noise also set out in NZS 6802:2008 for preventing sleep disturbance. These residential guideline upper noise limits at night are 45 dB $L_{Aeq(15mins)}$ and 75 dB L_{AFmax}.

59 The applicant has accepted that a mitigation package needs to be offered to residents of Moa Point Road, of which there are 19 dwellings. In my opinion, given the uncertainties surrounding the noise levels and duration of the construction works (over a number of years), I consider that a noise mitigation package should also be offered, up front, to the residents of Kekerenga Street and Ahuriri Street who are predicted to be significantly affected by noise. According to the AECOM 1 July 2016 Memorandum there are 19 dwellings that have a clear line of sight to the works and an additional 17 dwellings which are set back but which would need to be considered. These are not separately identified in the report as to actual addresses

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"*With regard to your email query below re construction staging and duration, we can confirm that Chapter 4 of the AEE should have set out that Stage H is anticipated to be of a duration of 5 months for marine based fill, or alternatively up to 18 months should land based (or a combination of land and marine based fill) is sourced. This is reflected in both Technical Report 7 and Technical Report 10 which are correct.*

The indicated total duration of construction as set out in the AEE however is not affected by this omission in the table shown in Chapter 4".

but dwellings with a clear line of sight to the works are likely to be those on the west side of Kekerenga Street located at the top of the hillside. There are a number of two storey dwellings on elevated sites on the eastern side of the road that may also be affected. A noise mitigation package would be designed to offer acoustic insulation and mechanical ventilation to noise exposed dwellings to ensure appropriate internal noise limits are met.

60 For this approach to work the applicant would, prior to construction works commencing, need to establish maximum construction noise limits each at Moa Point Road, Kekerenga Street and Ahuriri Street, that it will not exceed during any of the construction works. These limits would then be used to design the noise insulation of dwellings, on a house specific basis, to ensure that appropriate internal levels are provided. The limits would be determined using a precautionary approach (i.e. with a factor of safety included).

61 There are no internal noise levels recommended by NZS 6803:1999 but AS/NZS 2107:2000 *Acoustics – Recommended design sound levels and reverberation times for building interiors* recommends that 30 dB L_{Aeq} is an appropriate internal noise limit for bedrooms.

62 Technical Report 10 relies exclusively on an L_{Aeq} assessment but the construction noise standard also contains noise limits for L_{Amax} both during the day and at night. L_{Amax} is difficult to predict and is often dictated by individual noise events that may occur during an assessment period, for example a dropped metal plate. Care will need to be taken during the project, particularly at night, that high noise events are not allowed to be generated as there would be greater potential for this to exceed the L_{Amax} limits and be likely to cause sleep disturbance.

63 Construction noise mitigation is discussed in Section 7.0 of Technical Report 10. The predictions made in the report are undertaken with the expectation that the '*best available equipment and techniques*' will be adopted. This allows little opportunity for the reduction of the noise by using quieter plant and equipment. The practicability of using screens or barriers is discussed (in 7.3). These would have to be placed close to dwellings, which would be impracticable, and, in the case of dwellings at Strathmore Park, would not work anyway because of the steep topography.

64 The only viable noise mitigation methods available are therefore the sound insulation of dwellings and/or temporary rehoming at times when noise levels exceed the noise limits in the Standards.

65 The construction noise levels are predicted to be up to 59 dB L_{Aeq} at dwellings in Moa Point Road, which is 14 dB above the construction noise night-time noise limit. If noise insulation of the dwellings or temporary relocation is not agreed to by residents, or if this proves to be impractical, then these predicted noise levels have the potential to cause significant sleep effects and impacts on health, as identified in the WHO noise guidelines. At Kekerenga Street and Ahuriri Street the noise levels are predicted to be up to 53 dB L_{Aeq} which is 8 dB above construction noise night-time noise limit. Again, sleep disturbance is likely to occur with such noise levels depending on the exposure of the individual dwellings.

66 In the first instance, the closing of windows can result in a significant increase in noise insulation but this relies on alternative forms of ventilation being provided. As a rule of thumb the noise will be reduced from outside to inside by about 15 dB with windows ajar. A solidly constructed dwelling would be expected to reduce noise by at least 20 dB (and possibly more) with windows closed. There are a number of variables that can influence the noise insulation that a dwelling will produce (such as window design and airtightness).

67 Given that the construction works are predicted to take place over 48 months, I consider that these night-time noise levels would be unreasonable and that alternative noise insulation/ relocation requirements are essential.

Construction Noise – Traffic

68 With a total reliance on land based transportation of fill materials, there is predicted to be in the order of 1.5 million cubic metres of fill and other material requiring transport to the site. These would be transported from places such as Kiwi Point Quarry and Horokiwi Quarry. The source of marine based fill, while logical, cannot be relied upon because of timing of separate consenting procedures.

69 The proposed haul routes are separated between the daytime route and night-time route. These are set out in Section 2.2 of the AECOM Report. The daytime route involves inbound traffic using SH1 and Stewart Duff Drive and the outbound route via Lyall Parade and Onepu Road.

The night-time route would fully utilise SH1 outside the airport confines. Technical Report 10 estimates that there are 2,670 dwellings within 50 metres of the proposed night haulage route as described in Table 9 of that report.

70 Following concerns raised about the numbers of trucks proposed to use the main haul routes (including through the city) AECOM has predicted, in Table 12 of Technical Report 10, how many construction vehicle movements would cause a traffic noise increase of 3 dB L_{Aeq} or less for different one hour periods of the night. The report considers that this represents an "*acceptable*" increase in noise levels. I agree that an increase of 3 decibels normally represents an increase that is only just perceptible. This has resulted in a new programme of truck movement and routes with hourly movements of 30 construction vehicles up to 11pm, reducing to 25 vehicles per hour until 1am, 15 vehicles per hour until 2am with 5 vehicles per hour between 2am and 3 am. Vehicles would then be allowed to increase to 10, 20 and 30 vehicles per hour for 3am, 4am and 5am respectively. It is Ruahine Street which is the choke point in terms of noise for these volumes.

71 There are no District Plan noise limits for existing road noise or restrictions on the increase of noise on existing roads. Neither are there any noise restrictions on the use of State Highways with respect to traffic flows. Some level of traffic noise, within reason, should be expected for dwellings established close to main routes.

72 AECOM's approach of assessing the change in traffic noise to assess the impact of the noise from the construction traffic movements is therefore a reasonable one. The assessment used by AECOM includes L_{Aeq}, which is the average noise level, and the single event sounds (L_{Amax}) from individual trucks passing. The individual events will exceed the criteria selected by AECOM of 70 dB L_{Amax} but this is the same for nearly all other vehicles travelling on the road at night (for the closest dwellings). L_{Amax} sound levels can vary widely for passes of vehicles but the example in Technical Report 10 (111) that a passing car generates a noise level of about 72 dB L_{Amax} and a truck 82 dB L_{Amax} at 10 metres is a reasonable supposition. The existing situation is that there is a regular flow of traffic on the night-time haul route and each passing vehicle generates noise that exceeds 70 dB L_{Amax}. The proposal is to limit the numbers of vehicles so that the (energy) average increase in noise is only just perceptible. I consider that acceptable.

73 The assessment is undertaken for the route through the eastern suburbs and for the inner city, connecting to the motorway.

74 No assessment has been undertaken of the outbound route via Lyall Bay and Onepu Road, which is only during the day and therefore less likely to cause significant noise impacts. An assessment should be undertaken for this route for the sake of completeness. These are empty trucks and the importance will be to minimise pot holes and maintain the road surface to ensure that truck body slap[4] is minimised.

Construction Noise - Effects on Recreational Users

75 The recreational activities that are most likely to occur in this area are identified in the TRC Report as follows:

a) Surfers
b) Kite surfers
c) Wind surfers
d) Swimmers and divers
e) Fishers and seafood collectors
f) Dog walkers (on Lyall Bay beach)
g) Sightseers, picnickers and general leisure
h) Surf lifesavers
i) Cyclists
j) Boaties
k) Plane spotters

76 Table 14 Technical Report 10 predicts the construction noise and haul route noise as it would impact on the various recreation users. The AEE and Technical Report 10 have different predictions for recreation user noise. Table 7-10 of the AEE has predicted noise levels for the haul route which are 3dB greater than in Table 14 of Technical Report 10 (except for the Golf Course). As Technical Report 10 is the construction noise report then I will review Table 14 rather than the data in the AEE.

[4] http://www.nzta.govt.nz/assets/resources/road-surface-noise/docs/nzta-surfaces-noise-guide-v1.0.pdf

77 The construction noise will be audible as far away as Lyall Bay beach, but should not cause significant impacts given the raised ambient sound levels from the surf and, occasionally, from aircraft activity noise. Neither the runway extension construction work nor the haul route noise is predicted to exceed 49 dB $L_{Aeq(1\ hr)}$ for surfers and other users of Lyall Bay beach.

78 Recreation users on Moa Point Road and beach and the breakwater will experience the highest levels of construction noise (up to 60 dB $L_{Aeq(1\ hr)}$) and, at times, this may impact on the pleasantness of the area for walkers on the south coast, people fishing or plane spotters. Given the closeness of this area to the works there may be times when this level is exceeded. Walkers and cyclists would be passing through this area though and this construction noise would be transient for them.

79 The noise from the outbound haul construction traffic would generally have the biggest impact particularly for cyclists and walkers using Moa Point Road and Lyall Parade. The predicted noise level for walkers immediately adjacent to the haul road on the south coast is 58 dB $L_{Aeq(1\ hr)}$ (also in Table 14). The road is also close to the Spruce Goose Café, which has outdoor seating areas. The road and car park has been subject to damage by tides and wave action in recent times and it would be important for this stretch of road to be kept in good repair if empty trucks are not to cause significant annoyance. The predicted haul route noise for the Spruce Goose Café is 54 dB $L_{Aeq(1\ hr)}$. The proposal is that there will be no haulage on weekends which will help to reduce noise impacts at times of maximum enjoyment by beach users and patrons of the café. These requirements would best be included in the CNVMP.

80 The construction noise will also impact on golfers playing at Miramar Golf Course. A number of the greens at the southern end of the course will be close to excavation, the proposed depot, and stock pile areas. This could have an impact on the pleasantness of the golfing experience. Again this will be transient, but would be significant in the areas closest to the construction works. The greatest impacts will occur when work is undertaken on removing the hill on Stewart Duff Drive and then in the use of this area for stockpiling, which is immediately adjacent to the southernmost holes of the course.

81 I consider that noise impacts on recreational amenity are not significant, given that the construction noise and haul road noise is predicted to be less than 60 dB L_{Aeq}. The weekday daytime residential noise limit in the construction noise standard is 70 dB L_{Aeq} and I consider

that a level 10 dB below that limit will not therefore be significant. NZS 6803:1999 provides for the limits in the Standard to be applied to noise sensitive activities in other areas. As such I consider the weekday limits in Table 2 of the Standard to be appropriately applied on Lyall Bay Beach. This is the principal recreation area and is therefore deserving of protection.

Conditions for Construction Noise

82 The Application includes proposed conditions under section 8.5 of the AEE.

83 I agree with the proposal in the AEE that a noise insulation package of noise insulation/ ventilation and temporary relocation during times when construction work exceeded the limits should be offered to the residents of Moa Point Road.

84 I also recommend that a process needs to be put in place to identify affected residents of Kekerenga Street and Ahuriri Street to allow a noise insulation and mechanical ventilation package to be provided to them if necessary. To achieve this the applicant needs to identify the noise level at every dwelling where the future construction noise will exceed 45 dB L_{Aeq} or 75 dB L_{Amax}. Given the uncertainty of the future construction process, the assessment needs to be undertaken using the precautionary principle using appropriate safety factors.

85 This will then allow the predicted noise levels to become the new construction noise limits and for a noise insulation package to be offered that will reduce the allowable noise level to an internal level of 30 dB L_{Aeq} in bedrooms. An internal noise level of 60 dB L_{Amax} in bedrooms would also be logical (which is the construction noise outside limit of 75 dB L_{Amax} minus 15 dB for a ventilating window).

86 Where it proves to be impracticable to noise insulate and ventilate a dwelling then the occupants of Kekerenga Street and Ahuriri Street should be offered temporary relocation during times of high construction noise.

87 No mitigation would be provided where the noise is predicted to comply with the construction noise limits and where the applicant accepts that those limits apply.

88 As discussed above I also consider that it is appropriate to apply the weekday daytime construction noise limit to the beach at Lyall Bay. This condition would be:

Construction noise at Lyall Bay Beach (other than haul route noise on public roads) shall not exceed: 0730-2000 hrs 70 dB L_{Aeq} and 85 dB L_{Amax}

89 Otherwise I agree that these conditions adequately mitigate the noise impacts, subject to the changes I suggest below. The proposal to temporarily relocate residents of Moa Point Road will help to avoid the impact on sleep and the subsequent health issues.

90 I specifically comment on proposed noise conditions as follows:

Proposed Condition	**Issue**	**Comments**
42	Provision of a Construction Noise and Vibration Management Plan (CNVMP)	I agree that a CNVMP is essential in this case to mitigate construction noise that exceeds the noise limits in the Construction Noise Standard as far as is reasonably practicable. Reference is made to standards for mitigating the effects of noise and vibration. However, there are no standards for vibration in the proposed conditions (see below)
45(a)	Construction noise limits to be established for all dwellings	Delete the words *as far as reasonably practicable* from the heading of the criteria. Provide an alternative schedule of dwellings and noise criteria where these exceed the night-time limits.
45(a)	Use of term dB LAeq(T) and definition of (T)	The definition of (T) does not correspond exactly with NZS 6803. I recommend that the term Leq (or, more properly, L_{Aeq}) be used, as is the case in NZS 6803, allowing the measurement sample time to be directed by 6.3 of the Standard.
45(a)	Noise limits for industrial and commercial receivers	The construction works could not comply if these noise limits are applied at industrial and commercial receivers on Airport Land. These conditions should therefore not apply to commercial receivers on Airport Land which are all under the same ownership (WIAL). Noise management then becomes an internal matter which needs to be managed between WIAL and its tenants.
45(c)	Where the criteria set out cannot be practicably met.	The AECOM report identifies that significant exceedances will occur during certain construction stages at night, mostly at Moa Point Road, but also, potentially, at Strathmore Park. Condition 45(c) currently gives carte blanche for all locations for all times. It is recommended that the constructed

		noise level be predicted for each dwelling in Moa Point Road, Kekerenga Street, and Ahuriri Street to allow the level to be established as a noise limit for that dwelling.
46(a)	Where the criteria of Condition 45 cannot be met.	This Noise Schedule needs to be prepared for all construction works for all stages to determine whether Condition 45 will be met or not. I recommend that the words "*where the criteria of Condition 45 cannot be met*" be deleted.
46(b)	Allowing <u>five</u> working days for certification.	This would be an inadequate time period for Council to provide the certification. I have discussed this with WCC and consider that 10 working days would be appropriate.
48	Noise mitigation to Moa Point Road	I agree with the need for this condition which should be developed to include internal performance standards (see recommended new condition for Kekerenga Street and Ahuriri Street below which includes an internal noise limit for bedrooms).
49	Haulage route maintenance	Need to ensure that pot holes are minimised by regular maintenance. Empty trucks are particularly noisy when they drive over pot holes.
new	Kekerenga Street and Ahuriri Street	For residential dwellings located at Kekerenga Street and Ahuriri Street and not owned by the Consent Holder, identified on Figure Y [to be developed], methods to be adopted within the CNVMP to manage construction noise and vibration shall be formulated by the Consent Holder, having first consulted with the owners and occupiers of these properties. The mitigation could include, but not be limited to acoustic insulation and mechanical ventilation within the affected dwelling. The acoustic insulation shall be designed and maintained to ensure that the internal noise level does not exceed 30 dB $L_{Aeq(15\ mins)}$ and 60 dB L_{Amax} in bedrooms. The mitigation shall be undertaken by the Consent Holder in agreement with the owner and/or occupiers of the dwelling prior to the commencement of construction of the reclamation.
new	Vibration standard	See below

91 I include a possible vibration standard used by the Board of Inquiry (**BoI**) for the Waterview Connection Proposal[5] below:

Except where certified by the Council through the SSNMP (in accordance with Condition CNV.13), construction vibration received by any building shall be measured and assessed in accordance with the German Standard DIN 4150-3:1999 "Structural vibration - Part 3: Effects of vibration on structures", and shall comply with the criteria set out as follows:

Type of structure	Short-term vibration				Long-term vibration
	PPV at the foundation at a frequency of			PPV at horizontal plane of highest floor (mm/s)	PPV at horizontal plane of highest floor (mm/s)
	1 - 10Hz (mm/s)	1 - 50 Hz (mm/s)	50 - 100 Hz (mm/s)		
Commercial/Industrial	20	20 - 40	40 - 50	40	10
Residential/School	5	5 - 15	15 - 20	15	5
Historic or sensitive structures	3	3 - 8	8 - 10	8	2.5

92 Although I was not present at the Waterview hearing the BoI heard from a number of expert witnesses in arriving at this Standard. The AECOM report does not consider that vibration will be an issue for the Airport Extension construction works but it would be sensible to provide for a vibration standard in the event that vibration issues arise. I flag that a vibration condition would be appropriate in these conditions as a back-stop measure and recommend that this matter be considered during any pre-hearing expert conferencing. This would include identifying the most appropriate monitoring locations.

Assessment of Aircraft Noise

93 District Plan Rule 11.1.1.1 is set out in Appendix A. This rule controls aircraft operations to ensure that the rolling 90 day average 24 hour night-weighted sound exposure does not exceed a Day/Night Level (Ldn) of 65 dBA outside the Air Noise Boundary shown on District Plan Map 35. The rolling 90 day average means that the average is taken over any consecutive 90

[5] Final Report and Decision of the Board of Inquiry into the New Zealand Transport Agency Waterview Connection Proposal, Volume 2, Conditions of Consent 29 June 2011.

day period i.e. an assessment duration cannot be cherry-picked to avoid including two busy times in any single 90 days, for example.

94 The current emission of noise from aircraft activities is below this permitted level when measured at the Air Noise Boundary. The runway extension is predicted to cause an increase in aircraft operation noise, but this noise will still be within what is permitted by the District Plan.

95 Technical Report 26 (**The MDA Report**) states that the continuous noise monitoring around the airport indicates that the existing aircraft noise levels are four to five decibels below the 65 dB L_{dn} limit as set by the District Plan as it applies at the ANB.

96 The predictions of aircraft noise levels in the MDA Report have been undertaken using the Integrated Noise Model (**INM**) software program. This methodology is appropriate in terms of the requirements of NZS 6805:1992 *Airport Noise Management and Land Use Planning*.

97 The INM aircraft noise prediction software struggles with the hilly terrain around the Airport. The MDA Report identifies that the original airport noise contours were manually adjusted for screening effects from the hilly terrain and then a different software package (SoundPlan) was applied in an attempt to confirm the predictions. This was particularly around Moa Point (to the southeast) and Lonsdale Crescent (to the west).

98 The prediction in the MDA Report is that the screening effects will not be materially changed by the proposed runway extension. I consider this to be a reasonable conclusion given that the screening of topography is quite abrupt i.e. is formed by ridge lines, and that the changes in flightpath should, intuitively, not cause material changes to the screening that is currently provided.

99 The MDA Report recognises that the proposed runway extension will allow larger aircraft to use The Airport and considers what the changes in noise impacts will be with the altered touchdown and start of roll location for Runway 34. The start of roll location is where all the aircraft wait at the end of the runway prior to being given permission to commence take-off. Runway 34 is the terminology used for the runway being used to land and take-off in a northerly direction while Runway 16 is with landing and taking-off towards the south. The MDA Report also considers whether projected aircraft operations on the extended runway will

comply with the Airport's current noise controls. The Report considers both the long term average noise levels (L_{dn}) and single event noise levels (L_{Amax}) from individual aircraft.

100 Section 3 of the MDA Report explains the changes that will occur as a result of lengthening the runway.

101 The first change that would occur is that the new start of roll location for Runway 34 will commence further towards the south (when the take-off is to the north). There would be no change in the start of roll location for take-off to the south (Runway 16).

102 The alteration to the start of roll location for Runway 34 means that the shape of the existing predicted contour will change with an increase in noise occurring further to the south. The contours tend to increase in area as the aircraft leave the ground, when taking off. This change is illustrated in Figure B1 of the MDA Report (also numerically in Figure B2 and Table 3). Figure B1 is attached as Appendix 3 and shows where the 2035 65 dB L_{dn} forecast (the green contour) extends beyond the 2015 (actual activity) 65 dB L_{dn} level (the blue contour). This mostly occurs at the southern end of the runway, because the start of roll would be further south. Progressing in a northwards direction, the green contour starts to move outside the blue contour at around Lyall Bay beach (to the west) and the terminal buildings (to the east). Maximum separation between the contours occurs at about Coutts Street to the west and at Broadway (to the east) then tapering together further towards the north. A maximum 2 dB difference occurs in the L_{dn} level with the 2035 being greater than the 2015 actual activity level. Most of that increase occurs in the neighbouring areas which are just north of the midpoint of the runway i.e. between Coutts Street and the northern end of Bridge Street on the western side and between Broadway and Caledonia Street on the eastern side of the runway. I consider that this is an appropriate method of determining the change in the average aircraft noise levels.

103 Because the start of roll location for Runway 16 will not change then this will result in only subtle changes to the shape of the noise contours for aircraft taking off towards the south. This would be caused only by the difference aircraft mix and the small changes in noise generated by take-offs.

104 Figure B4 also calculates the predicted change in worst case single event noise levels (L_{Amax}). This shows that the 777-300 will increase single event noise levels by a maximum of 4 dB in the area around Broadway/Miro Street and Coutts Street. Technical Report 26 considers that the 777-300ER is the most likely aircraft to operate on long haul routes through Australia and on to New Zealand, then return. The 777-300ER (and 330neo) is the loudest Code E aircraft in the 2035 forecast. Figure B5 shows though that, historically, noise levels from individual types of aircraft have been significantly higher than they are today, or are likely to be in the future.

105 Section 3 also identifies that Code E/F aircraft would be introduced to the airport if the runway is extended. Code E aircraft are expected to fly regularly whereas Code F operations would only be "occasional". Code E aircraft include Boeing 777-300ER, Boeing 787-800 and Airbus A350-900.

106 The current controls were originally formulated on the principle that the airport may one-day reach capacity. The runway extension will not increase the capacity of the runway (although technology may do this) so the only changes result from the alteration in the start of roll location for Runway 34 (taking-off towards the north) and the introduction of larger noisier aircraft.

107 The approach used in the MDA Report is to use the Integrated Noise Model (INM) to calculate noise contours at Wellington Airport for current aircraft operations and a future 2035 forecast with the runway extension. These two modelled scenarios include the following number of movements and are compared with the number of movements in the ANB model. To get an idea of the numbers that have been modelled the following table is copied from the Executive Summary of the report.

	Current (FY2015)	Proposed (2035 with extension)	Permitted (ANB Runway Capacity)
Peak Period Average Daily Movements	266	386	1102

108 What this table shows is that modelling based on full capacity of the airport (undertaken in the 1990s to develop the District Plan Air Noise Boundary) considerably overestimates the

potential future likely scenarios. In other words, the predictions now are that the airport is unlikely to ever reach anything like capacity, at any rate not before 2035.

109 The actual predicted aircraft movements are shown in Table 2 of the MDA Report.

110 The MDA Report does not undertake predictions based on a future capacity scenario which would then give a direct comparison with the original approach taken in the District Plan. However, the approach taken in the Report is compatible with the recommendations set out in NZS 6805:1992 which recommends that a minimum period of 10 years be used and the selection of 2035 easily meets this.

111 The assessment of noise effects is presented in Section 5 of the MDA Report. The assessment is that the District Plan requirements imposed by the ANB will be complied with up until 2035 and that the change in noise levels will, on average, barely be perceptible. I agree with this assessment.

112 A separate assessment has been made of single event impacts which could have an impact on sleep. The critical time for this is between 10pm and 1am and between 6am and 7am. These are the night-time shoulder periods when flights regularly occur at the airport.

113 The proposed Code E departures e.g.777-300ER that would be enabled by the runway extension would cause L_{Amax} noise levels to increase by 4 decibels, which would not be significantly perceptible. The MDA Report recommends that community engagement and impact review should be undertaken before night-time Code E (and Code F) aircraft operations are implemented. MDA considers that the Air Noise Management Committee would be an appropriate group to oversee this process and review the outcomes.

114 I consider that this would be an appropriate safeguard to ensure that the noisier aircraft, operating at night, do not cause the District Plan ANB controls to be threatened. When assessing L_{dn}, a 10dB weighting is applied for flights that occur between midnight and 7am and between 10pm and midnight.

Conditions for Aircraft Noise

115 There is no proposal to alter the current duties imposed by the District Plan airport noise restriction and the ANB and as such I consider that the increase in aircraft number and size is likely to have a minor effect and that there is no need to impose additional conditions for aircraft noise.

Submissions

116 The Councils have asked me to comment on the following submissions regarding noise:

117 Owen Longstaff at 79B View Road, Houghton Bay is concerned about the night-time construction works and the impacts on sleep. The predictions are that the construction noise will be able to comply with night-time construction noise limits at View Road and as such I consider that it will be appropriate at this location.

118 Fingall Pollock is concerned about the potential for hearing damage for children from aircraft noise and cites the locations of Lyall Bay Kindergarten and school. Both the kindergarten and the school are outside the air noise boundary for the airport and will therefore experience significantly less than 65 dB Ldn noise level. This is well below the noise levels that have the potential to cause noise induced hearing loss.

119 Stan Andis of 36 Ahuriri Street makes a submission as a resident of Strathmore Park. Mr Andis is concerned about:

a) The lack of consultation (with residents of Strathmore Park);

b) The lack of certainty with regards to land based or water based transportation of construction fill;

c) Concerns regarding night-time construction noise;

d) Content of NZS 6803:1999 (which I discuss above);

e) ‘Amphi-theatre’ noise effects;

f) That no exceptions should apply to the construction noise limits;

g) Recreation receivers either being given too much consideration or (as with golf) not enough;

h) Road surface maintenance requirements;

i) Existing night-time paving work at the airport caused sleep disturbance;

j) Issues regarding the practicality of noise insulating dwellings or temporary relocation;

k) Barge noise.

120 Further information has been provided by the applicant (Memorandum of 1 July 2016) with regards to the increase in local noise levels resulting from barging the fill. The noise level at Kekerenga Street and Ahuriri Street is predicted to be 52 dB L_{Aeq} during Stage H with 50 barge movements per 18 hour day, which is 7 dB over the night-time noise limit. The noise will be 3dB less during that Stage with no marine base fill. Note that Revised Table 6 gives different predicted noise levels for 30 barge movements per day during Stage H (reclamation) with 47 dB L_{Aeq} predicted for Kekerenga Street and 51 dB L_{Aeq} for Ahuriri Street. I would expect these predicted levels to be similar (they are the same predicted levels for 50 barges per day). The construction noise level for Stage K (drainage, pavements and navigation lighting etc.) is predicted to be 53dB L_{Aeq} (+8 dB) for Kekerenga Street and 52 dB L_{Aeq} (+7) for Ahuriri Street. The Stage K predictions are not repeated in Revised Table 6 where changes resulting from the marine based fill option are assessed. Care should be exercised therefore, when considering Revised Table 6 that this is not done in isolation of the main report.

121 Mr Andis submits that the works should not exceed the night-time construction noise limits. I have discussed the predicted construction noise levels above and the likely impacts these will have on the residents of Strathmore Park. The noise is predicted to exceed the construction noise limits for certain stages of the construction works, and the resultant noise levels will have the potential to cause sleep disturbance to residents in the more exposed dwellings. Options to mitigate the noise appears to be limited as the construction works would need to take place at night. The only real mitigation option would be for the applicant to noise insulate and mechanically ventilate dwellings that would be exposed to noise that exceeds the limits.

122 Mr Andis refers to NZS 6803P to support his submission where he considers that construction noise limits should not be exceeded. Section 5.1.1 of NZS 6803P does allow for noise levels to be "*measured indoors where external measurements are impracticable or inappropriate*". The recommended upper limits for indoor noise levels are then included in Table 3 of NZS 6803P except that there are no specific alternative noise limits between 2000-0630hrs. Reference is made to the relevant provisions of NZS 6802 in the note to Table 3 with the comment "*this may mean that no noisy construction work can take place during these hours*".

123 NZS 6803:1999 also provides for upper limits for noise measured inside the building where there is no practicable method of measuring outside (which is not the case here). The internal noise levels are recommended as the levels in tables 2 and 3 minus 20 dBA. The Standard considers this to be a typical value for the sound reduction normally achieved in New Zealand buildings with doors and windows closed. On that basis the recommended internal night-time noise limit would be 25 dB L_{Aeq} which is very strict. I agree with Mr Andis that construction noise standard limits will provide appropriate noise management controls but I consider that it is appropriate to exceed those limits where there is no option and where alternative noise mitigation packages provide adequate protection, particularly against sleep disturbance.

124 Mr Andis is concerned about an amphitheatre effect. What is experienced by the residents at Kekerenga Street and Ahuriri Street is not an amphitheatre effect but simply the lack of any ground absorption between their dwellings and the airport. This is because the land falls away sharply giving dwellings on the edge of the hill wide and uninterrupted views of the runway. There is therefore no screening of any noise generated on airport land to a large number of these dwellings. This allows noise to be heard at greater distances than normal.

125 I have previously considered recreation users (including golf).

126 I have not undertaken a separate assessment of the ongoing maintenance works associated with the existing runway, except to recognise that airport construction noise was present during the noise monitoring that AECOM undertook.

127 Mr Andis has raised the issue of whether noise insulating dwellings is practicable and of temporary relocation. Noise insulation and mechanical ventilation of dwellings has been successfully undertaken in circumstances where it is not practicable to internalise noise from

major infrastructure and industry. As far as the practicability is concerned, this would need to be ascertained on a dwelling by dwelling basis as to the extent and practicability of any works. Some dwellings will be more challenging than others to treat. Where it proves to be impracticable to noise insulate/ventilate Kekerenga Street or Ahuriri Street dwellings to below the construction noise limits then residents of Kekerenga Street and Ahuriri Street should be offered temporary relocation.

128 Vanessa Yung of 62 Kainui Road is concerned that the number of planes and potentially size of planes will increase with the runway being extended. This will not result in an alteration to the runway configuration, other than aircraft starting their take-offs further to the south. The predicted change in single event maximum level (L_{Amax}) in Figure 4 of Figure B4 of Technical Report 26 indicates that there should not be a noticeable increase in the loudness of the individual aircraft at Kainui Road (1-2dB).

129 Penehuro Lefale of 32 Tirangi Road submits that the truck haulage will cause sleep disruption for residents along the route. There is now no proposal to use Tirangi Road as a haul route and Lyall Parade will not be used at night.

130 Helen Salisbury of 55 Tirangi Road submits about the increase in noise pollution and vibration from larger planes. The submission identifies the increase of 120 daily aircraft movements between 2015 and 2035 which increases the current 266 movements to 386. However, not all of this increase will be long haul flights brought about by the runway extension. Any increase in noise has been predicted as a combination of the natural increase in flights at the airport over that 20 year period combined with the additional long haul flights. While the long haul flights will be larger and slightly noisier aircraft they make up only a small proportion of the mix. Technical Report 26 (Table 2) is based on a forecast that of the total 134,014 annual 2035 aircraft movements 2,710 will be long haul. This is an average of 7.4 long haul movements per day.

131 Mention is made in the submission of the actual increase in noise that each individual aircraft will generate. The individual aircraft noise levels are set out in Table 4 of Technical Report 26. Table 4 shows that the current narrow body jets generate a noise level of 93 dB L_{Amax} at 160 metres to the side of the runway while the noisiest Code E aircraft generate 96 dB L_{Amax}. An increase of 3 dB is only just perceptible.

132 The submitter identifies that larger aircraft taking-off currently causes the house to vibrate, including the contents of the china cabinet. Houses in Tirangi Road are well within the ANB and the submitter is therefore currently experiencing high levels of aircraft noise for which noise insulation would be appropriate (if not already provided as part of the Airport LUMINS programme).

133 The submitter raises concerns about the curfew at the airport but the current proposal is that no changes will be made to the curfew or any of the other District Plan rules that currently apply.

134 The Guardians of the Bay also submit that construction traffic noise will have significant adverse effects, including on public health. I have considered the construction traffic noise above and consider that night-time truck movements have been considered and will be mitigated appropriately to ensure truck movements do not unduly increase existing State Highway noise levels. I do not consider that the daytime noise levels are likely to cause public health impacts (although further work on the day time use of Onepu Road for a haul route would assist with this assessment).

135 The submission of the Strathmore Park Progressive and Beautifying Association sets out concerns about operation on a 24 hour basis and takes issue with the approach taken in Technical Report 10 where a 'background plus' approach is mooted. Council has interrogated the background sound levels in the area and I am of the opinion that the background plus approach does not allow the night-time construction limits to be relaxed beyond the limits as they are set down in the Standard. These are the maximum recommended guideline limits for the protection of sleep and the background sound levels do not support their relaxation. While the applicant has not suggested that noise limits should be relaxed in the draft recommended conditions, the background plus approach has, in my view, been erroneously used in both the AEE and in Technical Report 10. Table 7 of Technical Report 10 gives a comparison between the predicted construction noise levels and the ambient (L_{Aeq}) sound levels, wrongly claiming these to be L_{90} background levels. I consider Table 7 to be quite misleading and consider that the submitter is correct to question this.

136 The proposed construction work will generally comply with daytime weekday noise limits and the submitter is correct that it is night-time activity that will cause impacts on residential amenity, and particularly on sleep.

137 The submitter comments on the noise from recent re-paving at the airport which resulted in complaints being lodged with WIAL. The submitter has no confidence that the applicant will be able to have the required 'vigilance' to ensure construction noise is appropriately managed over the full 48 month period. The construction noise and vibration management plan will contain all of the essential elements that will minimise problems and allow issues to be quickly recognised and resolved. The CNVMP will need to be carefully administered.

138 Antonius (Tony) Bernard Rovers resides at 47 Ahuriri Street and submits on the following points:

a) Background sound monitoring appears to have been carried out while construction works were taking place at the airport;

b) There is confusion over whether the monitoring was undertaken at 73 or 52A Ahuriri Street;

c) There is confusion about the background plus predictions and construction noise contours would have made understanding easier;

d) There is confusion about construction noise impacts on residents located slightly further from the runway extension works

e) Concerns expressed about impacts on sleep;

f) Concerns that changes to aircraft operations will exacerbate the main issue that the submitter has with airport noise i.e. early morning take-offs after 6am.

139 I have dealt with a number of these issues above. With regard to the background sound monitoring I consider that the applicant is not justified in seeking a relaxation of the construction noise limits based on the range of levels that were monitored. I concur with the submitter in that it is unclear from Technical Report 10 what influence the topography will have on construction noise. The predicted noise levels will be relevant for dwellings that overlook the construction work areas but there will be good noise reduction for dwellings that are fully screened where line of sight is removed. The screening effects of the topography are not factored into the predictions in Technical Report 10. This is relevant to the submitter's

concerns about the impacts on sleep. These will be less than implied in Technical Report 10 for dwellings that are screened from the construction works (such as the submitter's).

140 The airport operations will fit within the ANB and curfew requirements currently imposed by the District Plan. This will result a significant increase in airport activity in the next 20 years against which the increase in long haul flights will be modest.

Conclusions

141 I have undertaken a peer review of the applicant's assessments for construction noise, the road haulage activities and for the predicted changes to aircraft noise (Technical Reports 6, 10, and 26).

142 The airport extension is a major infrastructure project that will take place at one general location for a period of up to 48 months (or more). For this reason, it is unusual in the level of intensity and the inevitable noise impacts that will be generated.

143 Because of the airport flight safety risks a significant portion of these construction works will need to take place at night which is normally avoided, where practical, when residential activity is nearby.

144 The AECOM Report identifies that the residents of Moa Point Road will be significantly impacted upon by night-time construction noise with noise levels of 14 dB over the night-time construction noise limit of 45 dB L_{Aeq} . This is likely to cause sleep disturbance and health issues.

145 The conditions identify that additional noise insulation for dwellings and ventilation would be offered to the Moa Point residents and that temporary relocation would also be available. This is essential if the impact on sleep and associated health issues is to be avoided. If the residents do not accept the noise mitigation package on offer then, according to the WHO Guidelines, the resultant noise exposure is likely to cause a significant impact on the residents' health and amenity.

146 Potential noise impacts would also occur at dwellings in Strathmore Park, particularly those on Kekerenga Street and Ahuriri Street with a view over the construction activities. I consider that

there is a strong risk that future construction noise levels will exceed the 45 dB L_{Aeq} Construction Noise Limit during Stage 0 (site establishment), Stage H (reclamation), Stage J (ground improvement such as vibrocompaction) and Stage K (drainage, pavements and navigation lighting etc.). Notwithstanding the current uncertainty over the exact methodology to be used for the construction I recommend that a noise mitigation and mechanical ventilation package should be offered to residents of Kekerenga Street and Ahuriri Street and, with their agreement, the package would be installed before the construction of the reclamation commences. I consider the applicant needs to predict the greatest noise levels likely to be experienced at each dwelling where the noise will exceed the construction noise limits. These levels will be predicted with sufficient safety factor to allow them to be established as noise criteria at each dwelling and then for the noise insulation to be designed against the predicted levels.

147 I see this as being fair to the residents, consistent with the precautionary principle and sensible in that it protects residents at the start of the process rather than wait for noise to become a nuisance at some future stage. Without this treatment these residents will be exposed to significant night-time construction noise which is likely to cause sleep impairment.

148 Construction vehicle noise has been predicted for the various haul roads that would be used though the eastern suburbs and city. Ruahine Street has been found to be the most sensitive and truck volumes are proposed to be controlled on an hourly basis, through the night, to ensure that average noise levels only increase such that they are only just perceptible (i.e. by 3 dB). This would ensure that truck noise does not become significant for the neighbouring residents to the haul route.

149 I recommend that a noise assessment is undertaken for trucks on Lyall Bay Road and Onepu Road, which is a proposed daytime haul road. I agree that this route should not be used at weekends.

150 Predictions have been made in the AECOM report for noise levels at various recreation areas. Given the levels that are predicted I consider that construction noise effects on recreational activities such as walking, jogging, swimming, surf-lifesaving, dog walking are not significant at Lyall Bay. Moa Point Beach is more exposed to construction noise and walkers and cyclists would experience noise from time to time that could impact on their enjoyment of the area.

These beach users are likely to be more transient in nature (compared to users of Lyall Bay Beach) and, therefore, the noise will be less significant. The noise from the proposed excavation works and stockpiling activities taking place by Stewart Duff Drive are close to the southern end of the golf course and will cause a noise impact on the southernmost holes. This noise is likely to be significant for golfers using the far south end of the course, when excavations and stockpiling is taking place.

151 Overall the construction noise and vibration will be managed and controlled by reference to the Construction Noise and Vibration Management Plan. The nature and extent of the exceedances of the Construction Noise Standard limits requires that the CNVMP should be strictly and rigorously applied. For the construction noise effects to be acceptable then the CNVMP will need to be properly administered to ensure that noise is minimised at all dwellings thus providing for noise mitigation packages to provide appropriate protection. The key here will be in ensuring that sleep disturbance is avoided.

152 I agree that the noise conditions proposed by the applicant are required with the additions and modifications which I have suggested above. I recommended that changes be made to conditions 45, 46, 48 and 49 and that new conditions be provided to protect residents of Kekerenga Street and Ahuriri Street. I summarise my recommendations below:

a) Establish predicted noise levels outside Moa Point Road, Kekerenga Street and Ahuriri Street dwellings where the noise levels are predicted to exceed the construction noise limits,

b) These levels will include sufficient safety factor for them to be established as construction noise limits at each dwelling concerned,

c) Noise insulation packages will then be designed by the applicant and offered to protect the residents from the predicted outside noise levels. This will include residents of Kekerenga Street and Ahuriri Street in addition to Moa Point Road,

d) The internal noise design criteria for bedrooms will be 30 dB L_{Aeq} and 60 dB L_{Amax},

e) The noise mitigation packages will be installed prior to construction commencing,

f) Where it is impracticable to provide noise mitigation/ventilation to comply with the internal noise limits then offers of temporary relocation will be made,

g) Construction noise at Lyall Bay Beach (other than haul route noise on public roads) shall not exceed: 0730-2000 hrs 70 dB L_{Aeq} and 85 dB L_{Amax},

h) Delete the words *as far as reasonably practicable* from Condition 45(a) to make the limits apply to all dwellings except for specific dwellings on Moa Point Road, Kekerenga Street and Ahuriri Street, for which special provision is made above,

i) For the same reasons delete condition 45 (c) - *where the criteria set out above cannot be practicably met* (sic), *the process of Condition 46 shall be followed.* Where the conditions cannot practicably be met (at Moa Point Road, Kekerenga Street and Ahuriri Street) then I recommend that alternative limits are established on a dwelling by dwelling basis.

j) These changes subsequently allow condition 46(a) to be amended to delete the words *where the criteria of condition 45 cannot be met*. In any event the Noise Schedule in Condition 46(a) needs to be prepared for all affected dwellings to determine the level of impact and whether they comply or not.

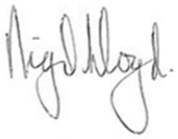
k) A vibration condition should be added. The applicant has assessed that vibration should not be an issue with the works but I consider that a vibration condition should be included, as a back-stop, to protect nearby residents and structures in the event that vibration is generated by future construction works. The suggested condition is taken from the Waterview Connection Proposal Decision.

l) To amend Condition 45(a) to provide for the limits to be expressed in the same way as NZS 6803:1999,

m) To amend Condition 45(a) so that the noise limits for industrial and commercial receivers shall not apply to commercial land parcels under the same ownership,

To amend Condition 46(b) to increase the lead time for the Noise Schedule to be submitted to WCC for certification from 5 to 10 days to allow adequate time for certification.

Date: 7 October 2016



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Nigel Robert Lloyd

APPENDIX A

WELLINGTON DISTRICT PLAN

11.1.1.1 Noise

Aircraft operations in general

11.1.1.1.1 Aircraft operations shall be managed so that the rolling 90 day average 24 hour night-weighted sound exposure does not exceed a Day/Night Level (Ldn) of 65 dBA outside the Airnoise Boundary shown on District Plan Map 35.

Aircraft noise will be measured in accordance with NZS 6805:1992 and calculated as a 90 day rolling average. All terminology shall have the meaning that may be used or defined in the context of NZS: 6805.

The level of noise from aircraft operations, for comparison with Ldn 65 dBA, is calculated from the total amount of noise energy produced by each aircraft event (landing or take-off) over a period of 90 days. This method of control does not directly control individual aircraft events, but does so indirectly by taking into account their contribution to the amount of noise generated in a 24 hour period.

Night flying operations

11.1.1.1.5 Domestic operations must not occur during the hours from midnight to 6am.

International operations must not occur during the hours:

- midnight to 6 am for departures
- 1 am to 6 am for arrivals

For the purposes of this Rule 'operations' means the start of a take off roll or touch down on landing.

APPENDIX B

AECOM NOISE CALCULATION POINTS

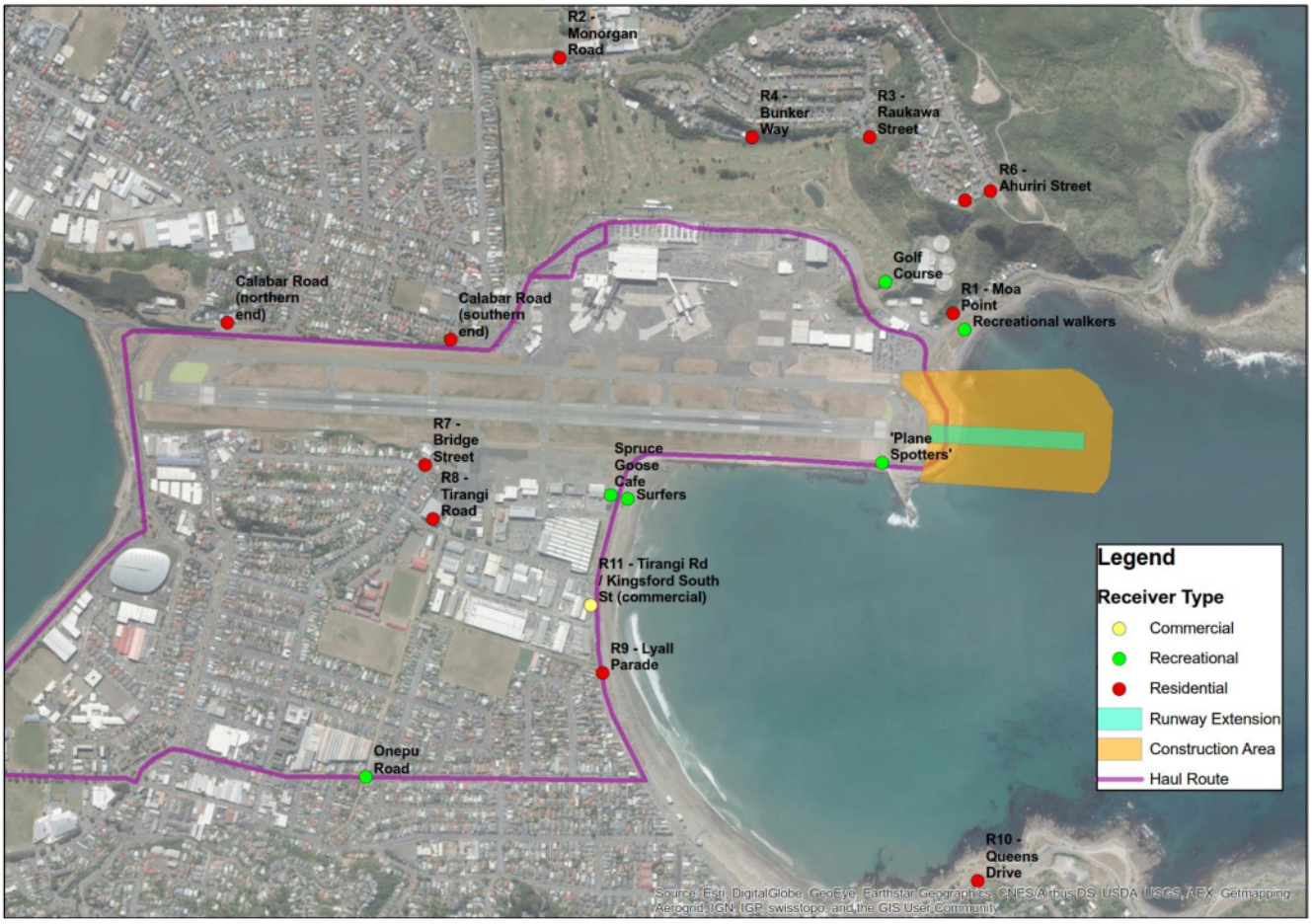
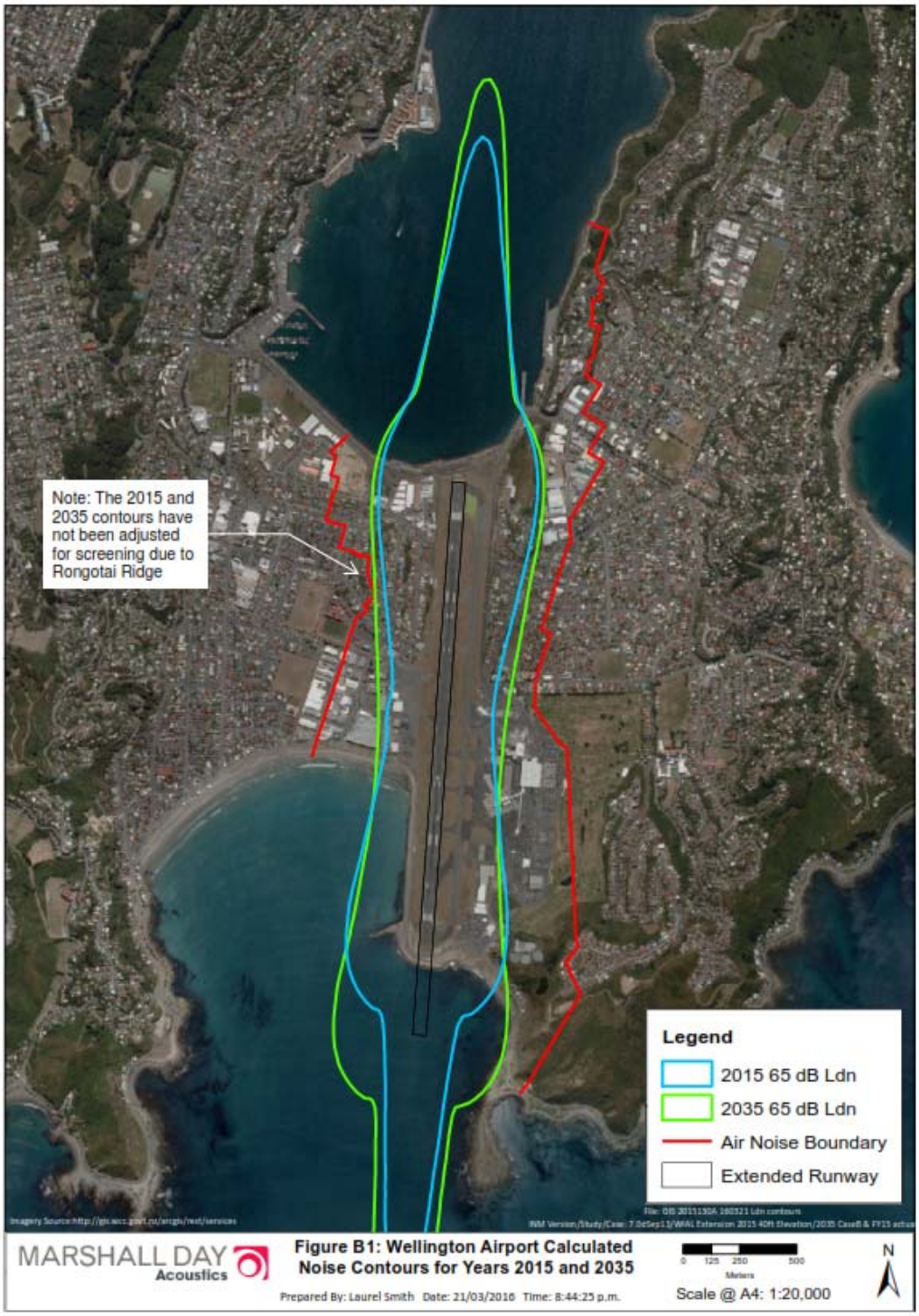


Figure 6 **Noise calculation locations**

APPENDIX C

MARSHALL DAY AIRPORT CALCULATED NOISE CONTOUR Figure B1



Annexure 2: Recreation and Landscape, Natural Character, and Visual Amenity

Dr Michael Steven

Wellington International Airport Limited

Proposed Runway Extension

Section 87F Report

Recreation, Landscape & Visual, and Natural Character Effects

Prepared for Wellington City Council &

Greater Wellington Regional Council

Michael Steven

Landscaper Architect/Landscape Planner

October 7, 16

Introduction

1. My name is Michael Lawrence Steven. I am a practicing landscape planner and landscape architect based in Pohara (Golden Bay).

2. I am a Registered Landscape Architect (NZILA).

3. I have read the Code of Conduct for Expert Witnesses in the Environment Court Practice Note (December 2014). This report has been prepared in accordance with the Code and I agree to comply with it. The matters covered within the report are within my area of expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

Qualifications and experience

4. I hold a Doctor of Philosophy in Architecture (Environment-Behaviour Studies) from the Faculty of Architecture, University of Sydney (Australia), a Master of Landscape Architecture by research from the Faculty of the Built Environment, UNSW (Sydney, Australia), a postgraduate Diploma in Landscape Architecture from Lincoln College (University of Canterbury), and a Diploma in Horticulture (Distinction) from Lincoln College.

5. My PhD research investigated the dimensions of environmental experience of recreationists within natural environments. In particular I investigated 'environmental knowing', or the way in which we make sense of the physical environment through our responses to the stimuli we perceive in the environment. My area of expertise is environment-behaviour studies, particularly environmental perception, and human factors in landscape design, planning, and management.

6. I have over 25 years of experience in the landscape architecture profession, both in New Zealand and Australia. A large part of my professional career has focused upon landscape assessment theory and practice. My PhD research at the University of Sydney investigated recreational experience, and in the course of this research I developed a typology of recreational experiences. I taught at tertiary institutions in Australia and New Zealand for 13 years. For the past 11 years I have practised as a landscape architect and landscape planner in New Zealand.

7. My recent professional work has involved landscape assessments and the presentation of expert evidence to local authority hearings Boards of Inquiry and the Environment Court on landscape issues for a wide range of sites around New

Zealand. I have a particular interest in the coastal environment, and I have undertaken several landscape, natural character and amenity assessments associated with coastal development proposals within the Wellington and Marlborough regions, including:

7.1. Expert evidence before the Environment Court, *Save the Point Inc. v Wellington City Council*, W82/2007 (Wellington Marine Education Centre, Te Raekaihau Point)

7.2. Expert evidence before the Environment Court, *Robert John Buckley v South Wairarapa District Council*, W4/2008

7.3. Expert evidence before the Environment Court, *Intercontinental Hotel v Wellington Regional Council*, W15/2008 (Hilton Hotel, Queen's Wharf)

7.4. Expert evidence before the NZ King Salmon Board of Inquiry

7.5. Expert evidence before the Environment Court in various appeals on marine farming applications, including: *KPF Investments Ltd v Marlborough District Council* [2014] NZEnvC 152; *R.J. Davidson Family Trust v Marlborough District Council* [2016] NZEnvC 81; *Clearwater Mussels Ltd v Marlborough District Council* [2016] NZEnvC 21.

8. I am a member of the New Zealand Institute of Landscape Architects, the Resource Management Law Association (RMLA) and the Environmental Design Research Association (EDRA).

Involvement with the proposal

9. I have been engaged by Wellington City Council and Greater Wellington Regional Council (**the Councils**) to review and report on technical reports prepared for the Wellington International Airport Ltd (WIAL) Proposed Runway Extension application. The specific technical reports I have reviewed are:

9.1. Technical Report 6 Assessment of Effects on Recreation (TRC Tourism), (including relevant aspects of Technical Report 11, Surf Break Impact Assessment (DHI Water and Environment Ltd))

9.2. Technical Report 24, Landscape and Visual Assessment (**ALVE**) (prepared by Mr Boyden Evans of Boffa Miskell Ltd)

9.3. Technical Report 25, Natural Character Assessment (**NCA**) (prepared by Mr Frank Boffa)

10. The purpose of my review and this report is to assist the consideration of the application through providing a critical review of the technical reports listed above. In particular I address:

    10.1. The appropriateness of methods applied in the assessments of environmental effects, and the adequacy and accuracy of the findings reported in the respective technical reports

    10.2. Any matters omitted from the technical reports pertinent to a decision on the application

    10.3. Any matter unresolved or which may be the basis of disagreement over the nature or severity of effects

    10.4. Any submissions referred to me by the Councils, relevant to the matters addressed in this report

    10.5. Any conditions that should be imposed if consent is to be granted.

11. In support of my review I have also read related technical reports and relevant sections of the Assessment of Environmental Effects document (Mitchell Partnership, 28 April 2016) and associated Appendices.

12. I prepared requests for further information on issues arising from the Recreation, and Landscape and Visual Effects Technical Reports. I address further issues arising from the applicant's responses to these requests later in this report.

13. In the company of other technical experts and Council Officers from the Councils, I visited the site on Thursday 30 June. I also have some familiarity with the site from 2 years residency in Wellington (2006-7), during which time I was involved in a number of coastal development matters, including the proposed Wellington Marine Education Centre at Te Raekaihau Point, at the western entrance to Lyall Bay.

14. This report is structured into five parts:

    14.1. PART A addresses Technical Report 6, Assessment of Effects on Recreation

    14.2. PART B addresses Technical Report 24, Landscape and Visual Assessment

    14.3. PART C addresses Technical Report 25, Natural Character Assessment

    14.4. PART D addresses matters raised by submitters that have been referred to me by the Consenting Authorities.

14.5. PART E summarises the principle conclusions I reach concerning my review of the Technical Reports, and recommendations arising from my review.

PART A: Assessment of Effects on Recreation (Technical Report 6)

Recreation Assessment: Review of methods

15. In this section I review Technical Report 6 (TR6), Assessment of Effects on Recreation (25 April 2016), prepared by TRC Tourism. I have also considered Technical Report 11 (TR11) , Surf Break Impact Assessment insofar as it informs my review of effects on surfing amenity. As the subject matter of TR11 is outside my area of expertise I do not review the document in this report, other than to note aspects of relevance to surfing amenity.

16. The recreation assessment described in Technical Report 6, applied five different techniques to the assessment of the recreational use of Lyall Bay and the likely effects of the project on recreation:

    16.1. A review of relevant background documents, plans and other reports

    16.2. Interviews with recreation user groups (key informant interviews)

    16.3. An online survey of 2,700 residents drawn from Wellington City Council's resident panel (on-line survey)

    16.4. Personal observations at and near Lyall Bay between 13 March and 1 April 2015 (participant observation)

    16.5. Review of technical reports and interviews with report authors on noise, construction method, traffic, ecology and surf amenity.

17. For the purposes of this review, I shall focus on the techniques I regard as most likely to yield data on current recreational use patterns in Lyall Bay: key informant interviews, on-line survey, and participant observation.

18. The adoption of three techniques (key informant interviews, on-line survey, and participant observation) for investigating the recreational use of Lyall Bay is a sound approach, in principle. Of the three techniques selected, no single technique has the capacity to yield sufficient data upon which to make informed judgements. The techniques adopted should, in principle, provide a good balance of data sources and ensure a range of recreational users is accounted for. The more techniques that are applied to the task, the more complete the emerging picture is likely to be.

19. Key informant (or stakeholder) interviews were conducted with representatives of recreation user groups (identified in Appendix 2 to the Recreation Report). Of those sources listed that represent actual recreational users, there is an unavoidable bias

towards active recreational users, particularly those users inclined to organise themselves into social groups as part of their participation in their activity of choice, such as surfers and surf life-savers. The report recognises that not all recreational users (e.g., surfers) will necessarily be club members. However, as regular users of Lyall Bay, the key informants selected for interview may have provided anecdotal information on recreational use by other users, not directly affiliated to the groups consulted.

20. The key informant interview process appears to focus largely on land-based activities, or at least activities that have an onshore presence or base within Lyall Bay (e.g., surf life-saving). Not represented among stakeholders interviewed are others groups, such as itinerant recreational fishers, that may visit the area by boat. The Wellington Recreational Marine Fishers Association is one such group. The views of members of this organisation do not appear to have been sought.

21. In this particular case it is difficult to judge the utility of the key informant interviews. While the report states (p.1) that: "[i]nterview questions were designed to find out about how recreation groups make use of Lyall Bay and other nearby bays on the South Coast", no information is provided as to specifically what questions were asked of the informants, and there is no separate analysis of the data obtained from these interviews. I assume that from the statement "...interview questions were designed", that the technique involved the use of structured or semi-structured interviews. A schedule of the questions asked and some analysis of the responses with respect to each question would have been helpful.

22. As there is no specific explanation or analysis of the interview process, I assume the data gathered has been used to inform the overall investigation, but in a rather general sense. There is no consistent basis for understanding what data may be attributed to which informant, and therefore how valid and reliable the findings might be. A more robust approach to this phase of the investigation and its reporting, would have produced data with greater utility.

23. The on-line participation survey provides quantitative data on participation in a range of recreational activities over a 12 month period (TR6, Figure 2). The report distinguishes between the activities engaged in by local residents (TR6, Figure 3), and activities engaged in by respondents residing in the wider Wellington City area (TR6. Figure 4).

24. It is a reasonable assumption that local residents would constitute a greater proportion of recreational users, and would also be more frequent users of Lyall Bay than residents from elsewhere in Wellington. Yet local residents are significantly

under-represented in the survey. Only 13% of the sample group were local residents (109 responses out of a total of 865[1] responses). I consider it would have been helpful to have identified a larger sub-set of local residents from the resident panel group, and to have conducted two separate surveys (Lyall Bay residents, and non-residents) for comparative purposes.

25. The survey found that within the population sampled, there appears to be a significantly higher level of engagement in land-based activities (categorized as either exercise-related, such as running, walking and cycling, or social activities, such as sight-seeing or visiting a cafe). Some marine activities, such as fishing from boats, are not represented at all in the survey findings, while other marine-based activities (e.g., swimming, surfing) rated very low for participation rates for both local residents (8%) and Wellington residents from further away (4%). The survey found Lyall Bay is used exclusively for recreational use by only 5% of respondents, the majority of whom were plane watchers.

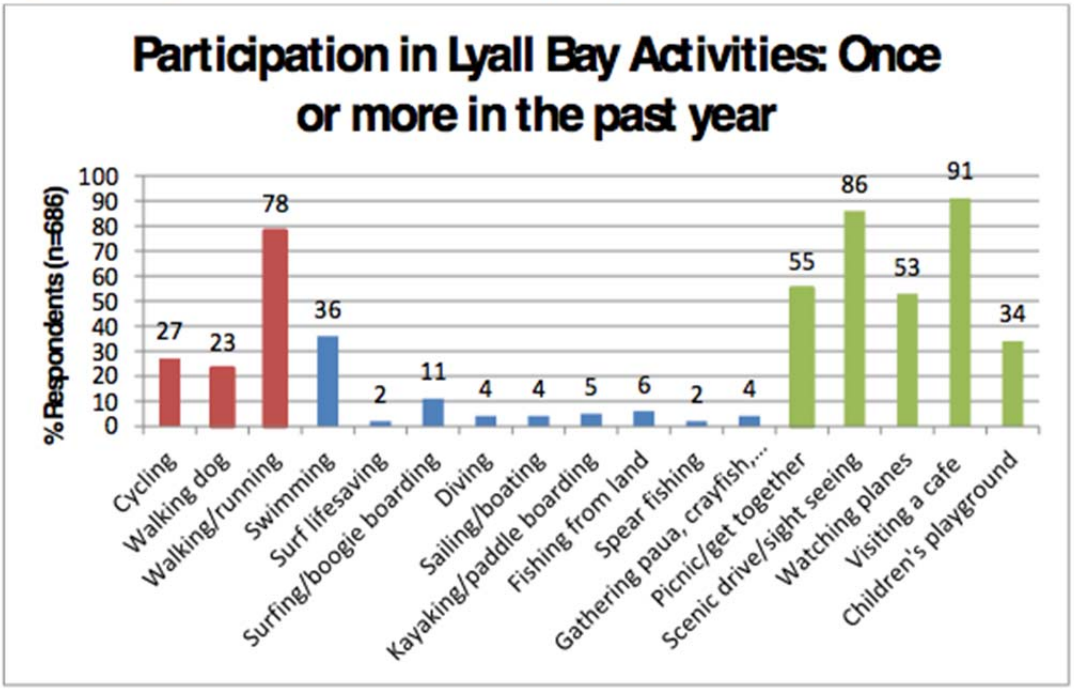
26. I consider a significant degree of caution must be applied in interpreting these findings and forming conclusions relevant to the project:

    26.1. The survey sample was drawn from Wellington City Council's Residents Panel. The use of a sample drawn from this panel is particularly relevant to the investigation matters of interest to, or affecting Wellington residents generally. This is not the case in this particular matter, as I do not regard it as a reasonable assumption that all residents of Wellington are equally likely to recreate at Lyall Bay. In my opinion, the use of such a sample is less suited to the investigation of the current issue, given the geographically-specific nature of the effects and the narrower range of groups likely to be affected. While this approach may have been useful in helping describe a general picture of recreation at Lyall Bay from a city-wide perspective, the generalities mask the most pertinent issues.

    26.2. The scoping of recreational issues prior to undertaking the recreational assessment should, in my opinion, have identified marine-based recreation, and in particular surfing, as the activities likely to be most affected. Marine-based recreational users, particularly surfers, are significantly under-represented in the survey sample, as Figure 2 from the Recreation Assessment (TR6) illustrates (see Figure 1).

[1] Figure 2 in TR6 refers to there being 686 respondents, which is a significantly lower figure than referred to in the text (p.1)

Figure 2: Participation in recreation activities in Lyall Bay in the last 12 months



Activities are colour-coded with red representing exercise related activities on land, blue representing activities on or in the water, and green representing social activities.

Figure 1: Reproduction of Figure 2 from Technical Report 6, Assessment of Effects on Recreation, illustrating the relatively small number of respondents engaging in marine=-based recreational activities

26.3. The numbers of respondents reported engaged in marine based activities was low (8% of Lyall Bay residents, 4% of residents from further afield). The 8% of Lyall Bay resident respondents (N=109) who participated in marine-based recreational activities numbers fewer than 9 respondents, while the number from further afield (4% of 756) amounts to no more than 30 persons. Of these 39 respondents, there is no data on how many are active surfers In my opinion, surfing is the recreational activity potentially most affected by the proposal, yet surfers, and other marine-based recreationists generally are under-represented in the sample.

26.4. In my opinion, a misleading aspect of the findings is the implication that adverse effects on marine-based recreation generally - and surfing in particular - cannot be regarded as more than minor owing to the low numbers of participants the survey identified as being engaged in these activities.

26.5. A scoping exercise prior to the design of the investigation should have identified that Lyall Bay is the pre-eminent Wellington surfing location. The key

informant interview process identified that on good days, the number of surfers riding the Corner reaches saturation point, while across the bay there may be 200 surfers in total. In these circumstances is it somewhat irrelevant that 96% of Wellington residents living further afield than Lyall Bay do not participate in watersports at Lyall Bay.

27. As a consequence of the issues listed above, I do not regard the on-line survey as being a reliable basis for assessing the importance of surfing and other water sports in Lyall Bay, nor the magnitude of adverse effects on watersports activities, particularly surfing, likely to arise from the project.

28. The third approach to data collection, participant observation, had the potential to complement the anecdotal nature of key informant interviews and participation patterns from the on-line survey, by providing data on the actual behavioural patterns of recreationists, as observed within Lyall Bay. The technique could be designed to provide data on participant numbers, time and dates of activity, duration of activity, the spatial distribution of activities, and prevailing weather conditions that may influence behavioural patterns.

29. Potentially a very valuable tool, the utility of the observation data is limited by the brief and unrepresentative period over which observations were made. Observations were conducted at 6 observation sites on 16 days between 13 March and 1 April 2015, yet for reasons that are not explained in the report, only the data for 7 days is reported. Significant variations in the data within this 7 day period are not explained, and no information is provided on weather conditions prevailing at the time that may have influenced observations. There is no indication whether the days surveyed can be regarded as representative of weather for March. No time is given for the duration of observations during the day, and what factors may account for differences in the data recorded. While the data was purportedly gathered from 6 observation sites around Lyall bay (TR6, Appendix 3, Observation Locations), the reported data makes no reference to the observation zone within which the activities were observed.

30. The Moa Point embayment is identified as an observation zone, yet there is no recreational data in the report that can be recognised as relating specifically to this location (or indeed, any location). The Moa Point embayment is readily accessible and offers a different range of recreational activities to the western areas of Lyall Bay. It is also the recreational location to be most directly impacted by construction activities, being immediately adjacent to the planned extension. As such, a substantial part of the CMA part of the embayment will be included within an exclusion zone for the period of construction. The direct implications of the exclusion zone for users of the embayment are not discussed, but I anticipate that this omission

can be rectified following further participant observation studies, as agreed following a request for further information (see following paragraphs and Appendix 1).

31. Overall, I consider the participant observation component of the recreation assessment to be poorly designed and implemented, and poorly reported. Very little, if any utility can be gained from the findings. There is no basis for accepting that seven days of reported data is sufficient to draw any useful conclusions on recreational use over a year.

32. Two requests for further information were made to the applicant (20 May and 16 June, 2016), in which a range of concerns were expressed regarding shortcomings in this aspect of the Recreation Assessment (see Appendix 1 for the full text of requests and the Applicant's responses).

33. In response to the first request, (20 May 2016), the applicant provided information on the weather conditions prevailing at the time of the surveys:

> *The observation technique was structured around fine days when use of Lyall Bay would be highest and where people were likely involved in a wider range of activities than on less-favourable weather days. While observing "low-use" days can also be useful, the need in this case was to explore how busy the place gets and what, if any, issues arise as a result. For instance, the observations provided insight into how busy The Corner car park becomes, including frequent pedestrian crossings between the car park and the Spruce Goose Café. This in turn was raised as a potential issue for management of the haul routes.*
>
> *The observations undertaken are specific to March. Undertaking observations on sunny/calm and sunny/windy days in spring, summer and winter (when most activity takes place) would provide a more complete picture of the potential maximum volumes of use that Lyall Bay could receive at any time of the year.*

In response to the second request (16 June 2016), the applicant has undertaken to complete further surveys necessary to provide a more complete and helpful data set:

> *The Applicant is prepared to undertake some further survey work during 2016 and for this to form part of the Applicant's evidence for the hearing.*

34. This is a positive step, and one which, if designed and implemented well, could yield valuable data unavailable from the other techniques used. The participant observation studies, when completed, will supplement the general understanding gained so far with specific information regarding patterns of recreational behaviour, as observed at different times of the day, and at different times of the year. Importantly too, this information could have a spatial dimension, illustrating how patterns of behaviour are distributed around the Bay.

35. The shortcomings of the on-line survey and participant observation methods aside, I consider the recreation assessment provides a reasonable but generalised understanding of recreational use patterns within Lyall Bay. The more common recreational activities are identified, and there is some limited information on their temporal and spatial distribution, and the particular weather and sea conditions that favour the marine-based activities.

Assessment of effects

36. The recreation assessment of effects has identified three main areas of effects (TR6, section 3, pp.16-21):

    36.1. Wave action and beach amenity

    36.2. Noise (construction and post-construction), and

    36.3. Construction phase traffic congestion.

37. The main Assessment of Environment Effects (AEE) document (p.236) re-states these effects in the following terms:

> *Potential annoyance or disruption to recreational pursuits (walking, cycling etc) during construction due to noise effects.*
>
> *Potential congestion/conflicts with recreational users (cyclists) along proposed public haulage routes*
>
> *Changes to the current surfing amenity in Lyall Bay*
>
> *Temporary disruption during construction and loss of access to kai moana, fishing spots and recreational activities within the immediately affected CMA*

38. The last point relates to the imposition of a marine exclusion - or temporary occupation - zones around the perimeter of the proposed reclamation - see Figure 1, below

39. The recreation report concludes that adverse effects with respect to each of these issues will be minor or less than minor. With respect to surfing amenity I regard this conclusion as an under-estimate of the level of likely effects.

Surfing amenity effects

40. The likely outcomes in terms of surfing amenity are identified in section 3.1 (TR6, p.16) as:

> *The Airport Rights surf break that occurs off the end of the current runway will be lost with the extension*
>
> *Surf rides at The Corner could reduce by 4% to 8% as a result of a slight reduction in wave peakiness*
>
> *Surf rides at Middle Beach could reduce by 14% to 29%*
>
> *Surf rides at West Beach could reduce by 18% to 27%*

41. These estimates are taken from figures reported in the Surf Break Impact Assessment (Technical Report 11), which I refer to briefly in the next section of this report.

42. The loss of the Airports Right surf break is considered a "...localised loss affecting a small group of people." I consider the matter of whether the effect is localised (or not) and the numbers of affected recreationists involved to be secondary to the magnitude of the actual effects, which in this case will be significant, i.e., total loss of the Airport Rights surf break. In considering the scale of effects, I understand that consideration of impacts on the resource itself (in this case a popular, but rare wave break), is of greater relevance than the numbers of participants who use that resource.

43. Effects on The Corner are assessed to be less than minor, given the high levels of congestion that can occur there, and the opinion that any further congestion may be "...very difficult to detect". Again, I consider the wrong test has been applied to the assessment of effects. While it is the case that high levels of congestion can occur at The Corner, the reduction in surf rides will aggravate a situation already subject to considerable user pressure. I understand that the density of users at The Corner can approach saturation levels at times. Any overall reduction in suitable waves will potentially lead to greater crowding, as surfers compete for a diminished resource.

44. While the proposed Submerged Wave Focussing Structure (SWFS) may serve to mitigate loss of surfing amenity at Middle and West Beach, the success of this particular aspect of the proposal is by no means assured, and insufficient data is available upon which to base an informed opinion. The SWFS is of itself a proposal requiring considerably more detailed baseline data to inform its design, and the potential environmental effects of its implementation. Any benefits that may accrue from its construction are largely hypothetical at this stage.

45. It has been proposed by the applicant, following submissions from affected stakeholders, that the design and implementation of the SWFS be the subject of an adaptive management approach, by way of a collaborative Surf Mitigation Adaptive Management Plan (SMAMP). A draft SMAMP is included as a condition of consent (Condition 66). I endorse this approach.

46. Effects on surfing amenity overall have been assessed to be minor by the applicant. As already noted, this conclusion appears to be based upon (1) assumptions concerning the effects of the extension on wave patterns within Lyall Bay, and (2) the limited numbers of surfers who are likely to be affected, particularly as the Airport Rights surf break is only surfed under certain rare conditions by a small number of expert surfers.

    46.1. I understand the issue of effects on wave activity to be uncertain, and contested, owing to insufficient baseline data and different approaches to modelling. This matter is referred to in the Review of Coastal Processes, prepared by Dr Derek Goring.

    46.2. As to the issue of numbers of recreationists affected, from the perspective of those surfers concerned who will experience the loss of surfing amenity that is likely to result, the effects can be regarded as significantly adverse (a complete loss of amenity in the case of the Airport Rights break), rather than minor. Even adverse effects of overcrowding that may result from a possible reduction in the number of surf rides, are likely to be perceived as more than minor by those most affected. In respect of effects on surfing amenity, I consider the recreation assessment has under-estimated the likely level of adverse effects, as these are experienced by the surfers themselves.

<u>Surf Break Impact Assessment (Technical Report 11)</u>

47. My review of this report is limited as for the most part I regard its subject matter as the domain of other disciplinary experts. In particular I defer to the expertise of Dr Derek Goring, the Councils' expert in hydrodynamic modelling and oceanography. However, I note the following comments/findings from the DHI report as being relevant to the consideration of surfing amenity:

    47.1. The Airport Rights break will be lost.

    47.2. The proposed runway extension will cause a reduction in wave 'peakiness', with a consequent reduction in surf rides of between 14- 29% for Middle Beach and 18-27% at West Beach.

47.3. The reduction in wave peakiness at The Corner surf break will be affected to a lesser extent, with an expected reduction of total number of surf rides of 4-8%.

47.4. For each of The Corner, Middle Beach and West Beach, adverse effects are predicted to be greatest during longer period swells.

47.5. I do not consider it likely that the potential surfing amenity adverse effects can be avoided or reduced.

47.6. A submerged wave focusing structure (SWFS) has been proposed as a means of potentially mitigating adverse effects. It is thought that the SWFS potentially may further enhance surfing amenity in Lyall Bay. However, as the SMAMP acknowledges, further baseline data collection, modelling and design is necessary to establish the feasibility of this aspect of the proposal. Accordingly, what level of mitigation it may provide is somewhat uncertain at this stage.

48. I understand these findings form the basis of opinions on the effects of the proposal on surfing amenity reported in the Recreation Assessment. However, I note also that the figures on the reductions in surf rides are based upon an approach to modelling that have been questioned by Dr Goring.

49. In Dr Goring's assessment, the development is likely to reduce the surfing amenity to some degree, but he questions whether any reduction will be discernible to surfers.

50. Accordingly, I consider the conclusions of the Recreation Assessment on the effects of the proposal on surfing amenity need to be treated with some caution. The one incontrovertible impact appears to be the total loss of the Airport Rights break. Beyond this, if the DHI (Technical Report 11) figures on reductions in surfing amenity should prove accurate, then in my opinion the adversity of effects has been under-rated by the applicant. What I regard as an under-rating of effects may be due to what appears to be the focus of the applicant's recreation assessment on the numbers of users that will likely be affected, rather than effects on the surfing resource itself.

Other recreation effects

51. Effects on cycling and pedestrian activity will likely be confined to the period of construction, and will be dependent to a large extent on the management of construction and haulage traffic particularly along Moa Point Road and Lyall Bay Parade. This is a route particularly favoured by weekend cyclists. An increase in heavy traffic for haulage will have adverse effects upon cycling amenity and safety - I consider the two aspects to be closely related as perceptions of safety will have a bearing on the amenity benefits of cycling. The magnitude of effects will depend upon

the frequency of haulage traffic, the size of haulage vehicles, and the times of greatest haulage traffic frequency.

52. The avoidance or mitigation of traffic effects falls to other experts to determine. It is proposed that construction phase traffic effects be controlled through the implementation of a Construction Traffic Management Plan (CTMP). I support the involvement of cycling advocacy groups in the preparation of this plan.

53. Loss of access or restrictions on recreational activities (particularly marine based activities, but including the gathering of kai moana) resulting from the imposition of the temporary occupation zones (see Figure 2, below) will occur. The full implications of the temporary exclusion zones may not be apparent until construction gets underway. The runway exclusion zone will affect persons gathering kai moana and fishing, and marine recreation activities such as kayaking, kite surfing and wind surfing. These water based activities are not location specific and it is likely the exclusion zones can be accommodated through changed recreation behaviour patterns.

54. From Technical Report 17 (Coastal Hydrodynamics and Sediment Processes) and the review of this report by Dr Derek Goring, I understand there to be a possibility of a turbidity plume from suspended sediment discharges reaching inner Lyall Bay under conditions of high sediment discharge (2 kg/s) and calm weather. Such a situation may result in water discolouration which may impact adversely upon amenity for swimmers. I understand the potential for suspended sediment plumes can be controlled by way of a proposed Erosion and Sediment Control Plan and associated Conditions (61-65). Mr McLean addresses this issue in detail.

55. The exclusion zone that will be necessary for the construction of the SWFS, being more centrally located within Lyall Bay, is likely to affect the full range of water based recreation activities through restrictions on access to the central part of the bay. While kite surfers and windsurfers may be able to avoid the area, adverse effects on surfers using the Middle Beach - and possibly other adjacent surfing zones - are likely to be more than minor for the duration of the construction period. Further detailed design and modelling of the effects of the structure will be necessary to reveal the full extent of the exclusion zone and construction activities on surfing amenity.

Figure 2: Reproduction of Figure 1.6 of the Resource Consents Application document showing what are referred to as Temporary Occupation Zones to Enable Construction (CMA areas appearing pale green/blue on aerial photo). These areas are referred to in paragraph 1.4.1 (p.10) as Temporary Exclusion Zones. The areas affected include both the areas of the proposed runway extension, and the location of the Submerged Wave Focussing Structure

56. Issues of noise and dust are discussed in the Recreation Technical Report 6 but as consideration of these matters fall within the disciplinary domain of other experts, I shall not comment beyond noting that:

    56.1. An increase in dust (and larger particulate matter from haulage vehicles falling onto roads) could have adverse effects upon the amenity of pedestrians and cyclists in particular. However, I understand the effects of dust can be avoided through conditions of consent.

    56.2. Noise, in the vicinity of an airport is a ubiquitous problem, and to a very large extent 'goes with the territory'. The report notes (p.17) that "[t]he effects of construction noise on all other activities (such as walking, running/jogging, swimming, surf life-saving and walking dogs along the beach) are not considered to be significant". I agree with this conclusion as it relates to recreational amenity.

Recreation Assessment: Conclusions and recommendations

57. The Assessment of Effects on Recreation (Technical Report 6) paints a very generalised picture of the recreational use of Lyall Bay. While the methods selected

for the investigation were sound in principle, the actual implementation of two of the methods - the online survey resident survey and the participant observation technique - have yielded data of limited relevance and utility to the issue under investigation. The decision of the applicant to conduct further recreation surveys prior to the hearing is acknowledged and supported.

58. Short term effects during the construction period will affect a wide range of recreational users, including cyclists, water-based recreationists (particularly surfers) and gatherers of kai moana. With the exception of adverse effects arising from the enforcement of exclusion zones, some of these effects (e.g., effects of heavy traffic on cyclists) may be manageable through management plans (e.g., Construction Traffic Management Plan), or through short term recreational behaviour modification by recreationists. I consider short term effects with respect to land-based recreational activities to be minor, or less than minor, and acceptable. Mitigation of effects on cyclists and other land-based recreationists can be mitigated to an extent by way of proposed management plans, including the Construction Traffic Management Plan and Stakeholders and Communication Management Plan.

59. The effects of exclusion zones may not be fully appreciated until these areas are established and their spatial extent becomes apparent. The exclusion zone for the SWFS is likely to have the greatest impact on the activities of Lyall Bay water-based recreationists, but uncertainties regarding the design of this structure prevent an accurate estimate of effects. I consider short term effects on water-based recreational activities, such as surfing and gathering kai moana to be more than minor within the areas of the exclusion zones. For some recreationists, such as surfers, adverse effects arising from the SWFS exclusion zone may be unacceptably adverse in the short term, and unable to be mitigated.

60. A level of recreation displacement may occur as individuals relocate their recreational interests elsewhere for the period of construction. This may apply particularly to those whose activities are impacted adversely by the exclusion zones.

61. Long term (post-construction) effects on surfing amenity are uncertain. If DHI (Technical Report 11) predictions as to the likely reductions in the number of rides should prove accurate, then I regard the long term adverse effects on surfing amenity to be more than minor. However, there is some uncertainty as to likely nature of effects on waves, and the implications for surfing amenity. Dr Goring notes in his report; "...the development is likely to reduce the surfing amenity to some degree. Whether that will be discernible to surfers is arguable." Dr Goring also notes that the prospects for mitigation and enhancement by way of the SWFS are uncertain, and he suggests alternative solutions be investigated through changes to the design of the

footprint of the runway extension. For expert surfers, the loss of the Airport Rights break may be regarded as an unacceptable outcome, and an outcome that is beyond the potential of the SWFS to mitigate.

62. I acknowledge as a positive proposal the condition of consent (Condition 66) providing for adaptive management of surfing amenity by way of a Surf Mitigation Adaptive Management Plan (SMAMP). However, my understanding of the situation is that there are too many uncertainties concerning the design and implementation of the proposed Submerged Wave Focusing Structure to be able to regard it as a viable option for mitigation. Insufficient baseline data is available, no detailed design has been undertaken, and no assessment of effects has been undertaken. It could prove to be the case that the SWFS proves unviable before any attempt to implement it through an adaptive management process even commences.

63. Landscape and urban design proposals for publicly accessible walking areas (promenade and lookout points, and Moa Point access) will enhance recreational opportunities for walkers. However, I consider the design concept for the Moa Point area to be insufficiently resolved to permit any helpful analysis. Significant questions of public safety arise from the provision of public access within an area subject to large waves, and this issue does not appear to have been recognised or addressed in the conceptual design proposals.

64. A Community Liaison and Stakeholders and Communication Management Plan (SCMP) is to be prepared and implemented (Condition 9), and a Community Liaison Group formed (Condition 10). The proposed membership of the Community Liaison Group (Condition 10(a) (iv)) is proposed to include: “Representatives of the local community, including at least one resident of Moa Point Road”. In my opinion, representatives of the local community should include a representative of the surfing and surf life-saving communities.

PART B: Landscape and Visual Assessment (Technical Report 24)

Introduction

65. In this section of my report I review Technical Report 24, Assessment of Landscape and Visual Effects (ALVE) report, prepared by Boffa Miskell Ltd and dated 22 April 2016.

66. The ALVE report follows the generally accepted format of such investigations, with a description of the project, a description of the existing environment, or landscape context, with particular reference to the Lyall Bay landscape/seascape.

67. The statutory framework for the assessment of the project is identified as the RMA and the NZCPS (2010). Section 3.1 of Appendix 1, Assessment Methodology refers also to the Wellington District Plan and the Regional Policy Statement 2010 (RPS) among a range of other documents that were reviewed. The RPS contains a number of objectives and policies pertaining to the coastal environment and landscape, but these are not specifically referred to in the ALVE report. It may be the case that the author of the ALVE report has assumed these objectives and policies to be addressed adequately by way of consideration of NZCPS Policies 13 and 15. However, I consider some comparative analysis of RPS coastal environment and landscape policies, with NZCPS Policies 13 and 15 is necessary to demonstrate that the relevant provisions of the RPS have been considered.

68. RPS Policy 50, *Managing effects on outstanding natural features and landscapes – consideration*, is a provision that requires specific analysis[2], and I address this in the next section of this report.

69. The method for the landscape and visual assessment is set out in Appendix 1 to the ALVE report. A review of the method is presented in following sections of this report.

Landscape context and significance

70. Project-based landscape assessments are generally premised on the definition of the landscape context within which the project is located, and with reference to which the magnitude of effects are to be assessed. In the context of this particular matter, and

[2] "Policy 50 provides an interim assessment framework for councils and resource consent applicants prior to the identification of outstanding *natural features* and *landscapes*, in accordance with policy 25, and the adoption of plan provisions for protection in accordance with policy 26." (Explanation to Policy 50 Managing effects on outstanding natural features and landscapes – consideration, Wellington RPS)

consistent with NZCPS Policy 15, the spatial extent of the landscape within which the project is located must also consider the adjacent seascape:

> Policy 15: Natural features and natural landscapes
>
> (a) *To protect the natural features and* ***natural landscapes (including seascapes)*** *of the coastal environment from inappropriate subdivision, use, and development:* [emphasis added]

71. For the avoidance of any ambiguity over the extent of the landscape context, it is necessary for the spatial extent of the landscape/seascape to be mapped. The relevant area has been defined and is illustrated on Figure 8 Lyall Bay Landscape/Seascape (ALVE report graphic attachments), reproduced below as Figure 3. The landscape context for the project is described in Section 3.0 (commencing p.5) of the ALVE report.

Figure 3: Reproduction of Figure 8 Lyall Bay Landscape/Seascape, from the ALVE Report. The areal photograph show the landscape/seascape defined for assessment purposes. The wider landscape/seascape is divided into a East Lyall Bay and East Lyall Bay area.

72. I regard the landscape as defined to be a credible analysis for the purposes of the assessment, however I anticipate that expert opinions may vary as to the spatial extent of the relevant landscape/seascape. Given the wording of the introductory

paragraph to NZCPS Policy 15 (*To protect the natural features and natural landscapes (including seascapes) of the coastal environment...*), an analysis that recognises the Lyall Bay seascape as a relevant area for assessment, independent of the terrestrial landscape, also may be regarded as a legitimate frame of reference for analysis.

73. How the landscape/seascape is defined in terms of areal extent, and the location of boundaries is influential in determining its natural character. The significance of the location of boundaries is illustrated at paragraph 4.24 (p.11) of the ALVE report where it states; "It is the landscape generally (as opposed to the seascape) that has undergone the greatest physical modification."

74. In this particular matter, it is the less-modified (and thus more natural) seascape that is to be impacted most significantly by the proposal, and on this basis consideration of the effects of the proposal on the terrestrial landscape are less relevant in my view. This raises the question of whether the seascape can and should be defined as a separate entity to the highly modified terrestrial environment for landscape assessment purposes. To the best of my knowledge, such separation is as yet untested in RMA-based landscape assessment, although the separation of terrestrial from marine areas is becoming standard practice in NZCPS Policy 13 assessments of the natural character of the coastal environment.

75. In consideration of RMA section 6(b), which provides for the protection of outstanding natural features and landscapes from inappropriate subdivision use and development, and NZCPS Policy 15, which provides for the protection of the natural features and natural landscapes of the coastal environment, it is necessary to address the question of whether any part of the landscape context of the project can be regarded as a feature[3]. For the purpose of s6(b) and NZCPS Policy 15 assessments, landscapes and features are to be regarded as distinctly different entities for resource management purposes. As is the case with landscapes, the extent of any landscape feature should be spatially defined through mapping.

76. At paragraph 4.6 (ALVE report, p.8) it is stated:

> *While Lyall Bay is not a natural landscape there are natural features present.*

77. No specific consideration appears to have been given to the identification and spatial definition of features, as distinct from the landscape/seascape. However, the

[3] "...a distinctive or characteristic part of a landscape". *Wakatipu Environmental Society Inc. v Queenstown Lakes District Council* C129/2001, 9 August 2001 at [33]

recognition that there are "natural features present" suggests the need for accurate spatial definition and analysis with respect to NZCPS Policy 15(b):

> *(b) avoid significant adverse effects and avoid, remedy or mitigate other adverse effects of activities on natural features and natural landscapes in all other areas of the coastal environment;*

78. At paragraph 3.12, (ALVE report, p.6) it is stated that Wellington City Council have not yet undertaken a study to identify any section 6(b) outstanding natural landscapes and features of Wellington district. In such circumstances I consider it necessary that the landscape assessment for the project address this issue. The requirement to do so is stated in Policy 50 of the RPS:

> Policy 50: managing effects of outstanding natural features and landscapes-consideration
>
> When considering an application for a resource consent, notice of requirement or a change, variation or review of a district or regional plan, a determination shall be made as to first, whether an activity may affect an outstanding natural feature and/or landscape, and second, whether or not an activity is inappropriate, having particular regard to the following:
>
> (a) the degree to which the natural feature or landscape values will be modified, damaged or destroyed including:
>
> (i) the duration and frequency of any effect, and/or
>
> (ii) the magnitude or scale of any effect;
>
> (b) the irreversibility of adverse effects on landscape values;
>
> (c) the resilience of the natural feature, place or area to change;
>
> (d) the opportunities to remedy or mitigate previous damage to natural feature or landscape values; and
>
> (e) whether the activity will lead to cumulative adverse effects on the natural feature or landscape values.

79. The ALVE report, in omitting any specific reference to the RPS, has failed to acknowledge the relevance of Policy 50, and the requirement to undertake an original assessment of the outstanding natural features and landscapes of the locality.

80. A generally accepted approach to landscape assessment adopts a 3-stage process for assessment[4]:

    80.1. Identify the relevant landscape/seascape, or feature,

    80.2. Determine whether a landscape/seascape qualifies as a 'natural' landscape/seascape or feature, and if so, how natural (with reference to the scale of natural character given in Figure 4, below),

    80.3. Assess whether any landscape/seascape or feature, as a natural landscape/seascape or feature, is also outstanding.

81. This 3-stage process is consistent with the evaluation process stated in RPS Policy 25: *Identifying outstanding natural features and landscapes – district and regional plans*.

82. The question of whether a landscape/seascape or a feature is 'natural' is particularly significant with respect to NZCPS Policy 15. While Policy 15(a) provides for the protection of; "*...outstanding natural features and outstanding natural landscapes in the coastal environment*", Policy 15(b) provides protection for "*...other natural features and natural landscapes in the coastal environment*" - i.e., natural features and landscapes that are not outstanding.

83. The ALVE report states (paragraph 4.24, p.11) that in the opinion of the assessor, the Lyall Bay landscape/seascape:

> *...cannot be considered a natural landscape/seascape. There are however, natural features present and natural processes occurring, albeit in places where these are truncated or modified. It is the landscape generally (as opposed to the seascape) that has undergone the greatest physical modification.*

84. Whether a landscape or feature is a natural landscape or feature is generally resolved with reference to the scale of natural character (Figure 4). The application of this scale is premised on the assumption that the terms 'natural character', and 'natural' as it is used in the context of outstanding 'natural' landscape refer to one and the same phenomenon. A natural landscape or natural feature can be regarded as a landscape or feature displaying natural character at levels above the mid-range

[4] Referred to in *Man O'War Station Ltd v Auckland City Council* [2015] NZHC 767, at [10]

(Moderate) of the scale. Within the ranges Moderate – Very High, a landscape or feature may be regarded as passing the naturalness threshold for consideration as an outstanding natural feature or landscape (or in this particular case, seascape). There is no objectively verifiable cut off point between ranges on the scale – more of a fuzzy transition - and as I note in the caption to the scale, landscapes and features within the upper end of the Moderate range of the scale may, in some circumstances, be regarded as sufficiently natural to pass the naturalness threshold for section 6(b) and NZCPS Policy 15 purposes.

Figure 4: 7-range scale of naturalness for the assessment of the degree of natural character exhibited by a landscape or the coastal environment. The shaded part of the scale is the range within which natural processes become dominant over cultural processes, and represents the range within which a feature or landscape may be regarded as natural enough for s6(b) or NZCPS Policy 15 purposes. Landscape assessed as being within the Moderate range of the scale will generally display natural and cultural influences in equal measure.

85. I consider an inadequate analysis has been conducted for the purpose of assessing the natural character of the landscape/seascape context of the project. While this work has been undertaken by Mr Boffa and reported in his Natural Character report (Technical Report 25), it is not cited in the ALVE report. Rather, At paragraph 4.26 (p.11) the ALVE report concludes:

> *In summary, the Lyall Bay landscape/seascape is highly modified with some parts much more modified than others. Given the extensive modification* ***it cannot be considered a natural landscape/seascape****. There are however, natural features present and natural processes occurring, albeit in places where these are truncated or modified. It is the landscape generally (as opposed to the seascape) that has undergone the greatest physical modification. Progressive reclamations to establish the current airport have had a significant effect on the seascape, particularly at the land/sea interface on the eastern part of Lyall Bay*. [emphasis added]

86. Mr Boffa assesses the natural character of the marine components of Lyall Bay (within which area the runway extension is shown as being located) as Moderate for the Inner Bay, Moderate-High for the Outer Bay, with an overall rating of Moderate. (see Natural Character Assessment Technical Report 25, Figure 5, p.15 for map of areas and summary table of natural character ratings, p.33).

87. The question of whether a characteristic area of seascape, such as the marine component of a bay (i.e., that area being defined as enclosed by the mean high water line, independent of the enclosing terrestrial land) could be considered as a feature for NZCPS Policy 15 purposes is as yet untested, to my knowledge. The case for a seascape feature can be understood with reference to two such features in the wider seascape of Cook Strait and the outer Marlborough Sounds: the Karori Rip, and the waters of French Pass. Both of these phenomena could, in my opinion, legitimately be regarded as seascape features, having distinct patterns of wave action and tidal currents that can be perceived and appreciated independently of the adjacent terrestrial environment. I consider that in circumstances in which the characteristics of currents and wave actions are sufficiently different to those of the wider seascape context, a case could be made for regarding the waters of a bay as a feature.

88. In my opinion, the waters of Lyall Bay have a distinguishing character derived from exposure to the southerly swells of Cook Strait, and the "unlimited fetch of the Southern Ocean", as it is referred to in Dr Goring's report. This character is sufficient to define the water surface as a seascape feature.

89. As noted earlier, support for the recognition of Lyall Bay as a feature appears at paragraph 4.6 of the ALVE report, where it is stated:

> *While Lyall Bay is not a natural landscape there are natural features present**. The sea, waves and tidal action are major defining elements** as are the sandy beach, the fringe of reefs and the unbuilt headlands of Te Raekaihau on the west and Palmer and Hue te Taka Peninsula on the east.* [emphasis added]

90. Just how this statement is to be interpreted in spatial terms is unclear, but I take the statement, "*the sea, waves and tidal action are major defining elements*", as support for the idea the waters of the bay as a natural feature. The matter could have been clarified in the ALVE report by means of a graphic representation of the spatial extent of any specific features that may be impacted by the proposal.

91. If Lyall Bay is conceptualised as a seascape independent of the adjacent landscape, or as a seascape feature for the purposes of NZCPS Policy 15 and RPS Policy 25 assessment, it is my opinion that, with reference to the scale of natural character presented above, a Lyall Bay seascape or feature clearly falls within the range of natural character that would qualify it as a natural seascape or a natural seascape feature. As such, Lyall Bay meets one of two high level tests for the identification of outstanding natural features and landscapes in RPS Policy 25: "that its natural components dominate over the influence of human activity".

92. As a natural seascape or natural feature, Lyall Bay would qualify as being subject to NZCPS Policy 15(b).

93. While the surface waters of Lyall Bay can be regarded as a natural seascape or natural seascape feature for the purpose of NZCPS Policy 15 and RPS Policy 25, it is my opinion that the second test in RPS Policy 25, the threshold for outstandingness, is not met. With regard to the second test of RPS Policy 25, whether the natural feature or landscape is "exceptional or out of the ordinary", I regard the waters of Lyall Bay as displaying high aesthetic quality, but overall, the seascape/feature falls short of being exceptional or out of the ordinary with respect to each of natural science, sensory and shared and recognised factors.

94. On the basis of my familiarity with the locality, and on the basis of an intuitive analysis only, it is my opinion that Lyall Bay, considered as a landscape/seascape incorporating the marine and terrestrial area defined in Figure 8 of the ALVE, does not qualify as an outstanding natural landscape on the basis of being exceptional or out of the ordinary with respect to each of natural science, sensory and shared and recognised factors. Accordingly, consideration with respect to NZCPS Policy 15(a) would not apply.

Summary: Landscape and landscape significance

95. I consider that the landscape/seascape and features of the project environs have not been adequately defined in conceptual or spatial terms. In my opinion it is open for the wording of NZCPS Policy 15 to be interpreted such that the marine component of Lyall Bay can be regarded as a seascape independently of the terrestrial landscape defining the Bay. Alternatively I consider it plausible that the marine component of Lyall Bay be regarded as a feature (or more precisely, a seascape feature).

96. Such ambiguities and uncertainties arise because of unresolved questions regarding the definition of key concepts associated with landscape assessment practice in the context of the RMA. For example, *landscape* itself remains a contested term, and I am unaware of any decisions of the Environment Court that clarify the meaning of *seascape*, such as when used in the current context.

97. The issue of whether the landscape/seascape context can be regarded as an outstanding natural landscape, and whether outstanding natural features are present does not appear to have been the subject of any detailed analysis in the ALVE report. No landscape/seascape is defined in spatial terms, and neither are landscape features so defined. However, at paragraph 8.119 (p.41) the ALVE report concludes:

> *In terms of section 6(b) of the RMA, Lyall Bay and environs is not an outstanding natural feature or landscape. In terms of Policy 15 of the NZCPS Lyall Bay is not a natural landscape but there are some natural features present.*

98. At an intuitive level I accept the ALVE report's findings on the absence of outstanding natural feature and landscapes. However, the acknowledged presence of natural features does invoke NZCPS 15(b), and this aspect of the assessment has received inadequate attention.

Assessment of landscape effects

99. The assessment of landscape effects is described in the GLVIA3 document (p.70) as follows:

> *The assessment of landscape effects deals with the effects of change and development of landscape as a resource. The concern here is with how the proposal will affect the elements that make up the landscape, the aesthetic and perceptual aspects of the landscape, and its distinctive character.*

100. This process relates to the European Landscape Convention definition of landscape (GLVIA3, p14) that provides the basis for the methods presented in the GLVIA3 document:

> *Landscape is an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors.*

101. The focus of the landscape effects assessment process is on changes to the natural factors referred to in the definition above: the biophysical landscape elements that contribute to landscape character and aesthetic quality The process is not concerned with effects that relate to the natural heritage or intrinsic value of biophysical factors. Such assessments are undertaken by other disciplinary experts from the biophysical sciences (such as are referenced in the ALVE report, see footnotes, pp.18-19). These assessments may inform the assessment of landscape effects, but only insofar as they relate to changes that affect landscape character and aesthetic qualities.

102. In the ALVE report, the assessment of landscape effects was undertaken with reference to effects on; (1) the biophysical landscape, and (2) landscape character. The role of the ALVE has been to summarise these effects and reach general conclusions on the landscape effects of the proposal.

<u>Effects on the biophysical landscape</u>

103. Biophysical landscape effects are identified as being associated with the 350m, 10.8ha extension of the existing runway into open water, covering a rocky reef that is

currently part of Moa Point. This will result in the total loss of marine environment and habitats currently associated with the reef. The biophysical effects are assessed as being moderately adverse (ALVE, paragraph 8.6, p.19), primarily on the basis of the scale and extent of modifications that have already occurred. Moderately adverse effects are defined in the ALVE report (p.49) as; "alteration to one key feature/attribute - partially changed".

104. I rate the biophysical landscape effects on Lyall bay east (refer to my Figure 3, ALVE report Figure 8) as being more than moderately adverse, in terms of the scale applied in the ALVE report. In my opinion a rating of moderately adverse does not respond adequately to a total loss of 10.8 ha of marine environment and its replacement with a terrestrial landform. However, to rate the adversity of biophysical landscape effects higher than moderate, I also have to set aside the assessment parameters defined in the Significance of Biophysical Change scale presented in Section 6 of the ALVE report (pp.48-49). In this scale, the author establishes the following indicative examples of what constitutes degrees of adverse change at the level of moderate and high:

> *High - Alteration to several key features/attributes-considerably changed*
>
> *Moderate - Alteration to one key feature/attribute –partially changed*

105. The parameters established by Mr Evans are, as far as I am aware, unique to this study, and are by no means universal in their application to the assessment of effects. The problem is the requirement that a high level of adverse effects must involve alteration to *several* key features or attributes, whereas moderate requires alteration to just one key feature or attribute. I do not agree with this assessment framework as it has been applied in this instance, and I consider that the proposed modification to a single key attribute in this instance is sufficient to warrant a rating of high adverse effects in the context of Lyall Bay.

106. I consider a high level of adverse effects for Lyall Bay east to be unacceptable in the absence of significant mitigation measures. I acknowledge the potential for mitigation to reduce the overall level of adverse effects in this area, and I endorse the proposals outlined conceptually in the ALVE and Urban Design reports. However, I consider the proposals are insufficiently resolved and there is insufficient detail available to enable an informed judgement on the potential for mitigation to reduce the adverse effects to an acceptable level.

107. I defer to the Councils' marine ecology expert, Dr Morrissey for comment on the ecological aspects of the loss of marine habitat, as these aspects do not pertain to the appreciation of landscape character or aesthetic quality.

108. The ALVE report (paragraph 4.12, p.9) notes the existing state of the south-eastern end of the runway (the Moa Point embayment), where rubble and what appears to be demolition debris has been used to protect the land/sea interface. This has been unsuccessful, and incursions by the sea are apparent. The existing runway/Moa Pt embayment interface could be described as a localised blight on the amenity of the coastline, and remedial actions to enhance this area, outlined conceptually in the ALVE report (see Figures 14-15), are to be encouraged.

109. While brief mention is made to changes that will result in the form of both Lyall Bay and the Moa Point embayment (e.g., paragraphs 8.6, 8.9, 8.107), I consider the changes that will result to the Moa Point area are more significant than the ALVE report acknowledges. At paragraph 8.113, the post-construction changes to the Moa Point landscape/seascape character are described as moderate, but I note that this is a reference to the character of the landscape/seascape ('character' being an abstract, or conceptual phenomenon) rather than to the form of the actual embayment. At paragraph 8.121, the landform effects within the area of the embayment are stated to be moderate - presumably adversely so.

110. I acknowledge the existing level of intrusion of the southern end of the runway into the Moa Point embayment, and also the visually unappealing - even blighted - nature of the embayment owing to the fill material at the runway/embayment interface. However, I consider a plan view analysis of the proposed extension (e.g., ALVE report, Figures 7, 8 and 9) reveals the effects of the proposed extension on the embayment to be very high in terms of the scale applied to the assessment of biophysical effects (ALVE report, p.49). However, in rating the biophysical effects on the embayment as very high, I reiterate my earlier reservations regarding the parameters defined by Mr Evans for each level on his scale. By his scale, very high requires "*Fundamental alteration to most key features/attributes*". In my opinion, the scale of the reclamation relative to the aerial extent of the Moa Point embayment, and the very significant changes that will result to the form of the embayment are such as to warrant a very high rating of adverse effects.

111. In principle I regard the thresholds for the assessment of the significance of effects in Mr Evans' scale (ALVE report, p.49) to be too rigid and prescribed. I also consider a 7-range scale to be excessively broad for this purpose, and question the capacity of an assessor to discriminate between levels without recourse to inflexible criteria, such as Mr Evans applies. Rather than an idiosyncratic scale devised for one purpose, I suggest the application of a scale that applies terms more consistent with RMA

practice, such as is presented on the NZ Quality Planning website where it describes the terms used for levels of effects[5].

112. With more appropriate edge treatment at the end of the runway, the embayment could be regarded as having a relatively naturalistic, concave form in its current state. However, as Figures 7 and 9 reveal, any sense of naturalness will disappear post-construction and the physical form of the embayment will be fundamentally changed. The form of the bay will instead be dominated by the straight line edge of the runway extension and the acute angle this forms with the existing shoreline. Given the more enclosed scale of the embayment compared with Lyall Bay west, the landscape effects of the runway extension will be most significant in the area of the Moa Point embayment than elsewhere.

113. Landscape proposals within the Moa Point embayment are described in brief terms (ALVE paragraph 8.10, p.20):

> *…the junction between the exterior rock armouring of the runway extension and the shoreline beach will be designed to provide a functional and integrated edge to the adjoining beach.*

114. The proposals are illustrated conceptually in Figures 14 and 15 (ALVE report), but the illustrations suggest an awkward visual relationship between the smooth surfaced, geometric Accropodes used for runway armouring and the natural rocks of the embayment. The Accropodes illustrated in the ALVE report (Figure 17) display a severe, monumental – even brutalist - character, which while functional in terms of sea defences, is incongruous with human scale and natural character considerations in an area intended for public access.

115. Given the intended provision for public access within the Moa Point area of the structure, and the fact that public access is already available to the embayment beach, I consider it necessary to provide a high quality design solution to the area where the existing beach ties in to the proposed structure. In particular, provision of public access (even informal access, as indicated on Figures 14 and 15) within a field of Accropodes will pose significant design problems, given the characteristics of the terrain. As the southern end of the runway is very open and exposed, public access to this area raises issues of safety during high seas, and these do not appear to have been addressed.

116. I recommend that WIAL provide further information at the time of a Court hearing, explaining how the runway extension will be integrated into Moa Point beach to

[5] http://www.qualityplanning.org.nz/index.php/consents/environmental-effects

mitigate adverse landscape and natural character effects. Such information should account for provisions for public safety in what is potentially a high hazard zone as a consequence of exposure to waves, and should be accompanied by more advanced design concept drawings than those that accompany the ALVE report.

117. A more naturalistic Accropode design, with pitted, coarser textured surfaces and crevices may be a possible aesthetic solution if such structures are also functionally suited to the task.

Assessment of effects on landscape character

118. Landscape character may be understood as:

> *A distinct, recognisable and consistent pattern of elements in the landscape that makes one landscape different from another, rather than better or worse*[6].

119. The ALVE notes the connection between landscape character as a general concept, and the narrower area of natural character as an area of specific concern. The natural character of the coastal environment has statutory protection, whereas the more general concept of landscape character does not, other than in the context of an outstanding natural landscape. Natural character aspects are addressed in the separate report prepared by Mr Boffa, and reviewed elsewhere in this document.

120. Effects on landscape character are considered separately for the western and eastern parts of the Lyall Bay landscape/seascape[7]. The effects on the western side are considered to be low, on the grounds that:

> [t]*he form and design of the extension, and the elements and materials used will be similar to what already exists and a high level of integration will be achieved. The open waters of the bay and the open sea will continue to have a major influence on landscape/seascape character.*

121. I agree with this assessment.

122. The situation is different on the eastern side of Lyall Bay, including the Moa Point embayment. During construction, the ALVE report states the adverse effects of the project on landscape/seascape character will be high, but these effects will drop to moderate post-construction.

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[6] Swanwick, C. and Land Use Consultants 2002, *Landscape Character Assessment*. Countryside Agency and Scottish National Heritage, p.8

[7] I use the terms eastern and western Lyall Bay in the same sense as used in the ALVE report, and illustrated in Figure 8 of that report. In a general sense, western Lyall Bay refers to that area of Lyall Bay between the proposed runway extension and Te Raekaihau Point, while eastern Lyall Bay refers to the area between the extension and Hue te Taka Peninsula.

123. I do not agree with the concluding statement in paragraph 8.113:

> *In terms of the scale of change in relation to the embayment, the original development of the airport was far greater than that being proposed by the proposed runway extension.*

124. Figure 3 of the ALVE report traces the historic coastline within the vicinity of the southern end of the runway. While I acknowledge that significant change has occurred to the character of the coastline in this area, I have commented elsewhere that the embayment can still be regarded as *naturalistic* in its concave form, if not natural. It is my opinion that the scale of the runway extension will have a significantly greater effect on the character of eastern Lyall Bay seascape than is acknowledged by the ALVE report, which assesses the post construction effects on landscape character as moderate (ALVE report, paragraph 8.113, p.40). In my opinion the effects of the runway extension on the landscape/seascape character of Moa Point will be high during the period of construction, and will remain high post-construction.

125. Some of the effects on landscape character can be mitigated through the restoration and rehabilitation of natural character, and the design proposals for the Moa Point area outlined conceptually in the ALVE report. However, I consider the more fundamental adverse effect is the change that will result to the form of the Moa Point embayment, and the effect this will have on the experience of landscape character of the embayment. The adverse effect on the form of the embayment could be mitigated to some extent through the elimination of the acute angle that will be formed by the junction of the extension and the embayment beach, and the design treatment of the junction. I recommend that the intersection of the extension with the natural form of the embayment be redesigned to eliminate the acute angle shown in my Figure 5, below.

126. I consider a more naturalistic form to the embayment could render the adverse effects acceptable, but I acknowledge there are submitters who consider the effects of the proposal on the natural character of the embayment/Moa Point area will be significantly adverse, and unable to be mitigated.

127. As Figure 5 (below) suggests, the area of sea to be reclaimed for the runway extension appears at least as great, if not greater, than the adjacent sea surface area that will remain within the embayment, post-construction. The character of the embayment will also be changed further by Accropode armouring structures, the straight line edge of the extension, and the unnaturally acute angle formed between the embayment and the extension, compared to embayments further east of Hue te Taka Peninsula.

Figure 5: Part of Figure 1, ALVE, illustrating relative surface areas of the runway extension and the residual area of the Moa Point embayment. The area of sea to be reclaimed for the runway extension appears at least as great, if not greater, than the adjacent sea surface area that will remain within the embayment, post-construction. Note also the acute angle created between the embayment beach and the extension (Source, Figure 1, Site Context, ALVE report)

128. While changes to the landscape/seascape character of the eastern Lyall Bay area are in my opinion significant, and under-estimated in the ALVE report, the preservation of character per se has no statutory basis. The more relevant matter is the adverse effects on the narrower concept of natural character, as provided for in NZCPS Policy 13, to which the issues raised above with respect to the Moa Point embayment also apply. Natural character, and the effects of the proposal on natural character, are discussed in Mr Boffa's report and have been addressed in a separate section of this document.

Assessment of visual effects

129. In assessing the magnitude of effects, extensive use is made of pre-construction photography and post-construction visual simulations. Visual simulations were

prepared with reference to the NZILA best practice guidelines for visual simulations[8]. Simulations are a standard tool to assist with the assessment of visual effects. The technology is robust and the simulations are realistic. It is relevant to bear in mind that the real-world experience of the development will vary from that represented in the simulations according to a range of factors, including the conditions under which simulations are viewed and atmospheric conditions prevailing at the time of viewing in the field. Simulations remain a useful analytical tool, however.

130. Simulations presented in the ALVE report were prepared from a range of 19 representative viewing locations, with a further simulation prepared to illustrate the effects as they will be experienced from an inter-island ferry. Viewpoints were derived from a 'zones of theoretical visibility' (ZTV) analysis, or view shed mapping. Again, this is a standard analytical procedure, but one limited by the inability of the process to factor in structures and vegetation to the analysis of visibility - hence the term 'theoretical visibility'.

131. For any project of this scale an almost infinite range of potential viewing locations might be identified from which visual simulations might be prepared. While the claim may be made that a simulation has not been prepared from a particular viewpoint of significance to an individual or community, I consider that a sufficiently representative range of viewing locations has been selected.

132. While not specifically referenced in the ALVE, the technique of applying the simulations to the assessment of visual effects follows the principles and process described in the third edition (2013) of Guidelines for Landscape and Visual Impact Assessment (GLVIA3), published by the Landscape Institute and Institute of Environmental Management, UK. I am familiar with this document, and Mr Evans, of Boffa Miskell Ltd, refers to his reliance upon in it his response to a request for further information (see Appendix 1 for the text of Mr Evan's response).

133. The GLVIA3 document has no formal status as a best practice approach to landscape and visual effects assessment in NZ but has been adopted by many members of the landscape profession. It is referred to as a source of assessment guidelines on the NZ Quality Planning website[9].

134. Assessments undertaken according to the GLVIA3 approach are not based upon public surveys, but rather are professional assessments informed by certain

[8] *Best Practice Guide, Visual Simulations BPG 10.2*, New Zealand Institute of Landscape Architects, November 2010.
[9] http://www.qualityplanning.org.nz/index.php/planning-tools/land/landscape/landscape-assessment

assumptions regarding the 'sensitivity' of certain viewing audiences. Sensitivity, in the context of the GLVIA3 approach, is defined in the following (somewhat obscure) terms:

> *A term applied to specific receptors, combining judgements of the susceptibility of the receptor to the specific type of change or development proposed , and the value related to that receptor. (GLVIA3, p.158)*

135. 'Specific receptors', in the case of the ALVE are either; (1) landscape receptors, or aspects of the biophysical landscape itself, or (2) visual receptors - people whose viewing experience is likely to be affected at a specific viewpoint.

136. Viewers are assumed to have differing levels of sensitivity to changes in views or visual amenity. Sensitivity to change is assumed to be based upon certain characteristics of the viewer:

> *The susceptibility of different visual receptors* [viewers] *to change in views and visual amenity is mainly a function of:*
>
> - *the occupation or activity of people experiencing the view at particular locations, and*
>
> - *the expectant to which their attention and interest may therefore be focussed on the views and the visual amenity they experience at particular locations.* (GLVIA3, paragraph 6.32, p.113)

133. The ALVE investigation adopted this assumption as the basis for assessing visual effects according to whether the viewers were likely to be residents or transients, according to the circumstances of each selected viewpoint.

134. The assumptions relating to the sensitivity of different viewers that underpin the investigation of visual effects are not supported by any reference in the GLVIA3 document, nor in earlier editions of the same publication. While the assumptions, may on the face of it have some intuitive appeal, they have never, to the best of my knowledge, been validated by empirical research that would support their application in the present context. I consider it plausible that many transient viewers – such as those that visit Lyall Bay for recreational purposes - may be as sensitive, or even more sensitive to changes as local residents. It is equally plausible that some local residents could, over time, become de-sensitised to changes resulting in adverse visual effects.

135. Specific assumptions explicit in the assessment of visual effects are set out in the ALVE report, paragraphs 8.2 (Table of factors that influence the Significance of Visual Effects) and paragraph 8.3 (Table of Significance of Visual Amenity Effects).

136. The implications of this approach is that the professional assessor (1) establishes the assessment framework, and then (2) presumes to conduct an analysis and determine a ratings of effects on behalf of the community, based upon certain assumptions as set out in the assessment framework. While the ALVE report documents the basis for the assessment of visual effects (see section 8, pp. 50-51) and makes the process reasonably transparent as far as the assessor's analysis is concerned, there is no reliable basis for assuming that the assessor's analysis conforms to those members of the community on whose behalf the assessor has conducted the assessment.

137. In my opinion, the obvious approach to resolving this uncertainty would be to ask the community, rather than presume to speak on its behalf, on the basis of certain untested assumptions.[10]

138. I acknowledge that a number of 'public open events' were held that were attended by Boffa Miskell staff (AEE report, Mitchell Partnerships, pp110-111). I assume the graphic visualisations were available for public viewing on these occasions. However, I do not understand there to have been any structured approach to eliciting opinions on visual effects on these occasions.

139. There has been a reluctance among members of the landscape profession to engage directly with community views on matters of amenity and visual effects, and this has been noted in decisions of the Environment Court[11]. This reluctance may be a response to a range of factors, including project budgets, project time frames, and lack of familiarity with appropriate techniques of community engagement.

140. I consider the current project to be one for which direct community engagement for the assessment of visual effects would be particularly helpful. It is somewhat perverse, in my opinion, to prepare a comprehensive range of sophisticated simulations but then to offer the opinion of a single landscape professional in support of claims as to the adversity of visual effects. I consider this approach particularly inadequate when the framework for the assessment of effects is based on unreferenced and untested assumptions contained in the GLVIA3

141. A further information request (RFI) was made to the applicant (16 June 2016), asking that the applicant:

[10] Section 3.43 (pp.43-45) of GLVIA3 refers to the desirability of public engagement and the prospect that consultation may provide; "...better understanding of the landscape and of local attitudes to it".
[11] e.g., *Mainpower New Zealand Ltd v Hurunui District Council*, [2011] NZEnvC 284 at [294]

> *...undertake and submit a visual effects investigation or survey that provides a more valid and reliable basis for decision making than the current professionally-based assessment, based as it is upon untested assumptions from the UK context.*

142. In response to the RFI, dated 1 July 2016, the applicant's landscape consultant, Mr Boyden Evans of Boffa Miskell Ltd, declined to do so, stating:

> *...it is considered that the visual effects assessment provided as part of the Application has utilised an appropriate methodology and no further assessment is required.*

143. I regard this response as unhelpful, given the opportunity provided by the project timeline to undertake direct community engagement on the assessment of visual effects. A well designed public engagement study, utilising the same visualisations that were applied to Mr Evan's analysis would have tested and perhaps validated the assessment framework and scale of effects applied by Mr Evans, and provided some empirical basis for understanding the visual effects of the project, relative to targeted sections of the community. In the circumstances, the findings of the assessment of visual effects can be considered valid only insofar as they are the professional view of Mr Evans, who I assume set up the parameters and conducted the assessment.

144. In the absence of a community consultation program, public submissions will need to suffice for the purposes of understanding community opinions. However, the self-selecting, non-representative nature of the submissions process will preclude any analysis that might validate the findings of the ALVE visual effects study. In particular, there is no basis for understanding that submitters will necessarily apply the same Significance of Visual Effects Scale presented in the ALVE report (p.51). A focused interview process in which responses to the visualisations are sought from a representative range of stakeholders could serve to validate the scale applied, and the professional assessment undertaken.

145. This process could reveal the Significance of Visual Effects ratings to be inconsistent with the real world experience of sections of the community. For example, the significance rating from the beach, Moa Point Rd is rated Very High. The Very High rating is premised on the assessment criterion;

> *Proposal is prominent and substantially restricts primary views such that existing views are fundamentally changed.*

146. In order for the effects to be rated Extreme, the following criterion must be met;

> *Proposal completely dominates/obscures all primary views.*

147. Submitters familiar with the Moa Point environs, including local residents, may rate the significance of effects as Extreme, but in doing so they will likely be applying criteria that differ from the professional assessment. The rating criteria imposed by the assessor may not be shared by other communities of interest, who may be inclined to apply criteria that more accurately reflect their own perceptions of the visual effects of the project.

148. The criteria applied by the ALVE report have no particular authoritative status. As the ALVE scale of the significance of visual effects has not been validated against public opinion, and as no alternative scale has been established through a public consultation process, the extent to which the ALVE professional assessment and community assessments coincide is unknown.

149. The issue of lack of correspondence between different scales of assessment, particularly between professional scales and those that may be regarded as more representative of community opinion, is a widespread problem in landscape assessment.

Mitigation

150. Mitigation proposals associated with the project are discussed with respect to three aspects:

- *Creation of, and improvement to, marine and terrestrial ecological habitats;*
- *Improved access and parking, including safety improvements for pedestrians and cyclists; and*
- *Additional and improved recreation facilities and opportunities.*

151. Improvements to marine and terrestrial habitats are summarised in the ALVE report but addressed in more detail in the Technical Report 19[12]. An aspect discussed in the ALVE report is the prospect of designing the arms of Accropodes such that they provide surfaces suitable for colonising by marine organisms (see Technical Report 19, *Assessment of Ecological Effects*, pp.38-39 for further discussion).

152. Elsewhere in this report I have commented on the possibility of design modifications to Accropodes to render them more aesthetically fitting. The prospect of surface modification for habitat creation and enhancement is also a compelling reason for the

[12] Technical Report 19: *Assessment of Ecological Effects of the reclamation and extension to Wellington Airport*, prepared for Wellington International Airport Company by Mark James (Aquatic Environmental Sciences Ltd, Alison MacDiarmid, Jenny Beaumont & David Thompson (NIWA), February 2015. (pp.38-39)

investigation of options for Accropode construction. While it appears there is no firm commitment to the use of alternative Accropode designs, I consider this option should be investigated further.

153. In the interests of encouraging landscape design initiatives directed towards the restoration of natural character, I also endorse further investigations into options for the enhancement of penguin habitat (ALVE report, paragraphs 74-76, p.16, and Figure 14), and for the field collection of macro-invertebrates from reefs destined for burial for the colonisation of the new surfaces, post-construction.

154. Options for improved access and parking are discussed and conceptual proposals are illustrated in Figures 10-16 of the ALVE report. While the proposals illustrated are indicative at this stage, the initiatives are to be commended and will constitute a significant improvement to public access options and the enjoyment of waterfront amenity and recreation within this part of the south coast. I support these.

155. Brief comment is made on the proposed submerged wave focusing structure (SWFS) (paragraph 7.10. p.17). This aspect of the project is addressed in more detail in a separate technical report[13] that I discuss elsewhere in this document.

Conclusions and recommendations: Assessment of landscape and visual effects

156. The landscape context of the proposal is clearly defined and in my opinion the area outlined in Figure 8 of the ALVE report is a defensible definition. However, the area is variously referred to as the Lyall Bay landscape, and Lyall Bay landscape/seascape. Whether these terms refer to one and the same spatial area is unclear. In my opinion the separate status of the Lyall Bay CMA as a seascape (as referred to in NZCPS Policy 15) separate from the terrestrial landscape, has not been explored or considered, and it should be.

157. Similarly the status of Lyall Bay coastal marine area as a natural feature is not sufficiently addressed by the applicant. The ALVE report recognises the presence of features within Lyall Bay but these are not mapped nor are they specifically referred to. In my opinion they should be.

158. Given the lack of clarity concerning how NZCPS Policy 15 is to be interpreted and operationalised for assessment purposes, and acknowledging the unique circumstances of this particular proposal, I consider some definitive statements on the relevant 'units of analysis' (landscape, seascape, feature), supported by some

[13] Technical Report 11: *Wellington Airport Runway Extension Surf Break Impact Assessment: Numerical Modelling, Preliminary Investigations and Feasibility Study*, DHI, October 2015.

professional analysis as to their application in the current context, would be helpful at the time of the hearing.

159. For the purposes of a section 6(b) and NZCPS Policy 15(a) assessment of landscape value, the ALVE report authors record that Wellington City Council has not yet undertaken an outstanding natural landscape assessment of Wellington. The authors have not undertaken an assessment of landscape significance either, but have stated that Lyall Bay is not an ONL. I agree - I do not consider any part of the landscape/seascape context of the proposal to be outstanding in section 6(b) or NZCPS Policy 15 terms.

160. Should the Lyall Bay CMA be regarded as a feature, then in my opinion, supported by Mr Boffa's natural character assessment, that, with reference to the scale of natural character presented elsewhere in this report, it is unquestionably a *natural* feature in terms of NZCPS Policy 15(b). As a natural feature, the runway extension should be assessed to determine if the effects are significantly adverse, or if adverse, whether they can be avoided, remedied or mitigated.

161. In my opinion the effects of the proposal on Lyall Bay as a seascape feature are not significantly adverse, and as such do not reach a level requiring avoidance. I regard the effects as adverse, but acceptably so, and able to be mitigated to an extent through marine and terrestrial ecological restoration initiatives directed towards the restoration of natural character.

162. Regarding biophysical and landscape character effects, in my opinion the conversion of 10.8 ha of marine environment to terrestrial landform, and consequent changes to the form of the Moa Point embayment, are more than moderately adverse effects (ALVE report p.44) . The relatively small scale of the Moa Point embayment compared with Lyall Bay west (refer to Figure 8, ALVE report), and its immediate proximity to the extension, makes it an area more susceptible to changes in landscape character. These changes relate particularly to the resulting unnatural form of the embayment, and the incongruent relationship between the architectural elements of the runway reclamation and the natural elements of the embayment.

163. In my opinion, and with reference to the scales of biophysical and landscape character effects applied in the ALVE report, I rate the post-construction effects on the Lyall Bay east landscape area as high, rather than moderate. While high, I consider the effects to be acceptable, and able to be mitigated to an extent through landscape design and ecological restoration initiatives. I agree with the ALVE report that the landscape/seascape character effects on the western side of Lyall Bay are

considered to be low with reference to the scale applied in the ALVE report, and in my opinion are acceptable.

164. The method applied to the assessment of visual amenity affects is based upon guidelines published by a recognised professional institute, is transparent in its application, and the assumptions underpinning the analysis are made explicit. Within these parameters the findings presented in the Summary of Visual Effects from Representative Viewpoints table (ALVE report, p.36) can be regarded as valid and reliable insofar as the professional opinion of the assessor is concerned. With reference to the criteria established by Mr Evans in his assessment, I generally agree with his assessment of effects, as summarised in the table, Summary of Visual Effects from Representative Viewpoints (paragraph 8.92, ALVE report). I depart from Mr Evans' assessment with respect to the effects on views from residential dwellings on Moa Point Road and the beach at Moa Point. I consider the effects on views from this area to be extreme, and unable to be remedied or mitigated. As such, I regard these effects as significant and unacceptably adverse.

165. I remain of the firm opinion that further work should be undertaken by way of community consultation on visual effects. Such work should seek to provide some validation for the assumptions that have informed the professional assessment reported in the ALVE report, including the scale of effects.

166. The magnitude of changes to the landscape/seascape character of the Moa Point embayment justify a significant input of ecological restoration and landscape design expertise to mitigate the effects of the proposal. The ALVE acknowledges the issues, and indicative, conceptual proposals have been prepared. I regard this location as an area presenting particular challenges, but with a potential for the creation of a publicly accessible space designed with regard to coastal natural character experience, safety, and ease of access.

167. As recognised in the ALVE report, particular attention should be applied to the design of the interface between the runway extension and the Moa Point embayment:

    167.1. Options for a more naturalistic plan form for the embayment/extension interface should be explored, such that the acute angle between beach and runway extension is rendered in a more concave manner, similar to coves between Hue te Taka Peninsula and Palmer Head.

    167.2. Alternative Accropode designs should be explored in the interests of achieving both (1) structures with a more naturalistic surface quality and greater aesthetic appeal, and (2) surfaces more suited to colonisation of marine organisms.

167.3. The embayment has a more human scale than Lyall Bay west, and the foreshore is readily accessible to the public. I consider the embayment to be the public place most adversely affected by the extension, in terms of natural character and amenity. However, it is an area with potential for the restoration of natural character, commensurate with provision for public access and the enjoyment of coastal amenity. I commend the range of design possibilities represented conceptually in Figures 14 and 15, but I recommend that they be more fully resolved at the time of a hearing.

PART C: Natural Character Assessment (NCA) (Technical Report 25)

Introduction

168. The proposed runway extension is located within what is unquestionably accepted as the coastal environment, as understood in terms of the New Zealand Coastal Policy Statement (2010) (NZCPS). As such the proposal must be considered with respect to NZCPS Policy 13:

> ***Policy 13: Preservation of natural character***
>
> *(1) To preserve the natural character of the coastal environment and to protect it from inappropriate subdivision, use, and development:*
>
> *(a) avoid adverse effects of activities on natural character in areas of the coastal environment with outstanding natural character; and*
>
> *(b) avoid significant adverse effects and avoid, remedy or mitigate other adverse effects of activities on natural character in all other areas of the coastal environment;*
>
> *including by:*
>
> *(c) assessing the natural character of the coastal environment of the region or district, by mapping or otherwise identifying at least areas of high natural character; and*
>
> *(d) ensuring that regional policy statements, and plans, identify areas where preserving natural character requires objectives, policies and rules, and include those provisions.*
>
> *(2) Recognise that natural character is not the same as natural features and landscapes or amenity values and may include matters such as:*
>
> *(a) natural elements, processes and patterns;*
>
> *(b) biophysical, ecological, geological and geomorphological aspects;*
>
> *(c) natural landforms such as headlands, peninsulas, cliffs, dunes, wetlands, reefs, freshwater springs and surf breaks;*
>
> *(d) the natural movement of water and sediment;*
>
> *(e) the natural darkness of the night sky;*
>
> *(f) places or areas that are wild or scenic;*
>
> *(g) a range of natural character from pristine to modified; and*
>
> *(h) experiential attributes, including the sounds and smell of the sea; and their context or setting.*

167. In my experience, the definition and application of the concept of natural character is one of the most vexed issues in landscape assessment practice. Neither the RMA nor the NZCPS define natural character, but Policy 13.2 provides some guidance with the words "... natural character is not the same as natural features and landscapes or amenity values...", followed by a range of matters (13.2.(a)-(h)) that may be investigated in the course of natural character assessments.

168. The Regional Policy Statement (RPS) also refers to natural character of the coastal environment at Policy 3: *Protecting high natural character in the coastal environment – district and regional plans,* and Policy 4: *Identifying the landward extent of the coastal environment – district plans.*

169. An operational definition of natural character, and how matters (a)-(h) apply to natural character and its assessment is the subject of ongoing debate, particularly with respect to how 'experiential attributes' are to be understood and operationalised in natural character assessments.

170. While the NZ Institute of Landscape Architects has published rudimentary 'best practice' guidelines for landscape assessment[14], these do not address natural character assessment in any useful way, and in particular, natural character as it is understood in the context of the NZCPS (2010). There is no recognised best-practice approach to the assessment of natural character for the purposes of the NZCPS (2010). This comment extends to the absence of an accepted, unambiguous definition of natural character, and a valid and reliable method for its assessment.

171. The approach taken by Mr Boffa differs in some subtle yet significant respects from definitions and approaches to natural character assessment adopted by other landscape architects in regional, district and project-based natural character assessments. However, I consider Mr Boffa's approach to be robust, rigorous and defensible, and is close to what I consider is a best practice approach to natural character assessment.

172. I do not consider this report the appropriate context for the promotion of a preferred definition of natural character, or method for its assessment. Rather, I have considered Mr Boffa's assessment and report in a more pragmatic sense, with regard to how well it responds to statutory requirements for assessment and the consideration of effects.

[14] New Zealand Institute of Landscape Architects. (2010). *Best Practice Guide: Visual simulations BPG 10.2*. NZILA.

173. The NCA report does not reference a recently published Boffa Miskell Ltd (2016) study, *Wellington City and Hutt City Coastal Natural Character Assessment.* This study reports on the investigation of the natural character of the coastal environment, of Wellington City and Hutt City, including the location of the proposed runway extension. However, the study only mapped natural character at the level of High and above, and at a coarse scale of analysis. No High (or greater) levels of natural character are mapped within Lyall Bay or the area directly affected by the runway extension (Figure 6), although the Hue te Taka Peninsula at Moa Point is identified as having High natural character in its terrestrial component.

174. I consider the finer grained analysis of Mr Boffa's NCA study to be a more reliable level of assessment for project–level purposes, such as the runway extension.

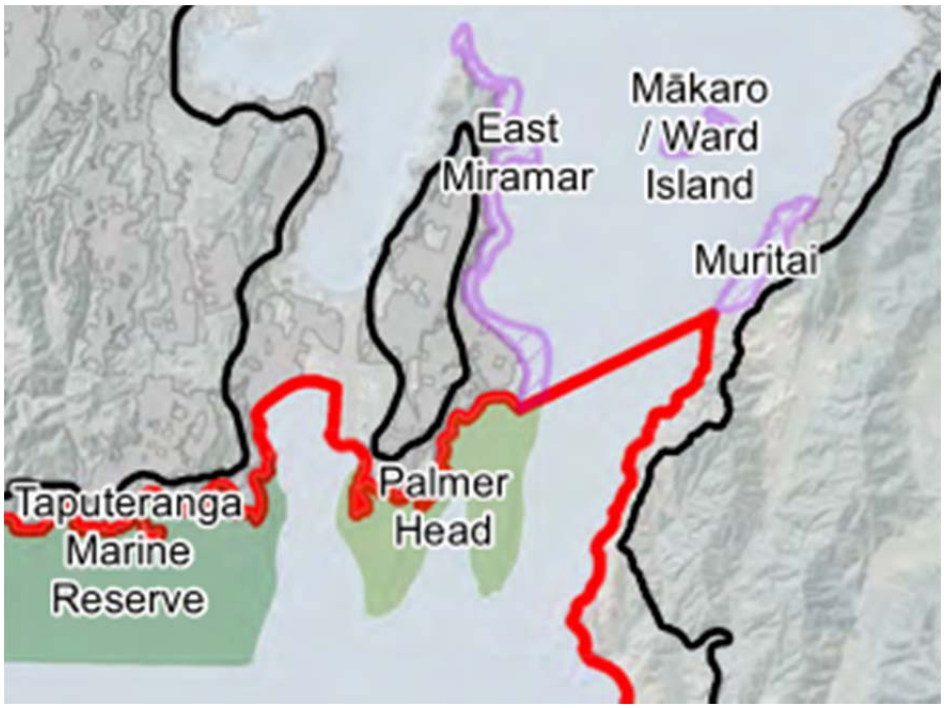

Figure 6: part Map 4, Coastal marine Area B: South Coast. Pale green = High natural character, Dark green = Very High natural character. The scale at which natural character has been mapped for the marine component of the coastal environment is too coarse to be reliable for the purposes of the runway extension natural character analysis. (Source: Boffa Miskell Ltd (2016) study, *Wellington City and Hutt City Coastal Natural Character Assessment.)*

Method applied to assessment

175. Any assessment task should be grounded in a clear and unambiguous definition of that which is to be assessed. For the purposes of the NCA, Mr Boffa's definition of natural character is similar to those that are applied, and generally accepted, in RMA-based landscape assessment:

> *Natural character is generally assessed on a continuum of modification that describes the expression of natural elements, patterns and processes (or the 'naturalness') in a coastal landscape/ecosystem where the degree of 'naturalness' depends on:*
>
> - *The extent to which natural elements, patterns and processes occur and are legible;*
> - *The nature and extent of human modifications to the landscape, marine area and ecosystems;*
> - *The proposition that the highest degree of natural character (greatest naturalness) occurs where there is least modification/uncluttered by obvious or disruptive human intervention and/or influence*

176. I consider this to be an acceptable definition for the purposes of the natural character assessment.

177. The assessment was undertaken with reference to the expression of natural elements, natural patterns and natural processes and the extent to which these have been modified by human intervention. As is sometimes done in other natural character assessments, natural elements, patterns and processes have been re-conceptualised into physical, biological and experiential factors. With input from NIWA scientists, these factors were assessed and rated within the terrestrial environment, and within different structural components of the Lyall Bay marine environment (beach, reefs and the bay, including water column and seabed).

178. The natural character of each of the broad categories of attributes (physical, biological and experiential) was assessed and rated with reference to a 7-range scale of natural character (Figure 7):

VERY HIGH	HIGH	MODERATE-HIGH	MODERATE	MODERATE-LOW	LOW	VERY LOW

Figure 7: 7-range scale of natural character for the assessment of the degree of natural character exhibited by a landscape or the coastal environment.

179. The application of this 7-range scale of natural character, endorsed by the Environment Court in *High Country Rosehip Orchards v Mackenzie District Council*[15], is becoming standard practice in natural character assessment. I support the use of this scale and consider it has been used appropriately in the NCA.

180. Marine and terrestrial components of the coastal environment have been assessed and rated separately, but accorded identical weight in determining a natural character rating for each area of the coastal environment assessed.

181. The coastal environment of the project environs has been assessed at a fine level of detail, according to "natural character component areas", as illustrated in Figure 5 of the NCA. As this is a project level assessment I consider this level of analysis appropriate and I agree with the definition of component areas. I accept there may be alternative approaches to this aspect of the assessment but the approach adopted provides utility and scope for a fine level of analysis.

182. The different attributes (physical, biological, experiential) were weighted such that the expression of physical and biological attributes was accorded greater prominence in determining natural character ratings. The weighting applied was:

Physical attributes	40%
Biological attributes	40%
Experiential attributes	20%

183. While I am unaware of any precedent for the application of such a weighting, and while there is no empirical basis that I am aware of for determining a valid ratio, I consider the approach adopted to be essentially sound, and reflects what I consider to be the relatively minor role of experiential attributes in rating natural character. I agree with, and endorse for the purpose of future assessments, the statement at paragraph 5.13 of the NCA:

[15] *High Country Rosehip Orchards v Mackenzie District Council* [2011] NZEnvC 387, at paragraph [93]

> *The basis for developing and applying the weightings noted above, is that natural character is a* ***condition*** *rather than a* ***quality*** *or* ***value*** *and to that extent, it exists regardless of experiential or perceived attributes*. [emphasis in original]

184. On the basis of this comment Mr Boffa may be considered generous in allocating experiential factors as much as 20% of the rating. However, these attributes are referred to in NZCPS 13.2(h), so some reference to them is justified. The issue remains to be resolved however, as to what experiential attributes are valid expressions of natural character.

185. The NCA, at paragraph 5.15, offers a helpful technique for determining the basis for adverse effects:

> *(i) Where natural character is assessed as being very high (VH) or high (H) a change considered to be significantly adverse, would be a reduction to a lower level of natural character.*
>
> *(ii) Where natural character is assessed as being moderate/high (MH) and less sensitive to change, a reduction to moderate/low or lower levels of natural character would generally be considered to be significantly adverse.*
>
> *(iii) Where natural character is assessed as being moderate (M), or below, there is limited potential to generate significant adverse effects within what is predominantly a modified coastal environment.*

186. I endorse this approach and consider it offers some rationale for what may otherwise appear a somewhat arbitrary approach to assessing the magnitude of effects.

187. NZCPS Policy 13.1(a) requires that areas of outstanding natural character within the coastal environment be identified and mapped. As with the assessment of coastal natural character generally, the definition and assessment of outstanding natural character (ONC) is a contested issue in RMA-based landscape assessment.

188. The NCA refers to ONC in the following terms:

> *Generally areas of outstanding natural character are identified and mapped following a comprehensive natural character assessment based on the 7 point scale referred to in paragraph 5.11.* [see Figure 4, above] *Outstanding candidate areas or parts of areas are selected where appropriate from those areas that have been assessed as having very high and/or high areas of natural character.*

189. A significant aspect of this approach is that ONC is not located on the same scale of natural character (the continuum from Very Low - Very High, my Figure 7). By this approach, ONC is regarded as a quality of characteristic that exists independently of

the scale, and therefore areas of High and Very High natural character may be identified also as Outstanding. The details of the process by which ONC is identified according to this approach are not specified in the NCA report, nor are critical criteria for 'outstandingness', in respect of natural character, identified.

190. A further insight into this interpretation of outstanding natural character is outlined in the Boffa Miskell Ltd (2016) *Wellington City and Hutt City Coastal Natural Character Assessment* (p.164):

> *An area with outstanding natural character may be an area within the coastal environment that is considered to have 'high' or 'very high' levels of natural character, although it is important to note that the 'high' or 'very high' ratings do not in themselves equate to 'outstanding', as clarified by the following Boffa Miskell definition:*
>
> > *'Outstanding' is a comparative evaluative term meaning; to stand out, exceptional, pre-eminent.*
>
> …
>
> *It was also determined that* ***outstanding natural character should combine both terrestrial and marine components*** *so that important sequences of ecological naturalness (such as from the top of a ridge above sea level to the bottom of the adjacent sea and interconnected systems) are considered.* [emphasis added]

191. A significant aspect of this approach is stated in the final paragraph quoted (and emphasised) above: that ONC is not attributed to terrestrial or marine components of the coastal environment in isolation, but only where they occur adjacent, in a continuous sequence. I agree with this interpretation of ONC, but I note that one of only two areas of ONC identified in the Boffa Miskell (2016) study is an isolated area of the marine environment – the Cook Strait Canyons

192. A different, competing interpretation of ONC places it on the same continuum of natural character, as the following annotated version of the scale of natural character (Figure 8) indicates:

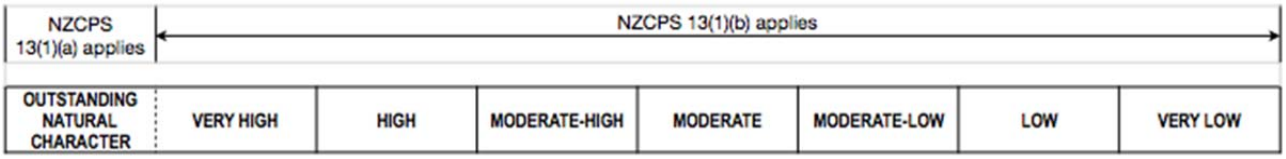

Figure 8: Alternative approach to ONC assessment: Outstanding Natural Character is understood as expressions of natural character considered at the extreme end of the Very High range of the scale, i.e. natural character approaching 'pristine' levels. It is generally accepted that pristine natural character, in the narrowest sense of the term, no longer exists, as all environments in NZ are to a degree, influenced by human agency.

193. By this approach, ONC cannot be identified within areas of the coastal environment that are otherwise identified as displaying High natural character. Only the most natural of areas rated Very High for natural character could be deemed to be ONC. The process and criteria used for identifying ONC by this approach would be the same as applies for the assessment of natural character generally - the expression of natural elements, patterns and processes and the extent to which these have been modified by human agency.

194. I consider there is insufficient information provided in the NCA to permit a critique of the technique applied to the assessment of ONC. Had this been provided, there is still the question remaining as to whether the most appropriate approach to the definition and assessment of ONC has been adopted. However, the absence of written analysis notwithstanding, I am satisfied that the issue has been given due consideration and a defensible conclusion has been reached as to the expression of ONC within the Lyall Bay coastal environment, that being that: "*...there are no areas of outstanding natural character within the Lyall Bay or its component areas, or within the south coast in the immediate vicinity of Lyall Bay*". (paragraph 7.1, p33, NCA report)

195. My approach to the assessment of ONC combines aspects of the two approaches outlined above. I agree with the principle that ONC is considered after a preliminary assessment of natural character for each of terrestrial and marine components of the coastal environment, but I do not regard areas identified as displaying High natural character as being candidates for ONC. The processes may be described simply as follows:

    195.1. The natural character of terrestrial and marine components of the coastal environment are assessed separately, and natural character is rated for each area with reference to the seven-range scale of natural character presented elsewhere in this report.

195.2. Outstanding natural character may be considered to exist in areas of the coastal environment where adjacent areas of marine and terrestrial environment are both rated Very High.

196. On the issue of the presence of ONC within the coastal environment of the project area, the NCA report concludes (paragraph 7.1) that:

> *...there are no areas of outstanding natural character within the Lyall Bay or its component areas, or within the south coast in the immediate vicinity of Lyall Bay.*

197. On the basis of the approach that I adopt, outlined above, I agree with this assessment. Neither the terrestrial nor the marine components of the Lyall Bay coastal environment rate Very High for natural character .

198. Regardless of which of the two approaches to ONC discussed above is adopted, I consider it a reasonable, defensible conclusion that ONC does not exist within the Lyall Bay area. This assessment is supported by the Boffa Miskell (2016) *Wellington City and Hutt City Coastal Natural Character Assessment*.

Restoration of Natural Character

199. Brief mention is made of NZCPS Policy 14 Restoration of Natural Character at NCA paragraph 4.9, where it is stated:

> ...more specific details relative to overall restoration and/or rehabilitation and mitigation of landscape and marine effects are reviewed and discussed in other reports.

200. I understand that significant aspects of the restoration of natural character in this context fall within the discipline of ecological restoration. While I have located some relevant references to ecological restoration proposals in the ecological technical report[16], some specific reference to these reports and a general summary of the proposed restoration initiative would have been helpful in the NCA report.

201. As noted above, I consider the Moa Point embayment to be an important location for both landscape/urban design and the restoration of natural character. Rather than accepting a reduction in natural character from moderate to low within this area, it is my opinion that landscape design and ecological restoration efforts should be directed towards at least maintaining the natural character of this area at moderate.

[16] Technical Report 19, Assessment of Ecological Effects

Natural Character Effects: Conclusions and recommendations

202. The project is clearly located within the coastal environment, and thus is subject to NZCPS Policy 13 and RMA section 6(a).

203. I consider the spatial basis for the assessment of natural character appropriate and the natural character ratings assessed by Mr Boffa to be soundly based.

204. The findings of the natural character assessments of the Lyall Bay component areas (as illustrated, NCA Figure 5) are clearly presented in tabular form in paragraph 6.57 and an overall summary provided at paragraph 6.60. I consider these tables offer rather more detail and information on the basis for natural character ratings than is often the case in natural character assessments, and such an approach is to be endorsed and encouraged.

205. It is generally recognised that the effects of different types of modification to natural character will be perceived differently between individuals or sections of the community. Much will depend upon the individual schemas that are applied to the concept of natural character and its recognition. In order that robust comparisons can be made I consider it important that assumptions and principles that underpin differing assessments be made clear, such that the basis for differences become apparent. In my opinion the NCA undertaken by Mr Boffa provides a generally well articulated, credible basis for understanding the natural character of the environs of the project, and likely effects on levels of natural character, as reported in paragraphs 6.56-6.57 and 6.60 of his report and summarised in the following table, taken from the NCA (p.33):

Natural Character	Pre-Construction	Post Construction
South Coast	High	High
Lyall Bay Overall	Moderate	Moderate
Lyall Bay Component Areas		
Hue te Taka Peninsula	High	High
Moa Point Embayment	Moderate	Low
Airport	Low	Very Low
Lyall Bay Beach	Moderate/Low	Moderate/Low
Western Shore	Moderate	Moderate
Te Raekaihau Point	High	High
Inner Bay (Marine)	Moderate	Moderate
Outer Bay (Marine)	Moderate/High	Moderate/High

Table 1: Summary of pre-construction and post-construction natural character ratings for Lyall Bay. Source: Natural Character Assessment (Technical Report 25) p.33

206. I expect that there may be opinions expressed maintaining that experiential factors should weigh more heavily in the assessment on natural character on Wellington's South Coast than has been the case in the NCA. It is certainly an environment within which the experience of natural forces and phenomena (wind, rain, atmospheric effects) feature prominently in the human experience of places such as Lyall Bay and nearby coastal environs. However, in my opinion, these experiences have more to do with the appreciation of the aesthetic quality of the South Coast landscape/seascape and amenity, than they do natural character. I consider it appropriate to place greater weight upon the more objective, tangible and less transient attributes that are indicative of the condition or state of natural character, as Mr Boffa has done.

207. I endorse the approach adopted by Mr Boffa (NCA paragraph 5.15) for considering the level of effects to be objective and in general I concur with Mr Boffa's assessment of the nature and magnitude of effects, as summarised in Table 1, above. Applying Mr Boffa's approach, only two component areas of the coastal environment will exhibit consequent reductions in natural character. These are:

    207.1. The natural character of the Moa Point Embayment will be reduced from moderate to low,

207.2. The natural character of the Airport component area will be reduced from low to very low.

208. I consider the effects on the Airport component area to be acceptable, providing the mitigation measures proposed in the ecological report are implemented. These include the roughening of Accropodes to create habitat suited to colonisation by marine organisms, and the re-establishment of marine organisms previously collected from the area of the submerged reef to be covered by the extension.

209. Regarding the Moa Point embayment component area; Mr Boffa rates the level of natural character for this area as being moderate (Pre-construction) and low (Post-construction), but does not comment on whether he considers this to be an acceptable end state, nor does he comment on the potential of mitigation measures to counter the decline in natural character within this area. While Mr Boffa's ratings may appear justifiable assessments in the absence of any mitigation, I do not regard a low natural character rating as being an acceptable outcome for this component area, post-construction. Given the mitigation proposals outlined in the Landscape and Visual Assessment Report 24, and with due regard to NZCPS Policy 14, I consider a reasonable objective would be to maintain the natural character level at moderate by means of ecological restoration and habitat creation and enhancement.

210. I also have reservations concerning Mr Boffa's comments on the likely effects on natural character of the proposed Submerged Wave Focussing Structure (SWFS) (NCA paragraph 6.49, last bullet point). As I state elsewhere in this report, the likely effects of the extension on the natural character of the marine area of Lyall Bay will depend upon (1) the effects of the proposed runway extension on natural wave patterns within Lyall Bay, and (2) the role of the SWFS in further modifying natural wave patterns. In addition, there is the effect of the structure itself (an artificial element in an otherwise predominantly natural environment), and the effects of the structure on coastal processes. I understand these to be contested or undetermined issues, and are the domain of oceanography experts to investigate and comment upon. My understanding is that there is insufficient data available upon which to make predictions on the likely natural character effects of the SWFS, and on this basis it is premature to predict, as Mr Boffa does, that the effects will be "slight".

211. While largely outside of the scope of the natural character assessment undertaken by Mr Boffa, the project clearly provides a range of opportunities for the application of NZCPS Policy 14, concerning the restoration of natural character. Aspects of this fall largely within the domain of the marine ecology, ecological restoration and landscape architecture/urban design disciplines. To this end I endorse the proposed conditions of consent (Conditions 80-85) that provide for the preparation and implementation

of an Ecological Mitigation and Management Plan (EMMP) (discussed also at Section 8.3.1.8, p.228 Assessment of Environmental Effects).

PART D: Response to Pubic Submissions

General

212. While many submissions refer to the prospect of adverse effects on recreation, landscape, visual amenity and natural character, I consider that to a large extent the issues raised with respect to these areas of concern have been adequately covered in the main body of my report. I comment on submissions from Clive Anstey and Yvonne Weeber, as the issues raised by these submitters are more detailed than other submitters on the same matters. My comments on the submissions of Mr Anstey and Ms Weeber are, to a large extent, relevant to all submitters on these same matters.

213. As a general comment regarding Mr Anstey's and Ms Weeber's submissions, I note that a common issue emerging from both submissions (and submissions generally on the same matters) are differences of opinion regarding the magnitude of adverse effects. Mr Anstey's and Ms Weeber's assessment of the adversity of effects is generally higher than the assessments reached by the authors of the Landscape and Visual, and Natural Character reports (Technical Reports 24 and 25).

214. I note that in the case of Mr Evan's assessment of landscape and visual effects, he follows a structured process of assessment, within which the magnitude of effects are determined with respect to criteria or indicators. Mr Boffa follows a similar process with respect to natural character. While I have commented that Mr Evan's assessment framework, while following GLVIA3 guidelines, is somewhat idiosyncratic, it does provide for a structured, reasoned approach to the assessment of effects. Mr Anstey's assessments are not reached with reference to an explicit assessment framework, and indeed it is likely that Mr Anstey refers to a different set of assessment criteria to Mr Evans. The resolution of such differences is difficult in the absence of a common, agreed assessment framework.[17]

215. Similar issues arise in comparing opinions expressed regarding ratings of the natural character of the coastal environment. For opinions as to natural character levels to be comparable, it requires that assessors refer to the same scale of natural character. Mr Boffa apples a 7-range scale of natural character, but the scale that is referenced in Mr Anstey's and Ms Weeber's submissions is not stated. Accordingly, it cannot be

[17] I understand Mr Anstey to be a NZILA Registered Landscape Architect and as such, he has the necessary expertise and experience to assess natural character. However, I understand his submission is that of an affected stakeholder rather than an impartial expert.

assumed that a rating of 'high', as used by the submitters, refers to the same level of natural character as the same term when used by Mr Boffa (see Figure 9).

Very High	High	Moderate-High	Moderate	Moderate-Low	Low	Very Low

Very High	High	Moderate	Low	Very Low

Figure 9: The importance of assessments of natural character referencing the same scale is evident from the two scales illustrated above: the upper scale is a seven-range scale such as is used by Mr Boffa, and the below, a five-range scale. Both scales cover the same overall range of natural character, but the equivalence between individual sectors on each scale is limited: for example, high refers to a different span of natural character on each scale, and thus a high rating is not directly equivalent. Where submitters do not reference any scale, there is little basis for comparison between opinions on levels of natural character.

Clive Anstey

216. Discussing amenity effects at paragraph 7, Mr Anstey states:

> *The environmental effects of the proposal, its construction and the completed extension, are explored by various experts and consultants, each dealing with their discrete areas of responsibility. This makes it difficult to gain any sense of cumulative effects. For example the effects on 'amenity' must address the combination of noise effects, visual effects, dust effects, just to name the obvious.*

217. I agree with this comment. I am of the opinion that amenity effects should be documented in a single source, incorporating an holistic assessment of amenity effects, rather than the fragmented approach currently taken by the applicant's experts. As Mr Anstey recognises, any sense of cumulative adverse effects on amenity is lost through a fragmented approach.

218. At paragraph 9 Mr Anstey states that the South Coast has high natural character. This may reflect popular conceptions of the natural character of the South Coast. However, in the context of NZCPS assessments this can be regarded as a generalisation. The Boffa Miskell (2016) *Wellington City and Hutt City Coastal Natural Character Assessment* identified limited areas of high and very high natural character around the South Coast: Pencarrow Head is rated high, while Turakirae Head is rated very high, but otherwise the South Coast generally and Lyall Bay are rated moderate-high. Mr Boffa has undertaken an analysis of natural character at a

finer grain, and he has identified a range of levels of natural character within the marine and terrestrial environments of the Bay.

219. Mr Anstey is critical of Mr Boffa's assessment of the magnitude of effects, claiming effects to be "extremely adverse and entirely unacceptable". In my opinion Mr Boffa has undertaken his assessment on the basis of an explicit method, and he has presented a reasoned analysis of the likely scale of effects on natural character.

220. In paragraph 15 of his submission, Mr Anstey comments on the assessed magnitude of adverse visual effects, and refers to one of the assumptions drawn from the GLVIA3 and applied to Mr Evans' assessment of affects:

> *The Landscape and Amenity report argues that the effects on residents are of greater importance than the effects on visitors. In the coastal environment there are few residents and high numbers of visitors so that effects are considered to be of a lesser significance than in areas where resident numbers are high.*

221. In my opinion, such comments serve to highlight the problem of adopting untested assumptions as the basis for assessment. Concerning visitors regard for adverse effects, Mr Anstey may be correct - or Mr Evan's may be correct. However the argument that each presents cannot be substantiated in the absence of structured consultation on community perceptions of visual effects. In my opinion, many visitors to the South Coast are likely to be as sensitive to adverse visual effects as residents.

222. At paragraph 17, Mr Anstey notes:

> *None of the applicants reports attempts any serious analysis of who visits the coast and what they do. If this analysis were undertaken it would highlight the rich diversity of activities that occur and how much they depend on the quality of the marine environment*

223. Similar opinions are expressed elsewhere in his submission (paragraph 21). I have commented on the deficiencies of the on-line survey in the Recreation section of my report, and I have also commented that the participant observation studied undertaken were inadequate. The applicant has agreed to undertake further participant observation studies, which, if appropriately designed and implemented should address identified inadequacies of existing recreation investigations.

Yvonne Weeber

224. Paragraph 6.12 of Yvonne Weeber's report raises the issue of inadequacies in the participant observation study undertaken for the Assessment of Effects on Recreation:

The use of the public spaces in the Lyall Bay and Moa Point is not adequately analysed in the applicant's Technical report 6 Assessment of Effects on Recreation. The 16 days that personal observation took place would not have included recreational families swimming and playing in the area as in the height of summer. The 16 days between the 13 March and 1 April 2015 used for personal observation would be considered as autumnal sea conditions where the sea temperature is dropping and the number of swimmers would have been very low. Hence the area where the highest amount of swimming actually takes place cannot be accurately represented in this report. The report also does not appear to have been taken on a Sunday when the number of people undertaking recreational activities on Lyall Bay can be higher.

225. I agree with this comment and it is addressed in the main body of my report. The applicant has agreed to rectify this shortcoming (see also comment in response to Mr Anstey's submission, above).

226. At paragraph 11.6, Ms Weeber states:

I consider the findings of the landscape and visual assessment are incorrect and understate the effects of the proposed reclamation due to the existing situation.

...and at 11.8:

I consider the significance of visual effects of the proposed reclamation would range from high to extreme and are understated in the Boffa Miskell assessment.

227. As I have noted in my general introductory comments, and with reference to Mr Anstey's submission, I consider Mr Evan's assessment to be reasonable insofar as the assessment framework he has developed and adopted is concerned. The different conclusions reached by Ms Weeber (and Mr Anstey) are likely to be based upon a different (but unstated) assessment framework.

PART E: Overall Conclusions and Recommendations

Recreation

228. The Assessment of Effects on Recreation (Technical Report 6) paints a very generalised picture of the recreational use of Lyall Bay. While the methods selected for the investigation were sound in principle, the implementation of the methods has been inadequate in terms of survey/investigation design and sampling. The investigations have yielded data of limited relevance and utility to the issue under investigation.

229. Several submitters[18] have remarked on the failure of the recreation assessment to identify the behavioural and spatial characteristics of the recreational use of Lyall Bay. The decision of the applicant to conduct further recreation surveys prior to the hearing is acknowledged and supported.

230. Short term adverse effects during the construction period will be experienced by a wide range of recreational users. Some of these effects, such as the effects of heavy traffic on cyclists and pedestrians, may be manageable through the Construction Traffic Management Plan, or through short term recreational behaviour modification by recreationists Some recreations may refrain from certain activities during the period of construction, or may seek alternative locations for their preferred activities. I consider short term effects with respect to land-based recreational activities to be minor, or less than minor, and acceptable. If adequately constituted, I consider the proposed Community Liaison Group and associated Stakeholders and Communication Management Plan will provide an appropriate mechanism for stakeholder feedback on matters that may arise in the course of construction.

231. The effects of exclusion zones may not be fully appreciated until these areas are established and their spatial extent becomes apparent. The exclusion zone for the SWFS is likely to have the greatest impact on the activities of Lyall Bay water-based recreationists, but uncertainties regarding the design of this structure prevent an accurate estimate of effects. I consider short term effects on water-based recreational activities, such as surfing and gathering kai moana are likely to be more than minor within the areas of the exclusion zones, but acceptability will differ with activity and location. For the main construction exclusion zone, I consider the short-term effects to be acceptable.

[18] Including Dr Sea Rotmann, Mr Clive Anstey, Ms Yvonne Weeber, the Surfbreak Protection Society

232. The exclusion zone for the SWFS is likely to have the greatest impact on the activities of Lyall Bay water-based recreationists, particularly surfers. However, uncertainties regarding the design of this structure prevent an accurate estimate of effects. It is possible that adverse effects arising from the SWFS exclusion zone may be unacceptably adverse in the short term, and unable to be mitigated.

233. Other than the certain loss of the Airport Rights surf break, which I regard as a significantly adverse effect that cannot be mitigated, the likely long term (post-construction) effects on surfing amenity are uncertain. If DHI (Technical Report 11) predictions as to the likely reductions in the number of rides should prove accurate, then I regard the long term adverse effects on surfing amenity to be more than minor. However, there is some uncertainty as to likely nature of effects on waves and the implications for surfing amenity. I rely on the opinion of Dr Goring in noting that the DHI predictions may not transpire, and that effects on surfing amenity may be minor, or less than minor.

234. The lack of detail concerning the design and operation of the SWFS creates a situation of uncertainty regarding the potential of this proposal to mitigate adverse effects on surf breaks (other than the Airport Rights break, which will be lost). I rely on the opinion of Dr Goring in noting that the SWFS may not be necessary, and if constructed, may not perform as predicted.

235. Landscape and urban design proposals for publicly accessible walking areas (promenade and lookout points, and Moa Point access) will enhance recreational opportunities for walkers.

236. What are likely to be minor short term construction-period adverse effects on recreation generally may arise as a consequence of noise, dust and the possibility of suspended sediment plumes in the waters of Lyall Bay. The avoidance or management of these effects through proposed consent conditions (e.g., proposed conditions 45 (noise), dust (36-41), erosion and sediment (61-65)) and associated management plans[19] is likely to restrict such short-term effects to acceptable levels.

[19] e.g., Community Liaison and Stakeholders and Communication Management Plan (SCMP), Construction Noise and Vibration Management Plan (CNVMP) Erosion and Sediment Control Plan (ESCP), Construction Air Quality Management Plan (CAQMP), Construction Traffic Management Plan (CTMP)

Landscape and Visual

237. I agree with the definition of the landscape context of the proposal as defined in the ALVE report (Figure 8). Consistent with NZCPS Policy 15, the defined landscape incorporates terrestrial landscape, and seascape. The presence of features (as recognised in NZCPS Policy 15 is acknowledged but no specific features are identified or mapped.

238. The separate status of the Coastal Marine Area of Lyall Bay CMA as a seascape, distinct from the terrestrial landscape, has not been considered, nor has the possibility been considered that the Lyall Bay seascape could also be regarded as a seascape feature.

239. The ALVE report does not recognise the wider Lyall Bay landscape/seascape as a natural landscape/seascape for the purposes of a NZCPS Policy 15 assessment of outstanding natural landscapes (including seascapes) and features. I agree with this assessment.

240. Considering the Lyall Bay CMA area as a seascape feature, independently of the terrestrial landscape, I consider this seascape feature to rate Moderate-High to High for natural character, and as such may be regarded as a natural seascape or seascape feature, and subject to NZCPS Policy 15(b).

241. I do not regard the seascape feature of Lyall Bay to be outstanding, and consequently I do not regard the area as being subject to NZCPS Policy 15(a).

242. The ALVE report rates effects with reference to three separate 7-range Significance of Effects scales. These scale includes indicative criteria for the rating of effects that constrains the factors that may be taken into account in assessing the level of effects. A summary of effects is provided in tabular form in the ALVE report (p.44). I am in general agreement with the ALVE assessment of effects insofar as these particular scales are concerned.

243. In my opinion the effects of the proposal on Lyall Bay as a seascape feature, are not significantly adverse, and as such do not reach a level requiring avoidance by NZCPS Policy 15(b). I regard the effects as adverse, but acceptably so, and able to be mitigated to an extent through marine and terrestrial ecological restoration initiatives directed towards the restoration of natural character.

244. Regarding biophysical and landscape character effects, in my opinion the effects are more than moderately adverse, as the ALVE report (p.44) assesses them to be. The relatively small scale of the Moa Point embayment compared with Lyall Bay west, and

its immediate proximity to the extension, makes it an area more susceptible to changes in landscape character.

245. In my opinion, and with reference to the scales of biophysical and landscape character effects applied in the ALVE report, I rate the post-construction effects on the Lyall Bay east landscape area as high, rather than moderate. While high, I consider the effects to be acceptable, and able to be mitigated to an extent through landscape design and ecological restoration initiatives. I agree with the ALVE report that the landscape/seascape character effects on the western side of Lyall Bay are considered to be low with reference to the scale applied in the ALVE report, and in my opinion are acceptable.

246. The method applied to the assessment of visual amenity affects is based upon guidelines published by a recognised professional institute (GLVIA3), is transparent in its application, and the assumptions underpinning the analysis are made explicit. Within these parameters , and with reference to the criteria established by Mr Evans in his assessment, I agree with his assessment of effects, as summarised in the table presented on p.36 of the ALVE report.

247. The area that will experience the greatest level of adverse visual effects is the Moa Point embayment, where effects are estimated in the ALVE report as being High to Very High.. These adverse effects derive to a large extent from the intrusion of the proposed extension into the field of view from residences on Moa Point Road and the Moa Point embayment beach (see visualisations represented in Figures 20D and 20F, ALVE Report). I rate the visual amenity effects from the Moa Point beach and adjacent residential dwellings on Moa Point Road to be unacceptably adverse and unable to be remedied or mitigated. For all other areas I regard the adverse visual effects to be minor, or less than minor, and acceptable.

248. I consider the criteria applied by Mr Evans to the assessment of adverse visual effects may not be shared by the community. In the absence of community consultation on the matter of visual effects I consider Mr Evans' assessment to be valid and reliable insofar as his professional judgement is concerned, but not necessarily representative of community opinion.

249. While I acknowledge the unacceptable level of adverse visual amenity effects experienced from Moa Point, as represented in the visualisations I refer to above, I consider there to be aspects of visual amenity that can be mitigated at a local level. While the preservation of the natural character of the coastal environment is required in itself (as I address in the next section), the perception of natural character is an aspect of the appreciation of visual amenity generally.

250. The magnitude of changes to the landscape/seascape character and visual amenity of the Moa Point embayment justify a significant input of ecological restoration and landscape design expertise to achieve some mitigation of the natural character effects of the proposal. The ALVE acknowledges the issues, and indicative, conceptual proposals have been prepared, all of which I endorse. However I regard the level of detail provided in the design proposals as they currently stand to be insufficient for the purposes of judging the adequacy of this aspect of mitigation.

Natural Character

251. The Natural Character Assessment (NCA) locates the project within the coastal environment, and thus is subject to NZCPS Policy 13. In my opinion this is an indisputable fact.

252. A coastal natural character study has been undertaken for Wellington and Hutt City (Boffa Miskell Ltd, 2016). This study has not been cited in the NCA, but I consider it to have limited utility for the runway extension project, given the coarse level of analysis at which coastal natural character was assessed. The Boffa Miskell (2016) study identified Lyall bay as having moderate-high natural character.

253. Mr Boffa has adopted a finer grain of analysis for his study and has undertaken an appropriate spatial analysis of natural character according to component areas of Lyall Bay. In my opinion, Mr Boffa's assessment of coastal natural character is appropriate for the purposes of project-scale analysis.

254. I consider the natural character ratings assessed by Mr Boffa have been arrived at by a valid method of analysis and are soundly based. The findings of the natural character assessment of the Lyall Bay component areas are clearly presented in tabular form in paragraph 6.57 and an overall summary provided at paragraph 6.60. I consider the natural character ratings pre- and post-construction to be credible and based on sound analysis.

255. Mr Boffa has found there to be no areas of outstanding natural character (ONC) within the Lyall Bay or its component areas, or within the south coast in the immediate vicinity of Lyall Bay. I agree with Mr Boffa's assessment; I consider it a reasonable, defensible conclusion that ONC does not exist within the Lyall Bay area. This assessment is supported by the Boffa Miskell (2016) *Wellington City and Hutt City Coastal Natural Character Assessment*.

256. I endorse the approach adopted by Mr Boffa (NCA report paragraph 5.15) for considering the magnitude of adverse effects to be objective, and in general I concur with Mr Boffa's assessment of the nature and magnitude of effects. Two component

areas of the coastal environment will exhibit consequent reductions in natural character post-construction. These are:

256.1. The natural character of the Moa Point Embayment will be reduced from moderate to low,

256.2. The natural character of the Airport component area will be reduced from low to very low.

257. I consider the effects on the Airport component area to be acceptable, providing the mitigation measures proposed in Technical Report 19 (Assessment of Ecological Effects) are implemented. These include the roughening of Accropodes to create habitat suited to colonisation by marine organisms, and the re-establishment of marine organisms previously collected from the area of the submerged reef to be covered by the extension.

258. Mr Boffa rates the natural character for the Moa Point embayment area as being Moderate (Pre-construction) and Low (Post-construction). In terms of the RMA scale of adverse effects, I consider this to be an adverse effect that is more than minor, but an adverse effect which is able to be mitigated to an extent.

259. I do not regard a Low natural character rating as being an acceptable post-construction outcome for the Moa Point embayment component area. I consider it feasible to maintain the natural character rating of the Moa Point embayment at the level of Moderate by means of ecological restoration and habitat creation and enhancement.

260. Within all other component areas of Lyall Bay I consider the effects of the proposal on natural character to be less than minor, and acceptable.

261. I have reservations concerning Mr Boffa's comments on the likely effects on natural character of the proposed Submerged Wave Focussing Structure (SWFS). My understanding is that there is insufficient data available upon which to make predictions on the likely natural character effects of the SWFS, and on this basis it is premature to predict, as Mr Boffa does, that the effects will be "slight", which I take to mean less than minor.

Recommendations

262. Recommendations arising from my review of Technical Report 6 (Recreation) are;

262.1. Construction Traffic Management Plan (CTMP): I recommend that representatives of cycling advocacy groups should be involved in the preparation of this plan.

262.2. Community Liaison Group (CLG): Condition 10(a) (iv) should include a representative of the surfing and surf life-saving communities.

262.3. Participant observation investigation: I recommend that the applicant undertake a further participant observation investigation into the spatial and temporal use of Lyall Bay for recreational activities. The investigation should record participant numbers according to land and sea-based activities, and be designed to provide data on seasonal and temporal variations in use, the influences of weather on activities and user numbers, and the spatial distribution of recreational activities.

263. Recommendations arising from my review of Technical Report 24 (ALVE):

263.1. Notwithstanding the applicant's response (dated 16 July) to the request for further information (dated 16 June) (see full text, Appendix 2), I remain of the opinion that the applicant should undertake a community consultation investigation into visual effects for the purposes of validating the scale of visual amenity effects and conclusions of the ALVE report.

264. Recommendations arising from the Technical Reports 24 & 25 (ALVE, and Natural Character):

264.1. I consider the landscape and urban design proposals for the Moa Point area to be inadequately resolved and require further development prior to the hearing on this matter. Aspects requiring particular attention include: provision for safe public access within a high hazard area, the elimination of the acute angled interface between embayment and extension and the creation of a more naturalistic form to the bay, the transition and integration of materials from the natural materials of the embayment to the Accropodes of the extension, and the design of aesthetically and ecologically fitting Accropodes.

264.2. Integral to this process is the restoration and enhancement of natural character within the Moa Point embayment, with the objective of maintaining

natural character levels at the level of moderate, rather than accepting a reduction to low, as anticipated by Mr Boffa.

264.3. In my opinion, an appropriate strategy for achieving an acceptable outcome for the Moa Point embayment area would involve the preparation of an integrated ecological restoration and development plan, drawing upon the skills of terrestrial and marine ecologists, natural character experts, landscape and urban designers, coastal process experts, and such other disciplinary inputs as are considered necessary.

264.4. I am reluctant to specify the maintenance of moderate levels of natural character within the Moa Point embayment as a condition of consent, given the somewhat imprecise and conceptual nature of natural character, and variations in the methods by which it is assessed. I am unaware of any objective basis for verifying the compliance with a condition requiring the maintenance of natural character at a particular level. In lieu of a specific condition requiring the maintenance of a particular level of natural character, I consider a comprehensive, multi-disciplinary approach to ecological restoration and design, with a moderate natural character objective in mind, to be an appropriate response.

Michael Lawrence Steven

October 7, 16

Appendix 1: Requests for Further information: Recreation Effects

First Request (Dated 20 May 2016)

2.20 Participant observation has been used to investigate human behaviour in public spaces, and the application reports on data collected on seven days during March 2015. Given the limited data set, please outline any limitations that should be recognised in drawing conclusions from the data, including:

- *The design of the participant observation technique used;*
- *Any circumstances that were prevailing on the days which observations were conducted (e.g. weather) that may have influenced the data;*
- *What level of activity might have been reported had observations been made at other times of the year – particularly in peak summer months*
- *What further observation investigations need to be undertaken to understand recreational use in Lyall Bay*

Tables 7-2, 7-3 and 7-4 all refer to Scenario 1 as being a "Large Event" and not a "Common Surf Event" (or common surf conditions). Paragraph 7.3.10 of the AEE report states: "Modelling such a structure for Scenario 1 (common surf conditions) predicted a longer right hand and left hand rides with larger wave face heights in the lee of the structure". Please clarify to which surfing scenario the paragraph cited above refers.

The application proposes a number of amenity & recreational improvements in the vicinity of the project that is outside land owned by WIAL, which will form part of the overall mitigation. Please provide confirmation that landowner approval has been sought, and is likely to be forthcoming, for the establishment of such works.

First Response (Dated 13 June 2016)

The observations were carried out to quantify what type and what level of use takes place in and around Lyall Bay during March. In light of the fact that there were no data available on the levels of recreational use of Lyall Bay, the observations were carried out to provide some context. This enabled the formulation of a picture of how busy Lyall Bay gets on a sunny day in March – and from this – it is easier to make more specific assumptions about the level of use the area gets in winter, summer and spring. It is likely that observations undertaken during sunny days in summer would show higher levels of participation in recreation activities than in March.

The observation technique was structured around fine days when use of Lyall Bay would be highest and where people were likely involved in a wider range of activities than on

less-favourable weather days. While observing "low-use" days can also be useful, the need in this case was to explore how busy the place gets and what, if any, issues arise as a result. For instance, the observations provided insight into how busy The Corner car park becomes, including frequent pedestrian crossings between the car park and the

Spruce Goose Café. This in turn was raised as a potential issue for management of the haul routes.

The observations undertaken are specific to March. Undertaking observations on sunny/calm and sunny/windy days in spring, summer and winter (when most activity takes place) would provide a more complete picture of the potential maximum volumes of use that Lyall Bay could receive at any time of the year.

To clarify the reference to "common surf event" in Paragraph 7.3.10 of the AEE is incorrect and should refer to "large or high surf quality wave event".

With regard to the urban design and amenity features that are proposed, the land affected is owned by WCC and WIAL is working with the appropriate Council personnel in this regard. A Memorandum of Understanding is being prepared which sets out the proposed works and associated establishment and ongoing maintenance requirements and obligations. These works will also be set out in the Landscape and Urban Design Management Plan (refer Appendix G) which will be prepared in consultation with key stakeholders including WCC and neighbours and any conditions that imposed by the decision maker.

Second Request (Dated 16 June 2016)

4 There is a very limited data set from participant observation of recreational activity in Lyall Bay, which informed the assessment of recreational effects. The applicant's response (refer to letter dated 13 June 2016) appears to acknowledge this shortcoming but does not propose a strategy to deal with this issue. Please undertake further investigation and submit a more representative assessment of the recreational use of Lyall Bay. GWRC recommend this study is conducted through to the summer of 2016/17 (to capture a seasonal spread of recreational use), with findings available for decision makers at the consent hearing.

Second Response (Dated I July 2016)

4 The Applicant is prepared to undertake some further survey work during 2016 and for this to form part of the Applicant's evidence for the hearing.

Appendix 2: Request for further information: Landscape & Visual Effects

Request (Dated 16 June 2016)

5 The applicant's response to Question 2.21 (refer to the applicant's letter dated 13 June 2016) states the landscape and visual assessment has been undertaken with reference to UK 'best practice' guidelines. These guidelines are underpinned by a number of (probably untested) assumptions, the basis for which is unreferenced in the guidelines document. GWRC is not aware of any evidence provided by the applicant that supports the proposition that the magnitude of visual effects can be generalised between two broad groups; 'residents' and 'transients', or that the occupation of viewers has any bearing on the magnitude of visual effects and if this generalisation has some basis at the most coarse level of analysis for the UK, such assumptions also apply in NZ. Therefore, please undertake and submit a visual effects investigation or survey that provides a more valid and reliable basis for decision making than the current professionally-based assessment, based as it is upon untested assumptions from the UK context.

Response (Dated 1 July 2016)

Boffa Miskell (Mr Boyden Evans) has considered the request relating to the landscape and visual assessment and has provided the following response to this request:

- *Guidelines for Landscape and Visual Impact Assessment Third Edition (GLVIA3) is accepted best practice guidance in the UK and has been referenced on New Zealand's Quality Planning website (Plan Topic: Land) as relevant landscape assessment guidance material. Given this, GLVIA3 provides a basis from which a valid and reliable best practice approach of assessing landscape and visual effects can be applied.*

- *GLVIA3 identifies that the sensitivity of the viewing audience is influenced by the occupation or activity of people. This recognises that people whose attention or interest is likely to be focussed on the landscape and on particular views are more sensitive to change. An understanding of visual sensitivity is separate from an understanding of the magnitude of change which can be observed from any given viewpoint. Put simply, some viewpoints are more susceptible to change than others.*

- *Viewing audiences with the greatest levels of sensitivity are likely to include residents or visitors to attractions where views of the surroundings are an important contributor to the experience. Conversely, transient viewing audiences are likely to have less sensitivity. GLVIA3 identifies that the views of travellers, including those using road, rail and other transport routes tend to have a moderate level of sensitivity,*

whilst noting some scenic routes may have increased awareness of views and higher levels of sensitivity.

- *The magnitude of change assesses the degree to which the proposed development would change an available view. The greater the extent that development permanently changes a view, the higher the magnitude of change will be. Such change can be assessed irrespective of how sensitive the location that such change is observed from. Notwithstanding this, a change in view is not automatically negative and does not automatically generate adverse visual effects; it needs to be considered in terms of the context and sensitivity of the view available.*

- *To assess views of the WIAL runway extension, an understanding of the sensitivity of the viewing audience is combined with the magnitude of change to understand the overall significance of visual effects. Within the assessment of landscape and visual effects used to support the airport runway project, the basis through which such factors have influenced this assessment have been described for each identified viewpoint using the table set out in the methodology.*

- *It is also worth noting that sensitivity of the viewing audience is a matter that has been around for some in landscape assessment methodology; it is covered in both the first and second versions of the Guidelines for Landscape and Visual Impact Assessment published by the Landscape Institute and Institute of Environmental Assessment in the UK, which were published in 1995 and 2002 respectively.*

- *Accordingly it is considered that the visual effects assessment provided as part of the Application has utilised an appropriate methodology and no further assessment is required.*

Annexure 3: Traffic

Steve Spence

Wellington Airport Runway Extension Consent

Traffic Assessment

Introduction

1. My full name is **Robert Stephen Spence**. I am employed by the Wellington City Council (**Council**) in the position of Chief Transport Advisor in the City Networks Group.

Qualifications and experience

2. I am a Chartered Civil Engineer, a member of the Institution of Professional Engineers New Zealand (MIPENZ) a Member of the Institution of Civil Engineers, United Kingdom (MICE) and hold a post graduate Diploma in Traffic Engineering. I am also a member of the IPENZ Transportation Group.

3. I have been engaged in the planning, design, construction and management of roads and traffic systems for over 35 years, both in the United Kingdom and in New Zealand.

4. I have been employed by Wellington City Council for over 30 years, holding various positions in the Town Planning, City Engineer's, Policy and Infrastructure departments including City Traffic Engineer, Manager Transportation and Traffic, and currently as Chief Transport Advisor in the City Networks Group.

5. I have been responsible for advising Council on its future policies for transport, including the development of the Council's Transport Strategy, and its Cycling, Parking and Walking Policies. I have also been responsible for the planning, design and implementation of numerous transport related projects. These include roading and traffic management improvements, pedestrian safety/amenity schemes, environmental street improvements, accident reduction projects, cycle ways, public transport improvement projects and parking improvements.

6. Examples of major projects which I have been involved with for the Wellington City Council are:

    a. Wellington Inner City Bypass – feasibility studies and concept designs.

    b. Courtenay Place environmental street improvements-planning and design.

c. Cable Street extension and one way system - planning and design.

d. Wellington City co-ordinated traffic signal system - planning, design and implementation.

e. SaferRoads, city-wide road safety project-planning and design.

f. Expert transport advisor to Council on major resource consent proposals, including the Inner City Bypass, Airport Retail Park, West Wind windfarm, Wellington Hospital, Johnsonville Mall redevelopment, Kumutoto (North Queens Wharf), Taranaki Street Wharf, Waitangi Park, Supreme Court building, Wellington Waterfront Site 10, and numerous other major projects.

g. Expert transport advisor to Greater Wellington Regional Council in relation to the Hilton Hotel project on the Wellington waterfront, and the redevelopment of the Overseas Passenger Terminal.

Involvement with the proposal

7. I provided pre-application transportation comments for the Council on the November 2015 Draft Transportation Assessment Report prepared by Traffic Design Group Ltd (**TDG**) on behalf of WIAL. In my preliminary comments to Council's consent planner Peter Daly, dated 13 May 2016, I raised a number of questions and asked for further information. During my absence on annual leave during the period mid –June to mid – July, my colleague Soon Teck Kong, Council's Manager Transport Network Operations liaised with the planner on the traffic effects of the proposal.

8. In this report I provide comments on Technical Report 9: Traffic Assessment dated April 2016 and prepared by TDG which was provided on behalf of the applicant (WIAL). I have also taken into account a subsequent report dated 22 August prepared by TDG which responds to a further information request to the applicant dated 19 July 2016.

9. I have visited the site on numerous occasions, most recently in August 2016, and am familiar with the proposed haulage routes through the city.

Assessment

10. My assessment considers the transport effects related to the construction of the proposed runway extension and also the transport effects resulting from the completed project. My main focus is on the construction effects resulting from the haulage of very large quantities of construction material from local quarries by road, to the construction site at the Airport, using High Productivity Motor Vehicles (HPMVs). For the purpose of clarity, the HPMVs proposed to be used for the project consist of a truck and trailer combination up to 23m long and carrying up to 20cubic metres (cu.m) of loose material. These vehicles are allowed to use the public road network under a permit issued by the road controlling authority. With the exception of over dimesion and overweight vehicles carrying large indivisible loads, they are the longest and heaviest vehicles allowed.

11. The applicant was asked to provide the further information referred to in Paragraph 8 and detailed in Paragraph 39 of my assessment.

General

12. Technical Report 9 provides detailed information on the traffic engineering and transport planning considerations involved in the proposed extension of the runway at Wellington International Airport. Its focus is more on truck routing and effects at the Kilbirnie/Rongotai end of the proposed road haul route and to a lesser extent on the other parts of the haul route. The report has little to say on the adverse amenity impacts during construction where trucks will travel through busy urban streets. The options (if any) for a marine as opposed to a road-based transport solution require further consideration.
13. On the matter of of transport-related effects these comprise a number of components, some of which are able to be quantified such as noise, emissions, vibration, safety related considerations such as vehicle operational characteristics (e.g. braking, manouevring and ability to fit with the existing road network), and other components which are more subjective. With regard to construction of the runway extension and the proposed haulage of fill material to the site, TDG has focussed on traffic effects which are able to be quantified, namely the ability of HPMV trucks to fit geometrically onto the existing road network; their impacts on network capacity e.g at intersections; and any road safety considerations. They have not addressed the more subjective traffic amenity effects other than proposing that truck haulage times avoid those times during weekdays when the haul routes are busiest and also at weekends when truck movements would

impact negatively on the public at times when they are at home or involved in recreational/leisure activities.

14. I understand that, in addition to the effects assessment undertaken by TDG, the applicant has commissioned technical assessments on environmental factors including noise and dust.
15. Similarly, I have not assessed other potential amenity factors such as; perceived safety effects on road users, (including pedestrians, cyclists, motor cyclists, motorists and passengers) and those carrying out activities adjacent to the public road; visual impacts; and any other social impacts in this report, but have focused on quantifiable transport effects. However, from my experience overseeing the planning and operation of the Wellington city road network over a number of years, these amenity factors will be a significant concern to those impacted by the scale and nature of the proposed truck haulage operation.
16. More specific commentary is provided in the following sections of this assessment.

Truck operating times:

17. The report proposes that truck haul times are arranged to avoid morning and afternoon peak traffic periods as well as school arrival and leaving times. No weekend truck activity is proposed. Night time construction fill activity is proposed to take place 10pm to 6am during weekdays. These proposals are designed to reduce potential adverse traffic effects on other road users as well as local land uses along the transport corridor. The duration of the project is expected to be approximately 3-4 years. I consider that these proposed truck operating times are appropriate.

Truck numbers:

18. "Worst case" (i.e. fully land-based fill haulage to the site) truck movement numbers will be significant with peak numbers up to 310 truckloads per day/30 truckloads per hour taken to the fill site from a land based quarry using maximum size HPMV's. Adding the return trips would result in up to 620 daily truck movements/60 trucks per hour in total (travelling there and back).

Truck routing:

19. Trucks carrying fill between the selected quarry and the proposed construction site at the southern end of the existing Airport runway, will use primarily State Highway 1 and 2 depending on the choice of quarry used. This will apply also to trucks returning from the Airport back to the quarry and applies both to daytime and night time operations. The proposed routing maximises use of the

state highway network,with some use of the local (WCC) road network in particular at the Airport end of the haul route. This route selection is appropriate as the state highway will usually provide the best available route to carry this type of traffic in terms of standards of design, construction and segregation from adjacent land uses. The proposed truck routes are shown in full on Figure 1 (Page 7) of Technical Report 9. Additionally Figures 9a, 9b and 10 (Pages 19,20,21) show to a larger scale, the proposed truck routing at the Airport end of the route. These larger scale plans differentiate between the daytime and night time truck haulage routes.

20. There are an number of lengths of inner city street which are included as part of the haul route and are are designated as state highway. Some of these streets have high levels of pedestrian activity both on the adjacent footpaths and crossing the road either mid-block or at one or more controlled pedestrian crossings. Examples are: Vivian Street, Kent Terrace, Ellice Street, Dufferin Street, Paterson Street, all of which will be used by trucks taking fill material to the Airport, and Paterson Street, Rugby Street, Sussex Street, Buckle Street and Karo Drive on the return trip to the quarry. These streets experience high levels of traffic currently and have heavily trafficked intersections with city arterial roads along their route. At the Basin Reserve, there are a number of schools which generate high pedestrian activity. These include Wellington College, Wellington East Girls College and St Marks School. Factors such as noise, emissions, vibration, vehicle operational characteristics e.g. stopping distances and physical fit with the existing roads, will impact on these areas. Additionally there are other components which are more subjective. These are referred to in Paragraph 15 of my assessment.
21. Typical traffic volumes are high and range from around 20,000 vehicles a day (vpd) on Vivian Street, 26,000vpd on Karo Drive, and about 19,000 vpd on Kent Terrace between Vivian Street and the Basin Reserve. Paterson Street which takes traffic to and from the Mt Victoria Tunnel, carries around 38,000vpd . Pedestrian volumes are not available but are significant at a number of the above locations . These numbers are taken from the NZTA 2015 Survey of State Highway Traffic Volumes.
22. The residential section of Wellington Road between Ruahine Street and Evans Bay Parade will be the section of the proposed haul route most impacted by the additional HPMV activity, as this section will be required to carry both fully laden trucks to the fill site as well as empty trucks returning to the quarry.
23. In the Kilbirnie/Rongotai area, it is proposed to route the HPMVs which have deposited their load at the runway extension site and are on the return trip to the quarry, along non-state highway roads including Lyall Parade, Onepu Road and Evans Bay Parade. This will impact on the local community through areas of residential concentration with high levels of local vehicle access and

pedestrian activity. In particular at the northern part of the proposed route where it goes through the Kilbirnie town centre, the intersections of Onepu Road /Coutts Street, Onepu Road/ Rongotai Road and Kilbirnie Crescent/Evans Bay Parade are both heaviliy trafficked and have high pedestrian activity. Between Coutts Street and Rongotati Road, the Countdown and Pak'n Save supermarkets generate high levels of vehicle traffic onto and off Onepu Road due to the presence of their car parks. There is associated high pedestrian activity on this part of Onepu Road. The route goes past St Pat's College and the Kilbirnie Park sports complex both of which generate significant vehicle and pedestrian activity. Also the Brentwood social housing complex on Evans Bay Parade.

24. Figure 10 (Page 21) in Technical Report 9 shows the proposed routing of trucks through the Airport precinct. This illustrates that during both day time and night time, trucks carrying fill to the construction site will route south along Stewart Duff Drive. During day time, trucks returning to the quarry from the construction site, will be required to route via Lyall Parade, Onepu Road and Evans Bay Parade because the applicant considers that it would not be practical or safe to establish a contra – flow traffic system along Stewart Duff Drive. During night time truck operations however the applicant proposes that trucks returning to the quarry, use a northbound route along Stewart Duff Drive, thus avoiding the need to use local roads through Lyall Bay and Kilbirnie. Because of the clear advantages which would result from a two-way route through the Airport precint for the day time operation as well as the night time operation proposed by the applicant, the applicant was asked to revisit the potential routing of trucks so that both inbound and outbound trucks travel through the Airport precinct roads both during day time and night time periods. TDG has now provided additional information on this matter in their 22 August Further Information Report, which supports their earlier position that the airport precinct does not present a viable option form outbound truck haulage during day time hours and they have reconfirmed their position. I accept the applicant's conclusion.
25. The applicant was asked to give further consideration the potential during day time periods, for outbound trucks to use Tirangi Road, Coutts Street, Bridge Street, Cairns Street, Rongotai Road and Jean Batten Street or Troy Street as an alternative to the applicant's preferred use of Lyall Parade, Onepu Road and Evan Bay Parade. Although this would involve using lower category roads in the District Plan roading heighrachy than the Lyall Parade/Onepu Rd/Evans Bay Parade option, it would have the attraction of avoiding the busier parts of Kilbirnie and would have less impact on existing residential properties in terms of the number of properties along this alternative route. TDG in their 22 August Further Information Report have provided detailed reasoning why this alternative would not present a valid truck route. These include conflict with a

defined cycle route, road alignment, parking issues and intersection legibility. I accept their conclusion that the Bridge Street route does not present a valid truck route.

Truck Impacts – TDG Assessment (Techncial Report 9):

26. With regard to construction of the runway extension and the proposed haulage of fill material to the site, TDG has focussed on traffic effects which are able to be quantified, namely the ability of HPMV trucks to fit geometrically onto the existing road network; their impacts on network capacity e.g at intersections; and any road safety considerations. They have provided detailed information on the haulage routes and the ability of the proposed construction traffic to safely negotiate the proposed haul routes, most of which are designated as state highway and are the responsibily of NZTA in regard to operational management as the relevant road controlling authority (RCA). TDG has provided details of the haul routes in the eastern suburbs with photographs and plans showing how the HPMV trucks will be able to fit within the existing road space on the local (WCC) roads. They show the proposed haul route from the runway fill site via Lyall Parade, Onepu Road Evans Bay Parade, through to join the state highway at Cobham Drive. They do not consider that any mitigation works are needed along the route.
27. TDG has concluded that with the numbers of HPMV movements proposed of up to 30 per hour the existing intersections along the local road network will be able to operate with no noticeable effect on intersection performance.
28. With regard to road safety considerations, TDG have assessed the full length of the haul routes between the fill sources and the fill site and have concluded that haulage trucks including HPMVs can be safely accommodated on the public road network in the manner proposed. They comment that the urban roads and state highways proposed to be used for truck haulage, are already roads designated to be used by heavy vehicles. I can accept this is the case however I suggest that the type of truck (HPMV) is significantly larger than the trucks which would usually be seen on urban roads in the city, especially driving through inner city streets and residential areas. Also the scale of the proposed haul operation, though arguably temporary in nature, is very large by any conventional standards and is planned to continue for 3 to 4 years although at varying levels of intensity.
29. In the case of the proposed HPMV routing along local roads in the Lyall Bay/Kilbirnie area, TDG has produced very detailed plans showing truck swept path/geometric requirements and how these fit within the available road space. They did not however in Technical Report 9 provide similar plans for the rest of the proposed haul routes which use the state highway network. This

was presumably because they consider that these roads are designated for use by large trucks. The applicant was asked to provide further information on these aspects.

30. TDG has now provided additional information on this matter in their 22 August Further Information Report. This includes information on traffic lane widths and diagrams showing HPMV swept paths along state highway sections of the proposed truck route. These include Vivian Street, Ruahine Street, Wellington Road, Karo Drive and confirm that HPMVs are able to remain within the marked traffic lanes. The exception is the right turn from Vivian Street into Kent Terrace where the HPMV swept path encroaches into the kerbside bus lane. This is not a significant matter as other long vehicles will be in the same situation and this section of bus lane could be modified if necessary. TDG has not however produced swept path diagrams for the Basin Reserve roundabout showing how HPMVs will negotiate the airport bound truck route from Kent Terrace into Paterson Street and the city bound truck route from Paterson Street via Dufferin/Rugby/Sussex and Buckle Streets to the Arras Tunnel and Karo Drive. TDG has been asked to provide this further information and have not done so to date.
31. In summary I am satisfied that, on the basis of the information provided to date by the applicant in Technical Report 9 and the 22 August, Further Information Report, and subject to appropriate conditions to be included in the proposed CTMP, the proposed HPMV truck routes and effects are acceptable from a technical standpoint, subject to satisfactory outstanding information on the swept path diagrams for the Basin Reserve roundabout, and other areas being provided. This covers physical accommodation within the road network, road user safety and network capacity, noting that there are potentially negative effects in the form of inherent increased safety issues caused by the significant operation.
32. I would note that the use of specific HPMV vehicle configurations will ultimately be subject to permit approval by the respective road controlling authority which for the majority of the proposed truck route will be the NZTA, and for the local roads, Wellington City Council.

Trucks – contingency routing:

33. It can be expected that some parts of the proposed haul route will be unavailable on occasions over the construction period of up to 4 years as a result of an accident or emergency, planned maintenance or other situations. An example would be night time maintenance work on the Mt Victoria Tunnel which could require use of the alternative route around Oriental Parade/Evans Bay Parade or alternatively through Newtown. Closure of the Terrace Tunnel could require HPMV's to re-route on to Aotea/Waterloo/Jervois Quays, Cable/Wakefield Street,

Kent/Cambridge Terrace. The applicant should therefore identify which alternative traffic routes might need to be used and provide an assessment indicating the suitability of the alternative routes, and what measures might be required to accommodate their use by HPMVs. Following the provision of this information, I suggest it is included in the CTMP. I suggest a condition be placed on any consent which would require that should the applicant need to use the alternate route for a period of more that 24 hours, they should submit a Traffic Management Plan to the Council for approval. In this way if the effects of the alternate route are likely to cause adverse effects, the Council may require that the frequency of truck movements decrease for a period of time, or that they be ceased for a period of time.

Truck types:

34. Use of maximum size HPMV vehicles is proposed as this would minimise the total number of truck movements required in connection with the extension works. In a further information request via Greater Wellington Regional Council in May 2016, The applicant was asked whether consideration had been given to the option of using smaller, less intrusive trucks as an alternative to HPMVs. In a written response dated 13 June, the applicant noted that an HPMV is able to carry up to 20cu.m of material per load where a conventional single unit truck would carry 5cu.m to 8cu.m depending on the type of truck used. This would require around three times as many truck loads and would present increased road safety issues, increased emissions and increased noise. TDG in their 22 August Further Information Report also makes the point that HPMVs are fitted with the most modern and effective braking and safety systems including ABS and roll stability.. Subject to satisfactory outstanding information being provided as mentioned in Paragraph 31 I agree that the use of HPMVs for this project is an appropriate choice.

Transport mode:

35. The position taken by the applicant is that a road based haulage option presents a worst case scenario in respect of the volume of material that may need to be transported by road direct to the site. The applicant has confirmed that they are continuing to investigate alternative marine sources and options which may materialise independently or in combination with road transport.
36. The applicant was asked to consider an option of barging fill across the harbour to Miramar Wharf and then transporting it to the Moa Point fill site by truck. This option was discounted by the applicant because access through the Airport was stated to not be possible due to conflicts with Airport security and operation. This conclusion appears to be at odds with the proposal in

Technical Report 9 for HPMV trucks carrying fill material to travel through the Airport via Stewart Duff Drive to access the Moa Point fill site. I suggest therefore that this option should be further considered as a potential option to avoid or reduce the need for large numbers of maximum size HPMV trucks to use the busy Wellington urban road network and would reduce its negative impact.

37. In summary I consider that the proposed "worst case" road based haul option is a significantly inferior option. There are inherent negative effects arising from the scale and size of the road based operation in terms of the generation of an aggregate safety risk.. It should only be used if all other non road based options are exhausted.

Quarry selection:

38. The TDG report suggests the most likely quarry options to be either the existing quarries at Horokiwi or Kiwi Point, both of which are conveniently located a short distance north of Wellington CBD. On the matter of quarry selection, Kiwi Point is both nearer to the Airport and has a superior road connection between the quarry and the nearby state highway. In the case of Horokiwi, the proposed HPMVs would impose a potentially significant extra load on the local road connection between the quarry and SH2 which is used by existing quarry vehicles and is the sole vehicular access into the Horokiwi settlement for residents and visitors. The applicant however notes that in the case of the Horokiwi Quarry, HPMVs routinely transport quarry material to other infrastructure projects in the region thereby providing an indication that Horokiwi Road is suitable for such trucks. They comment that pre, post and during construction surveys of pavement conditions will feature in the proposed CTMP.

Operational Traffic Generation resulting from the proposed runway extension:

39. Technical Report 9 report provides traffic forecasts for the future situation with the runway extension in place. These indicate that in 2030, during the busy hour, (This is an International Air Transport Association definition and corresponds to the peak domestic passenger activity) there would be in the order of 3303 vehicle trips (in+out) with the runway extension in place compared with 2975 vehicle trips without the extension. These projections are significantly lower than the Airport's 2030 Masterplan forecasts of 4007 which assumes the runway extension is in place. They amount to around 3 extra vehicles arriving at the Airport per minute during the busy hour and 3 extra vehicles exiting the Airport during the same period. I consider those to be quite low

and manageable numbers in the context of the underlying expected growth in airport traffic under the Business as Usual (BAU) forecasts as detailed in Technical Report 9 (Section 10) Note: On the matter of the Airport Master Plan, it is my understanding that the Airport is permitted as of right to continue to expand its operations as Business as Usual (BAU) with no obligation to mitigate any adverse effects external to the Airport as a result of the growth in Airport activity as envisaged in the Airport 2030 Masterplan. The effect however of the proposed runway extension is able to be assessed and compared with the BAU situation.

Construction Traffic Management Plan (CTMP):

40. A comprehensive CTMP will be required if the runway extension is to proceed and the applicant has submitted a CTMP Framework as Appendix A of Technical Report 9. This lays down a broad outline for the preparation of a comprehensive CTMP which will be required to be finalised by the appointed contractor, and agreed by Wellington City Council prior to the project proceeding. In the event that consent is granted then the proposed CTMP will need to include comprehensive conditions detailing how any issues arising from the truck haulage activity on the proposed haul routes will be monitored and actioned. These will need to be approved by the Council in consultation with the NZTA as the road controlling authority for the state highway parts of the road haul routes. On the matter of construction staff traffic and related parking, I do not see construction staff traffic and parking to represent a significant effect on the road network and these matters will be appropriately managed through the CTMP process. Additionally as mentioned in Paragraph 31 of my assessment, it can be expected that some parts of the proposed haul route will be unavailable on occasions over the construction period of up to 4 years as a result of an accident or emergency, planned maintenance or other situations. The applicant should therefore identify, which alternative traffic routes might need to be used and provide an assessment indicating the suitability of the alternative routes, and what measures might be required to accommodate their use by HPMVs, and this should be included in the CTMP.

Further information requested:

41. The applicant was asked in a letter from Greater Wellington Regional Council on 19 July, to provide further information on a number of matters. This resulted in a Further Information Report dated 22 August prepared for the applicant by TDG.The further information requested was as follows:

i. 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, determine the lane widths and lateral clearances along the route in particular opposing traffic flows.

ii. Further analysis as to how daytime HPMV traffic can be routed 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) – 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.

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

iv. Assessment of the transport haulage route should also include the NZTA road corridor (e.g Vivian Street, Mt Victoria Tunnel, Basin Reserve,) and WCC roads so that the effects for the entire haulage route are determined and assessed.

v. How the amenity effects, outlined above, will be addressed.

42. I have taken into account the further information provided by TDG in their 22 August Further Information Report which responds to the above matters, and discussed them in this report.
43. On 2 September I received further information from TDG realted to vehicle tracking plans which compares HPMV's with other large vehicles. I have taken this into account.
44. The matters which I consider still remain to be addressed are set out below.

Additional Matters

45. The applicant should identify which alternative traffic routes might need to be used as a result of an accident or emergency or for planned maintenance or other situation and provide an assessment indicating the suitability of the alternative routes and what measures might be

required to accommodate their use by HPMV's. This information should be included in the CTMP. In addition a condition should be required in order to require Council approval to an alternative route in situations where an alternative route is required to be used for a period of over 24 hours.

46. Further information has been requested from TDG showing the HPMV swept paths for the Basin Reserve roundabout and approaches (on multiple occasions). This is required in order to confirm the acceptability of the route.

Conclusion

47. In summary I am satisfied that, on the basis of the information provided to date by the applicant in Technical Report 9 and the 22 August, Further Information Report, and subject to appropriate conditions to be included in the proposed CTMP, the HPMV truck routes and related operational effects are acceptable from a technical standpoint. That is to say they will have some negative effects but likely a no more than minor adverse effect in regard to physical accommodation within the road network, road user safety and network capacity. Also the truck types and numbers and operating times are acceptable.
48. I note that further information has been requested from TDG showing the HPMV swept paths for the Basin Reserve roundabout and approaches. If these sections of the overall truck route are shown not to be able to satisfactorily accommodate HPMV trucks, then the viability of the overall truck routing proposal will need to be reviewed, and the acceptability of the route may change.

49. In addition there are inherent negative effects arising from the operation in terms of the generation of safety issues which produces an aggregate safety risk, and there may be other concerns raised as I mention in paragraph 15. I consider that the proposed "worst case" solely road based haul option is therefore a significantly inferior option to a barge or partly barged option. It should only be used if all other non road based options are exhausted. I therefore consider that the applicant should continue to pursue marine fill sources and marine transport options as a preferred alternative to a road based haul option.

Date: 7 October 2016

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Robert Stephen Spence

[redacted]

Annexure 4: Heritage and Archaeology

Vanessa Tanner

Heritage Assessment

Wellington International Airport Runway Extension

Introduction

1 My full name is Vanessa Anne Tanner. I am a Senior Heritage Advisor at Wellington City Council (**Council**).

Qualifications and experience

1 I hold a Master of Arts degree in Anthropology, majoring in archaeology from the University of Otago. I also hold a Bachelor of Arts combined honours degree in Geography and Anthropology from the University of Otago.

2 I have 19 years' experience in cultural resource management in New Zealand, in particular undertaking and reviewing assessments of effects on historic heritage for Resource Management Act 1991 (**RMA**) and Heritage New Zealand Pouhere Taonga Act 2014 (**HNZPTA**) purposes.

3 I have worked for the Council since December 2013. Prior to working for the Council I was employed for thirteen years in the Heritage Department of Auckland Council, and Auckland Regional Council prior to amalgamation.

4 I provide advice to Council on methods to avoid, mitigate and manage effects on historic heritage, on the land Council owns and administers. I also provide advice across Council on the management and protection of historic heritage places, from funding opportunities to the practical application of ICOMOS NZ Charter 2010 principles for the conservation of heritage sites. A primary function of my role is the assessment of Resource Consent applications against the Heritage Objectives and Policies of the Wellington City District Plan (**District Plan**).

Involvement with the proposal

5 I have reviewed the effects of the Wellington International Airport Runway extension (**project**) on historic heritage. I have primarily relied on the information supplied as part of the application to inform my assessment of effects on historic heritage.

6 I visited the site on Friday the 5th of August 2016.

Assessment

7 This report reviews the following document which assesses the effects of the proposal on historic heritage:

7.1 Technical Report 22: Jones, K. L. (21 April 2016) Archaeological assessment of southern extension of runway for Wellington International Airport Ltd (WIAL) for the Wellington International Airport Ltd.

8 In undertaking this review I also read the following document:

8.1 Technical Report 13: Raukura Consultants (March 2016) Cultural Impact Assessment Wellington Airport Limited Southern Runway Extension prepared for the Wellington International Airport Ltd.

9 My purpose in reading Technical Report 13 was to develop an understanding of places of cultural value which are part of the RMA definition of historic heritage and which may correlate with archaeological values.

10 However, this review does not address matters of cultural significance to Maori, this may only be undertaken by the appropriate tangata whenua.

Subject site and context

11 The site of the proposal is situated on the eastern side of Lyall Bay extending 350m south of the current terminus of the runway into the Bay and includes associated land based works and activities.

12 Under section 2 of the RMA 'historic heritage' means those natural and physical resources that contribute to an understanding and appreciation of New Zealand's history and cultures, deriving from any of the following qualities:

(i) archaeological:

(ii) architectural:

(iii) cultural:

(iv) historic:

(v) scientific:

(vi) technological; and

(b) includes-

(i) historic sites, structures, places, and areas; and

(ii) archaeological sites; and

(iii) sites of significance to Maori, including wahi tapu; and

(iv) surroundings associated with the natural and physical resources

14 A number of historic heritage items are situated within the vicinity of the proposed runway extension area. These items and their various levels of recognition are included in Tables 1 to 3 and illustrated in Figure 1 below.

Table 1: Historic heritage items in the vicinity of the Wellington International Airport Runway extension recognised in regional and district plans and the Heritage New Zealand List.

Name	WCC District Plan Heritage List	GWRC Operative Regional Coastal Plan Appendix 4	GWRC Proposed Natural Resources Plan	Heritage New Zealand List
Hue te para Beach	Site of significance to Maori - M78			
Hue te Taka/Moa Point			Mana whenua site of significance - Schedule C4	
Rangitatau	Rangitatau Reserve Precinct			Wahi Tapu Area List Number 9468
Lyall Bay Seawall	Map 4/5, Symbol 33	Lyall Bay Sea Wall		

Table 2: New Zealand Archaeological Association recorded archaeological sites in the vicinity of the Wellington International Airport Runway extension.

NZAA Number	Site Type	Location	Name
R27/554	Midden/ovens	Hue te Para/Lyall Bay	
R27/113	Midden/oven	Rangitatau Reserve Precinct	
R27/55	Pa	Rangitatau Reserve Precinct	Rangitatau Pa
R27/457	Oven	Rangitatau Reserve Precinct	
R27/460	Historic drain/tunnel	Moa Point Road	

Table 3: Other historic heritage items in the vicinity of the Wellington International Airport Runway extension.

Site type	Age	Location	NZAA Number
Gun emplacement	Constructed prior to WWII	Palmer Head	R27/171
WWII Radar Station	WWII	Palmer Head	R27/172
Telegraph Cable	1866	Lyall Bay	
Sewer Pipe	1895	Wellington Airport	
Wreck of the Winwick	1841	Unknown/Lyall Bay	
Moa-hunter middens	Pre-1450	Airport	

15 The historic heritage items recorded in the vicinity of the project comprise a range of sites representing occupation (middens, ovens), utilitarian (pipes, drains), communication and defensive structures (pa, WWII coastal defence structures). Collectively they provide evidence of a long history of use of the area from pre-European Maori settlement and resource consumption to early European arrival and communication. An important theme represented by sites in this vicinity is defence; being strategically located at the entrance to the harbour Maori utilised high, easily defendable headlands around the coast to construct pa, more recently such places were used as sites for coastal defence structures during WWII.

Figure 1: Map illustrating location of historic heritage items in the vicinity of the airport[1]

[1] Does not include items where locational information is insufficient to accurately map them

Assessment of effects

Historic heritage items

16 The proposal will not physically affect any of the historic heritage items listed in Tables 1, 2 or 3 above because they all lie outside the footprint of the project. However, the proposal will affect the context in which these historic heritage places exist. For example, the proposed 350 extra metres of runway in the coastal marine area may affect one's ability to appreciate and understand the WWII structures which were constructed to observe and defend Wellington's coast. In my opinion however, this effect is not significant.

17 The archaeological assessment for the project (Technical Report 22) has not assessed the significance of any of the historic heritage items recorded within the vicinity of the airport or the effect that the proposal will have on those places. Instead it has assessed the historic heritage significance of the project area using criteria set out in section 66 of the HNZPTA and concluded that the project area may have some historic heritage value (p 12) which will not be affected by the proposal. While this is not the approach I would have taken to the assessment, I generally agree with the conclusions on the impact of historic heritage items in the vicinity of the project.

Archaeological sites

18 Jones (2016) in Technical Report 22 finds the likelihood of encountering unreported archaeological sites on the land based component of the project area to be low and correspondingly recommends an Accidental Discovery Protocol (ADP) be put in place. I agree with this assessment, and recommend that an ADP be included as a condition of Resource Consent, should consent for the proposal be granted. I consider condition 87 proposed by the applicant to be an appropriate ADP condition.

19 However, I do not consider that Mr Jones (in Technical report 22) has undertaken a full archaeological assessment of the seabed where the reclamation is to take place. In pre-lodgement feedback to the applicant it was recommended that a maritime archaeological assessment be undertaken as part of the assessment of effects on historic heritage. The archaeological assessment makes reference to the fact that several ships have wrecked in the vicinity of the entrance to Wellington Harbour, including the Winwick, which was reportedly

wrecked at Lyall Bay in 1841 (p 8). The archaeological assessment did not involve an archaeological survey of the seabed, instead it relied on the fact that the Wellington Dive Guide does not list any shipwrecks in that location as evidence that there is no archaeological evidence on the seabed. This is not an appropriate information source to base an archaeological assessment on.

20 It is my opinion that until a full archaeological assessment, including a survey of the seabed, is undertaken by a suitably qualified maritime archaeologist it cannot be concluded that there is no archaeological evidence on the seabed (whether it is artefactual material or ship wreck sites) within the area proposed for reclamation. As such, I suggest a condition requiring an archaeological survey of the seabed across the area proposed for reclamation.

21 Depending on whether any archaeological evidence is found as a result of an archaeological survey of the seabed, mitigation of any adverse effects on historic heritage may be required. Despite the uncertainty as to whether or not any historic heritage values on the seabed will be affected, it is likely that archaeological investigation and recording of any artefactual material or ship wreck sites would be adequate mitigation for effects that the proposed reclamation may present. The requirements of the HNZPTA would apply to ship wreck sites where that wreck occurred before 1900; archaeological investigation and recording may be required under that Act if such evidence is found as a result of an archaeological survey of the seabed.

Planning Requirements

22 Under section 6(f) of the RMA the protection of historic heritage from inappropriate subdivision, use, and development is a matter of national importance.

23 The Wellington Regional Policy Statement, Objective 15, relates to identifying and protecting historic heritage from inappropriate modification, use and development.

24 As the proposal does not physically affect District Plan listed Heritage Buildings, Objects or Areas, there are no specific rules in Chapter 21 of the District Plan Chapter that are triggered by this application. The rules are triggered when works occur on the site of a listed item; no archaeological sites are listed in the District Plan. However, as the application is for a Discretionary (Unrestricted) Activity, all relevant matters must be considered.

25 I have considered the relevant policies and objectives of the District Plan relevant to heritage as detailed by Mr Daly, and I consider they will be met by the proposal with the condition requiring an ADP and the new condition I have suggested related to a maritime archaeological survey.

Matters raised in submissions

26 Submission 511 presents concern that the proposal would adversely affect the heritage value of the Moa Point cottages. The cottages are not included in the District Plan's Heritage List. The historic heritage value and the effects of this proposal on those values was not assessed as part of the application.

27 Submission 446 describes Lyall Bay as holding cultural heritage significance as a result of Hawaiian surfer and Olympic swimmer Duke Kahanamoku (1890-1968) having introduced surfing to the Bay. The submission also cites Lyall Bay's surf lifesaving history as contributing to its historic and cultural heritage value. The historic and cultural value of Lyall Bay to New Zealand's surfing history is not recognised in the District Plan. The historic heritage value and the effects of this proposal on those values were not considered in the applicant's assessment of effects.

Conclusion

28 There are no confirmed historic heritage resources located within the project area with exception of the sea bed which has not been systematically surveyed for archaeological sites. There are no physical or direct effects of the proposal on any known historic heritage items located within the vicinity of the Wellington International Airport.

29 There is a low likelihood of the proposal adversely affecting historic heritage items listed in the District Plan or archaeological sites on the land. As such, I consider the ADP proposed in condition 87 of the application to be an appropriate condition of any consent granted for the proposal.

30 However, an archaeological survey of the seabed should be undertaken across the area proposed for reclamation to conclusively determine whether or not the proposal will affect any

material from, or produce any information relating to, ships that have historically wrecked in, and in the vicinity of, Lyall Bay. An archaeological survey of the seabed could be required as a condition of any consent granted for the proposal, to be undertaken prior to construction commencing.

31 Should any archaeological evidence be found as a result of an archaeological survey of the seabed and be adversely affected by the proposed reclamation it is likely that those effects would be able to be adequately mitigated through archaeological investigation and recording.

32 The proposal, with conditions of consent in place including an ADP (proposed condition 87) and the requirement to undertake an archaeological survey of the seabed, including methods for mitigating adverse effects by requiring recording of any archaeological sites or evidence (should they be required), would in my opinion be appropriate, mitigate any potential adverse effects on historic heritage, and would be consistent with the objectives and policies of the District Plan.

Date: 7 October 2016

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Vanessa Anne Tanner

Annexure 5: Erosion and Sediment Control

Gregor McLean

Wellington International Airport proposed runway extension

Erosion and Sediment Control Assessment

Introduction

1 My full name is Gregor John McLean. I am a Director and Environmental Consultant at SouthernSkies Environmental Limited (SEL).

Qualifications and experience

1 I hold a Bachelor of Arts (Geography/Environmental Planning) from Massey University and a Post Graduate Diploma in Natural Resource Management from Lincoln University.

2 I have the status of a Certified Professional in Erosion and Sediment Control (CPESC Number 7628).

3 I have been in my position at SEL since 2003. My role at SEL involves the preparation of erosion and sediment control plans, expert advice, preparation of environmental management plans, monitoring ,site auditing and development, and delivery of erosion and sediment control training for contractors and consultants.

4 I have 20 years' experience in environmental management and erosion and sediment control, including:

4.1 Environmental auditing for Greater Wellington Regional Council and Auckland Council;

4.2 Development and delivery of International Erosion Control Association Approved Erosion and Sediment Control training to contractors, consultants and Council staff;

4.3 Preparation of chemical Flocculation Management Plans including soil bench testing;

4.4 Independent Erosion and Sediment Control expert for the Board of Inquiry on the Transmission Gully Project.

4.5 Erosion and Sediment Control expert for Greater Wellington Regional Council on the Mill Creek Windfarm, Wellington; and

Co-Author of the Erosion and Sediment Control Standard for the New Zealand Transport Agency (August 2010), and Auckland Council Erosion and Sediment Control Guideline (2015).

Involvement with the proposal

5 I have been engaged by Greater Wellington Regional Council (GWRC) to review and provide provide expert advice regarding erosion and sediment control measures during construction for the Wellington International Airport (WIAL) proposed runway extension application, dated 28 April 2016 (Project).

6 I visited the site on 27 July 2016.

Assessment

7 In assessing the application I have referred to the following documents:

7.1 WIAL Application:

7.1.1 APPENDIX D – Draft Construction Management Plan (**CMP**)

7.1.2 APPENDIX E – Draft Erosion and Sediment Control Plan (**ESCP**)

7.2 Technical Report 7 - AECOM – Concept Feasibility and Design Report

7.3 Technical Report 16 - NIWA – Marine Sediments and Contaminants (Lyall Bay)

7.4 Technical Report 17 - NIWA – Technical Report on Coastal Hydrodynamics and Sediment Processes in Lyall Bay

7.5 Technical Report 18 - NIWA – Ecological Character Report

7.6 Technical Report 19 - Aquatic Environmental Sciences (AES) – Assessment of Ecological Effects

7.7 Further information on the assessment of environmental effects provided by Mitchell Partnerships to GWRC 13 June 2016 (letter sent by email from John Kyle, Mitchell Partnerships to Jude Chittock, GWRC, 13 June 2016).

Effects of Construction

8 Potential effects of sediment discharges are described in the AEE and in the Technical Reports.

9 The three phases of construction for the runway extension where there will be sediment discharges are associated with the ground improvements (stone columns), the creation of the rock dyke and reclamation fill. In addition, the land based works (removal of the hillock and civil works) also have the potential for sediment related effects.

10 The need for ground improvements is not known at this stage. The ground improvement methodology will depend on the type of fill materials used for the reclamation and could include stone columns and/or vibro-compaction (Technical Report 7 – Appendix L).

11 The installation of the stone columns (if required) is to be undertaken by ramming a pile to the required depth and then installing stones inside the casing, after that the casing is removed. There will be localised minor sediment discharges as the casing is rammed in and then removed. The sediment related effects of vibro-compaction have not been assessed by the Applicant, however sediment raleted effects can be managed with silt curtains.

12 To construct the runway platform, a full section rock dyke will be built around the perimeter of the runway extension. The construction of the rock dyke has the potential to have sediment related effects during the placement of materials. This will dependent on the final construction methodology and the type of material used for the construction.

13 The assessment of effects is based on the rock dyke material being ‘cleanfill’ and sand-sized material (0.2mm and above). The plume modelling undertaken by NIWA (Technical Report 17) excludes the discharge of sand-sized material which they state will settle relatively quickly

and only have a small contribution to changes in receiving-water turbidity. There will still be localised turbidity effects as a result of the placement of the dyke material regardless of the minimum particle size. These effects can be considered minor provided appropriate mitigation measures, such as a silt curtain, is installed.

14 The reclamation fill has the greatest potential for sediment related effects on the marine environment. NIWA (Technical Report 17) identifies that the main source of turbidity in the water column would be from any clays, muds, or silts present in the fill material, even if they are only a small percentage of material by volume. I agree with this statement.

15 Technical Report 7 states that "The type of material used within the reclamation fill will be dependent on the Contractor's programme as fine particle materials will take longer to settle within the reclamation than coarse particle materials. Locating the weir at the opposite end to the filling operation will provide the mechanism to enable a large portion of settlement to occur inside the confined area. The sea conditions within the reclamation area will be more settled allowing the Contractor to actively manage the suspended settlement in a more controlled environment". I agree with this statement however I provide further comments on the erosion and sediment control devices in the Mitigation section of this report.

16 The rock dyke is to act as a containment barrier with dewatering via a weir/ decant arrangement. The key issue here is to ensure that the rock dyke is sealed to allow only dewatering via the weir/ decant. It will be critical that the first stage of reclamation achieves this.

17 Dewatering will be an ongoing operation as fill is placed, initially it will be displacement of contained sea water until such time as the fill is above Mean High Water Springs (MHWS), where rainfall will result in discharges from the surface of the reclamation. The draft construction programme indicates that the reclamation filling could take between 5 to 18 months depending on the source of material. In this regard there will be sediment discharges for the duration of the reclamation operation. This is further discussed below.

18 Delivery of reclamation material via the road network has the potential to cause tracking of dirt onto the road from the trucks. There are a number of options available to ensure that this does not occur. The applicant has suggested that a wheel wash or alternative measure for cleaning

vehicles be installed at exit points from the construction site and stockpile areas if applicable and that street sweeping of roads within the vicinity of the construction site entry and exit points will occur. Provided this is addressed through the management plans required as conditions of consent, the effect of this on the receiving environment should be less than minor.

19 The land based activities (removal of the hillock and civil works) also have the potential to generate sediment as a result of earthworks. I consider that erosion and sediment control measures installed and maintained in accordance with the GWRC Erosion and Sediment Control Guidelines - September 2002 (ESC Guidelines) will ensure that these effects are minor.

Mitigation Measures

20 The applicant proposes to manage sediment discharges and water quality throughout the construction phase of the Project via a Construction Management Plan (CMP) and an Erosion and Sediment Control Plan (ESCP). A Draft of these plans is attached as Appendix D and E of the AEE.

21 The purpose of the CMP is to describe the environmental management and monitoring procedures to be implemented during the construction phase of the Project. The CMP states that the management of sediment discharges throughout the construction phase will be implemented via the ESCP.

22 The ESCP is proposed to specify the erosion and sediment control measures that will be implemented during the construction phase of the Project, and confirm the monitoring obligations and actions that will be undertaken should there be any exceedance of the turbidity limits.

23 The draft ESCP describes a tool box of physical measures to reduce sediment discharges from works within the Coastal Marine Area (CMA) and above MHWS.

24 For works above MHWS the ESCP is focussed on the prevention of sediment as a result of road haulage of reclamation materials. There are other aspects (such as removal of the hillock and civil works associated with Moa Point) that also need to be considered. I consider that erosion and sediment control measures installed and maintained in accordance with the ESC

Guidelines will ensure that these effects are minor. In this regard proposed condition 61 requires a modification to ensure that the 'ESC are designed, installed and maintained in accordance with the ESC Guidelines'. This will ensure any sediment related effects of this operation are appropriately mitigated.

25 For works within the CMA the ESCP identifies a number of ESC devices that are available:

25.1 Floating sediment curtains or floating silt fences positioned around the perimeter of the work areas, including discharge points;

25.2 The use of material that is defined as "clean fill" as the only material that is deposited directly into the water;

25.3 The use of weirs and sediment traps at reclamation discharge points to capture suspended sediments;

25.4 Marine equipment that minimises material loss;

25.5 Marine equipment and construction methodologies that minimise sea floor disturbances

26 I agree that the above measures will assist in managing the seidment related effects of the works.

27 The key measures in my opinion are the floating silt curtain for all marine based works, the weir/ decant system coupled with the proposed construction methodology and fill source/ quality.

28 Floating silt curtains isolate sediment-laden waters, allowing sedimentation of disturbed waters within the enclosed area and can be effective in controlling turbidity in coastal environment. There are significant cost, design and maintenance issues associated with them, especially in a coastal environment like Lyall Bay. Regardless of this, I am of the opnion that they will be required for all marine based works to assist in reducing sediment related effects. I agree with

Mr Morrisey's comments that the silt curtains will concentrate the effects on habitats isolated within the curtain and that the silt curtain should be positioned around the discharge points.

29 The weir/ decant system will operate once the perimeter rock dyke is in place. Essentially the inner reclamation area will be a large pond and in my opinion discharges should be controlled via floating T-Bar decants. The ESC Guidelines provides design parameters that need to be met to achieve good sediment treatment, these include decant rates, length to width ratios and positioning of decants. These parameters should be incorporated into the management of sediment discharges from the reclamation and therefore should be included in proposed condition 61.

30 The decant system should have a shutoff valve installed so that in the event of a non-compliant discharge, the effects can be actively managed or ceased if required.

31 Wind and wave action can resuspend sediment within the water column. There are measures that can be installed to reduce this effect. Floating booms constructed from non-perforated novacoil strung across the impounded water can assist in reducing these effects. It is recommended that this be considered by the applicant through the ESCP.

32 Given the uncertainty of discharge quality and sediment related effects, a precautionary approach should be taken, in this regard chemical treatment of impounded water should also be considered. Chemical treatment could asisst in the settlement of any sediment laden runoff and would further enhance the discharged water quality. There are a number of chemical treatment options available that could be incorporated into the design and a condition requiring a Chemical Treatment Plan should be imposed.

33 Auckland Councils Draft Technical Publication - Overview of the Effects of Residual Flocculants on Aquatic Receiving Environments states that "The generic characteristics of flocculants and their propensity for toxicity to be lessened by particulate and dissolved organic matter including humic substances, and by neutral range pH. Saline water carries a strong signature of these characteristics and it is therefore likely that residual flocculants would be rapidly inactivated. Such bound residuals are stable and do not release or breakdown into toxic components. Additional to this is the reality that any discharges of residual flocculants are likely to be highly infrequent and of a very small volume relative to the dilution potential of the

receiving waters (especially in the coastal marine area)". In this regard the environmental effects of using chemical treatment are considered to be minor.

34 The construction methodology and source/ quality of fill will also have an influence on sediment discharges. Given the uncertainty of the source/ quality of fill, other then it needs to meet the definition of 'cleanfill' the focus should be on the measures to manage the discharge.

35 The construction methodology will need to ensure that the rock dyke is sealed to control sediment related discharges via the decant system and will need to ensure that progressive stabilisation can be undertaken. Progressive stabilisation of the reclamation should reduce the exposed surface area, erosion of the fill material and subsequent sediment discharge.

36 The material imported for the reclamations, rock dykes, groynes and temporary fill/surcharge shall be in accordance with the Ministry for the Environment "cleanfill" definition, as detailed in Publication ME418 "A Guide to the Management of Cleanfills, 2002" or subsequent updates. Condition 58-59 require the material to meet this definition and that a log recording the source of material be maintained. I also consider that a testing regime be implemented to ensure that all material is 'cleanfill'. This could either be at source of material or based on a test per number of truckloads.

37 I consider that proposed Conditions 61- 63 need to be modifed to include the matters that have been discussed above in Paras 30 – 35.

Monitoring

38 The application states that an adaptive management approach to monitoring turbidity against the existing background limits will be required to ensure water quality effects from sediment plumes are appropriately mitigated. This approach is to be contained within the ESCP.

39 Adaptive management enables a 'plan-do-check-act' approach to be undertaken whereby the ongoing monitoring and reporting that is proposed creates a continuous feedback loop from the effects being created, allowing for the most appropriate solution to be utilised or change of method made for any particular environmental effect.

40 An adaptive management approach requires setting of clear objectives, monitoring, research and review mechanisms through consent conditions. Once monitoring has occurred, the assessment of monitoring results will lead to “adapted” development and operation to ensure any effects of the activity are at acceptable levels.

41 Technical Report 19 identifies the monitoring in relation to sediment discharges that is to be included in an Environmental Monitoring Plan (EMP). It outlines the following:

41.1 Monitoring of turbidity at a compliance site and a control site during the reclamation to ensure that the TSS in the discharge plume is less than 25 mg/L beyond 150 m when the control site is <15 mg/L and a maximum of 10 mg/L above levels at the control site.

41.2 Monitoring of the extent of the plume ring construction to confirm that levels and extent are as predicted.

42 It is noted that there are no proposed conditions that include a separate EMP, however this recommended monitoring has been incorporated into Conditions 61 - 63, the Erosion and Sediment Control Plan and Monitoring. I consider this to be appropriate.

43 The ESCP states that monitoring of turbidity shall be undertaken at a compliance and control site as shown a map which shall be prepared and attached to the ESCP.

The monitoring at both sites shall include:

1. Continuous (telemetered) turbidity sensors and loggers shall be installed, operated and maintained.

2. The logged data shall be processed and assessed by the Consent Holder on a daily (24-hour) basis.

3. Data processing to extract a 48-hour rolling median, replacing the earliest 24-hour data record with the latest 24-hour data.

During any works in the coastal marine area (**CMA**) or dewatering discharges to the CMA, compliance with the turbidity limits set out in the conditions will be adhered to. If monitoring detects an exceedance of the turbidity limits then the process in the conditions and reporting requirements set out in the ESCP shall be followed.

44 The ESCP outlines that in the event that monitoring identifies an exceedance of the recommended suspended sediment limits, then it will be the responsibility of the contractor to ensure that the work area and associated sediment treatment and prevention devices are thoroughly inspected to ensure there is no obvious sign of fault. If any obvious sign of fault or failure is identified then this shall be remedied as soon as is practicable, and reported to the GWRC. Condition 65 outlines the actions that are required where an exceedance has occurred. These actions will need to be modified to incorporate actions that will be required for early warning triggers as suggested in Para 46.

45 Other experts have provided an assessment of the proposed discharge triggers, sediment modelling, monitoring locations and mixing zone. It is noted however that the modelling undertaken and subsequent limits proposed by the applicant are sediment loads (Total Suspended Solids - TSS) whereas the monitoring equipment proposed in the ESCP is a continuous turbidity (Nephelometric Turbidity Units - NTU) sensor (telemetered). There are complexities with the conversion of turbidity data to concentrations of TSS. In addition, it is unlikely that a single source of fill will be used therefore any conversion would require constant recalibration as fill sources change. In my opinion continuously monitoring turbidity would provide real time data which would then enable appropriate adaptive management actions to be undertaken in a timely manner when there are exceedances of the discharge triggers.

46 The triggers proposed (Condition 64) are not adaptive management triggers, they are compliance triggers and therefore there is a need for early ‘warning’ triggers to be established. These would enable an adaptive management process to be implemented prior to an effect ocurring, rather then a reactive management process during the construction phase. Early warning triggers would allow the contractor to make any necessary changes to site management prior to the compliance trigger being breached. If early warning triggers were established then the ESCP could also set out these actions. The actions could be wide ranging, however would normally include a full audit of the sites controls and undertaking any

necessary maintenance. Essentially if the compliance trigger is breached then the first course of action should be cease works and discharge.

Conclusion

47 Given the uncertainty of discharge quality and sediment related effects, a precautionary approach should be taken to the management of sediment and discharge limits/ triggers.

48 The proposed management plans (CMP and ESCP) are part of the key aspects to managing sediment related effects of the development. It is critical that the information contained in these plans addresses the areas of uncertainty regarding sediment discharges. Adaptive management of the site is another critical aspect to managing these sediment related effects.

49 Given the proposed monitoring is utilising a turbidity sensor, the measurement of NTU rather then TSS would enable real time data to be used and therefore adaptive management actions to be undertaken in a timely manner.

50 The proposed conditions go some way to addressing the adaptive management triggers, and information requirements for the management plans. I consider that the conditions should be modified to include the following:

50.1 Condition 64 - Early warning triggers in addition to the compliance trigger, coupled with this would be the actions associated with the early warning triggers.

50.2 Condition 61 should include a reference to the ESC Guidelines as a minimum standard in the development of the ESCP. In addition the condition should be more specific in terms of the requirement for the decant system (including shut off valve) from the reclamation, the requirement for a floating silt curtain for all marine based works, progressive stabilisation and measures to reduce wind and wave action within the impounded water of the reclamation

50.3 A condition for a Chemical Treatment Plan should be imposed

50.4 Condition 58-59 to include a testing regime to confirm that all imported material is classified as ‘cleanfill’

50.5 A detailed construction methodology for the reclamation works, including how it is proposed to ensure that the rock dyke is sealed. This should be incorporated into Condition 22

51 Provided modifications were made as discussed above, the effects of sediment discharges could be appropraitely managed.

Date: 7 October 2016

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Gregor John McLean

Annexure 6 Air Quality

Louise Wickham

Wellington International Airport proposed runway extension

Air quality Assessment

Introduction

1 My name is Louise Fleur Wickham. I am a Senior Air Quality Specialist at Emission Impossible Ltd. I have been in this position since April 2011.

Qualifications and experience

1 I hold the academic qualifications of Bachelor of Chemical and Materials Engineering from the University of Auckland and a Masters of Environmental Law from the University of Sydney. I am a certified Resource Management Act 1991 decision maker.

2 I have over 20 years' experience in air quality gained in New Zealand, Australia and the United Kingdom and split equally between the private and public sectors. From 2004 to 2011, I was the Ministry for the Environment's senior adviser on air quality. During this time, I was the Ministry's technical lead on air quality matters and played a key role in the introduction, implementation and review of the *Resource Management (National Environmental Standards for Air Quality) Regulations 2004*. I have authored, or co-authored, a number of national good practice air quality guidance documents.[1]

3 Since 2011, I have continued to provide technical air quality advice to both government and private clients and to publish technical air quality guidance.[2] This includes technical advice to the Environmental Protection Authority on air quality aspects of transport proposals such as the Basin Reserve Flyover and McKays to Peka Peka expressway. I currently assist Hawke's Bay Regional Council and Greater Wellington Regional Council with applications for resource consents to discharge contaminants to air.

[1] For example:
Ministry for the Environment, (2008). *Good practice guide for assessing discharges to air from land transport*. June. (co-author)
Ministry for the Environment, (2005). *Updated Users Guide to Resource Management (National Environmental Standards Relating to Certain Air Pollutants, Dioxins and Other Toxics) Regulations 2004 (Including Amendments 2005) (second draft).* October.

[2] For example:
Ministry for the Environment, (in press). *Good practice guide for assessing and managing odour.* (lead author).
Ministry for the Environment, (in press). *Good practice guide for assessing discharges to air from industry*. (co-author)
Ministry for the Environment, (in press). *Good practice guide for assessing and managing dust*. (co-author)
Auckland Council, (2014). *Use of background air quality data in resource consent applications*. GD2014-01, July.

4 I am a member of the Resource Management Law Association and the Clean Air Society of Australia and New Zealand.

Involvement with the proposal

5 I was engaged by Greater Wellington Regional Council (GWRC) on 13 May 2016 to review and provide advice on air quality effects associated with construction of the Wellington International Airport (WIAL) proposed runway extension.

6 I visited the WIAL site and surrounds on Thursday 30 June 2016.

Assessment

7 I have reviewed the following documents to inform this assessment.

- WIAL Proposed Runway Extension Resource Consents Application (Application) prepared by Mitchell Partnerships dated 28 April 2016, specifically the assessment of environmental effects (the AEE): Section 7.9 Air Quality Assessment, and Section 8.5 Proposed Draft Conditions.
- Application Appendix D Draft Construction Management Plan
- Technical Report 21 – Wellington Airport Runway Extension Air Quality Assessment prepared by AECOM Consulting Services (NZ) Ltd dated 19 April 2016
- Letters from Mr J Kyle, Mitchell Partnerships Ltd to Ms J Chittock, Greater Wellington Regional Council dated 10 and 13 June 2016 responding to further information requests.

8 In my opinion, the key air quality issues arising from construction are:

- particulate matter (‘nuisance’ dust and respirable fractions); and
- traffic emissions from construction of the extended runway.

9 I will address each of these in turn below.

Particulate matter

10 The primary discharge to air of potential significance from construction of the extended runway is fugitive dust. Fugitive dust, also generally referred to as particulate matter, comprises a wide range of particle sizes. The common definitions used for assessment purposes are:

- Total suspended particulates (**TSP**), which includes anything smaller than 100 micrometres (µm) in diameter. In practice, the large particles (ie, greater than 20-30 micrometres) do not last long in the atmosphere, as they tend to fall out rapidly and settle. Particles deposited on a surface only become individually visible at about 50 micrometres. It is these larger dust particles that are generally responsible for 'nuisance' dust effects.

- Particles smaller than 10 µm in diameter are known as **PM_{10}**. PM_{10} includes particles referred to as 'coarse' (between 2.5 and 10 µm) and 'fine' (less than 2.5 µm, also known as **$PM_{2.5}$**). These smaller, respirable, fractions of particulate can be inhaled into the lower (PM_{10}) and upper ($PM_{2.5}$) sections of the lungs are known to cause adverse health effects.

11 In this project fugitive dusts arise from the following sources:

- Trucks transporting up to 1.5 million cubic metres of fill material to the construction zones at the airport over a three or four year period; and

- Construction activity at the airport (construction of haul and access roads, removal of topsoil, placement and compaction of fill material, operation of vehicles on access/haul roads, wind erosion, stockpiles, rehabilitation).

12 Following a request for further information the applicant advised[3] that all truck loads of fill will be covered prior to transport. I consider that covering the loads is best practice and will

[3] Letter from Mr J Kyle, Mitchell Partnerships Ltd to Ms J Chittock, Greater Wellington Regional Council dated 13 June 2016

satisfactorily mitigate potential fugitive dusts over the course of the haul route. I recommend a condition of consent to reflect the fact that all loads will be covered prior to transport, as set out in **Attachment 1** to this report (my recommended condition 2).

13 With respect to construction, good practice for assessing the *nuisance* aspects of fugitive dust (TSP) is to consider the FIDOL parameters (i.e. frequency, intensity, duration, offensiveness and location) and this has been undertaken by the applicant[4]. However, it is also good practice to focus on mitigation so as to avoid or remedy potential adverse effects, particularly when assessing *potential adverse health effects* of (the respirable fractions of) fugitive dust (i.e. PM_{10}).

14 Whilst I disagree with the applicant's conclusions regarding frequency[5], I concur with the applicant's assessment that, *in the absence of mitigation*, fugitive emissions of dust from construction of the runway extension could adversely impact residents of Moa Point. I further concur with the applicant that it is therefore, appropriate to focus on mitigation and good practice management of fugitive dust to ensure no adverse (health and/or nuisance) effects occur offsite.

15 As an aside, the applicant has assessed the proposal in general accordance with published good practice for dust management (Ministry for the Environment, 2001). However, this guidance is in the process of being updated.[6] Where appropriate I have reviewed the assessment and recommended mitigation and good practice management conditions of consent based on current good practice. These tend to be more comprehensive and more stringent than those recommended by the applicant.

16 Accordingly, **Attachment 1** sets out my recommended conditions of consent for mitigation and good practice management of fugitive dust from construction of the runway extension. Paragraphs 30 – 32 details how these agree or differ, and why, from conditions of consent recommended by the applicant. I consider that, if implemented, these would ensure adverse effects from fugitive dusts from construction of the extended runway will be satisfactorily

[4] Technical Report 21, section 6.2

[5] Notably, the applicant's conclusion that there is "limited potential for off site dust nuisance to occur with any significant frequency" in light of the relatively high frequency (34%) of winds at a level that would involve dust pick up (5 m/s) in a direction from the construction zone(s) towards residents at Moa Point.

[6] Emission Impossible Ltd successfully contracted to the Ministry for the Environment to update this guidance. This was completed in June 2016 and is in the process of being published. I was a co-author on this guide.

avoided, remedied or mitigated. These conditions include baseline monitoring (i.e. prior to construction commencing) to demonstrate no significant impacts at Moa Point where residents are closest to the construction zones.

17 A submitter from Moa Point Road has expressed doubt about the applicants statement in the AEE that fugitive dust will be mimised to within 50 metres of the source and raised concerns over a perceived lack of management or monitoring.[7]

18 The submitter appears to be unaware of the monitoring proposed by the applicant (continuous TSP and meteorological monitoring during construction). However, I agree that good management and monitoring will be critical in Wellington's high wind environment to ensure that fugitive dusts do not cause any adverse effects offsite. This is particularly true for Moa Point's high wind environment where the predominant north/south winds may also 'eddy' into the bay increasing the likelihood for deposition of fugitive dust emissions.

19 This is why I have recommended additional mitigation recommendations as conditions of consent to those recommended by the applicant in the AEE (refer my recommended conditions 1-2 and 19-30 in **Attachment 1**) based on existing good practice at other construction sites in New Zealand. This includes more stringent 'trigger levels' for TSP and PM_{10} requiring prompt action by the consent holder to minimise emissions to ensure that there are no adverse amenity impacts (TSP) and no adverse health effects (PM_{10}).

20 I have also added monitoring recommendations as conditions of consent to those recommended by the applicant (refer my recommended conditions 3-18 in **Attachment 1**) based on existing good practice at other construction sites in New Zealand. This inludes continuous monitoring for TSP, PM_{10} and meteorology for a full year prior to construction commencing. If implemented, this baseline monitoring will provide site-specific, representative data to refine the existing good practice 'trigger levels' for TSP and PM_{10} to be site specific for Moa Point's high wind environment when construction commences.

21 I consider that, if implemented, my recommended conditions of consent will ensure the applicant is managing the site at all times to minimise fugitive dust and avoid any adverse

[7] Submission by Mr Peter Hyam of 41 Moa Point Road dated 12 August 2016

effects. It will further provide real-time, publicly available (online) monitoring to demonstrate this is the case.

Traffic emissions

22 Traffic emissions during construction arise from:

- Trucks transporting fill material to the construction zones at the airport over a three or four year period; and
- Construction vehicles at the airport.

23 The key pollutants that are emitted to air from vehicles include:

- Carbon monoxide (CO);
- Nitrogen oxides including nitrogen dioxide (NO_2);
- PM_{10} and $PM_{2.5}$;
- Sulphur dioxide (SO_2); and
- Hazardous air pollutants (e.g. benzene, polycyclic aromatic hydrocarbons).

24 In addition to these pollutants directly emitted from vehicles, ozone and particles (from sulphates and nitrates) can form downwind of the point of emission by reacting with other gases in the atmosphere. These are called secondary pollutants.

25 I consider the primary pollutant of potential significance from traffic emissions to be nitrogen dioxide. Short-term exposure to nitrogen dioxide is linked with adverse respiratory effects including airway inflammation in healthy people, increased respiratory symptoms in people with asthma, increased visits to emergency departments and hospital admissions for respiratory issues, especially asthma.

26 Assessment of nitrogen dioxide requires an understanding of the ambient air quality of the receiving environment, which has not been well characterised by the applicant. I am aware that background annual levels of nitrogen dioxide long-term are already elevated compared with the World Health Organistation guideline in Wellington at some transport monitoring sites.[8]

27 The applicant considers that the impact of nitrogen dioxide emissions from the trucks hauling fill will be negligible. Screening modelling of emissions data from vehicle manufacturers[9] does support 310 trucks per day[10] being unlikely to have any measureable impact on long-term nitrogen dioxide levels. However, given the uncertain nature of many manufacturers NOx emissions data, I agree with the applicant's proposal to monitor ambient levels of nitrogen dioxide.

28 Rather than six months, as recommended by the applicant, I recommended baseline monitoring using passive samplers for a period of a year in accordance with existing good practice (Ministry for the Environment, 2008). A full year of monitoring will include all meteorological conditions that may give rise to maximum ambient levels of nitrogen dioxide. This will assist with:

- Establishing baseline (i.e. annual) levels of nitrogen dioxide; and
- Indicative monitoring (only) of impacts of construction traffic.[11]

29 I also concur with the applicant's recommendations for passive nitrogen dioxide monitoring as conditions of consent at two locations along the transport route (Calabar Road and Onepu Road). In addition, I also recommend a third monitoring location at Lyall Bay Parade and a fourth monitoring location at Moa Point because these are locations where residents may also be exposed to transport emissions (as set out in **Attachment 1**).

[8] Greater Wellington Regional Council, (2015).
[9] NZTA air quality screening model version 2
[10] Technical Report 10, Assessment of Construction Noise Effects, at para 19.
[11] Passive monitoring is a low-cost method suitable for trend analysis only (i.e. it cannot be compared with the 1-hour national environmental standard for nitrogen dioxide).

Recommended Conditions of Consent

30 The majority of (air quality) conditions of consent proposed by the applicant are in accordance with good practice. I support the consent conditions proposed by the applicant[12] relating to:

- Community liaison (applicant proposed conditions 8-10)
- Complaints management (applicant proposed conditions 11-12)
- Construction in accordance with proposed management plans (applicant proposed conditions 17, 21-24, 26-29)
- Construction Air Quality Management Plan (applicant proposed condition 37)
- Continuous TSP and meteorological monitoring (implied through requirement for construction management plan in applicant proposed condition 37(e))
- Visual dust monitoring (applicant proposed condition 40)

31 However, a number of conditions are not as clear as they could be. For example, the applicant has proposed a condition requiring a construction management plan that *describes* any temporary changes to the speed limit, including a 20 km/hr speed limit on unsealed construction site haul roads (applicant proposed condition 30(a)). I consider this less clear and enforceable than a consent condition requiring a speed limit on unsealed surfaces and stating what that speed limit should be.

32 Similarly, a number of the applicants recommendations for management and/or monitoring in the detailed assessment appear to have been overlooked in proposed consent conditions. For example, Technical Report 21 recommends passive monitoring of nitrogen dioxide at two locations along the proposed haul route but this is absent from the proposed consent conditions in the AEE.[13]

[12] Section 8.5 AEE, page 240
[13] *Ibid.*

33 **Attachment 1** includes my recommended conditions to improve clarity and address apparent oversights. It further includes a my recommendations to *replace* a number of conditions suggested by the applicant to give greater surety that adverse effects will be avoided or mitigated. I recommend:

- Reducing speed limit for unsealed areas from 20 km/hr to 10 km/hr (applicant proposed conditions 30(a) and 37(c)(i), my recommended condition 19). This lower speed limit is in accordance with existing good practice and common to many construction sites in New Zealand.

- Increasing pre-construction monitoring from 3-months to one year (applicant proposed condition 39, my recommended condition 13). In my view, a full year of monitoring is required to adequately characterise the existing environment. This is also in accordance with existing good practice.

- Reducing 1-hour TSP trigger level and adding new 5-minute trigger level (applicant proposed condition 41, my recommended conditions 15 and 16). These reduced trigger limits are in accordance with good practice at other transport construction sites in New Zealand (e.g. Mackay's to Peka Peka and Waterview transport projects). I further recommend the (absolute) trigger levels be reviewed upon the completion of pre-construction monitoring to ensure they are not over, or under, conservative for the existing environment (my recommended condition 14).

- Reducing timeframe for follow-up with (dust) complainants from 10 working days to three (applicant proposed condition 11b, my recommended condition 28). A prompt response will facilitate a good neighbourly relationship with the community in accordance with existing good practice.

34 **Attachment 1** further contains my recommended conditions of consent in *addition* to those proposed by the applicant. These are intended to:

- Address the mitigation relied upon in both the applicant's and my assessment of construction discharges to air (applicant's recommendations in section 7.9.5 of the AEE and my recommended conditions 19-26); and

- Provide good practice air quality monitoring and management of particulate from construction (my recommended conditions 1-18 and 29-30).

Overall Assessment

35 Assuming my recommended conditions of consent are implemented I consider:

- Discharges to air from the construction of the extended runway will not have any adverse health or nuisance impacts on air quality offsite;

- Discharges to air from trucks hauling fill will not have any significant impact on air quality in the wider region; and

36 When considering the actual and potential effects of an activity, section 104 of the RMA requires the decision maker to have regard to the Resource Management (National Environmental Standards for Air Quality) Regulations 2004 (NES for air quality). The NES for air quality includes short-term, ambient air quality standards for, *inter alia*, PM_{10} and nitrogen dioxide. Provided the conditions of consent I have recommended are implemented, I consider that the proposed construction will not impact on achievement of (NES for air quality) ambient standards for PM_{10} and/or nitrogen dioxide.

Conclusion

37 In my opinion, the key air quality issues arising from the proposed construction are:

- Particulate matter ('nuisance' dust and respirable fractions); and

- Traffic emissions from construction of the extended runway (including trucks hauling fill to the site).

38 I consider that discharges to air from construction of the extended runway, including traffic, will be satisfactorily addressed (i.e. no adverse effects offsite) if my recommended conditions of consent are imposed.

39 I have less confidence that the applicant's recommended conditions of consent will ensure adverse effects are limited to within 50 metres offsite. This is reflected in my recommended conditions for mitigation and management of fugitive dust being more comprehensive and stringent than those recommended by the applicant.

Date: 7 October 2016

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Louise Wickham

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Attachment 1 Recommended Conditions of Consent: Air Quality

General Conditions

1 There shall be no noxious, dangerous, objectionable or offensive discharges to air to the extent that the discharge causes an adverse effect at or beyond the boundary of the site (i.e. construction zone(s)).

2 The consent holder shall cover all loads (that may generate fugitive dust discharges to air) to minimise the generation of fugitive dust. This includes all material being transported to and from the construction zone(s).

Air Quality Monitoring: General

3 All air quality and meteorological monitoring shall be undertaken in accordance with the *Good Practice Guide for Air Quality Monitoring and Data Management* (Ministry for the Environment, 2009).

4 All air quality monitoring to be sited, as far as practicable, in accordance with AS/NZS 3580.1.1:2007 *Methods for sampling and analysis of ambient air – Guide to siting air monitoring equipment.*

5 Meteorological monitoring to be sited, as far as practicable, in accordance with AS 3580.14:2014 *Methods for sampling and analysis of ambient air - Meteorological monitoring for ambient air quality monitoring applications.*

6 Continuous monitoring for PM_{10} and passive sampling for nitrogen dioxide shall be carried out at Moa Point at a location that is, as far as practicable, representative of resident's potential exposure to discharges to air from construction.

7 Passive sampling nitrogen dioxide (only) shall also be carried out at three locations along the proposed heavy traffic route on sections of State Highway 1:

- Onepu Road;
- Calabar Road; and

- Lyall Parade

8 Passive monitoring for nitrogen dioxide shall be carried out in accordance with the method described in section 3 of NZTA, (2016) *Ambient air quality (nitrogen dioxide) monitoring network Annual report 2007-14*.

9 Continuous meteorological and total suspended particulate (TSP) monitoring shall be carried out at a location that is, as far as practicable, representative of local weather conditions across the construction zone(s).

10 Continuous monitoring for particulate matter less than 10 micrometres in diameter (PM_{10}) shall be carried out in accordance with Schedule 2 of the Resource Management (National Environmental Standards for Air Quality) Regulations 2004.

11 Continuous monitoring data shall be made available online in real-time in a format similar to GWRC public air quality monitoring.

12 Monthly summary reports of quality assured, air quality and meteorological monitoring data shall be provided to GWRC, and made available online, within 10 working days of end of each calendar month.

Advice Notes

The purpose of passive NO_2 monitoring is to detect long-term impacts (if any) of the proposal. The purpose of the PM_{10} monitoring is to demonstrate no adverse effects on health (i.e. ensure compliance with the national environmental standard for PM_{10} at Moa Point). The purpose of TSP monitoring is to demonstrate no adverse amenity effects from fugitive dust offsite. The purpose of meteorological monitoring is to inform ongoing site management (e.g. investigating dust complaints) and developing site specific trigger levels for TSP and PM_{10} (refer Condition 14).

The location(s) of PM_{10}, TSP and met monitoring sites have not been specified to provide some flexibility for the applicant to practically achieve these objectives.

Air Quality Monitoring: Pre-Construction

13 Monitoring shall be carried out for at least one year prior to construction commencing, for:

- TSP;
- PM_{10};
- Meteorology (rainfall, temperature, wind speed and wind direction); and
- Nitrogen dioxide.

14 At the completion of pre-construction monitoring, the consent holder and community liaison group shall review the (recommended) trigger levels in Table 1 (set out below) and amend them if necessary to ensure they are not under, or over, conservative for the existing environment.

Air Quality Monitoring: Construction

15 Monitoring shall be carried out during construction for:

- TSP
- PM_{10}
- Meteorology (rainfall, temperature, wind speed and wind direction); and
- Nitrogen dioxide.

16 In the event that any particulate trigger level in Table 1 (visible dust, TSP or PM_{10}) is exceeded, the consent holder shall investigate the cause as a priority and, if appropriate, immediately initiate dust mitigation measures to reduce ambient levels of particulate.

17 In the event that the one-hour PM_{10} or TSP trigger levels in Table 1 are exceeded for more than 1 hour (i.e. two consecutive hours, or more, above 150 $\mu g/m^3$ for PM_{10} or above 200 $\mu g/m^3$ for TSP), the consent holder shall cease all activities that generate fugitive discharges of dust to air. Construction may recommence when the trigger level is no longer breached. This does not apply if an investigation identifies that the consent holder is not the cause of the PM_{10} or TSP trigger being exceeded.

Table 1: Recommended* Trigger levels for TSP and PM_{10}

Parameter	Averaging period	Trigger Level
Visible dust	Instantaneous	Visible dust crossing the boundary
TSP	5 min 1 hour	250 µg/m^3 200 µg/m^3
PM_{10}	1 hour	150 µg/m^3
Wind warning	1 minute	10 m/s (during two consecutive 10-minute periods)
Rain warning	12 hours	There has been no rain in the previous 12 hours

*To be reviewed following 12-months baseline monitoring (refer Condition 14).

18 The consent holder shall notify GWRC monthly of any exceedances of the trigger levels in Table 1 and of the outcomes of any investigations and remedial actions undertaken.

Construction Dust Management

19 The speed of vehicles travelling on unsealed areas or access roads shall be limited to less than 10 km/hr.

20 The consent holder shall provide and use adequate water suppression to minimise dust emissions from unsealed areas and other sources of fugitive discharges of dust to air.

21 There shall be no deposition of earth, mud, dirt or other debris on any public road or footpath resulting from transport of materials, construction or construction related activities. In the event that such deposition does occur, it shall be removed as soon as practicable.

22 A wheel wash shall be installed, maintained and used to prevent the transportation of material onto sealed surfaces where the material can become a source of dust emissions.

23 Stockpiled material shall be located as far as practicable outside the operational flight envelope and away from sensitive receptors (i.e. residences at Moa Point).

24 The size, height and number of stockpiles that may generate fugitive dust shall be kept to a minimum and managed so as to avoid or minimise the generation of fugitive dust.

25 Construction is to be carried out, as far as practicable, in accordance with good practice mitigation of fugitive discharges of dust to air as outlined in the most up to date version of (Ministry for the Environment, 2001) *Good Practice Guide for assessing and managing the environmental effects of dust emissions*. This includes:

- Locating stockpiles and sources of fugitive discharges of dust to air so as to maximise separation distance to sensitive receptors (primarily residents at Moa Point).
- Limiting the height and slope of stockpiles.
- Limiting the drop heights from conveyors, loaders or other equipment transferring material that may generate fugitive discharges of dust to air.
- The use of wind breaks and/or bunding for stockpiles.
- Re-vegetation of exposed surfaces (including inactive stockpiles).
- Regular sweeping of sealed surfaces.
- Swift clean-up of spillage around transfer points.

26 Construction vehicles shall be serviced and maintained to minimise discharges to air as follows:

- Appropriate and regular engine maintenance (no visible emissions to air for more than 10 seconds).
- Ensuring vehicles are loaded correctly (i.e. not overloaded and/or covered if the material being transported has the potential to generate fugitive discharges of dust to air).

Construction: Dust Complaints Management

27 Upon receipt of any complaint about dust, the consent holder shall investigate the cause as a priority and, if appropriate, immediately initiate dust mitigation measures to reduce ambient levels of particulate. The investigation shall consider frequency, intensity, duration, offensiveness and location of the alleged dust nuisance and be carried out in general accordance with complaint investigation methods in the most up to date version of (Ministry for the Environment, 2001) *Good Practice Guide for assessing and managing the environmental effects of dust emissions*.

28 The consent holder shall advise the complainant of the outcomes of their dust complaint as soon as practicable, but at least within three working days.

29 The consent holder shall notify GWRC monthly of any dust complaints and of the outcomes of any investigations and remedial actions undertaken.

Construction: Dust Management Training

30 The Consent Holder shall ensure that personnel responsible for supervising contractor site staff (eg. foremen, supervisors, and managers) shall undergo dust management training required by the Construction Management Plan. Specifically, training shall include:

a) Dust mitigation;

b) Dust complaint management;

c) All conditions of consent relating to dust management including trigger levels and actions to undertake in the event these are exceeded;

Annexure 7 Economic Impacts

Greg Akehurst

S87F REPORT

Proposed Runway Extension at Wellington International Airport

Economic Assessment: Review of the Cost Benefit Analysis and the Economic Impact Assessment

Introduction

1 My full name is Gregory Michael Akehurst. I have 20 years consulting and project experience, working for commercial and public sector clients. During this time, I have worked on over 400 projects, the majority addressing issues of spatial distribution of activities and services to meet needs of specific markets and communities, as well as assessing the economic effects of developments, growth and change on regional economies.

2 I specialise in the assessment of demand and markets, the structure and nature of economic sectors, the form and function of urban economies, preparation of economic projections, and evaluation of impacts, outcomes and effects. I have applied these specialties in studies throughout New Zealand, across many sectors of the economy.

Qualifications and experience

3 I have a Bachelor of Arts, majoring in Geography and a Bachelor of Commerce, majoring in Economics from the University of Auckland. I am a Director of Market Economics Limited, an independent research consultancy.

4 The key aspects of my experience that are directly relevant to this case include; infrastructure impact modelling, regional economic modelling, tourism flows and expenditure modelling, retail and business modelling and projections, as well as cost benefit analysis.

5 I have significant experience in modelling and assessing the economic role that major infrastructure providers play in regional and national economies. I have carried out studies for a number of airports and seaports and my company has assessed the impacts of major roading projects, rail networks and other transport infrastructure work.

6 My company has developed a suite of regional economic impact models that I have applied widely across New Zealand over the past 20 years. These models provide detailed disaggregations of local economies, and economic linkages to trace how

spending flows through and generates employment, household income and contributions to regional domestic product. I also model how tourist spending patterns impact local and regional economies. This is based on a robust understanding of tourism markets, spending patterns, forecasts and the infrastructure required to facilitate their requirements.

7 I have been involved in a number of similar projects, including: economic assessments of Auckland International Airport Limited, Ports of Auckland Limited, and Queenstown International Airport Limited. In addition, I have assessed the economic effects of New Zealand's Cruise Tourism on regions and New Zealand as a whole for Cruise New Zealand since 1996.

8 I have applied these studies or assessment of effects in evidence for Council hearings, in the Environment Court and have prepared affidavits for the High Court.

Involvement with the proposal

9 I have been asked to review Technical Report 4: Sapere Research Group – Cost Benefit Analysis as well as Technical Report 27: EY – Economic Impact of the Proposed Runway Extension by both Wellington City Council and Greater Wellington Regional Council (the Councils). These two reports relate to the economic assessment of the proposed runway extension. I have also assisted with requests for additional information and reviewing the provided information.

10 I have reviewed submissions received by the Councils that have identified economic aspects of the proposed development.

11 I confirm that I have read the Expert Witness Code of Conduct set out in the Environment Court's Practice Note 2014. I have complied with the Code of Conduct in preparing this evidence and I agree to comply with it while giving oral evidence. Except where I state that I am relying on the evidence of another person, this written evidence is within my area of expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed in this evidence.

12 I have not carried out a site visit of the proposed runway extension.

13 I have had discussions with Sapere as part of preparing this report to clarify aspects of their assessment (including meetings on 22nd June 2016 and 26th of September 2016). As part of those discussions, I have obtained additional data and further explanation around existing data. Where I have relied on that additional data, I have stated what that data is, and referred to it where it was oral discussions.

Summary of Key Points

14 The Sapere Research Group have prepared a national cost-benefit assessment of the proposed runway extension and have identified $2.3bn in net additional national benefits in today's dollars. This is predicated on a set of passenger forecasts developed by InterVISTAS that have a high share of additional future passengers coming to Wellington from long haul destinations and a low share coming from short haul destinations.

15 I believe that while CBA provides an overview of the scale and direction of the economic effects at the regional level, and it provides good information as to whether the outcome of a particular investment will result in a net improvement or otherwise in economic wellbeing, it provides no insight into the nature and distribution of those effects, both positive and negative. This means that it is not clear from the Sapere report how much employment is sustained, how many families can expect to be supported, or even which sections of the economy are likely to receive the most benefit. A CBA is agnostic to who receives benefits or bears costs, it simply tells us, after adding all costs and benefits (wherever they fall) that the benefits outweigh the costs by a particular ratio.

16 The national level assessment is important, but it is necessary to understand the effects at a regional level. To this end, Sapere prepared a summary regional CBA based on their assessment of the potential distribution of both the costs and the benefits.

17 The CBA as summarised by Sapere captures costs and benefits across 4 main categories; Airports, Airlines, Users and Other Sections of the Community. This is an appropriate framework in which to assess the economic effects. In summary, the majority of the effects estimated by Sapere are in line with the findings of my review. However, there are three key areas where my assessment differs from Sapere's that affect the outcome and one that may be important distributionally but not in terms of quantum at the national level:

17.1 Airport: costs to build the extension do not appear to include sufficient optimism bias in their estimates. As a rule, developers tend to under-estimate the costs especially if the projects are unique or non-standard in any way. This is a well-documented effect that needs to be acknowledged in a study such as this.

17.2 Airlines: No account of any increase in landing charges has been identified. It may be that they do not increase, in which case the costs sit against the appropriate category. However, if the airport seeks to fund the extension

through landing charges, then the distribution of costs, both sectorally and geographically changes. BARNZ in their submission state that the increase could be as high as $47m annually, however that is likely to exaggerate returns on the capital investment. Note that in my review these figures are identified but have not been factored into the final cost benefit splits.

17.3 Users: Sapere have estimated the value of travel time for leisure travellers by translating the Australian values into New Zealand dollar terms. This results in a figure of $57/hour associated with the time savings from flying direct. This is significantly higher than my estimate based on adopting the NZTA land based leisure travel cost and factoring it up to reflect the air travel ($31.36/hour). The difference this makes is approximately $196m in net terms to the outcome at the national level.

17.4 Other Sections of the Community: Costs, Sapere have adopted an incremental approach to assessing the cost footprint of the net additional tourists attracted to Wellington. This is similar to a marginal analysis and assumes that the majority of tourism infrastructure and assets exist, and represent sunk costs. The additional tourists therefore only place a very small cost burden on New Zealand providers of goods and services. Sapere do not have information to allow this to be quantified, so have adopted MBIE's Value Added estimation process from the draft event evaluation guidelines. This indicates that every dollar spend can be split 25% to costs and 75% to benefits. I think this is too low and doesn't accurately reflect the totality of tourism costs. I believe that they are best represented by the average cost structures embodied in the Statistics New Zealand's Tourism Satellite Accounts (TSA) (especially in the long run) and Input Output tables produced by Statistics New Zealand. Relying on these values sees costs rise to approximately 48% of every additional dollar spent in New Zealand. It is likely that in the short run, i.e. within the first few years, that the cost structures better reflect the incremental values adopted by Sapere, however in the long run, they are more likely to reflect the average costs as hotels are renovated or new ones built. This means that the true cost figure to meet tourists additional needs, likely lies somewhere between the average costs as I have outlined and the incremental or marginal costs – if they were able to be determined.

18 These differences increase economic costs, or lower the benefits generated by the extension to a greater or lesser degree. Sapere estimate the total national costs faced by the country will be approximately $1.79bn in NPV terms over 40 years. My more conservative adjustments increase this to approximately $2.39bn, or $597m more.

19 The reduction in the value of travel time saving's I have applied reduces the benefits by approximately 5%. That is, the generalised cost of travel savings to users of the airport estimated by Sapere to be approximately $1.6bn reduces to approximately $1.4bn in my estimation using a lower VoTT figure.

20 Adjusting for these changes lowers the total incremental economic benefits to $3.9bn from $4.1bn as reported by Sapere at the national level. The net effect of these changes is to reduce net benefits to $1.53bn from the $2.3bn reported by Sapere and the Benefit Cost Ratio (BCR) from 2.3 as reported by Sapere, to 1.64. These figures are still strongly positive in CBA terms, meaning that if the proposed runway extension proceeds, the result would be a strong economic wellbeing lift for New Zealand.

21 In addition to the work carried out by Sapere, WIAL commissioned Ernst & Young (EY) to carry out a national economic impact assessment to provide background information to the proposed runway extension (Technical Report 27). I have a number of significant concerns about the technical robustness of this report. In my opinion, it is of limited use.

22 To address the limited regional information provided initially in the national CBA and to address the shortage of a robust regional EIA, Sapere provided a breakdown from the national to regional level for the CBA and the summary EIA they provided. In essence, the Sapere regionalisation relies on a very simple multiplication of the national expenditures by 31% to reflect the share of spending expected to be captured by Wellingtons role as a gateway city.

23 In my view, the regional effects that result from this are likely to be overstated because, at the national level there are no inter-industry trade flows generating effects outside of the region where the spending occurs, at the regional level there are inter-regional imports to consider meaning that the regional effects will always be lower than national on a per dollar basis. This is not reflected by applying a single ratio to the national effects.

24 Finally, there appears to be an issue with the manner in which the NPV calculations have been carried out. The result is that the figures presented in the Sapere work are approximately 7% over stated – either that or the dates in the Sapere spreadsheet are wrong.

25 The key conclusion I have reached having read the evidence, in the form of supporting reports to the resource consent application and the wider submissions is that, if the passenger projections relied upon by Sapere and WIAL are accurate, then the runway extension will deliver a net benefit to the Wellington region of approximately $465m

(assuming a 31% capture rate of tourist spending) and approximately $1.53bn in net terms to the nation.

26 These are lower figures than estimated by Sapere in their assessment. The key reasons for the difference are the more conservative estimates of the value of travel time I have adopted (for leisure travellers), my adoption of average cost structures to describe the economic footprint of additional tourists and my inclusion of higher construction costs by including an optimism bias – in line with international best practice. I acknowledge that my figures are more conservative and I accept that the overall net regional and national economic benefit might be higher, somewhere between my estimate and Sapere's.

27 The economic activity generated by the additional international visitors that Sapere anticipate arriving into Wellington stimulates employment. Employment required to meet tourist needs rises from around 200 in 2021 to over 1,000 by 2059 (the final year of assessment). In addition to this are the approximately 600 jobs annually generated in Construction over the three years of the proposed build.

28 These employment effects are significant, however the tourism related ones are directly dependent on the traffic forecasts prepared by InterVISTAS materialising.

29 I have also found that the net benefit presented in the CBA is sensitive to changes in input parameters. This adds a degree of uncertainty that surrounds the benefits. For example, the share of spend captured within the Wellington economy is driven by the type and nature of tourism that manifests. If this were to increase to, for example 50%, employment peaks at close to 1,800 job equivalents by 2059 and $635m net regional economic benefits.

30 However, the share of spend captured by Wellington as a city is likely to fluctuate in-line with passenger numbers. This means that a narrow, more Wellington focused tourism future is characterised by higher shares of capture but potentially lower actual passenger numbers and vice versa. This means that the 31% share adopted by Sapere is possibly a true reflection of the scale of effect in the Wellington economy.

31 Evidence prepared by Ailevon Pacific (APAC) on behalf of BARNZ has identified what they believe are significant issues with the passenger projections that Sapere rely upon to generate their impacts. That evidence casts doubt upon the starting points InterVISTAS use for their projections and the assumptions InterVISTAS rely upon to generate their projections. APAC go so far as to state that the InterVISTAS reports are

"fundamentally flawed[1]" and that the projections "provide an overly optimistic view of Wellington International Airport's long haul service potential[2]".

32 If the passenger projections are overstated, then the economic benefits will not materialise as described in the Sapere report.

33 In addition to the raw economic benefit numbers, the levels of employment the tourism expenditure would support (more than 1,000 jobs by 2059 at the Wellington Regional level), confirm that this extension will bring a significant benefit to the Wellington economy and that the benefits are likely to be distributed widely.

Assessment

34 My assessment focuses on the economic effects of the proposed runway extension, as identified in technical reports accompanying the application for Resource Consent submitted by WIAL, including:

34.1 Technical Report 4: Sapere Research Group – Cost Benefit Analysis (19 April 2016) (**CBA).**

34.2 Technical Report 27: EY – Economic Impact of the Proposed Runway Extension (24 February 2014) (**EIA**).

34.3 The additional information provided by the applicant, including the response to the Request for Further Information (1 July 2016), particularly Attachment 2 that deals with the CBA and the EIA as prepared by Sapere, as well as explanations and information provided to me by Sapere.

34.4 The submissions that have an economic aspect as identified by the Councils.

35 I have relied on other data sources and reports to inform my review. The main ones including:

35.1 The Ministry of Business, Innovation and Employment's Post Event Economic Evaluation Guidelines.

35.2 Statistics New Zealand's Tourism Satellite Accounts (TSA) and related datasets.

[1] Wellington International Airport Passenger Forecast Review, prepared for Ailevon Pacific Aviation Consulting (APAC), submission No. 688 (BARNZ), July 2016, page 2.
[2] Ibid.

35.3 Market Economics' economic accounts[3] of the Greater Wellington region and New Zealand's economic accounts.

36 The assessment covers both the CBA and the EIA reports. I have covered the regional assessments as well as the national level CBA and EIA that are included in the application.

Background

37 The application for a Resource Consent to extend the Wellington Airport runway was accompanied by reports from Sapere and EY who were commissioned to provide assessments of the economic effects. The EY report was prepared before the CBA and focuses on the potential economic impacts of the proposed extension and uses multipliers to estimate the total effect.

38 The CBA focused on the net economic benefit position at the national level and took into account a wide range of factors likely to impact on the costs and benefits at the national level. The CBA report includes a short discussion on the likely regional effects. In addition, Sapere ran sensitivity analyses to assess the potential effects/outcomes at a national level. These included altering passenger volumes, capital costs, discount rates, shifts in the proportion of existing users that use direct flights and different proportions of Value Added by NZ businesses during business processes.

39 As part of the assessment, Sapere made assumptions (out of necessity) as to the manner in which the proposed runway extension (and Code E gates) would be funded. Sapere have assumed that the proposed runway extension would be funded by central government through general taxation. It is my belief that the funding mechanism used for the proposed runway extension would have a fundamental effect on the economic outcomes for both regional and national residents. The manner in which a project is funded either regionally, nationally or privately influences the level of benefit that is delivered and distribution of costs across communities.

40 I do not believe that a national level CBA provides sufficient insight into the type, scale and nature of economic effects because it does not show a detailed and robust assessment of the regional level effects i.e. the distribution of costs and benefits. To this end, I requested further information that described and quantified the potential effects at the regional level. My assessment below covers both the original Sapere report and the additional information they provided.

[3] Economic accounts show the economic activity in a region and the level of interaction between sectors and industries both within and outside the region.

41 In addition to the CBA, I reviewed the Economic Impact Assessment (**EIA**) prepared by EY. The EIA has a number of significant issues. Importantly, it was based on an earlier set of air traffic projections. The EY report estimates that the additional passenger services (capacity) would add 711,000 seats by 2060, translating to an additional 576,000 pax. The InterVISTAS' estimate puts the passenger growth at around 387,000 additional international passengers (not seat capacity) when comparing the most likely growth options (with and without the proposed runway extension in 2060). Sapere provided additional information about the regional economic impacts assessment in the response to the additional information requested.

42 I summarise my assessment of the regional CBA and EIA after commenting on the national level CBA and EIA.

National level CBA

43 Sapere's CBA focuses on the potential national effects of the proposed runway extension. The CBA estimates the net benefit that could accrue to the nation and it looks at aspects such as the value of the nation's resources that would be used up in extending the proposed runway as well as providing goods and services to additional visitors. The net benefit is estimated by subtracting the overall costs from the overall benefits. The CBA considers a range of effects on different segments, including:

43.1 The effects on airports.

43.2 The effects on airlines.

43.3 The effects on users (passengers and freighters).

43.4 The effects on other sections of the community.

44 I have focused on the approach, as well as the key inputs and implications for the CBA.

45 Sapere's CBA is directly informed by the InterVISTAS assessment of passenger numbers and Sapere presents a summary of the forecast passenger traffic in Section 3 of the CBA report. Economic outcomes of the project captured in the CBA are directly dependent on the accuracy and robustness of the traffic forecasts. Apart from construction costs, all the main cost and benefit items in the CBA rely (directly or indirectly) on the InterVISTAS assessment. If the InterVISTAS assessment is wrong (over or understated), then those errors flow through in to the CBA analysis.

46 Sapere's CBA provides three scenarios based on different traffic forecasts. The low and high scenarios reflect the 5th and 95th percentile outcomes. In effect, only 10 percent of outcomes modelled are excluded from the assessment. This is a very wide spread and while it provides an indication of the distribution of effects, it doesn't assist much in focusing around the 'most likely' scenario (based on InterVISTAS median 'median' estimate).

MBIE Expenditure to Benefit Ratio

47 One of the key ratios used in the CBA is the additional tourist expenditure to NZ benefit share. Sapere has applied the Ministry for Business Innovation and Employment's (MBIE) "*Major Events Development Fund – Post-event Economic Evaluation Guidelines*" to estimate costs and benefits associated with additional visitor spend. As the name suggest, these guidelines were prepared to assess events rather than major infrastructure projects. The MBIE guidelines are designed to estimate the share of 'value add' to the economy arising from additional tourist expenditure generated specifically by the event[4].

48 Value add is similar to GDP, in that it contains the value of payments to wage and salary earners as well as operating surplus, depreciation, subsidies and taxes. It is true to say that Value Add or GDP is not the same as benefit.

49 Sapere, by using this ratio as a proxy for benefit, implies that benefit to spending is based on GDP. This is important because GDP includes salaries and wages, consumption of fixed capital and taxes – these items are regarded as business costs in CBA terms. If they are simply included in the CBA without appropriate adjustments, then benefits would be overstated.

50 I note that Sapere's original CBA (November 2015)[5] used information from TSA to derive the proportions of visitor expenditure that are costs and benefits. The MBIE guidelines recommend using a benefit ratio (% of $1 spending that is a benefit) that is higher than that implied by the TSA. The TSA presents an average cost approach in that it sums all of the receipts from tourist expenditure and the manner in which all sections of the economy have met their needs. Therefore, the TSA captures a significant proportion of the tourism infrastructure costs that an incremental approach might not include.

[4] Page 21, "Economic Evaluation Outcomes: Major Events development Fund", (May 2013), MBIE. These Guidelines are currently under review.
[5] This report is mentioned in section 1.3 of the CBA.

51 It is not clear why Sapere changed their approach. On page 7 of the CBA report, Sapere state that; "*As a primary purpose of a CBA is to allow comparisons of initiatives across policy and industry areas, a lack of consistency in methodology, as is evident in these studies, undermines the usefulness of the CBA to decision-makers. There is, therefore, a case for adopting the present draft guidelines to achieve consistency in approach between this CBA and other assessments which estimate the net benefit from additional visitors*". In my view, this assessment is for a proposed runway extension and the resulting visitor spending profile is likely to differ from spending associated with a Major Event. Therefore, relying on the MBIE value add estimation guideline to assess benefits from tourism expenditure will tend to overstate benefits and understate costs.

52 I understand that Sapere have utilised the MBIE guidelines as a proxy for the benefit share of their incremental approach to assessing the economic footprint of the additional tourists. I understand from discussions with Sapere that they have done this because they believe that the additional tourists are a small portion of the total tourists in any one year. They believe that this marginal approach presents a more accurate picture of costs and benefits.

53 I believe that in the short run, this is an appropriate response as across the initial years there will be limited change to Wellington's tourism infrastructure to meet these needs. However, if the passenger projections are accurate the numbers rise to more than 380,000 each year over the 44 year time horizon.

54 In my view these numbers are sufficient to begin estimating the costs of meeting their needs using an average cost approach that captures costs to fund new tourist infrastructure (hotels, retail outlets, recreational facilities, and other infrastructure). While it is clear that the volume of demand arising specifically from the additional tourists might not generate the need for their own set of hotels, shops and facilities, they are part of the growth in tourism that does. This means that in the medium to long run, it is more likely to be the average cost approach that better reflects their impacts.

55 Given that Sapere have relied on an incremental approach that states only 25% of all tourist expenditure is cost and my analysis indicates that approximately 48% of tourist expenditure is cost (on average), the actual effect likely lies somewhere between these 2 figures (assuming the 25% cost adopted is robust). It is likely to sit closer to the incremental end in the short term and at the average cost end in the medium to long run. Given this study covers more than a generation; I would argue that the medium to long run outcomes should dominate.

56 Sapere did use the TSA information in the November 2015 CBA report (as referred to in section 1.4.2, page 6 in the current report). In my assessment, I have taken into account a range of Statistics New Zealand (SNZ) and MBIE published datasets (including the International Visitor Survey) that provide a detailed assessment of visitor spending, and the costs to businesses of delivering goods and services to visitors. For example, the Regional Tourism Estimates (RTE) dataset provides a breakdown of visitor spending on eight tourism products, by type of visitor (domestic or international) and origin of the visitor (breakdown of NZ region or eleven international regions). I have associated this spending information with the Statistics New Zealand published Supply-Use Tables (or Input-Output Tables) to estimate how much it would cost businesses to deliver services to tourists.

57 Sapere indicated (p7) in the CBA that *"…average cost of all goods and services sold in New Zealand provides a poor indicator of the typical costs of supplying the additional goods and services demanded by the additional tourists that visit Wellington*". Sapere asserts that "*This is because the mix of goods and services purchased by international visitors differs from the mix purchased by locals*". In addition, Sapere highlights that domestic and international tourists have different spending profiles. While I agree that domestic and international visitors have different spending profiles, this does not mean that business costs to service these two groups differ. For example, the input costs of a café to provide a cup of coffee is the same irrespective of whether it is purchased by a local, a non-Wellington resident or an international visitor. The cost structures of businesses are relatively stable so therefore, it would be appropriate to use the input structures (i.e. costs per unit output) to estimate the cost to businesses of meeting incremental demand arising from the proposed runway extension, including international visitor spending.

58 Combining more detailed information on visitors' spending profiles with information on businesses' input structures provides a robust assessment of the net benefit position. For example, the latest Statistics New Zealand, Input-Output Tables show that for every $1 of output produced by 'accommodation', 'food and beverage service' and 'transport', $0.494 is used to pay suppliers i.e. the direct costs or intermediate consumption (these are direct inputs and excludes salaries, wages, taxes, and imports) accounts for 49.4% of every $1. Clearly, costs are greater than the 25% implied by the MBIE guidelines and used by Sapere.

59 In 2015, these sectors accounted for 53% of international visitors' spending (based on the TSA) meaning that it is an important segment in understanding total costs and benefits. By adhering to the MBIE guidelines for estimating value add, Sapere applies a lower cost base to over half of the visitor spending covered by their study. The effect is to understate the costs and overstate the benefits.

60 Changing the ratio used to estimate benefits from expenditure will change both the scale of costs and benefits. Sapere's sensitivity analysis highlights this effect and shows that under the higher portion of 54.1%[6] of spending that is treated as a cost (compared to 25% used), the cost-benefit ratio comes down from 2.3 to 1.7 – a 39% decrease. This sensitivity highlights the importance of using an appropriate ratio or method to derive the cost to benefit relationship for visitor spending.

61 In my view, relying solely on the MBIE value add estimation guidelines does not provide an accurate estimate of all the tourist expenditure costs and benefits over the duration of the study period. Similarly, it does not accurately reflect the medium to long run costs that New Zealand businesses would incur in delivering the goods and services to these visitors. Using the MBIE value add estimation guidelines by themselves is likely to overstate the net benefits because it understates the cost components.

62 Sapere argues (in Section 1.4.2 on page 7) that there is a need for consistency in the ratios used in assessments of this nature (i.e. the MBIE guidelines). However, these guidelines have been prepared to provide consistency across events when evaluating government funding of events as part of a government programme. In my view there is no need to maintain consistency with that programme because Sapere state that this CBA is not designed to determine whether government funding is appropriate or not, it is to support WIALs application for Resource Consent under the RMA.

63 In my view, a more robust approach would be to assess the short term impacts using a marginal or incremental approach, and combine that with a medium to long run estimate of effects using an average cost approach. To this end, I have provided a range in my summary table of costs and benefits. At the high benefit end the values rely solely on the Sapere figures, at the lower net benefit end, the figures rely on the average cost of tourism values.

Funding load

64 The CBA assumes that capital costs would be funded through general taxation. The assessment then considers alternative funding approaches (p. 100) and comments on the different impacts on economic efficiency and distributional equity. The assessment does not quantify the potential scale of the benefits or costs that could be expected under different funding approaches – in particular at the regional level.

65 This is an important gap because if the extension is funded using a different approach to general taxation, then the degree to which benefits would be realised is liable to

[6] This value corresponds with 45.9% of the spending that is viewed as Value Added that Sapere derived from the TSA

change. For example, the extension could be funded using debt such as a WIAL bond. For simplicity, assuming that the bond is structured over 12 years at an interest rate of 4%, the interest payments[7] would be $12.2m per year. This annual payment would need to be recovered in some way and landing charges could be one possibility. If these costs were then passed to passengers in the form of higher airfares, then the total demand for seats would be lower. The effect of this would be to reduce the number of visitors coming to Wellington, thereby lowering the economic benefits that the proposed runway extension would deliver. This simple example shows the potential effects of one alternative funding mechanism and highlights the potential interplay between the funding approach and economic effects as well as the distribution of those cost and benefits.

66 These are important aspects and I would expect an economic assessment to consider the effects of alternative funding approaches in sufficient detail and to quantify any potential changes to effects they result in. The CBA provides high level commentary on alternative funding mechanisms, but it does not quantify the effects.

67 This is also an important gap because it is likely that the project would not be funded using the general taxation approach given that the airport is part owned by the public and private sectors. While it is true that at the national level, the manner in which the extension is funded is not especially relevant, it is extremely important at the regional or local level as it has a direct bearing on who pays the costs to be compared with who receives the benefits.

68 In the sensitivity analysis, the CBA provides an indication of the potential cost-benefit ratios under different air traffic levels. Under the low traffic scenario, the cost-benefit ratio is materially lower than the 'most likely' scenario. The cost-benefit ratios, for the low scenario across all the sensitivities, are on average only 65% of the cost-benefit ratio of the 'most likely' scenario. The average cost-benefit ratios under the high scenario (again across the sensitivities) are 16% higher than the most likely scenario. This variation implies that the downside risk is greater than the upside potential – if the air traffic forecasts (most likely scenario) do not materialise then the implications are more severe than if the growth forecasts are exceeded. This points to the importance of understanding the potential effects on air traffic volumes (and therefore the costs and benefits) under different funding approaches.

69 A potential issue that is not canvassed in the CBA is the potential funding implications and effects on the domestic network if a portion (or all) of the funding load is recovered from existing users on the domestic network. Similarly, if the cost to airlines increase due to a shift in the value of the runway infrastructure (i.e. the asset

[7] Technically called the 'coupon' and excludes any repayment of the principle. The principle would also need to be repaid at maturity.

value), and airlines then increase their airfares on domestic or existing international flights, then existing users would be worse off. Further, price increases are likely to reduce demand for air travel and freight at the margin, resulting in lower levels of economic activity. The domestic air network and the connections it facilitates are important to the NZ economy and NZ's wellbeing. If the proposed runway extension reduces the level of traffic on the domestic network due to an increase in overall costs, then it is safe to assume that it would have a detrimental effect on national level economic outcomes and wellbeing.

70 In the BARNZ submission the potential for additional landing charges to existing airport users is estimated to be as high as $47m annually. Should this be applied, over the duration of the study period additional landing fees translate to over $446.7m (in $NPV_{7\%}$ terms). These would redirect the costs from the airport sector to the airline sector at the national level. Sapere have assessed as though only central government funding occurs at the national level and regional level funding at the local or regional level. They have not assessed the effect at the regional level if the airlines fund the extension.

71 However, there are issues with the BARNZ estimates as they would imply a level of return on capital for the airport that is significantly higher usual and may cause problems with bodies established to oversee the business activities and returns on investment for natural monopolies such as Wellington Airport.

72 It is also not clear if the capital cost (or any of the other costs) associated with the proposed runway extension includes costs associated with mitigating and managing the environmental effects during and after construction. If these costs are not included in Sapere's assessment then the net benefits are likely to be overstated.

Passenger and Freight

73 In estimating the incremental economic benefits for users of airline services, Sapere estimates the generalised cost of freight. This is done by using the opportunity cost of time based on the road freight transport (not air travel) between Wellington and Auckland. The current domestic route network provides the ability to transport goods between Wellington and Auckland by air. It is not evident from the CBA why Sapere opted to use road freight as the mode to estimate opportunity costs.

74 With reference to the freight capacity, it appears that the assessment is based on the tonnes of freight capacity that would be available if the routes (and flights) are added. In reality, only a portion of the available capacity would be used. This is similar to the 'load factor' that is used to show what portion of the available seats is filled by fee paying passengers. It is unlikely that 100% of the freight capacity would be used on

the new routes. It is not clear if the assessment is based on 100% of the capacity or if freight demand has been adjusted to reflect a 'load factor'. If a 100% utilisation has been used, then the assessment would need to be adjusted downward to reflect the situation where the flights do not operate at 100% capacity. Such an adjustment is likely to have a marginal effect on the overall assessment by reducing the cost effectiveness of the services underpinning the air traffic (i.e. more flights needed to service the freight demand, or the same number of flights with less freight carried per flight).

General Comments

75 In addition to the above points, I have also identified some other areas of difference (I address the first two in more detail in the following section on the regional CBA):

75.1 The sensitivity of the CBA to changing the value of travellers time parameters.

75.2 It is not clear if the assessment included sufficient allowance for optimism bias covering the construction costs.

75.3 The assessment does not fully discuss all the costs and benefits and how these could be interpreted in different ways. For example, salaries and wages are included as a benefit but they are also a cost to businesses. For this reason, it is worthwhile to express some of these effects in an economic impact assessment (EIA) because it provides a useful context within which to understand the scale and nature of these effects.

75.4 The sensitivity analysis uses a very wide range (distribution) of settings. For example, the low and high traffic forecasts adopted in the sensitivity analysis applied the 5^{th} and 95^{th} percentile projections, for the low and high scenarios respectively. The low scenario projects an extra 263,900 passenger movements (in 2060) and the high scenario projects 935,300 extra movements compared to the most likely scenario with 578,200 extra movements (as presented in the *Spreadsheet in support of Sapere CBA 19.4.16 – Release for consultation*" attached to the BARNZ submission (Appendix Three)). The way in which the sensitivity analysis is presented appears to show that the cost-benefit ratio remains above 1.0 (i.e. a net benefit position) for most scenarios. However, the assessment does not show the potential effects and outcomes if some of the drivers are combined. For example, the assessment does not comment on the cost benefit ratio under a high construction cost scenario combined with lower use of direct flights by existing users. Combining the sensitivity analyses in

such a way would show the potential outcomes if regional demand does not materialise and estimated construction costs overshoot estimates.

76 In addition to the above, I have identified a potential issue with the Net Present Value (NPV) calculations in the "*Unprotected - Spreadsheet in support of Sapere CBA 19.4.16 – Release for consultation.xlsx"*. While I understand that this spreadsheet has not been submitted as part of the resource consent application (but was an attachment to the BARNZ submission), the tables in the current report match the tables as presented in the spreadsheet, implying that the calculations are the same. Also, while I did not audit the spreadsheet, the NPV figures are not calculated in the way that I would expect. If I recalculate the NPV of the "Total Construction Cost (risk adjusted including contingency)", using the same 7% discount rate, then I get $278.6m compared to Sapere's value of $298.1m. Similarly, if I recalculate the 'Total additional expenditure by non-resident visitors to NZ on goods and services supplied by NZ businesses (excluding GST)' then I get a value of $2.06bn compared to Sapere's value of $2.20bn. These two examples are 6.5% lower than Sapere's stated figures.

77 I suspect that this difference arises either because in the Spreadsheet the discount rates are expressed as at a date (1 April 2015) that may not be correct. If it is, then the calculations Sapere have carried out fail to discount any expenditure that occurs in the first year following 1 April 2015. Each subsequent years expenditure is then discounted by the rate for the previous year – that is, by 7% less than it should. By assuming that the date is correct (1 April 2015) and that everything is being discounted back to this date, then Sapere has treated the first year as though no discount should apply.

78 If however, it is simply that the date is incorrect in the spreadsheet, then other than spreading a little confusion, there is no real harm done. However, the outcome is not clear.

79 Given that the CBA assessment reports virtually all of its findings in NPV terms, the above means that the cost and benefit figures could be overstated by 7%. It is my belief that this error (either the wrong model start date, or the exclusion of the first year from the discounting) remains in the final version of the report as presented in support of the Resource Consent application.

80 With reference to capital costs and their timing, Sapere indicates (page 50) that the "*…nominal capital cost has been spread equally over the assumed three year construction period (i.e. 2017/18 to 2019/20)…*". However, in the spreadsheet (mentioned in paragraph 76) the first year in which capital costs are incurred is labelled year ending '31 Mar 2017'. It is my understanding that 31 March 2017 should

be grouped in 2016/17 not 2017/18. This again adds to the confusion and makes it difficult to determine the correct values.

National CBA Summary

81 In summary, the national level CBA highlights a strongly positive outcome. As Table 1 shows, the net effect based on my more conservative stance due to the factors discussed in this report still generates a $1.53bn economic wellbeing gain for New Zealand. While this is some $793m lower than the Sapere estimates ($2.3bn), it still generates a strong BCR of 1.64.

Table 1: National Summary of Costs and Benefits of the Wellington Airport Runway Extension, ($NPV_{7\%}$ $'000)

Costs	**Low Cost**	**High Cost**
Airports	343,869	420,265
Airlines	-	-
Users	834,316	834,316
Other sections of the community	611,630	1,132,264
Total Incremental Economic Costs	**1,789,815**	**2,386,845**
Costs Difference		*597,030*
Benefits	**High Benefit**	**Low Benefit**
Airports	121,744	121,744
Airlines	5,826	5,826
Users	1,601,085	1,404,266
Other sections of the community	2,385,447	2,385,447
Total Incremental Economic Benefits	**4,114,102**	**3,917,283**
Benefit Difference		- *196,819*
Cost Benefit Assessment	**2.30**	**1.64**
Total National Net Benefit	**2,324,287**	**1,530,438**
Net Difference		*793,849*

82 The national level CBA does not provide a detailed assessment of the regional costs and benefits, particularly the costs that would fall to Wellington region. Sapere provided a high level summary of the regional CBA in response to a request for

additional information. I comment on the Sapere's regional CBA and EIA after presenting my observations about the national level EIA.

National level EIA – Ernst Young Report

83 As mentioned above, I have been asked to review both the CBA and EIA reports. In this section, I summarise the findings of my review of Technical Report 27: EY – Economic Impact of the Proposed Runway Extension (24 February 2014) (EIA).

84 It is very important to note that the EY report is based on a different set of air traffic forecast figures. Therefore, the EIA it is not consistent with the CBA. The EIA is unclear on the size of the net change that is it assessing. I did request a breakdown of the net change that is assessed, but this information was not provided.

85 In spite of the different air traffic forecasts and the limited information about the change that is assessed, I have reviewed the EIA and have identified a number of critical issues, including:

85.1 The EIA uses a multiplier approach. It is based on a derived multiplier and also included a number of factors to adjust the spending before converting it (the spending) into Value Added (VA is similar to GDP). The EIA is unclear on the rationale for the adjustments or the source(s) of the adjustment factors used. Further, the assessment uses a multiplier of 2.5 to estimate the total impacts delivered by the direct effects. However the report states (in footnote 52) that an indirect multiplier of 1.5 has been used. The reason for this discrepancy is unclear. A number of economic studies have been completed for Wellington International Airport and it is unknown why the EIA didn't use the information and estimates in those studies as a guide. It is also unknown what sort and type of multipliers are used. The multiplier could be Value Added or Gross Output multipliers or it could be a Type 1 or a Type 2 multiplier. Type 1 multipliers exclude the flow-on effects associated with people spending their salaries and wages and Type 2 multipliers include these effects.

85.2 The assessment does not include the effects of project fundeding. Normally, the funding approach is included in an assessment to estimate the counterfactual (i.e. the potential economic effects of the funding if it was spent in another way) and how the project is financed. By including a counterfactual, the net economic impact can be assessed and understood in an appropriate context.

85.3 The EIA does not include the economic effects associated with the construction phase i.e. Value Added in the economy due to the spending during the construction activity, and number of jobs that are supported by the construction and supply industries. Extending a runway is a substantial project and the construction activity alone is likely to have a real impact on the regional economy. By excluding the construction effects, the assessment is understating the total economic impacts. In addition, a large portion of the construction effects would be felt within the region and excluding them is likely to understate the effects on the regional economy.

86 The EIA describes the additional visitor expenditure as benefits. However, from my perspective neither the expenditure nor the economic impacts are benefits. An EIA traces the flow of goods and services through the economy that are used to deliver/service the visitor expenditure. Importantly, an EIA reports on the change in the level of economic activity that is needed to deliver the projected change (i.e. the economic shock). An EIA then expresses the economic change using metrics such as Gross Output, Value Added (or GDP), employment levels and income. Note that these are economic metrics and they are not 'benefits'. For example, GDP includes taxes, salaries and wages and other 'costs'. GDP is a measure of economic activity, not 'benefit' as used (incorrectly) in the EIA.

87 The EIA (Technical Report 27) provides an indication of the economic impacts using value added. Value added is very similar to GDP so this is an appropriate measure. However, this is the only metric provided in the EIA. In my view, a comprehensive EIA needs to cover GDP as well as employment effects and household income.

88 Further, for large infrastructure investments such as the proposed runway extension, an economic impact assessment should also reflect inter regional flow-on effects. As an economy, the Wellington region interacts with the rest of the country, buying inputs from other regions. In turn, these regions transact with other regions, including Wellington, highlighting the integrated nature of the economy. This suggests that some of the economic effects of the proposed runway will be felt outside of Wellington region and it is important to understand these effects fully.

89 In summary, the EIA report has a number of critical methodological issues that undermines its usefulness. Further, the fact that it is based on earlier air traffic forecasts means that it cannot be viewed in conjunction with the CBA to get a fuller picture of the proposed runway extension's economic effects. Therefore, in my view the EIA contributes little to the discussion.

Regional CBA - Sapere Research

90 Using the additional information provided in the 'Response for Further Information' (dated 1 July 2016) and the tables in CBA report that Sapere referenced in this response, I comment on Sapere's regional CBA.

91 Sapere's response to the additional information request (1 July 2016) emphasised that a CBA, in Sapere's view, is the most appropriate way to assess contributions to economic wellbeing from a project such as the airport expansion and that the manner in which it might be funded should be addressed in a business case and is for the Board of WIAL to determine. The response states that the CBA does not assume that the project will be funded by the Government – yet in section 7.1 of Technical Report 4, (page 100) Sapere state "The estimates presented above (including the sensitivity analyses) assumed, for simplicity, that all of the additional capital costs under each option would be funded through general taxation revenue".

92 This is an important assumption as the cost loading on regional residents is very different if they are asked to fund the proposed runway extension via rates (partially or totally), compared with funding through general taxation revenue (with the cost spread across all NZ) that Sapere has assumed occurs.

93 Simple maths highlights these differences. If the total construction cost is spread among Wellington households[8] the funding load that falls on each household is estimated at $1,692 per household. That is, the total construction cost divided by the number of households. If the proposed runway extension is funded via general taxation revenue, then the expected cost to each household in New Zealand is some $192. That is, the total construction cost divided by the total number of households[9]. These figures are very different. This example clearly illustrates that the regional (cost) effects are subject to the manner in which the project is funded i.e. where the funding load falls.

94 If nationally funded, Wellington households could expect to cover some 11% of the direct construction costs compared with 100% if funded entirely from the region's ratepayer base (out of rates). Funding the proposed runway extension nationally suggests that some $264m of the cost is transferred out of the Wellington region to the rest of New Zealand (notwithstanding income differences and business concentrations).

[8] This example ignores the fact that a portion of the rates and tax load falls on commercial and industrial properties and business.
[9] This example uses households and not taxpayers.

95 In the Response for Further Information (dated 1 July 2016; Appendix 2) Sapere states that it is important to assess all the costs and benefits that arise from the project regardless of where they occur. They go on to state that "Reducing an assessment to any particular geographic region risks counting transfers between regions, with no net effect on wellbeing, as either a cost or a benefit".

96 However, it is entirely necessary to assess the effects at the regional level as well as at the national level because the transfers between regions are vitally important to understand when assessing the effects on the region, or the community in question. To ignore them is to misrepresent the nature and distribution of effects.

97 The spatial distribution of effects, their concentration and loading are important to the decision, therefore, a national CBA alone, is not sufficient, as it does not capture these regional effects.

98 Having said that, Sapere in presenting a regional disaggregation of costs and benefits, do err on the side of caution by sheeting home all the costs to the Wellington region. This means that if the regional CBA comes back with a positive outcome – that is, the benefits outweigh the costs, then regional authorities can be confident that the development of the extension will improve the overall economic wellbeing of the region. If the costs are borne more widely, then local economic wellbeing improves further.

99 Sapere have extracted information from its national CBA "*the net economic benefits which are likely to accrue to the Wellington region and show how those benefits greatly exceed all of the costs of constructing the extension*" in order to provide a regional perspective. Sapere's approach to estimating the regional CBA is to derive the costs and benefits from the national CBA by either allocating a portion of the national level costs and benefits to the region or to allocate all of the costs and benefits to the region. Deciding between the options appears to be based on where the costs and benefits are expected to fall/arise.

100 The response provides the net benefits for the following segments:

100.1 Wellington Airport,

100.2 Airlines,

100.3 Passengers and freight,

100.4 Local business/other sections of the community.

101 All the figures are in Net Present Value (NPV) terms out to 2060 and are based on Sapere's figures[10].

Benefits

102 **Wellington Airport**: It is also worth noting that a portion of benefit is the residual value of the asset (proposed runway extension and presumably the gates) at the end of the assessment period. The report states that the residual value is $19.3m based on increasing real construction costs over time. They have adopted a 1.5% average annual increase in those costs as part of the residual value. In other words 1.5% asset value growth over the study time period. I accept that this provides a more accurate estimate of the value than if 0% was selected.

103 **Passenger and Freight Services**: This segment is a key driver of the overall benefit that the extension is estimated to deliver. Economic benefits arise in the form of improvements in the generalised cost of travel (for passengers) and freighting.

104 A time saving accrues to outbound residents from not having to first travel to Auckland or Christchurch to travel internationally. By 2060, this segment is estimated to be equal to 461,500 passenger movements (annual movements in 2060 including enplane and deplane) on the domestic network (that is 230,750 travellers). The Sapere analysis translates these movements into costs and benefits.

105 With reference to the costs for the users of additional airline services, this relates to the costs incurred by users (PAX) that take up the 'new services'. I interpret 'additional' as those passengers that would not have travelled internationally if it were not for the extension.

106 Users (passengers) are estimated to experience a benefit of some $723.1m arising from improvements in generalised costs (for outbound travellers). This benefit is a function of the value of time used in the assessment. Based on my analysis of Sapere's supporting spreadsheets, their assessment used $57.02 per hour for leisure travelling individuals (although the report reads $53.60 per hour) and $76.42 per hour for business travellers. If this cost (unit prices per hour) changes, then the benefits accruing to this segment will also change.

107 Having assessed the process Sapere adopted to arrive at the Value of Travel Time (VoTT)[11] I believe the benefit is overstated. I understand that the figures used are

[10] The figures quoted in this section are based on Sapere's data and have not been adjusted for the calculation issue mentioned in paragraph 76.

[11] Value of travel time refers to the cost of time spent on transport, including waiting and actual travel

based on extrapolations from international studies, however the one definitive piece of New Zealand based information available is overlooked. In Appendix 4 Sapere (in the CBA report) state that the difference between business VoTT and leisure VoTT is large (i.e. business is 3.46 times greater than leisure). This is higher than elsewhere in the world. Instead of assuming this is relevant in the New Zealand context they adjust the figures to reflect international differences. However, in doing so they move from the base information to exceed the average overseas examples.

108 NZTA estimate the VoTT for land based leisure travel is $9.80 and $33.87 for business – a 3.46 differential (Table 35 of the national CBA). Sapere also record in Table 36 a range of differences between Air based and land based travel VoTT estimates to assist in converting the land based figures to air based. Only 2 examples exist for leisure travel, both from the US. The first shows a 1.9 ratio, the second a 3.2 differential.

109 Sapere end up applying a 5.8 ratio, that is, the VoTT for land based leisure travel is $9.80 and the value applied for the purposes of estimating the benefits accruing to leisure airport users in the CBA is $57.02. This has a significant effect on the total economic benefits accruing as a result of the runway extension because leisure travellers make up over 90% of total travellers.

110 I have re-estimated the economic benefits for Users by adjusting the VoTT down to reflect the international information provided. I have done this by starting with the NZTA land based leisure travel time cost, and factored it up by 3.2 (the highest non business scale up ratio presented in Sapere's Table 36 on page 124). This produces a leisure travel value of time of $31.36 and has the effect, when applied to the leisure travel portion, of reducing the benefit to users to $527.3m which is $196.8m less than Sapere's figure of $724.1m (Table 20 in the CBA report). Note that I haven't adjusted the business value Sapere have applied. It seems broadly appropriate and as it only applies to a very small share of total travel time savings have very little impact on the outcome.

111 Sapere estimates the net benefit to the region from the additional freight that is expected to be flown in to, and out of, Wellington due to the extra services, using information in the EY report (the economic impact assessment). The EY report implies that the imports and exports would grow to 25,000 tonnes (p. 61 of the CBA) per year by 2058/59. This assumes that all (100%) the freight capacity on the added flights is taken up[12]. Over the past decade, the average annual freight moved out of/in to Wellington (internationally) has been 1,402t[13]. For the freight movement to grow to 25,000t from the current level (by 2060), it would need to grow at 6.6% (compound).

[12] It is unclear if a load factor is applied.
[13] Statistics New Zealand. Overseas Merchandise Trade data.

Total freight movement (weight inbound and outbound) has been trending down for the past 25 years[14]. Nevertheless, if the growth rate used in the Sapere analysis (as estimated by EY) is applied to current freight totals, then the total freight by 2060 is estimated at around 5,872t.

112 The 25,000t figure is 4.3 times greater than the estimated 5,872t (using the current freight movements and applying EY growth rates). This suggests that the additional freight 'costs' as reported in the CBA could be around four (4.3) times lower. Similarly, the benefits would be lower by the same ratio. Sapere put the benefit to freighters at $1.96m and applying the factor (4.3 mentioned above) reduces this benefit to $0.5m.

113 With the above adjustments for the alternative VOTT and lower imports and exports, the net benefit to Wellington region is estimated at $558.4m – some $208.4m less than Sapere's estimate of regional benefits. The vast majority of this shift is due to changing the parameter used to value travellers time. This highlights the sensitivity of the benefit analysis to the VoTT value. It also underscores the point that the freight component's contribution to the costs and benefits is relatively small.

114 **Local business and other sections of the community**: is the final segment included in Sapere's analysis. Sapere assumes that 75 per cent of the spending is a benefit (and 25 per cent is a cost). This is as per the MBIE guidelines, which (as already noted) are for events (not tourism activity in general) and are for estimating 'value add' not benefit. I have outlined my concerns about relying on this ratio in paragraph 47. Using the TSA delivers different results – every $1 spent by a visitor would generate $0.678 of Value Added (after adjusting for GST and including the flow on effects). If only the direct effects (not flow on effects) are considered, then $1 of spending would generate $0.388 of VA. The same information (TSA) can be used to estimate the costs. For every $1 spent by visitors, businesses incur $0.477 of cost (excluding imports, a cost that adds another $0.135).

115 The Sapere approach at the national level (p. 88 of the National CBA Report) uses the median spending of international visitors and multiplies it with the estimated number of visitors to derive the total spending. It then adjusts the spending for GST – GST is seen as a benefit for New Zealand. The national figures used are:

115.1	Total Spending	$2.4bn (incl GST)
115.2	GST collected	$183.4m
115.3	Spending that is 'benefit'	$2.2bn (p. 87)

[14] Calculations based on Statistic New Zealand.

115.4	Cost to service visitors	$550m (p. 63)

116 The Sapere analysis reviewed international visitor spending by region and the arrival port for international visitors to try to estimate a possible 'gateway effect' – an important part of the regional analysis (p. 93 of the Sapere national CBA report). Visitor expenditure is 'allocated' to Wellington region based on this gateway portion. In turn, this portion is then multiplied by 75% to estimate the benefits associated with the expenditure.

117 Essentially, Sapere estimate the net benefits that accrue to the Wellington region as 31% of the national benefit (less the same portion of the national cost). The figures in Tables 14 and 28 of Sapere's national CBA report, give a net benefit to Wellington region of $512.0m[15]. I note that MBIE indicates that when assessing the regional benefits of an event, only 50 per cent of the international visitor expenditure should be included as it is assumed that the rest (25 per cent) flows out to other regions.

118 It is necessary to adjust the estimated benefits that arise from expenditure by removing imported goods from the total because the value associated with these transactions flow out of the region and country. Using the figures published in the TSA suggests 13.5 per cent of the total value of goods and services sold (directly) to visitors relate to imported goods[16]. Applying this to Sapere's estimated spending would reduce the 'benefit' by the same percentage. Sapere use 25 per cent of expenditure as the cost of goods sold. This approach is based on the MBIE guidelines for assessing events based spending. It is however important to realise that parts of the benefits could be interpreted as costs.

119 The difference between visitor expenditure and the cost of goods sold shows 'primary inputs'. Primary inputs include, compensation of employees, operating surplus, consumption of fixed capital, other taxes on production, tax of products, subsidies and imports. These are the components, other than imports, that make up GDP and excluding taxes on products, value add. This is the value that the MBIE approach is seeking to estimate - with the 75%:25% split. Sapere are using this to reflect benefits, however a number of these aspects are actually business costs (wages and salaries, for example).

120 Compensation of employees and consumption of fixed capital account for 50% and 22% per cent of the total primary inputs and tax on products (e.g. rates) account for a further 13.6% of primary inputs. In the Sapere analysis, all of these components are

[15] This is slightly lower than the figure Sapere quotes. We suspect that this is due to rounding.

[16] This is imports sold directly to tourists by retailers as a share of direct tourist demand. It does not include the indirect tourist demand and the cost of inputs used to satisfy the flow on effects (to supplier industries). It is not clear if Sapere adjusted the figures for imports.

treated as benefits (by default) as they have adopted a more generalised proxy for assessing benefits. However, some of these items can be seen as a cost as well as a benefit and others (e.g. labour) also have an 'opportunity cost'. For example, salaries and wages are a business cost but they are also a benefit insofar as they represent a payment to households i.e. provide households with income. Both perspectives need to be assessed.

121 Normally, the flow on effects of wages and salaries paid are quantified as part of an economic impact assessment. In my view, it is important to put the employment effect in context and to highlight the wider economic considerations and effects such as total employment, GDP and income effects. An EIA aligned with a CBA usually does this.

122 Consumption of fixed capital is a cost that should be included in the assessment because it is a cost. Sapere include this component in their estimates of costs and benefits only in so far as the real discount rate captures the consumption of fixed capital (depreciation) associated with the airport extension. Consumption of fixed capital varies between 8.1% and 9.8% for retailers and for accommodation and food services respectively (for the Greater Wellington Region, sourced from M.E's estimates of the Greater Wellington economic accounts[17]). Using a weighted average value suggests that the benefits, as stated by Sapere would be overstated by approximately $56m.

123 In addition to the above, it is not clear how Sapere takes into account interregional trade flows (imports and exports between NZ's regions). Around a third (31.4%) of retailers' and accommodation and food services' inputs are sourced from outside the region, but from within NZ. This suggests that a portion of the effects flow out of the region, generating benefits outside the region while the costs are incurred locally. The consequence of Sapere not including interregional flows in their assessment is that the net benefit to the Wellington region has been overstated.

124 It is possible to recalculate the net benefit that accrues to Wellington region using an average costing approach and compare it to using the incremental or marginal cost approach that Sapere use by adopting the MBIE value add estimation process as a proxy.

125 Table 2 summarises the key benefit figures I have described above in comparison with the Sapere benefit figures at the Regional level.

[17] Greater Wellington Economic Futures Model, 2014, developed for Greater Wellington under the Sustainable Pathways 2 to 6 year project, funded by the Ministry of Science and Innovation, by M.E Massey University and RIKS.

Table 2: Present Value of Regional Costs and Benefits of Wellington Runway Extension ($000)

Benefits	High Benefit	Low Benefit
Airports	87,200	87,200
Airlines	-	-
Users	766,800	558,384
Other sections of the community	512,100	277,906
Total Incremental Economic Benefits	**1,366,100**	**923,490**

126 The above results provide a range of outcomes. At the high benefit end are Sapere's values for Users, and other sections of the community to generate a total Incremental economic benefit of $1.36bn. For the low benefit values I have adopted more conservative assessments of VoTT and higher average costs to meet tourist needs (plus I have removed inter-regional imports). This produces an incremental economic benefit of $923m, some $442m lower than the high benefit scenario (on Sapere's estimates).

127 I believe that the bounds reflected in the above table define the edges within which the true benefit figure may sit. I understand the processes Sapere have adopted to generate their estimates of benefit but do not believe they fully reflect the range of outcomes likely to occur. For example, in adopting an incremental approach for tourism expenditure, they always remain with short run estimates of effects, whereas in the long run, the impact of expenditures will tend towards the average cost approach I have applied. I accept that the true figure may lie between these estimates.

128 Given the nature of the type of tourism likely to be focused on Wellington from the new routes opened up by the Runway extension, it may be the case that assuming 31% of spend occurs within the Wellington Region is too low.

129 This is because Wellington does not operate as a true gateway the way that Auckland or Christchurch does. This means that people who choose Wellington over Auckland or Christchurch do so for more Wellington specific reasons. This means that Wellington is likely to receive a higher share of their expenditure than the norm for gateway cities.

130 I have attempted to model the effect of this by increasing the share of expenditure captured to 50%. This has the effect of raising the benefits to other sections of the community from $277m to over $448m and the net position to over $635m (compared with $465m (see Table 3).

131 This highlights the sensitivity of the outcomes to changes in assumptions – especially assumptions that cover aspects with a high degree of uncertainty, such as tourist behaviour in response to a new offer (e.g. direct long haul flights to Wellington). For the purposes of assessing Costs and Benefits it is appropriate to view the lower share of spend occurs within Wellington.

Costs

132 In addition to the benefit side of the discussion, Sapere comment on the capital cost of the proposed runway extension. The above discussion (net benefits) does not include the construction cost and the deadweight costs. Sapere included these two items in the regional assessment to illustrate the balance between the costs and benefits of the proposed runway extension if it was all funded from within the region. In addition to the proposed runway extension of $298.1m that Sapere use in their regional assessment, I also include the cost of the Code E gates ($7.5m) so that this cost is also treated as a regional cost. For simplicity, I combine these two items into one value – $305.6m. The associated deadweight cost (at 20%) is therefore estimated at $61.1m, the same as Sapere (prior to optimism bias).

133 With reference to the construction cost, I have assumed[18] that the values used include allowances for contingencies and cost overruns. It is not clear if the costs have been adjusted sufficiently for "optimism bias". Sapere inform me that the construction estimates do take into account a 10% cost plus factor. This falls at the bottom end of the range suggested for non-standard civil construction projects, and may still underestimate true costs.

134 The NZ Treasury highlights[19] that "*optimism bias occurs when favourable estimates of net benefits are presented as the most likely or mean estimates. It is an endemic problem in cost-benefit analysis and may reflect overestimation of future benefits or underestimation of costs*". The UK Treasury's 'Green Book Guidelines of Cost-Benefit Analysis' describes optimism bias in detail in 'Supplementary Green 'Book Guidance' on optimism bias[20] and it suggests that the capital expenditure for the proposed runway extension should be adjusted by between 10 per cent and 66 per cent to capture optimism bias as a non-standard civil engineering project. Standard civil engineering projects have an optimism bias range of 3% to 44%. Using the ratios of 10% to 66% suggests that the construction cost could be between $336.1m and

[18] The report states that (p 50) that AECOM provided median, risk adjusted, nominal capital cost of construction, amounting to $287.5m.
[19] NZ Treasury Guide to Social CBA. p 31.
[20] Accessed from:
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/191507/Optimism_bias.pdf.

$507.3m. I have used an optimism bias rate of 25% in order to assess the effect of cost over-runs impacting on the overall project viability (in cost benefit terms).

135 Next, the deadweight costs are applied to the adjusted construction costs to capture the effects of funding the project using general taxation. The CBA guidelines highlight that the range of the effects vary between 14 per cent and 50 per of the revenue collected and suggest that a rate of 20 per cent be used[21]. Using a optimism bias (25%) and the 20 per cent deadweight ratio, returns an estimated cost of $458.4m. In my view, this adjusted figure provides a more realistic view of the costs of the runway.

Net Position

136 The Sapere assessment of the regional costs and benefits suggests a net position of $1bn benefit to the region. My alternative assessment, based on Sapere's approach but with a stricter application of regional trade flows, lower VoTT for Leisure travellers, lower freight benefits and higher overall share of costs to meet tourists needs, represents a more conservative view of potential outcomes and returns a lower net benefit result of $465.2m (Table 3).

Table 3: Regional Costs and Benefits of Wellington Airport Runway Extension, ($NPV_{7\%}$ $000's)

Costs	**Low Cost**	**High Cost**
Airports	298,100	381,938
Airlines	-	-
Users	-	
Deadweight Cost	61,117	76,388
Total Incremental Economic Costs	**359,217**	**458,325**
Benefits	**High Benefit**	**Low Benefit**
Airports	87,200	87,200
Airlines	-	-
Users	766,800	558,384
Other sections of the community	512,100	277,906
Total Incremental Economic Benefits	**1,366,100**	**923,490**
Cost Benefit Assessment	**3.80**	**2.01**
Total Regional Net Benefit	1,006,883	465,165
Net Difference		*541,718*

137 I accept that the net position is likely to fall between the Sapere's 'Low cost High benefit' and my 'High Cost low benefit' outcomes presented above. Sapere's

[21] Both the Australian CBA guide and the US 'Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs' suggest that the marginal deadweight loss of general taxation is around 25 per cent.

assessment generates the highest level of net regional benefits at just over $1bn in present value terms, whereas my more conservative approach generates a net benefit position of $465m to Wellington Region (in present value terms over 40 years).

138 It is important to note that under both approaches, the proposed extension to the Wellington Airport runway still returns a significantly positive benefit position to the Wellington Region. Based on my analysis the runway extension returns a healthy BCR of over 2.0 at the regional level (compared with 3.8 for the higher benefit approach). In other words economic wellbeing improves by more than twice the associated regional costs.

Regional Economic Impact Assessment (by Sapere)

139 I have reviewed Sapere's discussion of regional economic impacts of the proposed extension (as presented in the response to Request for Further Information dated 1 July 2016). A CBA provides useful information about the net effect of the proposed runway extension on economic wellbeing. However, a CBA approach does not necessarily capture all the effects. For example, employment effects (and the salaries and wages paid to households) are important because they provide a useful measure of how a proposal could impact the community. It is important to note that impacts are not benefits and I do not assume or imply that these two measures are synonymous. However, understanding the total economic impact and expressing it in GDP terms is important because the GDP effects can then be expressed in per capita terms and put in the context of the size of the economy. GDP is a measure of economic activity and combining it with population (i.e. per capita) offers an ability to express the shift in economic activity in relative terms. It is also possible to express economic effects in employment terms so that it is possible to express the effects in meaningful terms, providing some context.

140 Sapere indicated that the measures such as GDP or employment have no special characteristics that make them more valuable or preferable to net benefit. However, net benefit tells nothing about the distribution of effects. There is no way of knowing whether very few individuals or sectors capture the entirety of an effect, unless you understand both its sectoral and spatial distribution.

141 In my view, assessing the economic effects of the proposed runway extension needs a CBA as well as an EIA in order to understand the distributional effects of the change. Assessing the proposed runway extension using multiple assessment approaches would provide a more varied and richer understanding of the economic effects. GDP and employment are also used in other economic assessments that are undertaken under the RMA (specifically Section 32 assessments) so it is worthwhile including these metrics in assessing the proposed runway extension.

142 In its regional EIA (presented in the response to Request for Further Information dated 1 July 2016), Sapere list a number of caveats. Most of these caveats apply to multiplier analysis and not economic impact assessments per se. Multiplier analysis is one approach used when assessing the economic impacts. Other economic assessment tools and models, such as Input-Output models and Computable General Equilibrium (CGE) models) can be used to address some of the issues and limitations raised by Sapere. However, Sapere have used multiplier analysis to assess the economic impacts. Multiplier analysis is one of the most basic approaches used when assessing economic effects and is not widely used. Multipliers are derived from Input-Output tables and are summary measures of the economic relationships. However, IO tables can be used to provide a more refined indication of the economic impacts – including the sectoral and spatial distribution of effects.

143 With reference to the limitations and issues mentioned by Sapere[22], I disagree with two, specifically:

143.1 That there is no accounting for "displacement" effects, where increased expenditure in one region simply displaces expenditure in another region with no improvement in net economic wellbeing, and;

143.2 Relying on counting expenditures that multiply across different markets and summing the series of expenditures to come up with a total benefit impact/estimate. This is in essence double counting as the additional resources available to the economy are just the direct impacts or shocks, not the subsequent rounds of resulting expenditure.

144 With reference to the first limitation (displacement), designing or defining how the economic shock is introduced in the model is key to avoiding this situation. In addition, in multi-regional models (including Input Output models), transfers between regions are captured and reflected. Recent advances in regionalisation techniques mean that it is now possible to provide greater resolution around interregional trade.

145 The second point on 'double counting' does not portray how IO models are typically applied. Expenditures are translated in to the economic 'shock' (the change), adjusted for imports (interregional and international), retail margins, and transfer effects and then expressed in terms of changes in final demand. Next the economic effects associated with the estimated 'final demand' can be estimated and the associated GDP and employment effects derived. Importantly, these estimated impacts are measures of GDP, employment and income (economic impacts) but they are not

[22] Contained in Attachment 2, Wellington International Airport's response to Request for Further Information, 1 July 2016, Mitchell Partnerships, Page 3.

benefits. GDP is an indicator of economic activity and is not a measure of 'benefit'. Therefore, double counting is avoided and Sapere is mistaken.

146 In preparing their EIA, Sapere extracted information from three reports to estimate the economic impacts, including:

146.1 The economic impact of the NZ cruise sector (by M.E),

146.2 Economy of the Arts in Wellington (by Martin Jenkins),

146.3 The EY report (Technical Report 27).

147 Using the information in these reports, Sapere derived a set of ratios from these reports to estimate the flow on economic impacts of the proposed runway expenditure on the spending on the regional economy.

148 In my view it is not appropriate, to use the first two reports for the following reasons:

148.1 The cruise report reflects the economic impacts associated with cruise ship passengers and ship visits. Intuitively, the spending profiles of cruise passengers and visitors arriving by airplane vary considerably. For example, a cruise passenger is likely to spend less on accommodation and transport (e.g. taxis) relative to a visitor arriving by airplane. Therefore, due to these spending differences it is not appropriate to use the cruise report.

148.2 With reference to the Martin Jenkins report, there are three points that make it inappropriate to use this report:

148.2.1 Firstly, the report uses economic relationships developed by M.E for Auckland's creative sector. It is not appropriate to use Auckland's ratios in Wellington due to differences in the structure of both economies.

148.2.2 Secondly, the report covers the arts sector and uses six broad sub-groups, including Performing Arts (including Music), Museum / Library / Archives, Publishing, Design, Screen Production and Radio, as well as Visual Arts, Crafts and Photography. These sectors have unique production and employment structures that are not transferrable to the sectors that are related to visitor expenditure.

148.2.3 Thirdly, the report is based on another report that was done in 2005. More recent datasets are available that could be used to derive more accurate impacts.

149 Therefore, the Sapere economic impact assessment (presented in Appendix 2 of the Request for Further Information 16 July 2016), does not accurately reflect the Wellington situation because:

149.1 It is based on the wrong sectors,

149.2 It is based on Auckland information (and economic relationships), and

149.3 It relies on old data.

150 In addition to the above, the assessment does not consider:

150.1 The one-off effects associated with the construction activity,

150.2 The effects of how the project is funded e.g. debt funded, rates funded or funded using offshore capital).

151 Finally, Sapere's regional economic impact assessment does not report, or reflect, other economic measures. The assessment reports on Value Added (similar to GDP) but it does not include detail on employment (or income) effects. Therefore, the regional economic impact assessment undertaken by Sapere does not add to the discussion because it is not robust or accurate.

Submissions

152 In addition to reviewing the reports, I have reviewed the economic submissions as identified by the Councils. Of the submissions that oppose the proposed runway extension, the reasons for opposing revolve around:

152.1 The traffic forecasts being too optimistic and the identified additional routes are commercially unviable.

152.2 The effect of an increase in asset value (of the proposed runway extension) on the domestic network resulting in an increase in user charges.

152.3 The manner in which the extension is likely to be funded, and the impact that will have on residents or existing users of the airport.

153 I comment on each submission below and highlight the implications of the points raised from an economic perspective.

Air New Zealand Limited (Air NZ)

154 Air NZ is NZ's largest airline, servicing domestic and international routes. The airline is opposing the application for a number of reasons.

155 Air NZ indicate that the "*current regulatory model for airport aeronautical assets also means that to the extent that new infrastructure is unused or underused, the total or net cost of those infrastructure assets is imposed on existing airport users, increasing the cost to incumbent airlines and travellers with no corresponding benefit to them*".

156 This is an important point because it suggests that the proposed runway extension could lead to an increase in the cost to existing users, including the domestic routes. In turn, this could then lead to an increase in domestic fares (rest of NZ to WIAL flights) without any commensurate increase in the benefits that the passengers on these routes receive. An increase in airfares will most likely reduce demand for flights on the wider network resulting in lower economic benefits across the rest of NZ (due to the shift in passenger and freight demand). If the proposed runway extension results in higher passenger fares, then the effective outcome is an additional tax on the domestic network without an improvement in levels of service. The CBA is silent on this potential scenario and the flow on effects.

157 I have run some preliminary numbers based on broad estimates on the scale of the potential landing charge increases and have found that the overall effect on the benefits that flow from the extension is very small (both nationally and regionally) and would make no material difference to the outcome.

158 Other specific points raised by Air NZ, in support of its opposition relate to the air traffic forecasts. According to Air NZ, the route forecasts are not credible and are unlikely to eventuate. As mentioned above, the CBA and EIA both rely on traffic forecasts prepared by InterVISTAS. If the forecasts do not materialise, then the economic benefits would not manifest.

159 Air NZ believe that the routes are not commercially viable because of market demand (is small) meaning that the market offer is likely to be uncompetitive therefore airlines have a limited ability to effectively service those routes at a profitable price point.

160 In addition, Air NZ claims that the application over-estimates the time and cost savings that would be derived from the proposed routes. Therefore, Air NZ indicates that the wider economic benefits are overstated. It is my understanding that Air NZ

formed this view based on its understanding of the potential for long haul flights and route development.

161 Air NZ's position is clear; it does not support the InterVISTAS traffic forecasts. However, Air NZ does not provide an alternative set of forecasts but it appears that Air NZ is suggesting that the routes are not viable (at all). If none of the routes are viable and none of the routes are developed, as Air NZ asserts, then the CBA and EIA assessments will be overstating the benefits as they rely on the InterVISTAS projections to drive their passenger numbers and the resulting expenditure flows.

Board of Airline Representatives New Zealand Inc (BARNZ)

162 BARNZ opposes the proposed runway extension and contends that the economic analyses (CBA and EIA) and the traffic forecasts are "fundamentally flawed".

163 With reference to the traffic forecasts, BARNZ highlights 5 reasons why the InterVISTAS projections are optimistic. They include; the small size of the Wellington market, the catchment used by InterVISTAS is too large, long haul demand is overstated, assumptions about the attractiveness of Wellington to connect with other cities and the role of Auckland and Sydney (and other airports) in catering to non-stop long haul demand are overstated.

164 BARNZ commissioned Ailevon Pacific Aviation Consulting (APAC) to review the InterVISTAS reports. APAC considers that the InterVISTAS forecasts provide an overly optimistic view of WIAL's long haul service potential. Further, APAC asserts that InterVISTAS has significantly over-estimated the Airport's existing and potential demand in particular for long haul. APAC also claims that based on its assessment, InterVISTAS' proposed nonstop long haul services at WIAL fall well short of commercial viability.

165 From my perspective, it is critical to note the material difference in APAC and InterVISTAS position. APAC suggests that none of the routes are viable whereas InterVISTAS finds a positive growth outlook. Clearly these two position have very different economic effects. Under the APAC approach the proposed runway extension will impose costs (construction and operational) without delivering many, if any, benefits. Conversely, InterVISTAS suggest growth in air traffic and this projected growth is then used to generate the economic effects as reported by Sapere and EY.

166 It would be helpful if there was an agreed position (or range) for the air traffic forecasts to inform the economic assessment. The economic assessment is predicated on air traffic forecasts, therefore if the forecasts change, then the associated economic effects will also change. Given that the range across which they may change

includes negative or very small benefits, it becomes important to understand whether the passenger numbers will eventuate.

167 In APAC's view, some of the long-haul possibilities included by InterVISTAS are open to WIAL with the current runaway infrastructure. APAC states that wide body aircraft have operated at WIAL and Singapore Airlines will shortly commence a trans-Tasman service. APAC asserts that there are possibilities for wide-body aircraft but "no airline currently chooses to fly to Wellington using wide-body aircraft". From an economic assessment perspective, only change that is facilitated by the proposed runway extension should be included. If any of the routes included in the economic assessment could in fact be serviced with the current runway infrastructure, then those routes should be excluded from the assessment otherwise changes that are not attributable to the proposed runway extension would be included and result in an overstating of economic benefits.

168 In addition to the issues with the InterVISTAS projections, BARNZ states that the CBA itself misleading due to the following reasons:

169 BARNZ asserts that the CBA approach does not properly account for labour costs and fixed capital costs. Further, BARNZ points to value of travel time savings and comments that these values are overstated in the CBA assessment. BARNZ claims that this is due to the parameters used to value travellers' time. I highlight this issue in paragraph 106.

170 BARNZ points to anomalies in the spreadsheets underpinning the CBA, specifically the passenger forecasts. I have investigated this claim and have received more detailed information from Sapere[23] including detailed annual passenger forecasts that show Sapere have used the correct information and have not front-loaded their projections.

171 BARNZ contends that the CBA needs to include the cost of the environmental effects, including the mitigations. I agree with this point because excluding these costs would understate the total cost and overstate the cost-benefit ratio. If all these costs are not included as part of the construction costs then total costs are understated.

172 BARNZ also raise the issue that WIAL could increase its charges to existing users by way of the increased asset value (of the runway). However, I believe they have over-estimated the amount of this charge as discussed above. In addition, were the airport extension to be funded from landing charges, then the effect is to simply transfer the

[23] "Annual Most Likely Updated Forecast Summaries 11Mar2016.xlsx", spreadsheet containing annual passenger origin/destination projections by market. Provided by Sapere to me directly.

cost burden to a different section of the community, rather than increase the total costs.

Guardians of the Bays Incorporated Society (the Society)

173 The Society comments on a number of areas in its submission, including environmental, economic, urban design and others. I comment on the passenger forecasts and economic analysis areas as raised by the Society.

174 With reference to the passenger forecasts, the Society asserts that the "passenger forecasts that are predicted by the Applicant are based on flawed data resulting in an overstatement of forecast passenger numbers". The Society states that this overstatement is due to the large catchment (including areas such as Kaikoura) that the airport draws from in the analysis. The Society also questions the viability and probability that airlines would establish the long-haul routes when other options exist – including short haul links across the Tasman, currently possible.

175 The Society submitted that the CBA relies on traffic forecasts to estimate the economic benefits. The Society correctly points to the fact that if the traffic forecasts are not achieved, then the economic benefits would not be realised. I agree they are the key, however I have not reviewed the traffic forecasts, but both the CBA and EIA rely directly on the air traffic forecasts. I agree with the Society insofar as that it is crucial to base the CBA and EIA on accurate and robust air traffic forecasts.

176 The Society also points a need to assess potential economic effects at a regional as well as a national level. I agree with the Society on this point and I have discussed this point (and Sapere's response) above.

177 The final economic point raised by the Society relates to the funding mechanism and the fact that ratepayers could contribute to the proposed project. My understanding of the Society's point is that if ratepayers' funds are used then other projects would not be progressed due to funding constraints. This is dealt with in the Sapere assessment by treating the entire cost of the extension as a cost to Wellington Region (ultimately its rate payers). If the CBA under these conditions still returns a positive outcome for the Region, then economic wellbeing is enhanced.

178 The CBA includes a deadweight cost to reflect the effects of increasing the cost on ratepayers, particularly the effects of the distortions caused by it. However, reducing discretionary spending will have additional economic effects on the regional economy because households and businesses will have less money to spend in the regional economy. The CBA does not include this effect, rather it relies on the net improvement in economic wellbeing.

Dr Rotmann

179 I note that Dr Rotmann is one of the signatories of the Guardians of the Bay Society Incorporated submission. Dr Rotmann's submission covers similar areas as the Guardians of the Bays Incorporated Society's submission. I comment on the points where Dr Rothman's submission differs from those raised by the Society.

180 The key points raised by Dr Rotmann relate to:

180.1 The CBA's reliance on the traffic forecasts that have been the subject of "significant critique". I have addressed this issue above.

180.2 The potential for cost and time overruns and the potential pressure on the ratepayer base. This point relates to optimism bias and I have addressed this point elsewhere.

180.3 The need for a business case based on Treasury's Better Business Case framework. The CBA and EIA assessments are prepared for an RMA process and I do not agree with Dr Rotmann that this assessment requires a business case. While I do agree that a business case (or similar) would be needed to inform a decision to fund (or not) the proposed runway extension, such a decision is beyond the scope of this assessment. Nevertheless, a CBA needs to consider the economic costs of alternative funding approaches and how those costs fall on the communities bearing the funding load.

180.4 Dr Rotmann also points to the potential effect of the proposed runway extension on WIAL's asset base and the potential effect on landing charges. This point is raised by BARNZ and I comment on this point in my assessment of the BARNZ submission.

180.5 Dr Rotmann asserts that he has never had an issue connecting through the existing hubs and that connecting through the larger hubs increases his options both in terms of routes, flight times and costs. This points to his experience and travel preferences. It can be argued that other residents will have the same/similar preferences. This issue is presumably able to be addressed in traffic forecasts by adjusting the expected travel patterns for user preferences. The potential effect of such an adjustment would be to lower the net benefit accruing to the region. If the traffic forecasts do not reflect such an adjustment, then the benefits are likely to be overstated and the costs understated. This will then translate into an overstatement of the net benefits.

Mr Walbran

181 In general, Mr Walbran does not support the application on the grounds that the economic benefits do not justify the negative environmental effects.

182 Assessing the economic values of the environmental effects is complex and this is a known issue in CBA. At the core of this issue is how to 'value' the environment. One approach to this is to use a multi-criteria approach (MCA) to understand the potential effects in qualitative terms. The Sapere CBA includes a qualitative indication of the environmental costs (table 4 on p 63).

183 In addition, Mr Walbran asserts that the economic benefits have been overstated but he does not explain why.

184 With reference to the EIA (Technical Report 27), Mr Walbran states that the air travel growth used in the assessment appears high based on jet fuel use. He refers to Business New Zealand's Energy Scenarios[24]. That report points to jet fuel use growth of around 1%.

185 The mentioned report shows two scenarios and the supporting datasets (downloaded separately) show that the compound growth rate for jet fuel use in NZ is 1.6% under the one scenario and 1.3% under the other. This is lower than the total traffic growth for the most likely scenario (in the CBA) with a projected 2.3% growth under the most likely option (under the base case option). Mr Walbran states that the EIA assumptions are outlined in Section 2.3 and that using this information the growth rate is approximately 7% per annum. However, Section 2.3 presents a "Disclaimer on the Demand Scenarios". I am unclear how Mr Walbran calculated the 7%.

186 Notwithstanding this uncertainty, it is not appropriate to compare the traffic forecasts with NZ jet fuel use and projected outlook because the proposed runway extension would enable inbound as well as outbound flights and the inbound flights would carry fuel from their origin to burn on the inbound flight. The outbound flight would load fuel in Wellington to burn on the outbound flights. Only the new outbound flights would add to NZ jet fuel use suggesting that the jet fuel use vs traffic forecasts is not appropriate.

[24] The report can be downloaded from here: https://www.bec.org.nz/projects/bec2050

Mr Kile (JumpJet)

187 The main issue raised by this submitter relates to the "probability of regular disruption". The level of disruption that could be expected during the construction phase is beyond my expertise and I don't comment on this point.

188 However, the submitter also raises a number of points that are relevant from an economic perspective and I deal with those points.

189 Mr Kile discusses the possibility of cost blowouts and the potential for the costs to 'double the original construction cost'. The CBA assessment uses 'risk adjusted' costs to inform the cost-benefit ratio. In my assessment, I expand on this and include an adjustment for optimism bias. In my view, this adjustment reflects the point raised by Mr Kile. The effects of this adjustment are discussed in paragraphs 133 and 135.

190 Mr Kile also highlights that there are potential costs relating to subsidising airlines to deliver the potential long haul services. This matter is not included in the CBA assessment. Any subsidy should be included in the assessment if the airlines would not deliver the service if a subsidy is not paid. In other words, if the traffic forecasts are dependent upon the subsidy then the cost should be included in the assessment as this cost could be material.

191 For example, assuming that a $9/passenger subsidy is paid on the international flights (under the most likely scenario) for the first 10 years, then an extra $7.9m in cost is added (in NPV terms align with the assessment period).

192 I do not know if a subsidy would be required to attract any additional airline services but neither InterVISTAS nor APAC discuss this point.

Mr Sanderson and Mrs Stokes

193 These submitters support the application and the CBA accompanying it and comment that the "net direct benefits which are generally of a scale that we would expect" and that the results "will be found to be accurate". Further, the submitters highlight that they have undertaken work in 2008 and 2012 and in these studies they found that direct benefits in terms of reduced travel times, new visitor expenditure and lower fares.

194 I am aware of two studies that these submitters (as key members of the economic consulting firm BERL) have completed about Wellington Airport. These include a 2009

study titled: “Current Economic Impact of Wellington International Airport” and a 2012 study titled: “Economic impact of a Wellington long haul air link”.

195 Judging by the titles, these studies were economic impact assessments and not cost-benefit analysis.

196 I did not review these studies but they have been referenced in various articles and other reports. In fact, I questioned why Sapere did not consult these studies when preparing the regional EIA because I would expect these studies to provide specific figures about the airport, passenger figures and spending and the economic impacts that the airport is generating.

197 Nevertheless, it is not surprising that the submitters found that the similar effects as those identified in the CBA because the type of effects that should be included in an EIA and CBA are similar.

198 There is little information in the submission that is additional to the overall discussion but it is worth nothing that Mr Sanderson asserts that the “analyses could have been extended to measure some of the benefits which Sapere state as ‘not able to be quantified’ and that they believe “that most of these elements of wider benefits are measurable”. However, the submitters do not reflect on the likely implications of including these matters in the assessment.

Porirua City Council (Mrs Walker)

199 The Porirua City Council supports the application because “it will bring benefits to the national and regional economy”. However the Council states that “clear positive economic benefits for Porirua City from the project need to be proven”.

200 I agree that it is necessary to understand the regional effects (costs and benefits) of the proposed development. While it is possible to estimate the region wide effects of the proposal, the assessment carried out is unlikely to provide more insight into the net benefits at the sub-regional level. It is possible to provide insight into the distribution of costs and benefits within the region. This could provide an indication of the net regional (city level) effects to identify any negative economic effects (at the city level).

201 This work has not been carried out as it does not contribute to the national or regional outcome and is beyond the scope of my review.

Qantas Airways

202 Qantas Airways (Qantas) is opposing the application and raise a number of points in support of its submission.

203 Qantas does not believe that there is a need for substantial investment in the proposed runway extension at this time. In addition, Qantas states that there is sufficient capacity to service the needs of the aviation sector in the short term and that there is adequate capacity to respond to growth.

204 Qantas highlighted that it is not aware of a need for (demand) wide-body aircraft to service the Wellington market. The limited demand is ascribed to available capacity at Auckland, Christchurch and other ports as well as the nature of the domestic network. In essence, the point Qantas is making is that the traffic forecasts and the expected (potential) demand for the services underpinning the CBA are inaccurate. It appears that Qantas does not believe there is demand for the services potentially enabled by the extension. Qantas states that it may be possible to deliver the services using route-based economics as oppose to "building for growth" that may not materialise.

205 Qantas also raises concerns regarding the possibility that the proposed runway extension investment could lead to an increase in the ticket prices that would, in turn reduce demand for flights with negative effects on the performance of the domestic network. My interpretation of this point is that Qantas has concerns about how the proposed runway extension would be funded and the potential exposure of the domestic routes to changes in landing fees that would need to be passed on to passengers and freighters.

206 The main points of the Qantas submission can be summarised as:

206.1 The need for robust traffic forecasts to inform the CBA and EIA, and

206.2 A thorough assessment of the financial implications and where the funding load falls and then using this to inform in the CBA.

207 The main points are consistent with the issues and points that I raise in my assessment.

Mr Harrison (Tail risk)

208 Mr Harrison (principal at Tailrisk Economics) opposes the application. In his submission he states that the "national benefit numbers have been grossly exaggerated" and that "the benefits are primarily based on the number of additional tourists that will be attracted to New Zealand". Mr Harrison also questions the methodological foundations of the cost benefit analysis.

209 Mr Harrison's submission included a report he prepared in which he comments on the traffic forecasts and the CBA. This report is dated December 2015, so it is not directly related to the CBA in the application (dated 19 April 2016). Nevertheless, the points Mr Harrison raises are still relevant.

210 Mr Harrison highlights his concerns about the air traffic forecasts and makes the point that the CBA relies on it. Mr Harrison states that: "The benefits are dependent on the projections of New Zealand passenger numbers" and I agree with him on this point.

211 Mr Harrison lists the reasons why he believed the CBA is overstating the net benefits of the proposed runway extension. He states that the values used to estimate the value of travel time "are materially higher than the figures that would be used for transport related cost benefit analysis in New Zealand". However, he does not suggest an alternative. I point to the sensitivity of the CBA to changes in these value (paragraph 106).

212 Mr Harrison claims that the ratios used to translate visitor expenditure into benefits should include the opportunity costs of all inputs and not just the intermediate goods. I interpret this is suggesting that the labour costs should also be included in the CBA and accounted for as an opportunity cost. Mr Harrison's point is consistent with Air NZ's submission.

213 However, Sapere have accounted for costs by assuming that some 75% of expenditure is net benefit to the region (and the nation). I believe this is too high a share and have provided a more conservative view above. In both of our assessments, labour costs are a component part of the cost structures and have therefore been accounted for.

214 Another point raised by Mr Harrison relates to user charges. Mr Harrison states that in the assessment's approach to user charges, it is assumed that existing users of the airport would be levied, and it is argued that this would be inefficient compared to broad based tax funding (general taxation). Mr Harrison asserts that "existing users of the airport should not be charged for a capital investment that does not provide them with benefits. But the long-haul users, who will benefit, certainly should bear the cost". In my view, Mr Harrison is essentially suggesting a need to link the funding

mechanism (payment) to the long haul flights. However this does not address a possible situation where the expected long haul flights do not materialise meaning that it would not be possible to recover the costs from a specific segment. This then raises the question of where the funding load would fall if the long haul flights fail to materialise. The CBA does not address this issue in its assessment and comparison of the alternative funding approach.

Conclusion

215 Wellington International Airport Limited has applied for a Resource Consent and as part of the application submitted an Assessment of Environmental Effects (AEE). The AEE included a CBA and an EIA. The CBA focused on the national level and was subsequently backed up with a more detailed regional assessment of effects following a request for further information. The EIA provided with the application was undertaken by EY, and Sapere also provided a brief regional EIA following a request for further information.

216 The CBA (national and regional level) relies on the InterVISTAS air traffic forecasts. Submitters have presented alternative air traffic demand analysis (APAC as part of the BARNZ submission) that are materially different from the InterVISTAS figure relied upon by Sapere. If they prove to be accurate, then the proposed runway extension would have very limited, if not negative, impacts on both the regional and national economies and economic wellbeing.

217 At the national level, both the work carried out by Sapere and the assessment I have carried out (that relies on some more conservative assumptions) highlight a strong economic benefit to New Zealand with a Benefit Cost Ratio that ranges between 1.64 and 2.3, and a net economic benefit over 40 years in current discounted terms of between $1.53bn and $2.34bn.

218 By adjusting the input values and by refining the information used in the CBA, my opinion is that the net regional benefits estimated to accrue to Wellington region are $465m. This is lower than Sapere's estimate, but still significant, especially in light of the employment sustained by the tourism flows. I acknowledge that my figures are more conservative and I accept that the overall net regional and national economic benefit might be higher, somewhere between my estimate and Sapere's.

219 The EY economic impact assessment was based on an earlier set of passenger projections so it is not consistent with the CBA. Sapere derived their own set of multipliers to estimate the regional economic effects of the proposed extension. However, there are a number of issues with the Sapere approach meaning that this part of the assessment is not accurate. Further, the Sapere assessment does not

provide any indication of the economic impacts using any other metrics[25], such as employment or income.

220 Using the Sapere visitor spending estimates suggests that employment sustained by the tourism flows grows to be equivalent to more than 1,000 jobs in Wellington Region by 2059 plus approximately 600 jobs annually throughout the three year construction period. The number of jobs and economic activity they represent is a significant positive effect.

221 Based on the work I have carried out and the information provided by Sapere, I am confident that the development of the runway extension will result in a substantial and positive net economic benefit to both New Zealand as a whole and Wellington Region – assuming the passenger forecasts are accurate.

Date:	7 October 2016
	 . . . . . . **Gregory Michael Akehurst**

[25] In the request for additional information (16 June 2016), the importance of understanding the GDP and employment effects across the regions is highlighted.

Annexure 8 Recommended Conditions of Consent – joint set issued for WCC and GWRC consents

Consent number	Consent description	General conditions	Specific conditions
Resource consents from GWRC			
[34044]	<u>Reclamation</u> Coastal permit to reclaim and use approximately 11 hectares of the coastal marine area to the south of the Wellington Airport runway in Lyall Bay, including any: • associated destruction, disturbance, deposition and discharge of sediment and dust to the foreshore and seabed and to air during construction of the reclamation; • disturbance of the foreshore and seabed associated with the mooring of vessels during construction of the reclamation; • diversion and dewatering during construction of the reclamation; • generation of construction related noise.	1 – 6	7 – 33, 40 – 65, 67 – 79, 81 – 87, 112 – 121
[34047]	<u>Temporary structures</u> Coastal permit to construct, use and maintain temporary structures including moorings for construction related purposes, lighting structures, site establishment facilities, machinery and equipment in the coastal marine area associated with the construction of the proposed runway extension and associated project works, including any: • associated destruction, disturbance, deposition and discharge of sediment and dust to the foreshore and seabed and to air during construction of the structures; • disturbance of the foreshore and seabed associated with the mooring of vessels during construction;	1 – 6	7 – 33, 40 – 65, 67 – 76, 80 – 87, 112 –113, 119 – 121

	• diversion and dewatering during construction of the structures; • generation of construction related noise.		
[34048]	<u>Earthworks</u> Land use consent and discharge permit to undertake earthworks associated with the construction of the proposed runway extension and associated project works including the removal of a hillock to develop a construction compound site and any associated discharges of sediment laden water to land where it may enter water.	1 – 6	7 – 33, 40 – 65, 67 – 76, 78, 81 – 87, 119 – 121
[34049]	<u>Discharges to air during construction</u> Discharge permit to discharge dust to air from earthworks activities associated with the construction of the proposed runway extension and associated project works including the removal of a hillock, stockpiling and handling of fill and construction materials.	1 – 6	7 – 33, 40 – 65, 67 – 76, 81 – 87, 117
[34050]	<u>Beach nourishment</u> Coastal permit to deposit natural materials onto the Moa Point Beach foreshore for the purpose of beach and amenity enhancement.	1 – 6	7 – 33, 40 – 65, 67 – 76, 81 – 87, 117, 119 – 121
[34045]	<u>Construction of permanent structures</u> Coastal permit to construct permanent structures associated with the proposed runway extension and related project works including a submerged surf wave focussing structure in Lyall Bay, a protection structure over part of the Moa Point wastewater outfall pipeline and all other ancillary structures, including: • associated destruction, disturbance, deposition and discharge of sediment and dust to the foreshore and seabed and to air during construction of the structures; • disturbance of the foreshore and seabed	1 – 6	7 – 33, 41 – 65, 67 – 76, 77 – 98, 106 – 121

	associated with the mooring of vessels during construction; • diversion and dewatering during construction of the structures; • generation of construction related noise.		
[34046]	Occupation of the coastal marine area Coastal permit to occupy the coastal marine area for construction purposes, temporary and permanent structures, and ongoing maintenance works associated with the proposed runway extension and related project works including the toe of the reclamation below mean high water mark, a submerged surf wave focussing structure in Lyall Bay and a protection structure over part of the Moa Point wastewater outfall pipeline including: • associated destruction, disturbance, deposition and discharge of sediment and dust to the foreshore and seabed and to air from the maintenance of these structures; • generation of noise from maintenance activities.	1 – 6	12 – 13, 18 – 29, 42, 74 – 76, 79, 80 – 117, 119 – 127
[34051]	Stormwater discharges post construction Coastal permit to discharge stormwater from the extended Wellington Airport runway directly to the coastal marine area (CMA) and to land adjacent to the CMA where it may enter the waters of the CMA.	1 – 6	12 – 13, 128 – 136
Resource consents from WCC		**General conditions**	**Specific conditions**
SR357837	Land-use activities Land-use consent for the construction, operation and maintenance of the proposed runway extension and associated project works on land and road reserve including: • temporary site offices and associated facilities; • laydown and stockpiling	1 – 6	7 – 76, 80 – 87, 117 – 121

	areas; • construction, modification, upgrading and use of internal site access ways; • construction, alteration and upgrading of existing network utilities to provide for construction related activities and the long term use of the runway and taxiway; • earthworks, including associated transport, and vegetation clearance; • modification and upgrading of the Moa Point Road underpass and other associated roading upgrades; • generation of construction related noise; • construction and use of runway infrastructure and structures on land including (but not limited to) ancillary structures, fencing and navigational aids, beach remediation and landscape/amenity improvements; • the continued use of reclaimed land for airport purposes.		

Definitions	
AEE	Means the Wellington Airport Runway Extension Assessment of Effects on the Environment Volumes 1 to 2, dated April 2016
BMP	Biosecurity Management Plan
CAQMP	Construction Air Quality Management Plan
CBMP	Coastal Bird Management Plan
City Council or WCC	Means the Wellington City Council
CLG	Means the Community Liaison Group
CMA	Coastal Marine Area
CMP	Construction Management Plan
CNVMP	Construction Noise and Vibration Management Plan
Commencement of Construction	Means the commencement of Stage 0 as per the AEE and Construction Sequencing Programme required by condition 14.
Construction Phase	Means the duration of the construction of the Project from site establishment (Stage 0) through to completion of all construction related activities (Stage K).
Construction or	Means the areas identified in Figure 1-5 of the AEE and includes all construction

Project Site	related activities landward of mean high water springs and out to the 300m temporary occupation areas of the CMA.
CTMP	Construction Traffic Management Plan
CTP	Chemical Treatment Plan
EMMP	Ecological Mitigation and Monitoring Plan
ESCP	Erosion and Sediment Control Plan
Heavy Vehicle	Comprising of a truck and trailer unit approximately 23m long
LUDMP	Landscape and Urban Design Management Plan
Manager GWRC	Means the Manager, Environmental Regulation, Greater Wellington Regional Council
Manager WCC	Means the Manager, Environmental Regulation, Wellington City Council
MMP	Maintenance Monitoring Plan
MHWS	Mean high water springs
MOMP	Marine Operations Management Plan
NUMP	Network Utilities Management Plan
Project	Means the construction, maintenance and operation of the Wellington Airport Runway Extension, as described in Chapter 1 of the AEE.
Project Website	www.connectwellington.co.nz
Regional Council or GWRC	Means the Greater Wellington Regional Council
RMA or 'the Act'	Means the Resource Management Act 1991
SCMP	Stakeholder and Communications Management Plan
SMAMP	Surf Mitigation Adaptive Management Plan
Stage	Means a stage of the Construction Phase as defined in the construction sequencing programme in accordance with condition 14.
SWFS	Submerged Wave Focussing Structure
TSP	Total Suspended Particulate
TSS	Total Suspended Sediment
Work	Means any activity or activities undertaken in relation to the Project
Working Day	Has the same meaning as in section 2 of the Resource Management Act 1991

Condition Number	**General conditions**
1	The Project shall be undertaken in general accordance with the plans and information submitted with the application and statutory forms documented as consent numbers WGN160274 [34044, 34045, 34046, 34047, 34048, 34049, 34050, 34051] and SR357837, subject to such amendments as may be required by the following conditions of consent. The plans and information include: a) Assessment of Environmental Effects report, dated April 2016 b) Technical Reports contained in Volume 2 of the application c) Further information provided to GWRC and WCC on 10 June 2016, 13 June 2016, 1 July 2016, 17 August 2016 and 22 August 2016 (Letters from Mitchell

	Partnerships) and 27 September 2016 (spreadsheet and emails from Sapere Research Group) and clarification memos provided on 15 July 2016 and 2 August 2016 (from Mitchell Partnerships) and 25 August 2016 (from Sapere Research Group). d) Plans and information presented in support of the application at the hearing. Where there is conflict between the documents lodged and the conditions, the conditions shall prevail. Where there is an inconsistency between the information and plans lodged with the application and at the hearing, the most recent approved plans and information shall prevail. e) The relevant section of any technical report referred to in these conditions shall be regarded as part of these conditions, and a copy of each shall be appended to these conditions. f) The Project Website shall provide online access to these conditions and the plans and reports referred to in these conditions throughout the construction of the Project, and hard copies shall be available at the Project site office, and presented to any City or Regional Council enforcement officer on request.
2	a) The Consent Holder shall permit the agents and enforcement officers of the City and Regional Council to have unlimited supervised access to relevant parts of the construction site for the purpose of carrying out inspections, surveys, investigations, tests, measurements and/or to take samples to enable the City and Regional Councils to undertake their monitoring functions in relation to the Project.
3	Monitoring of wind speed, wind direction, air temperature and rainfall shall be undertaken: a) In general accordance with the *Good Practice Guide for Air Quality Monitoring and Data Management*, Ministry for Environment, 2009; and b) Continuously for the duration of the Construction Phase of the Project, at a location that is representative of the local weather conditions across the construction site which is to the satisfaction of the Manager, GWRC. All meteorological monitoring shall be sited, as far as practicable, in accordance with AS 3580.14:2014 *Methods for sampling and analysis of ambient air – Meteorological monitoring for ambient air quality monitoring applications*.
	Consent Lapse and Expiry
4	Pursuant to section 125(1) of the Act, this consent WGN160274 [34044, 34045, 34046, 34047, 34048, 34049, 34050, 34051] and SR357837 shall lapse 10 years from the date of its commencement unless it has been given effect, surrendered or been cancelled at an earlier date.
5	Pursuant to section 123(a) of the Act, the following consents WGN160274 [34044] - Reclamation shall have an **unlimited duration** Pursuant to section 123(c) of the Act, the following consents: WGN160274 [34047] – coastal permit for construction of temporary structures WGN160274 [34048] – landuse consent for earthwork activities WGN160274 [34049] – discharge permit for discharges to air WGN160274 [34050] - coastal permit for beach nourishment WGN160274 [34045] – coastal permit for construction of permanent structures shall expire **10 years** from the date of commencement. Pursuant to section 123(c) of the Act, the following consents: WGN160274 [34046] – coastal permit for occupation and ongoing maintenance of permanent structures shall expire **35 years** from the date of its commencement.

	WGN160274 [34051] – coastal permit for stormwater discharges from the runway extension shall expire **5** years from the date of its commencement.
	Review of Consents
6	The Manager GWRC and the Manager WCC may review any or all conditions of this consent by giving notice of their intention to do so pursuant to section 128 of the Act, at any time within three months of the 30 June each year for the duration of this consent, for any of the following purposes: a) To deal with any adverse effects on the environment, which may arise from the exercise of this consent, and which it is appropriate to deal with at a later date; b) To review the adequacy of any monitoring plans proposed and/or monitoring requirements so as to incorporate into the consent any monitoring or other requirements which may become necessary to deal with any adverse effects on the environment arising from the exercise of this consent; and c) Ensuring the conditions of this consent are consistent with any National Environmental Standards, Regulations, relevant plans and/or the Wellington Regional Policy Statement. The review of conditions shall allow for the deletion or amendment of conditions of this consent; and the addition of such new conditions as are shown to be necessary to avoid, remedy or mitigate any significant adverse effects on the environment.
	Pre-construction Administration
7	a) The Consent Holder shall arrange a pre-construction site meeting between the WCC Compliance Monitoring Officer and Regional Council and any other relevant party nominated by the City and Regional Council (Invited Parties), including the primary contractor, at least 10 working days prior to commencement of each Stage of work as outlined in the Construction Sequencing Programme. The purpose of the meeting is to identify the immediate forward works programme and how conditions have been, or will be, met. b) The Consent Holder shall ensure that additional site meetings for the same purpose as (a) above are held between the Consent Holder/Requiring Authority, and Invited Parties, at appropriate intervals, and not less than every six months following Commencement of Construction.
	Duration of construction works
8	The construction work outlined in Stages O to K of the Indicative Construction Sequence in Table 4-4 of the Assessment of Environmental Effects report, dated April 2016 (i.e. from site establishment to the completion of runway extension drainage and pavements and Moa Point Road and beach amenity improvements) shall not exceed a period of 4 years.
	Community Liaison
9	A Community Liaison person shall be appointed by the Consent Holder for the duration of the Construction Phase of the Project. The Consent Holder shall take appropriate steps to advise the Community Liaison Group (in accordance with condition 11), the Surf Steering Committee (in accordance with condition 92), GWRC and WCC of the Community Liaison person's name and contact details. If the Community Liaison person will not be available for any reason, an alternative contact person shall be nominated, to ensure that a Project contact person is reasonably available at all times during the construction phase of the Project. *Advice note: The intent of this condition is to ensure that someone is available 24 hours a day for affected parties to contact during the Construction Phase. If direct contact cannot be made with the Community Liaison Person, follow-up will occur*

	as soon as reasonably practicable.
10	a) The Consent Holder shall prepare a Stakeholder and Communications Management Plan (SCMP) in consultation with the Community Liaison Group that sets out procedures detailing how the public and stakeholders will be communicated with throughout the Construction Phase of the Project. The stakeholders comprise the Moa Point and Rongotai communities, road users and the residents affected by construction activities. b) The purpose of the SCMP is to provide a framework to: (i) Inform the community of construction progress; (ii) Engage with the community in order to foster good relationships and to provide opportunities for learning about the Project; (iii) Provide early information on key Project milestones; and (iv) Respond to queries and complaints. c) As a minimum, the SCMP shall include: (i) Details of a contact person available on-site at all times during Work. Contact details shall be prominently displayed at the entrance to the site(s) so that they are clearly visible to the public at all times. (ii) Procedures for recording and responding to all complaints; (iii) Methods to consult on and to communicate the proposed hours of construction activities outside of normal working hours and on weekends and public holidays, to surrounding residential communities, and methods to deal with concerns raised about such hours. (iv) Any stakeholder specific communication plans required. (v) Monitoring and review procedures for the SCMP. (vi) A definition of what would constitute a 'minor change' to the SCMP. (vii) Details of communications activities proposed including: • Publication of a newsletter, or similar, and its proposed delivery area. • Newspaper advertising. • Notification and consultation with individual property owners and occupiers with dwellings along Moa Point Road, and along the proposed haulage routes. • The use of the Project Website for public information. The SCMP shall include linkages and cross-references to methods set out in other management plans where relevant. The SCMP shall be provided at least 10 working days prior to construction commencing, to the Manager GWRC, the Compliance Monitoring Officer WCC and the Community Liaison Group. The SCMP shall be implemented and maintained throughout the entire Construction Phase and following construction as necessary, and updated if required.
11	The Consent Holder shall establish a Community Liaison Group. a) Membership of the Community Liaison Group shall include (but not be limited to): (i) The Community Liaison person; (ii) Representatives of Wellington International Airport Ltd; (iii) A representative of the Contractor appointed to undertake the works; (iv) Representatives of the local community including at least one resident of Moa Point Road; (v) A representative of Iwi mana whenua; (vi) A representative council officer from WCC and GWRC. b) The purpose of this group shall be to provide a means for monitoring the effects of constructing the Project on the community by providing a regular forum through which information about the Project can be provided to the community and the community can provide information about the effects of the Project to the consent holder. c) Matters to be considered by the Community Liaison Group shall include, but not be limited to:

	(i) The traffic, noise, dust, lighting, landscaping, and other related aspects. (ii) Likely times and duration of night time construction work, likely traffic disruption and establishing a reasonable means of communication with affected persons on this. (iii) The suitable content and form for dissemination of information to the public. The Consent Holder may also separately disseminate information to the public. (iv) How the Community Liaison Group can assist the Consent Holder in monitoring the effects during the construction period and monitoring the contractor's compliance with the conditions of consent relating to the construction work. d) The Consent Holder shall ensure that: (i) Invitations to attend meetings are issued to the Community Liaison Group at least once every three months throughout the Construction Phase so that the intentions of this condition are fulfilled; (ii) Invitations are sent to the Community Liaison Group at least 10 working days prior to the scheduled meeting date; (iii) Meeting are held at an appropriate venue; and (iv) Meeting minutes of all Community Liaison Meetings are recorded and distributed to the Community Liaison Group within 10 working days of the meeting being held. *Advice Notes:* *1. The Consent Holder shall consider any feedback or recommendations provided to it by the Community Liaison Group in a meaningful and transparent way. For the avoidance of doubt the Community Liaison Group does not have any delegated authority as a decision maker.* *2. The community liaison group is considered "established" when the consent holder has collated contact details for all persons joining the group, and the group has been provided with the first meeting date.*
	Complaints
12	a) The Consent Holder shall maintain a permanent register of any complaints received alleging adverse effects from, or related to, the exercise of these consents. The record shall include: (i) the name and address (where this has been provided) of the complainant; (ii) identification of the nature of the complaint; (iii) location, date and time of the complaint and of the alleged event; (iv) weather conditions at the time of the complaint (as far as practicable), including wind direction and approximate wind speed if the complaint relates to air discharges; (v) the outcome of the Consent Holder's investigation into the complaint; (vi) measures taken to respond to the complaint; and (vii) any other activities in the area, unrelated to the Project that may have contributed to the complaint, such as noisy or dusty conditions. b) The consent holder shall notify the Manager GWRC and the Compliance Monitoring Officer WCC within **24 hours** of receiving a complaint. c) The Consent Holder shall respond to the complainant within **3 working days** of the complaint; d) The Consent Holder shall also maintain a record of its responses and any remedial actions undertaken; e) This record shall be maintained on site and shall be made available to the Compliance Monitoring Officer WCC and the Manager, GWRC, upon request. The Consent Holder shall provide the Compliance Monitoring Officer WCC and the Manager GWRC with a copy of any complaints register every six

	months as required by condition 17.
	Incident Notification
13	In the event of any incident that has or could have resulted in a condition or conditions of this permit being contravened, the permit holder shall: a) Notify the Manager, Wellington Regional Council and the Compliance Monitoring Officer WCC within 24 hours of the consent holder becoming aware of the incident, or the next working day.
	Sequencing and Schedule of Construction Activities
14	a) The Consent Holder shall submit to the Compliance Monitoring Officer WCC and the Manager GWRC at least 30 working days prior to commencement of construction a detailed programme outlining the proposed sequencing and/or staging of the Construction Phase activities and confirmation of when draft and final Landscape and Urban Design Management Plan and Maintenance Management Plan will be provided to the Council Managers for certification. b) In addition to (a) above and condition 16 below, the Consent Holder shall provide the Compliance Monitoring Officer WCC and Manager GWRC with any updated construction sequencing programme if significant changes occur in the programme. Any updated programme shall be submitted at least 5 working days before any such changes in scheduling or sequencing occurs.
15	The Consent Holder shall provide detailed engineering plans and drawings (including dimensioned, cross-sections, elevations and site plans) of all areas of proposed construction of the Project (including associated permanent and temporary CMA occupation), permanent structures and temporary structures to the Manager GWRC with at least 30 working days before the proposed date of commencement of the construction of the reclamation or any ancillary temporary structures.
16	The Consent Holder shall provide the Manager GWRC, the Compliance Monitoring Officer WCC and the CLG with a schedule of construction activities for the Project at monthly intervals throughout the construction phase of the Project. Each monthly schedule shall demonstrate how it fits into the overall construction sequencing programme required by condition 14 and shall indicate appropriate intervals at which an invitation will be made to the Council Managers to meet on-site to discuss the next stage or stages of construction activities.
	Six Monthly Monitoring
17	The Consent Holder shall provide a six monthly monitoring report to the Compliance Monitoring Officer WCC, the Manager GWRC and the CLG on 1 June and 1 December each year (or on an alternative date as otherwise agreed to by the Council Manager(s)) for the duration of the Construction Phase. The purpose of this report is to provide an overview of the monitoring and reporting work undertaken, and any environmental issues that have arisen during the Construction Phase of the Project. As a minimum, this report shall include: a) All monitoring data required in accordance with the conditions of this consent and a summarised interpretation of this data. This shall include complaints, monitoring data for TSP, PM_{10}, meteorology, nitrogen dioxide, visible dust, construction noise and vibration, cleanfill testing, all monitoring required under the ESDP and CTP, and data from turbidity and clarity monitoring at the boundary of the reasonable mixing zone; b) A record, as required by condition 12, of all complaints received over the previous six months and the outcomes of any investigation and actions taken. c) Any work that has been undertaken to improve the environmental performance on the site or that is proposed to be undertaken in the up-coming six months; d) Recommendations on alterations to the monitoring required and how and when these will be implemented through changes to the relevant

	management plans; and e) Any other issues considered important by the Consent Holder or requested by the consent authority.
	Management Plans – General
18	a) All construction work shall be carried out in accordance with the applicable certified management plan(s) and other plans required by these conditions. b) The draft management plans listed in c) that were lodged with the resource consent application shall be updated, and all other management plans listed in c) shall be prepared by the Consent Holder and provided in draft form to the Manager GWRC and the Compliance Monitoring Officer WCC for initial comment at least 30 working days prior to the Commencement of Construction. c) The following final management plans must be provided to the Council Manager(s) for certification at least 20 working days prior to Commencement of Construction : i. Construction Management Plan; ii. Construction Noise and Vibration Management Plan; iii. Construction Air Quality Management Plan; iv. Erosion and Sediment Control Plan; v. Construction Traffic Management Plan; vi. Ecological Mitigation and Monitoring Plan; vii. Chemical Treatment Management Plan; viii. Stakeholder Communications Management Plan; ix. Biosecurity Management Plan; x. Marine Operations Management Plan; xi. Network Utility Management Plan; xii. Coastal Birds Monitoring Plan. d) The following management plans must be provided to the Council Manager(s) in draft form for initial comment and final form for certification at the Construction Phase as indicated in the Construction Sequencing Programme required by condition 14: i. Landscape and Urban Design Management Plan; and ii. Maintenance Management Plan e) The Surf Mitigation Adaptive Management Plan shall be provided to the Manager GWRC for certification at least 6 months prior to the Commencement of Construction in accordance with condition 89. f) All management plans shall be prepared in general accordance with any relevant consent conditions. Prior to being submitted to the Compliance Monitoring Officer WCC or the Manager GWRC for certification, the management plans listed in c)(i)-(xii) above shall be reviewed by a suitably qualified person. Any comments and inputs received from the reviewer shall be clearly documented, along with a clear explanation of where any comments have not been incorporated and the reasons why. The Commencement of Construction shall not start until the Consent Holder has received the Council Managers' written certification for the management plans in c) and e). g) The management plans listed in c), d) and e) above provide the overarching principles, methodologies and procedures for managing the effects of construction of the Project to achieve the environmental outcomes and performance standards required by these conditions. h) A copy of the certified management plans listed in c), d) and e) above will be provided to the CLG and made publicly accessible on the Project website. The management plans are not required to include all details for every construction stage at the time the plan is submitted for certification. If further details are to be provided later, the construction management plan shall specify

	which stages require further certification at a later date. Further details shall be submitted to the Council Manager for certification prior to construction commencing in the relevant stage
19	If the Consent Holder seeks to make a 'minor' change to a certified management plan, the change shall be submitted to the Council Manager for certification at least **two working days** prior to any changes taking effect. For the purpose of this condition, 'minor change' is defined in the relevant management plan. If the Consent Holder seeks to make a more than minor change to a management plan, the change shall be submitted to the Council Manager for certification at least **five working days** prior to that change taking effect.
20	Where a management plan is required to be prepared in consultation with any third party, the management plan shall demonstrate how the views of that party (or parties) have been incorporated, and where they have not, and the reasons why.
	Construction Management Plan
21	In accordance with condition 18, the Consent Holder shall prepare a **Construction Management Plan (CMP).** The purpose of the CMP shall be to confirm construction methodologies, plant equipment and construction timeframes, including staging, and identify the measures to avoid, remedy or mitigate adverse effects from construction activities. The CMP shall include, as appendices, the suite of management plans required under condition 18 which must be certified prior to the Commencement of Construction, except for the Landscape and Urban Design Management Plan, Maintenance Management Plan and Surf Mitigation Adaptive Management Plan which is required to be submitted at an earlier date.
22	The CMP shall include details of: a) The management of construction activities; a) A detailed construction methodology for the reclamation works, including how it is proposed to ensure that the rock dyke is sealed; b) Public access restrictions including areas and notification requirements; c) Marine equipment and operational requirements; d) Details of how the consent holder will ensure that all fill material used for the reclamation meets the Ministry for the Environments definition of "cleanfill" as detailed in Publication ME418 "*A Guide to the Management of Cleanfills"* (2000) using previous contaminant testing, the history of the source location and a testing regime. e) Staff and contractors' responsibilities; f) Training requirements for employees, sub-contractors and visitors; g) Environmental incident and emergency management; h) Communication and interface procedures; i) Environmental complaints management (required under condition 12); j) Compliance monitoring; k) Environmental reporting; l) A definition of what constitutes a 'minor change' to the CMP; and m) CMP review.
23	The CMP shall confirm the material (e.g. rock, fill, and accropodes) requirements and sources of material that will be utilised in the construction of the Project. Details of the transportation of the material to the construction site and management of the material once it has reached the Project site (i.e. storage/stockpiles) shall also be provided in the CMP. If any of the material is to be transported to the site via a barge, details of any mooring and vessel management systems that will be utilised shall also be provided.
24	The CMP shall provide details relating to the site preparation, establishment, laydown areas, plant equipment and post construction rehabilitation, including but

	not limited to: a) Location of site offices and other construction staff facilities (car parking, amenities); b) Location of storage and laydown areas; c) Location and extent of fill stockpiles; d) Plant equipment including both landside and marine based equipment, as well as mooring requirements; e) Machine and vehicle refueling areas; f) Project lighting; and g) Details of the site demobilisation and rehabilitation of the site post construction of the Project. *Advice note: No storage or laydown area, including plant or equipment of any type, may occupy any WCC land, including legal road, without the prior written approval of WCC.*
25	The CMP shall include a lighting plan for the Project. The purpose of this plan shall be to ensure that lighting overspill and illumination to airside activities, passing vessels, adjoining land uses and marine species is appropriately managed. The lighting plan shall also demonstrate that all lighting installed cannot be confused with navigation aids. The Plan shall identify the methods to manage light spill on adjacent land uses as far as is practicable and to minimise the risk of bird attraction and strikes.
26	The Consent Holder shall ensure that personnel responsible for supervising contractor site staff (e.g. foremen, supervisors, and managers) undergo environmental awareness training required by the CMP. Specifically, training may include (as relevant) but not be limited to: a) Design details for erosion and sediment control measures and associated methodologies; b) The sensitivity of the coastal marine area and how these aspects should be managed (i.e. the presence of marine mammals, birds, etc.); c) Briefing on the requirements for any cultural ceremonies to occur before commencement of construction or during work; and d) Dust mitigation, dust complaint management and all conditions of consent relating to dust management including trigger levels and actions to be undertaken in the event these are exceeded.
27	The CMP shall confirm final details, staging and sequencing of construction, and sufficient engineering design information to ensure that the Project remains within the limits and standards approved under this consent and that the construction activities avoid, remedy or mitigate adverse effects on the environment in accordance with the conditions of this consent.
28	The CMP shall be implemented and maintained throughout the entire Construction Phase and following construction as necessary.
29	A copy of the CMP shall be held on the construction site at all times and be available for inspection by the WCC and GWRC, and be made publicly accessible on the Project website.
	Marine Operations Management
30	In accordance with condition 18, the Consent Holder shall prepare a **Marine Operations Management Plan (MOMP)** in consultation with the Harbourmaster, GWRC. The purpose of the MOMP shall be to confirm details of marine operations for the runway extension and identify measures to avoid, remedy or mitigate adverse effects from marine operations on the environment including navigational safety.
31	The MOMP shall include, as a minimum, its objectives and intended outcomes and

	address the following: • Transport route planning in and out of the harbour, including the loading points; • Weather limits (including swell) for each part of marine operations; • Lay-up options for when barges are not required or halted due to bad weather; • Construction, use, inspection and maintenance of all moorings laid for the project; • Contact details and radio procedures for all marine vessels: • An assessment of the vessels to be used against Maritime Rule Part 90 (Pilotage) to establish if the Masters require Pilotage Exemption Certificates to operate. If Masters require Pilotage Exemption Certificates to operate, details of how this will be achieved shall be provided; • Confirmation of marine insurance (including wreck removal) for all vessels involved; • Confirmation of Maritime NZ certification, where appropriate, for all vessels involved; • Emergency and breakdown contingency plans. • Spill prevention and management procedures • A definition of what constitutes a 'minor change' to the MMP
32	The MOMP shall be implemented and maintained throughout the site establishment and construction phases of the project and following construction as necessary, and updated if required.
33	The Consent holder shall ensure that all moorings are constructed and maintained in accordance with the current Wellington Regional Council Mooring Construction Guidelines to ensure the safe mooring of the vessel at all times. Where the mooring is not constructed in accordance with these Guidelines, the construction shall be to the satisfaction of the Harbour Master, GWRC.
	Construction Traffic Management
34	In accordance with condition 18, the Consent Holder shall submit a **Construction Traffic Management Plan (CTMP)**. The objectives of the CTMP shall be to: 1. Meet the specific requirements for construction traffic management including, where required, to obtain approval from road controlling authorities for the activities required. Where any approval is required from a private land holder, or a person having an interest in private land; to obtain those approvals before undertaking any work; to be in accordance with the relevant By-Laws, Acts, Regulations and Wellington City conditions pertaining to traffic; 2. adopt NZTA's Code of Practice for Temporary Traffic Management including any activity that varies the normal operating conditions of any road; 3. ensure the application of best practice methodology to all traffic controls associated with construction; 4. ensure compliance with relevant legislative requirements; 5. effectively manage traffic generated during the construction phases of the project so that: - construction traffic volumes are safely accommodated within the existing road network; - so far as is reasonably practicable, congestion or traffic delays are avoided; - any traffic effects associated with construction are mitigated as far as reasonably practicable; - the needs of other road users and liaison with road controlling authorities, residents, businesses, sports facilities, major events organisers and emergency services are considered and where appropriate addressed; and

	- discharges of fugitive dust are minimised as far as possible The certified CTMP shall confirm the procedures, requirements and standards necessary for managing the traffic effects during construction of the Project so that safe, adequate and convenient facilities for local movements by all transport modes are maintained throughout the construction period. In particular, the CTMP shall describe, where appropriate: a) The method to be used to ensure the departure and arrival times of trucks carrying fill material is staggered so as to avoid trucks travelling in 'convoy'. b) Any temporary changes to the speed limit; c) a 10km/hour speed limit on unsealed construction site haul roads; d) Provision for the safe and efficient access to construction vehicles to and from the construction site; e) The identification of primary haulage routes, and alternative haulage routes to be used in a contingency where the primary haulage routes are not available; f) Design and maintenance of haulage vehicle routes including any limitations and any associated permit requirements; g) Temporary traffic management measures to manage intersection and road user safety, as well the methods to manage any temporary closures of any public roads; h) Pre and post construction pavement condition surveys; i) Changes required to the existing landside vehicle and pedestrian access to facilitate construction activity. Techniques employed to manage staff vehicle movements safely and efficiently to and from the construction site; j) Monitoring and reporting; k) Emergency response and incident management; and l) The identification of staff and contractors' responsibilities.
35	The CTMP shall be implemented and maintained throughout the construction phase of the Project and following construction as necessary, and updated if required. Where an alternative haulage route is proposed to be used for a period of more than 24 hours, an updated CTMP shall be provided for certification if the alternative arrangements are not already certified as part of the initial CTMP.
36	The Consent Holder shall use best endeavours to ensure that Moa Point Road remains fully operational for both vehicular and pedestrian use throughout the Construction Phase, and any necessary modification or upgrades are implemented prior to the completion of construction of the Project. The Plans specifying these modifications and/or upgrades shall be submitted as part of the CTMP. Where any temporary closures are required, the Consent Holder shall be required to notify the roading authority and the CLG and implement any measures specified in the CTMP for managing traffic and pedestrian access during any closures required.
37	a) Prior to the construction of the Project, the Consent Holder shall undertake a pre-construction condition survey of the carriageway/s along those roads affected by the Project and submit a copy to the relevant road controlling authority. The condition survey shall consist of a photographic or video record of the carriageway, and shall include roughness, rutting defects and surface condition. b) As soon as practicable following completion of construction of the Project, the Consent Holder shall, at its expense, conduct a post-construction condition survey of the road network affected by the Project. c) The results of the pre and post construction surveys will be compared and, where necessary, the Consent Holder shall, at its expense, arrange for repair of any damage to the carriageways and footpaths (and associated road components), where that damage has resulted from the impacts of construction of the Project.

<table>
<tr><td>38</td><td>
a) The Consent Holder shall carry out regular inspections of the road network affected by the Project during construction to ensure that all potholes and other damage resulting from the construction of the Project are identified as soon as practicable.
b) The Consent Holder shall contribute fair and reasonable costs towards repair and maintenance of potholes and other damage resulting from the construction of the Project.
c) Prior to construction commencing, the Consent Holder will agree with the relevant road controlling authority the nature, extent and frequency of the inspections.
</td></tr>
<tr><td>39</td><td>
a) Heavy vehicle movements for the transportation of construction material to and from the Site shall be restricted to the following transportation periods:
(i) Monday to Friday 9:30am to 2:30pm along the route shown in Figure 1-2 (Page 5 of the AEE dated 28 April 2016 submitted with the application); and,
(ii) Monday to Friday 10pm – 6am along the route shown in Figure 1-3 (Page 6 of the AEE dated 28 April 2016 submitted with the application).
b) The number of heavy vehicle movements along the routes shown in Figures 1-2 and 1-3 shall not exceed the following:
<table>
<tr><th>One hour period starting</th><th>Day Time Route (Figure 1-2)</th><th>Nigh Time Route (Figure 1-3)</th></tr>
<tr><td>9.30am</td><td>15</td><td></td></tr>
<tr><td>10am</td><td>30</td><td></td></tr>
<tr><td>11am</td><td>30</td><td></td></tr>
<tr><td>12 noon</td><td>30</td><td></td></tr>
<tr><td>1pm</td><td>30</td><td></td></tr>
<tr><td>2pm – 2.30pm</td><td>15</td><td></td></tr>
<tr><td>10pm</td><td></td><td>30</td></tr>
<tr><td>11pm</td><td></td><td>25</td></tr>
<tr><td>12am</td><td></td><td>25</td></tr>
<tr><td>1am</td><td></td><td>15</td></tr>
<tr><td>2am</td><td></td><td>5</td></tr>
<tr><td>3am</td><td></td><td>10</td></tr>
<tr><td>4am</td><td></td><td>20</td></tr>
<tr><td>5am</td><td></td><td>30</td></tr>
</table>
</td></tr>
<tr><td></td><td>Construction Air Quality Management</td></tr>
<tr><td>40</td><td>
Pre-construction monitoring
The consent holder shall carry out monitoring for at least one year prior to commencement of construction for the following parameters:
• Total suspended particulate (TSP)
• PM_{10}
• Meteorology (rainfall, temperature, wind speed and wind direction) and
• Nitrogen dioxide

Continuous meteorological and TSP monitoring shall be carried out at a location that is, as far as practicable, representative of background local weather conditions for future comparison with air quality at the construction site.
</td></tr>
</table>

	Continuous monitoring for PM_{10} and passive monitoring for nitrogen dioxide shall be carried out at Moa Point at a location that is, as far as practicable, representative of resident's exposure to background air quality prior to construction. A summary of the results of pre-construction monitoring shall be provided to the Manager, GWRC and the Compliance Monitoring Officer, WCC within one month of the monitoring being completed.
41	At the completion of pre-construction monitoring, the consent holder shall review the trigger levels in condition 45 in consultation with the Community Liaison Group and amend the trigger levels if necessary to ensure they are not under, or over, conservative for the existing environment. The consent holder shall provide the Manager, GWRC and Compliance Monitoring Officer WCC with a copy of the review document within 10 working days of the review being completed. *Advice Note: Should it be necessary to amend the trigger levels in condition 45, a change of conditions application under s127 of the Resource Management Act will be required.*
42	**Discharges beyond the site boundary** There shall be no discharges to air that, in the opinion of an enforcement officer of the GWRC are noxious, dangerous, objectionable or offensive discharges at or beyond the boundary of the property from which the consent holder operates. These discharges include dust and other particulate matter. *Advice Note: The property from which the consent holder operates has been identified as all construction zones as shown on Figure 1-6 in Volume 2A of the resource consent application being the reclamation works within the coastal marine area, all works within Part Lot 1 DP 78304 (construction and stockpile compound) and Section 1 SO 342914 (Moa Point Road), the Moa Point Beach Remediation Area and the Landscape/amenity Improvements Area.*
43	**Air quality monitoring during construction** The consent holder shall carry out monitoring during construction of: • Total suspended particulate (TSP) • PM_{10} • Meteorology (rainfall, temperature, wind speed and wind direction) • Nitrogen dioxide • Visible dust The consent holder shall undertake continuous TSP and meteorological monitoring for the duration of the Construction Phase at a location that is, as far as practicable, representative of local weather conditions across the construction site. Continuous monitoring for PM_{10} and passive sampling for nitrogen dioxide shall be carried out at Moa Point at a location that is, as far as practicable, representative of resident's potential exposure to discharges to air during the Construction Phase for the duration of the works. Passive sampling of nitrogen dioxide shall be carried out at the following three locations (in addition to Moa Point) along the proposed heavy traffic route for the duration of the construction phase: • Onepu Road; • Calabar Road; and • Lyall Parade

<table>
<tr><td>44</td><td>Exceedance of management trigger levels
In the event that monitoring in accordance with Condition 43 shows any particulate trigger level in Table 1 of condition 45 for visible dust, TSP or PM_{10} is exceeded at the monitoring locations set out in the approved Construction Air Quality Management Plan, the consent holder shall investigate the cause as a priority and, immediately initiate dust mitigation measures to reduce ambient levels of particulate.</td></tr>
<tr><td>45</td><td>Exceedance of compliance trigger levels
In the event that monitoring in accordance with condition 43 shows the one-hour PM_{10} or TSP trigger levels in Table 1 is exceeded for more than 1 hour (i.e. two consecutive hours or more above 150 µg/m^3 for PM_{10} or above 200 µg/m^3 for TSP), the consent holder shall:
• Immediately cease all activities that generate fugitive discharges of dust to air; and
• Notify the Manager, GWRC within 24 hours of the exceedance being recorded; and
• Investigate the cause of the exceedance and initiate mitigation measures to reduce ambient levels of particulate to prevent re-occurrence

Construction may recommence when the one-hour PM_{10} and TSP trigger levels in Table 1 are no longer exceeded at the monitoring sites.

Table 1: Trigger levels for TSP and PM_{10}
<table>
<tr><th>Parameter</th><th>Averaging period</th><th>Trigger Level</th></tr>
<tr><td>Visible dust</td><td>Instantaneous</td><td>Visible dust crossing the boundary</td></tr>
<tr><td>TSP</td><td>5 min
1 hour</td><td>250 µg/m^3
200 µg/m^3</td></tr>
<tr><td>PM_{10}</td><td>1 hour</td><td>150 µg/m^3</td></tr>
<tr><td>Wind warning</td><td>1 minute</td><td>10 m/s (during two consecutive 10-minute periods)</td></tr>
<tr><td>Rain warning</td><td>12 hours</td><td>There has been no rain in the previous 12 hours</td></tr>
</table>
</td></tr>
<tr><td>46</td><td>Siting and methods for air quality monitoring equipment
All air quality monitoring shall be sited, as far as practicable, in accordance with AS 3580.1.1:2007 Methods for sampling and analysis of ambient air – Guide to siting air monitoring equipment.

All meteorological monitoring shall be sited, as far as practicable, in accordance with AS 3580.14.2014 Methods for sampling and analysis of ambient air – Meteorological monitoring for ambient air quality monitoring applications.

Passive monitoring of nitrogen dioxide shall be carried out in accordance with the methods described in section 3 of Ambient air quality (nitrogen dioxide) monitoring network annual report 2007-14, New Zealand Transport Agency (2016).

Continuous monitoring of PM10 shall be carried out in accordance with Schedule 2 of the Resource Management (National Environmental Standards for Air Quality) Regulations 2004.</td></tr>
<tr><td>47</td><td>On-line provision of air quality monitoring data
The consent holder shall make continuous monitoring data collected in accordance with condition 43 available on the Project website in real-time in a format similar to</td></tr>
</table>

	Wellington Regional Councils public air quality monitoring.
	Minimising dust discharges from vehicles
48	The speed limit of all vehicles travelling on unsealed areas or access roads shall be limited to a maximum of 10km/hr.
49	The consent holder shall cover all vehicle loads that may generate fugitive dust discharges to air to minimise the generation of fugitive dust. This includes all material being transported to and from the construction site.
50	The consent holder shall ensure that water is available on the construction site for dust suppression for the duration of the Construction Phase. The consent holder shall employ dust suppression as required to minimise dust emissions from unsealed areas and other sources of fugitive discharges of dust to air.
51	The consent holder shall ensure that the deposition of earth, mud, dirt or other debris on any public road or footpath resulting from the transport of materials and construction related activities is avoided.
52	The consent holder shall install, maintain and use a wheel wash to prevent the transportation of material onto sealed surfaces where the material can become a source of dust emissions.
53	The consent holder shall ensure that construction is carried out, as far as practicable, in accordance with good practice mitigation of fugitive discharges of dust to air as outlined in the most up to date version of the Ministry for the Environment *Good Practice Guide for assessment and managing the environmental effects of dust emissions.* This shall include: • Locating stockpiles and sources of fugitive discharges of dust to air outside the operational flight envelope and so as to maximise separation distances to sensitive receptors, particularly the Moa Point residents. • Minimising the number, size and height and slope of stockpiles. • Limiting the drop height from conveyors, loaders and other equipment transferring material that may generate fugitive discharges of dust to air. • The use of wind breaks and/or bunding for stockpiles. • Re-vegetation of exposed surfaces, including inactive stockpiles. • Regular sweeping of sealed surfaces. • Swift clean-up of spillage around transfer points.
54	**Minimising vehicle emissions** The consent holder shall ensure that construction vehicles are serviced, maintained and operated to minimise discharges to air as follows: • Appropriate and regular engine maintenance to ensure there is no visible emissions to air for more than 10 seconds; • Ensuring that vehicles are not overloaded.
55	**Construction Air Quality Management Plan** In accordance with condition 18 the Consent Holder shall prepare a **Construction Air Quality Management Plan (CAQMP)**. The purpose of the CAQMP shall be to establish procedures and methods to ensure compliance with the conditions of this consent with respect to off-site discharges, monitoring and responding to any complaints and events.
56	The CAQMP shall, as a minimum, set out its objectives and intended outcome and address the following: a) A map clearing showing the boundary of the site for the purposes of assessment compliance with condition 42. b) The location of the Total Suspended Particulate (TSP) and PM_{10} monitoring site(s) between the beachfront area and the long term car park for assessing compliance with the management and compliance trigger levels and the specific methods for monitoring and recording monitoring data; c) Visual monitoring of dust emissions;

	d) Methods to be used to limit dust emissions, including: (i) Guidelines for the operation of construction vehicles, including speed restrictions of 10km/hr for vehicles on unsealed construction haul roads; (ii) Guidelines for the placement of fill material; (iii) Guidelines for the avoidance of dust tracking on adjacent roads; (iv) Guidelines for the establishment and/or use of stockpiles, including dust control; and (v) Guidelines for the control of dust on operational areas of the site. e) Criteria for implementation of dust control on the site, including wind speed triggers; f) Continuous monitoring of TSP concentrations, PM_{10} and meteorology; g) Passive monitoring of nitrogen dioxide; h) Monitoring and recording of construction vehicle maintenance; i) Process equipment inspection, maintenance, monitoring and recording; j) The identification of staff and contractors' responsibilities and training procedures. k) A definition of what constitutes a 'minor change' to the CAQMP
57	The CAQMP shall be implemented and maintained throughout the construction phase of the Project and following construction as necessary, and updated if required.
58	The visual dust monitoring required in accordance with the CAQMP shall comprise: a) A daily review of: (i) weather forecasts; and, (ii) weather conditions observed and data outputs from weather stations; for the purpose of planning an appropriate daily work schedule and associated dust management responses; b) A daily inspection of: (i) stockpiles to ensure they are not being subjected to wind erosion; (ii) land immediately adjacent to the construction site, construction exits and the adjoining roads for the presence of dust deposition; (iii) exposed construction surfaces for dampness to ensure exposed un-stabilised areas are minimised; and (iv) dust generating activities to ensure dust emissions are effectively controlled. c) Weekly inspections of: (i) Watering systems to ensure equipment is maintained and functioning effectively to dampen exposed areas.
	Construction Noise and Vibration Management
59	In accordance with condition 18, the Consent Holder shall prepare a **Construction Noise Vibration Management Plan (CNVMP)**. The purpose of the CNVMP shall be to provide a framework to manage construction noise/vibration appropriately by outlining the methods, procedures and standards for mitigating the effects of noise and vibration during construction of the Project.
60	The CNVMP shall, as a minimum, set out its objectives and intended outcome and address the following: a) Description of the work, anticipated equipment/processes and their scheduled durations; b) Hours of operation, including times and days when construction activities causing noise and/or vibration would occur including a noise schedule and haulage exclusion periods; c) The methodology to achieve construction noise (in accordance with condition 62) and vibration criteria in accordance with condition 64 requirements;

<table>
<tr><td></td><td>
d) Identification of affected houses and other sensitive locations where noise and vibration criteria apply and where exceedances of the standards may occur;
e) Construction noise control measures;
f) Monitoring and reporting;
g) Emergency response and incident management; and
h) The identification of staff and contractors' responsibilities.
</td></tr>
<tr><td>61</td><td>The CNVMP shall be implemented and maintained throughout the construction phase of the Project and following construction as necessary, and updated if required.</td></tr>
<tr><td>62</td><td>
a) Construction noise shall comply, with the following criteria in accordance with NZS6803:1999:

Residential receivers
<table>
<tr><th>Time of week</th><th>Time period</th><th>dB LAeq(T)</th><th>dB LAmax</th></tr>
<tr><td rowspan="4">Weekdays</td><td>0630-0730</td><td>55</td><td>75</td></tr>
<tr><td>0730-1800</td><td>70</td><td>85</td></tr>
<tr><td>1800-2000</td><td>65</td><td>80</td></tr>
<tr><td>2000-0630</td><td>45</td><td>75</td></tr>
<tr><td rowspan="4">Saturdays</td><td>0630-0730</td><td>45</td><td>75</td></tr>
<tr><td>0730-1800</td><td>70</td><td>85</td></tr>
<tr><td>1800-2000</td><td>45</td><td>75</td></tr>
<tr><td>2000-0630</td><td>45</td><td>75</td></tr>
<tr><td rowspan="4">Sundays and public holidays</td><td>0630-0730</td><td>45</td><td>75</td></tr>
<tr><td>0730-1800</td><td>55</td><td>85</td></tr>
<tr><td>1800-2000</td><td>45</td><td>75</td></tr>
<tr><td>2000-0630</td><td>45</td><td>75</td></tr>
</table>
Industrial and commercial receivers other than on Wellington International Airport owned land
<table>
<tr><td>Time period</td><td>dB LAeq</td></tr>
<tr><td>0730-1800</td><td>70</td></tr>
<tr><td>1800-0730</td><td>75</td></tr>
</table>
b) Construction noise is assessed and managed in accordance with NZS6803:1999 Acoustics – Construction Noise.
c) Construction noise at Lyall Bay beach shall not exceed 70 dB L_{Aeq} and 85 dB L_{Amax} (0730 to 2000hrs).
</td></tr>
<tr><td>63</td><td>
a) Prior to the works/activity taking place, the Consent Holder shall prepare a separate Noise Schedule. The Noise Schedule shall describe site specific noise management and mitigation measures required to address the specific circumstances and environmental conditions of the affected area, which shall be in addition to the general mitigation measures noted in the CNVMP. The Noise Schedule shall contain the following information:
a) The activity and location of proposed works;
b) The timing and duration of the activity;
c) The equipment to be used;
d) Predicted noise levels;
e) Identified dwellings at which compliance cannot be achieved with
</td></tr>
</table>

<table>
<tr><td></td><td>conventional mitigation measures;
f) How affected persons are to be consulted; and
g) Alternative management and mitigation measures proposed.
b) The Noise Schedule shall be submitted to the Compliance Monitoring Officer WCC and Manager GWRC for certification at least ten working days prior to the relevant construction activity commencing.
c) The Consent Holder shall implement the measures set out in the Schedule throughout the relevant construction period referred to in the Noise Schedule.</td></tr>
<tr><td>64</td><td>Construction vibration received by any building shall be measured and assessed in accordance with the German Standard DIN 4150-3:1999 “Structural vibration – Part 3: Effects of vibration on structures”, and shall comply with the criteria set out as follows:
<table>
<tr><th rowspan="3">Type of structure</th><th colspan="4">Short-term vibration</th><th>Long-term vibration</th></tr>
<tr><th colspan="3">PPV at the foundation at a frequency of</th><th rowspan="2">PPV at horizontal plane of highest floor (mm/s)</th><th rowspan="2">PPV at horizontal plane of highest floor (mm/s)</th></tr>
<tr><th>1 – 10Hz (mm/s)</th><th>1 – 50Hz (mm/s)</th><th>50 – 100Hz (mm/s)</th></tr>
<tr><td>Commercial/ Industrial</td><td>20</td><td>20 – 40</td><td>40 – 50</td><td>40</td><td>10</td></tr>
<tr><td>Residential/ School</td><td>5</td><td>5 – 15</td><td>15 – 20</td><td>15</td><td>5</td></tr>
<tr><td>Historic or sensitive structures</td><td>5</td><td>3 – 8</td><td>8 – 10</td><td>8</td><td>2.5</td></tr>
</table>
* Further work is required to determine the appropriateness of the limits in this condition; monitoring, recording and reporting requirements and whether vibration limits in the CMA are required.</td></tr>
<tr><td>65</td><td>The detailed design of any structural construction noise or vibration mitigation measures (e.g. temporary construction noise barriers) as identified in the certified CNVMP, shall be undertaken by a suitably qualified acoustics specialist, and shall be implemented prior to commencement of the Construction Phase(s) that necessitates that particular mitigation measure.</td></tr>
<tr><td>66</td><td>For residential dwellings located along Moa Point Road, Kekerenga Street and Ahuriri Street and not owned by the Consent Holder, identified on Figure X [to be developed], methods to be adopted within the CNVMP to manage construction noise and vibration shall be formulated by the Consent Holder, having first consulted with the owners and occupiers of these properties. The mitigation could include, but not be limited to:
• Temporary relocation during night time construction work
• Acoustic insulation and mechanical ventilation within the affected dwelling to meet an internal noise level of 30 dB $L_{Aeq(15\ Mins)}$ and 60 dB L_{Amax}.
Noise predictions shall be provided as part of the CNVMP that identifies the expected noise level at all dwellings where the noise limits in condition 45 above are to be exceeded. The actual construction noise levels shall not exceed the</td></tr>
</table>

	predicted levels. The mitigation shall be undertaken by the Consent Holder in agreement with the owner and/or occupiers of the dwelling prior to the commencement of construction of the reclamation.
67	The Consent Holder shall ensure that any pot-holes or pavement discontinuities along the carriageway of the haulage route, identified in Figure X [to be developed], near residences, are repaired prior to the use of the road by heavy construction traffic and maintained throughout the heavy traffic usage period. These shall be identified as part of the CTMP.
	Network Utilities
68	**Network Utilities Management Plan** In accordance with Condition 18 and condition 71, the Consent Holder shall prepare a **Network Utilities Management Plan (NUMP)**. The purpose of the NUMP shall be to ensure that enabling work, and design and construction of the Project adequately takes account of (and includes measures to address), the safety, integrity, protection (or, where necessary, relocation of) existing network utilities. The NUMP shall address the following network utilities: • Infrastructure in relation to the Moa Point Waste Water Treatment Plant (WWTP) including the main outfall pipeline, the sludge pipeline and the interceptor main; • Telecom duct; • 11,000-V cable; • 400-V cable; • Stormwater Line; • Dual 180mm concrete encased steel sewer line rising main; • 20mm water main; • Gas Line; and • Any other network utilities located within the area of the works or along any haulage routes where such infrastructure may be affected.
69	The NUMP shall be prepared in consultation with the relevant infrastructure providers who have existing network utilities that are directly affected by the Project. The NUMP shall as a minimum, set out its objectives and intended outcomes and address the following: a) Measures to be used to accurately identify the location of existing network utilities; b) Measures for the protection, relocation and/or reinstatement of existing network utilities; c) With respect to the Moa Point WWTP infrastructure: • Details of the options considered to avoid, remedy or mitigate adverse effects arising from the construction of the project • The detailed design of the agreed option for the protection of the infrastructure including details of the consultation undertaken with Wellington City Council, Wellington Water and VEOLIA; • A detailed construction methodology for the protection structure including timeframes; • Details of measures to ensure the risk of damage to the infrastructure during work are mitigated; • Details of contingency plans should any damage occur to the infrastructure. d) Measures to ensure the continued operation and supply of infrastructure services; e) Measures to provide for the safe operation of plant and equipment, and the

	safety of workers, in proximity to live existing network utilities; f) Measures to manage potential induction hazards to existing network utilities; g) Measures to communicate with the relevant utility service providers during the Construction Phase; h) Earthwork management (including depth and extent of earthwork), for earthwork in close proximity to existing network utilities; i) Vibration management for work in close proximity to existing network utilities; and j) Emergency management procedures in the event of any emergency involving existing network utilities. k) A definition of what constitutes a 'minor change' to the NUMP. *Note: Should the preferred option for the protection of the Moa Point WWTP infrastructure involve the relocation of the infrastructure, an application for separate resource consents will be required.*
70	The NUMP shall be implemented and maintained throughout the construction phase of the Project and following construction as necessary, and updated if required. The measures to appropriately avoid, remedy or mitigate adverse effects on the Moa Point WWTP infrastructure shall be implemented in consultation with Wellington City Council, Wellington Water and Veolia.
71	**Methodology for developing a NUMP in relation to Moa Point WWTP infrastructure** Prior to preparing a Network Utilities Management Plan (NUMP), the Consent Holder shall prepare a report in consultation with Wellington City Council which sets out the methodology for the development of the NUMP with respect to the Moa Point Wastewater Treatment Plant Infrastructure (the Main Outfall Pipeline, Sludge Pipeline and interceptor main). The report shall include, but not be limited to: a) The process for engaging and consulting the asset owner, its managers and operators; b) Criteria for an acceptable solution, including timing for implementing any mitigation agreed, operational efficiency, structural integrity, maintainability, access for repairs, guarantees and warranties for construction; c) The process for agreeing independent technical experts who evaluate and design mitigation options; and d) Mediation steps for resolving differences in technical evaluations. The report and a record of consultation with Wellington City Council on the report shall be provided to the Manager, GWRC within 10 working days of its completion.
	Coastal Management
72	The Consent Holder shall notify the Manager GWRC in writing within 10 working days of the completion of each stage of ground-treatment works, reclamation, structures and revetments within the CMA. *Advice note: Notifications must be sent to notifications@gw.govt.nz. Please include consent reference WGN160274.*
73	The Consent Holder shall supply to the Manager GWRC and the LINZ Hydrographic Services Office and LINZ Topographic Services Office (Chief Hydrographer, National Topo/Hydro Authority, Land Information New Zealand, Private Box PO Box 5501, Wellington 6145), a complete set of as built plans, final topographic and bathymetric data, and appropriate certification confirming that the new reclamation, associated structures, and revetment works have been built in accordance with sound engineering practice, within 60 working days of the

	completion of the works associated with the reclamation portion of the Project.
74	The Consent Holder shall maintain the construction site in good order and shall, as far as practicable, remedy all damage and disturbance caused by plant, vehicles and equipment to the foreshore and Open Space B land during construction, to the satisfaction of the Manager GWRC and Compliance Monitoring Officer WCC.
75	The Consent Holder shall ensure the removal of all equipment, erosion and sediment control measures, surplus soil, sediment and construction materials from the CMA within 30 working days following the completion of the construction works.
76	All imported fill material to be used in the reclamations, rock dykes, groynes and temporary fill/surcharge shall be in accordance with the Ministry for the Environment "cleanfill" definition, as detailed in Publication ME418 "A Guide to the Management of Cleanfills, 2002" or subsequent updates. Details of how the consent holder will meet this condition using previous contaminant testing, history of the source location and a testing regime are required to be set out in the Construction Management Plan.
77	The consent holder shall ensure that any material sourced from the Wellington Harbour Deepening Project to be used as fill for the reclamation is limited to material from the 'Harbour Entrance Area' as defined in the report titled *Draft marine ecological assessment for Wellington harbour shipping channel deepening*, Tonkin and Taylor (May 2016).
78	The Consent Holder shall maintain a log recording the source of fill material imported onto each reclamation or temporary and permanent occupation site. This log shall be made available to the Manager GWRC for inspection on request.
79	The Consent Holder shall undertake a survey of sea bed morphology in the whole of Lyall Bay two years following the completion of the SWFS in a manner that is comparable to surveys required by conditions 94 and 99. A hydrographic survey report shall be completed to compare the survey results with the Mackay & Mitchell, 2014 bathymetric survey referenced in Technical Report 17, any other relevant surveys and those required by conditions 94 and 99 to ascertain any anomalous changes in seabed heights or accretion/deposition patterns post construction of the proposed runway extension and SWFS. The report shall identify remedial action or mitigation that is required to address any adverse effects identified to comply with conditions 80(a) and 93(f). A copy of the survey report shall be supplied to the Manager GWRC within six months of the completion of the survey.
80	The structures authorised by this consent shall remain the responsibility of the consent holder and shall be maintained so that: a) Any erosion of the coastal marine area that is attributable to the structures and works carried out as part of this permit is repaired by the consent holder; b) The integrity of the structures is maintained and no materials are dumped or stored on the structures c) The structures do not pose a hazard to navigation or public safety The consent holder shall undertake maintenance to the satisfaction of the Manager GWRC where a breach of this condition is determined. *Note: Any maintenance works outside of the scope of the application, Maintenance Management Plan or permitted rules of the regional plans will require a separate resource consent.*
	Erosion and Sediment Control Plan and Monitoring
81	**Erosion and Sediment Control Plan** In accordance with condition 18, the Consent Holder shall prepare an **Erosion and Sediment Control Plan (ESCP)**. The purpose of the ESCP is to describe the methods and practices to be implemented to ensure the effects of sediment

	generated from construction practices associated with the Project on the Lyall Bay coastal environment (including Moa Point embayment) will be appropriately managed. The ESCP shall, as a minimum, be prepared in accordance with the *Erosion and Sediment Control Guidelines for the Wellington Region* (September 2002), set out its objectives and intended outcomes and address the following: a) The identification of appropriately qualified and experienced staff to manage environmental issues associated with sedimentation on-site; b) The identification of staff who have clearly defined roles and responsibilities to monitor compliance with the limits set by these conditions and the requirements of the ESCP and any relevant conditions; c) Provision to ensure effective erosion and sediment control measures are installed prior to and during all construction work, within and adjacent to the coastal marine area; d) The design criteria and dimensions of all erosion and sediment control measures for all works (above and below mean high water spring) to ensure that they meet the *Erosion and Sediment Control Guidelines for the Wellington Region* (September 2002). Erosion and sediment control measures within the reclamation area are to include floating silt curtains, a weir/decant system using floating decant T-bars which include shutoff valves so discharges can be stopped and floating booms constructed from non-perforated nova-coil strung across the impounded water. e) Details of how progressive stabilisation will be achieved and measures to reduce wind and wave action within the impounded water of the reclamation. f) Details of the management triggers for turbidity and visual clarity that will be used to provide early warning that the quality of the discharge to the coastal marine area from discharges is reducing and on-site investigations are required; g) Details of how the rate of sediment discharge to the coastal marine area of 2kg/s at any time will be achieved. h) Details of control and compliance monitoring in accordance with condition 83 including the number and location of monitoring sites, data collection, assessment and recording procedures for assessment compliance with the management triggers and compliance limits; i) Details of the monitoring methodology that will be employed to confirm sediment control devices meet the requirements of the ESCP and any relevant conditions j) Details of how turbidity, total suspended solids and clarity (as transmissivity) will be calibrated for fill from each fill source prior to use of fill from that source, how this will be implemented on site and the results provided to GWRC; k) Procedures for measuring the rate of discharge (as TSS concentration times flow rate) when the management trigger for TSS and/or visual clarity is exceeded. l) Details on site access locations and sediment and dust controls m) The responsibilities, procedures and response actions required to ensure that the discharge is ceased should the receiving-water turbidity limits set out in condition 85 (below) be exceeded; n) The actions that will be undertaken for sediment control during extreme weather and/or emergency situations; and o) Methods and procedures to be undertaken for decommissioning the erosion and sediment control measures. p) A definition of what would constitute a ‘minor change’ to the ESCP.

82	The ESCP shall be implemented and maintained throughout the construction phase of the Project and following construction as necessary, and updated if required.
83	**Monitoring at the reasonable mixing zone boundary** As part of the ESCP the Consent Holder shall confirm the location of the compliance and control turbidity and visual clarity monitoring sites. Monitoring sites shall be established such that turbidity and visual clarity monitoring is undertaken at a depth of 1.5 m.[1] At least three compliance monitoring sites shall be located at the outer edge of the near-field zone of reasonable mixing, which shall be 150m from each discharge point in the rock-dyke. At least five control sites shall be located within Lyall Bay[2] and be representative of existing ambient conditions and selected based on the following criteria: a) Water depth and wave heights are similar to the compliance sites. b) The sites shall be located away from existing storm water discharge outlets and other land based discharge points to minimise the near-field interference on ambient turbidity within Lyall Bay. The location of the compliance and ambient monitoring sites shall be shown on a map attached to the ESCP. Monitoring shall be undertaken at the compliance sites and the ambient sites. This monitoring shall include: 1. Continuous (telemetered) turbidity sensors and loggers shall be installed, operated and maintained. 2. Continuous (telemetered) visual clarity (as transmissivity) sensors and loggers shall be installed, operated and maintained, 3. The logged data shall be processed and assessed by the Consent Holder on a daily (24-hour) basis. 4. Data processing to extract a 48-hour rolling median, replacing the earliest 24-hour data record with the latest 24-hour data. Full records of data and data processing shall be kept by the consent holder and provided to GWRC in the six monthly monitoring reports or on request.
84	**Exceedance of management triggers** In the event that monitoring undertaken in accordance with condition 83, identifies that either the turbidity or visual clarity management triggers set out in the ESCP have been exceeded at the boundary of the 150m reasonable mixing zone, the consent holder shall undertake the following: a) Immediately undertake a full audit of all erosion and sediment control measures within the construction area, including discharge or seabed disturbance locations, discharge rates and discharge methods; b) Monitor the rate of discharge as TSS concentration times flow; c) Remedy any causes to these measures that may have contributed to the exceedance, as soon as practicable and record what remedial measures were undertaken; d) Assemble information and observations of wave, tide and weather (rainfall, wind) conditions over the previous 48-hours as a background to possible alternative or contributing causes of the exceedance. e) Record details of the exceedance circumstances required by a) – d) above and make this information available to any enforcement officer from the Wellington Regional Council on request.
85	**Compliance limits**

[1] near-surface, but minimising sensor interference with air-bubbles entrained by wave activity.

[2] north of a line between the narrow isthmus of Hue te Taka Peninsula and Waitaha Cove.

	In accordance with the ESCP, the following turbidity and visual clarity compliance limits shall be adhered to at the boundary of the 150 reasonable mixing zone by the Consent Holder at all times the Construction Phase: a) When the sensor-calibrated suspended sediment concentration at any of the control sites, using a 48-hour rolling median, is less than 15 mg/L then the following shall not be exceeded: • The suspended sediment concentration at any of the compliance monitoring sites shall not exceed 25 mg/L • A reduction in visual clarity by more than 50% of background clarity as measured at the control sites b) When sensor-calibrated suspended sediment concentration at any of the control sites is equal or above 15 mg/L using a 48-hour rolling median, then the following shall not be exceeded: • The suspended sediment concentration at any of the compliance sites shall not exceed the ambient concentrations by more than 10 mg/L (ambient plus 10 mg/L) • A reduction in visual clarity by more than 50% of background clarity as measured at the control site.
86	**Exceedance of the compliance limit** In the event that the monitoring undertaken in accordance with condition 83, identifies that any of the turbidity or visual clarity compliance limits in condition 85 have been exceeded, then the Consent Holder shall undertake the following: a) Cease works and all discharges from the site to the CMA immediately; b) Immediately carry out and record in writing a full audit of the condition of all erosion and sediment control measures within the construction area, including discharge or seabed disturbance locations, discharge rates and discharge method (e.g. pipe, weir); c) Remedy any causes to these measures that may have contributed to the exceedance, as soon as practicable and record what remedial measures were undertaken; d) Assemble information and observations of wave, tide and weather (rainfall, wind) conditions over the previous 48-hours as a background to possible alternative or contributing causes of the exceedance; e) Notify the Manager at GWRC within one working day of the exceedance, providing details of the exceedance circumstances, and record what measures were undertaken and what actions will be taken, including timeframes, to avoid future exceedances; Works on site and discharges to the coastal marine area cannot recommence until the full audit required by b) above is complete and monitoring in accordance with condition 83 shows that turbidity and visual clarity at all compliance monitoring sites are below the compliance limits in condition 85. *Advice note: Compliance with this condition does not preclude GWRC investigating non-compliance with condition 85 and/or taking enforcement action.*
87	**Chemical treatment Plan** In accordance with condition 18 the consent holder shall prepare a **Chemical Treatment Management Plan** (CTMP). The purpose of the CTMP shall be to establish procedures for the chemical treatment of sediment laden water prior to discharge. The CTP shall include as a minimum: a) Confirmation of the flocculant or other treatment to be used; b) Confirmation of the method of flocculation or other treatment to be used, including any alternatives if that method is found to be ineffective after use on site, including the timeframes for making the change between methods; c) Details of how the flocculation or other treatment dosage will be triggered;

	d) Details of optimum dosage rate calculated from the catchment; e) Details of all monitoring including, management trigger levels, compliance trigger levels and responses; f) Procedures for the storage of water treatment chemicals onsite; g) A spill contingency plan for water treatment chemicals; h) Methods and responsibilities for monitoring and maintenance of the system; i) Identification of a suitably qualified and experienced person and their specific responsibilities for ensuring that the chemical treatment is operating as outlined in the CTP; j) A plan for any decommissioning of treatment facilities; k) Confirmation of the time period for which the CTP will apply and circumstances in which the CTP will be updated; and l) A definition of what constitutes a 'minor change' to the CTP.
	Submerged Wave Focusing Structure
88	**Design of SWFS** In preparation of the SMAMP in accordance with condition 89, further modelling to confirm the final overall shape, size and position of the SWFS shall be undertaken by an appropriately qualified expert(s) to confirm that the location and design of the structure will meet objectives (a) – (i) of Condition 93. This modelling shall incorporate baseline information collected in accordance with condition 94 and include a review of a range of alternative design iterations and predicted swell events/scenarios that could arise as a result of each. The preferred design shall be selected in consultation with the Surf Steering Committee as set out in condition 92 and the reasons for its selection and predicted swell events/scenarios shall be described in the SMAMP.
	Surf Mitigation Adaptive Management Plan
89	At least 6 months prior to commencement of construction of the runway extension the consent holder shall prepare and submit to the Manager GWRC for certification a Surf Mitigation Adaptive Management Plan (SMAMP). The SMAMP shall be prepared by an appropriately qualified expert, following consultation with the Surf Steering Committee set out in condition 92. The purpose of the SMAMP shall be to provide: a) The design of the Submerged Wave Focusing Structure (SWFS) and a description of the key performance design criteria and objectives for the to offset the loss in surfing quality predicted in the middle and western sections of the beach; b) Confirmation of the location of the SWFS; c) Confirmation of the location of the exclusion zone around the SWFS during construction, the length of time the exclusion zone will be in place including measures to ensure restrictions on public access will be minimised (for example restricting construction to working days only), and how the exclusion zone will be policed (e.g. using a physical barrier, signs etc.); d) Details of the methodology and material to be used to construct the SWFS; and e) Monitoring, reporting and maintenance requirements following the construction of the SWFS.
90	The consent holder shall ensure that the SMAMP prepared in accordance with condition 89 includes a detailed description of the methodology and materials that will be used in the construction and maintenance of the SWFS. Information shall include, but is not limited to: a) Confirmation that the material selected to construct the SWFS has proven

	durability in the marine environment; b) Confirmation that the SWFS shall be designed to require minimal repair or maintenance for the life of the structure; c) Provision of a construction methodology that takes into account the local characteristics of the site including sourcing of material, construction plant and machinery operating entirely at sea, construction timeframes, potential risks (i.e. storm events), the need to minimise any adverse effects on public access and recreational users in and around the construction site; d) Detailed design and engineering plans of the SWFS including: (i) Location of the SWFS and exclusion zone backed by a geo referenced aerial photograph. The layout will include as a minimum; exact distance offshore, orientation in relation to shoreline, plan shape, major axis length and minor axis width, indication of batter slopes, location of nearby natural reef features; and typical sections through the SWFS along the major and minor axes sufficient to describe the main elements and significant form variations of the structure. Typical sections will include as a minimum existing seabed levels (relative to AHD), main tidal plane information, design crest heights (relative to AHD), and average properties of structural materials. e) The nature and scope of all inspection and maintenance work for the SWFS including; • The likely frequency of inspections and maintenance; • The likely methodologies for inspections and maintenance; • Measures that will be used to mitigate adverse effects on the environment; • Equipment to be used and how adverse effects on marine operations and navigational safety will be minimised; and • Procedures to notify the public, in particular recreational users, of maintenance activities, hazards and exclusion areas. f) A definition of what constitutes a 'minor change' to the SMAMP. *Advice note: the placement of rock for the SWFS is to be undertaken from machinery operating entirely at sea i.e. there shall be no shore-based activities on Lyall Bay beach associated with the construction.*
91	Once the SMAMP prepared in accordance with condition 89 has been certified by the consent authority, the consent holder shall prepare and submit to the consent authority relevant construction details including but not limited to: • The date works shall commence to construct the SWFS • The current stage of works as per the programme required in accordance with condition 14 • A contact person on site
	Surf steering committee
92	Prior to the preparation of the SMAMP, the consent holder shall establish a Surf Steering Committee that incorporates representation from stakeholder groups including but not limited to Wellington Board Riders Club, and local Surf Lifesaving Clubs. The Committee shall continue to exist for the duration of the consent for the ongoing maintenance of the SWFS. The Committee shall: a) Have input into the detailed design phase of the structure in accordance with condition 88; b) Review baseline monitoring results including those prepared for the SWFS and

	provide feedback; c) Review the draft SMAMP and to provide feedback; d) Review the operational monitoring results and provide feedback; e) Act as a liaison group for WIAL whenever any maintenance work is being carried out by the consent holder that may impact on the surf at Lyall Bay, including 'the Corner' ; f) Act as a liaison group for WIAL as to any emergent swimmer safety issues that arise as a result of the SWFS. The consent holder shall engage and fund the costs of an independent and appropriately qualified and experienced expert to assist the Committee with undertaking its functions as required. Other costs incurred by the Committee in undertaking its functions shall be met by the consent holder. *Advice note: for avoidance of doubt that the Surf Steering Committee is a liaison group between the consent holder and the community and does not have a decision making role.*
	Key performance design criteria and objectives
93	The consent holder shall ensure that the design of the SWFS as described in the SMAMP prepared in accordance with condition 89 achieves the following key performance criteria and objectives: a) That the SWFS shall be designed to meet the following parameters, in a wide representative range of surfable wave conditions (ranging from average to very good quality conditions) when assessed against the baseline information obtained to meet the requirements of conditions 94 and 96: (i) the generation of localised wave focusing across its footprint thereby forming pronounced wave peaks; and (ii) after generation, each wave peak shall propagate into shallower water to form peeling waves suitable for surfing (as opposed to waves tending to close-out), and as far as is practicable, the structure shall be designed to result in surfable rides of at least 50 – 100 metres in length; and (iii) the overall number and distribution of quality surfable rides post the completion of the runway extension shall be either equal to or better than for existing surfing conditions; b) That the SWFS shall not cause an increase in safety risk to swimmers during mild wave and weather conditions; c) That the crest height of the structure shall be low enough to prevent waves breaking on the structure except during rare periods of exceptionally large wave heights; d) That the SWFS is located and designed in such a way so as to have negligible adverse effects on surfability at the surf break known as the Corner; e) That the SWFS shall not pose a safety risk to board riders, or other recreational users within Lyall Bay (other than risks normally associated with surfing and other recreational activities); f) That the SWFS shall not increase coastal erosion or accretion when assessed against the baseline information obtained to meet the requirements of Conditions 94 and 95. g) That the SWFS shall be built in such a way that its structural integrity is not compromised by excessive seabed mobility or localised scour; and h) That the material selection and construction method shall not cause any adverse impacts on significant marine habitat or species. i) The SWFS is constructed to withstand 100 year return period offshore waves (10.5m).

	Baseline monitoring of existing surf conditions
94	Before preparation of the SMAMP in accordance with condition 89, the consent holder shall commission monitoring by an appropriately qualified expert(s) in order to provide additional baseline information which shall include: a) An assessment of detailed wave measurements (length, height, period) at the Lyall Bay entrance, 'The Corner', Middle and Western Beach and the anticipated location of the SWFS. Detailed measurements shall be obtained for a period of not less than six months and where practicable include at least three occurrences of each of the swell and weather scenarios outlined in section 5.3 of the draft SMAMP (i.e. Scenario 1-3 in Technical Report 11); b) Survey sea bed morphology of the whole of Lyall Bay area including at the anticipated location of the SWFS; and c) Five coastal profiles along Lyall Bay to be surveyed every 1-2 months for a full year. d) Bed sediment grab samples are collected between +2m and -5m depths at one metre intervals depth contours for three transects along the beach. e) Undertake surfing amenity modelling as described in Technical Report 11 using the wave, bathymetric data, sediment size and coastal profile information collected in accordance with condition 94 (a) – (d). f) A pre-construction surfing amenity survey.
95	The monitoring of the sea bed morphology required by condition 94(b) shall be undertaken on a quarterly basis for a period of one year in a manner that is comparable to surveys required by conditions 79 and 99. The purpose of this monitoring shall be to assess and quantify seasonal variations in sediment movements within Lyall Bay.
96	The surfing amenity survey required by condition 94(f) shall entail the use of suitable tracking devices fitted to surf boards to assess the distribution and length of surfable wave rides at The Corner, Middle and Western Beaches in Lyall Bay in a range of surf conditions. The study shall involve at least 10 surfers surfing concurrently at agreed locations in Lyall Bay during each event. The survey shall take place over a period of at least three months. *Advice note: the purpose of this survey is ascertain baseline surfing amenity i.e. the number and distribution of quality surfable rides at The Corner, Middle and Western Beaches.*
	Construction of the SWFS
97	The consent holder shall ensure that the SWFS is constructed in accordance with the construction details required by condition 89. Construction shall commence at the same time as or immediately following the placement of rock armouring around the runway extension reclamation (Stage B of the construction). Once commenced, work to complete the construction of the SWFS shall be carried out in a continuous manner as far as practicable so that the SWFS is completed in the shortest timeframe possible but no longer than twelve months from the date of commencement.
98	The consent holder shall notify the Manager, GWRC of the construction completion date of the SWFS within 5 working days of completion. *Advice Note: Notifications must be sent to notifications@gw.govt.nz. Please include consent reference WGN1160274.*
	Post construction performance SWFS monitoring
99	Once the SWFS has been established, the consent holder shall be required to monitor the effects and performance of the SWFS. This monitoring shall commence six months after the construction completion date of the SWFS, The monitoring shall include:

	a) An assessment of detailed wave measurements at the Lyall Bay entrance, 'the Corner' and the location of the SWFS; b) A survey of sea bed morphology of the whole of Lyall Bay area, including at the location of the SWFS in accordance with condition 94(b) and 95; c) Undertake surfing amenity modelling as described in Technical Report 11 using the wave, bathymetric data, sediment size and coastal profile information collected in accordance with condition 94 (a) – (d). d) A surfing amenity survey undertaken in accordance with conditions 94 (f) and 96. The purpose of this monitoring shall be to provide a comparative analysis of the effects of the SWFS on wave quality in order to confirm its success and fulfilment of the key performance criteria and objectives of the SWFS. This monitoring shall also confirm the effects of the structure with respect to sea bed morphology or adverse erosion/accretion, and swimmer and/or recreation safety within the Lyall Bay area.
100	A post construction monitoring report shall be prepared by a suitably qualified and experienced person or persons and be submitted to the Manager GWRC for approval within three months of the completion of survey required by condition 99 (b) (or on an alternative date as otherwise agreed to by the Manager, GWRC). The report shall: • summarise the results of the post construction performance monitoring undertaken in accordance with condition 99; • compared post construction monitoring against baseline information collected in accordance with condition 94 and key performance criteria specified and objectives specified in condition 93; • identify any remedial action or alternative mitigation in the event the SWFS is not meeting the key performance criteria and objectives; • summarise consultation with the Surf Steering Committee (required in accordance with condition 92) on remedial action or alternative mitigation required (if applicable). Any approved remedial action or alternative mitigation shall be completed within six months of the post construction monitoring report (or on an alternative date as otherwise agreed to by the Manager, GWRC). Advice Note: *remedial action or alternative mitigation options may require a separate resource consent.*
101	In the event remedial action or alternative mitigation is required under condition 100 the SMAMP shall be updated to reflect any changes to maintenance and monitoring requirements.
102	In the event remedial action or alternative mitigation is required under condition 100, the Consent Holder shall repeat post-construction monitoring outlined in condition 99 six months after the remedial action or alternative mitigation option is completed and submit a post construction monitoring report in accordance with condition 100. The purpose of this monitoring and report shall be to provide a comparative analysis of the effects of the remedial action or alternative mitigation option on wave quality in order to confirm its success and fulfilment of the key performance criteria and objectives. This monitoring shall also confirm the effects of the structure with respect to sea bed morphology or adverse erosion/accretion, and swimmer and/or recreation safety within the Lyall Bay area. *Advice Note: the intent of this condition is ongoing adaptive management to mitigate any adverse effects on surfing amenity and shoreline morphology.*
103	If analysis of the monitoring undertaken in accordance with condition 99 determines that the SWFS is successful in achieving the objectives of the SMAMP, the consent holder shall be required to repeat the monitoring set out in condition 99 in the following circumstances: • every five years for the duration of the consent; or in circumstances where

	there is clear evidence that the SWFS has been damaged to the extent that it is unlikely to be meeting the parameters set out in condition 93; or • If requested by the Manager, GWRC *Advice note: GWRC will only request additional post construction monitoring in the event there is an observable change in shoreline morphology or surfing amenity that may have resulted from the operation of the SWFS. This matter will be discussed with consent holder.*
104	The Consent Holder shall inspect and assess the structural integrity of the SWFS after any wave event reaching the 10-y return period wave height at Baring Head and take remedial action if necessary. The Consent holder shall provide an inspection report to the Manager, GWRC within 10 days of the inspection. The report shall include but not be limited to: • The extent the rocks comprising the SWFS have been moved by the large waves • Actual or potential effects the damage to SWFS may have on both surfing amenity and erosion at Lyall Bay beach • remedial action and when this work will be undertaken.
	Certification of SWFS maintenance methodology
105	The consent holder shall prepare and submit a maintenance methodology to the Manager, Greater Wellington Regional Council at **least 20 working days** prior to any maintenance works commencing on the SWFS, for authorisation that it is in accordance with the SMAMP and all conditions of this consent. The works shall not commence until the maintenance methodology has been certified by the Manger, GWRC. The maintenance methodology shall include, but not be limited to, the following details: a) Details of the proposed maintenance work including a detailed methodology b) Roles and responsibility of key site personnel b) Identification of experienced person(s) to manage the environmental issues on site c) Details of any public access restrictions, protocols for ensuring the public is aware of any restrictions and what measures will be in place to minimise disruption of public access and use of the coastal marine area d) Proposed hours of maintenance works e) Details of processes/measures to be put in place to prevent the discharge of contaminants (e.g. oil, fuel) to the coastal marine area; and f) Procedures to be undertaken in the event of a discharge/spillage of contaminants (e.g. oil, fuel) to the coastal marine area The works authorised under this consent shall be carried out in accordance with the authorised maintenance methodology. Any amendments to the maintenance methodology shall be to the satisfaction of the Manager, GWRC.
	Ecological Mitigation and Monitoring
106	**Ecological mitigation and monitoring plan** In accordance with condition 18, the Consent Holder shall submit an Ecological Mitigation and Monitoring Plan (EMMP). The purpose of the EMMP shall be to: a) Detail the ecological management programme that will be implemented to appropriately manage impacts on the environment, specifically the coastal marine area and habitats, during and after the construction phase of the Project; b) Document the permanent mitigation measures, including the management and maintenance of ecological mitigation; c) Ensure that mitigation has been successful by establishing post construction

	monitoring and response procedures; and d) The EMMP shall be finalised in consultation with Iwi mana whenua.
107	The objectives of the EMMP shall be to: a) achieve a similar level of habitat and species diversity along the rock dyke post construction of the Project comparative to communities on other reefs in Lyall Bay. b) Improve habitat for penguins, variable oyster catches and reef heron at sites along the Wellington south coast comparative to pre-construction of the project. c) Minimise the risks to wildlife of boat-strike, entanglement and noise from pile-driving. The EMMP shall include, but not be limited to, information required in other conditions of this consent and details of the following: a) The monitoring to be undertaken during construction and post construction as required below; b) A definition of what constitutes a 'minor change' to the EMMP; c) Information on how the following outcomes will be achieved: (i) Habitat creation or enhancement along the rock dyke for selected marine algae and invertebrates, including anemones, chitons, snails, lobsters, adult kina and paua; (ii) A reef-like pathway to encourage recolonisation of the new rock dyke and increased amenity values for fishers and divers by creating artificial reefs in the middle of Moa Point Bay; (iii) Monitoring of cultural health indicators as agreed with Iwi, in order to ensure that any potential adverse effects on cultural values such as mauri, are appropriately measured and managed; (iv) Mitigate the effects of the destruction of rocky reefs and their resident populations within the construction zone, and speed up the repopulation of the rock dyke by: • Field collection of mobile macro-invertebrates from reefs prior to the commencement of construction, and either transferring these species to Hue te Taka Peninsula prior to construction or tagging and transferring to new reef surfaces once construction is completed. Larger macro-invertebrates shall be translocated to Hue te Taka peninsula prior to commencement of construction. • The translocation to the new rock dyke of juvenile paua and kina to provide founder populations to accelerate recolonisation. Details of the source of the transplanted paua and kina and issues of genetic compatibility relating to this are to be provided. • Monitoring of tagged species to determine the effectiveness of field collection and transferring species as described in (iv) above. This monitoring is to be undertaken within three years of the completion of the Construction Phase (in accordance with condition 111). (v) Nesting habitat creation for penguins through a variety of boulder sizes in the rock dyke in order to allow penguins to find caves under rocks and locate ledges with smaller rocks, pebbles and gravel to construct nests; (vi) Methods to determine how shags and other coastal birds will be deterred from roosting on the rock dyke to minimise the need for the consent holder to cull birds; (vii) Methods developed in consultation with Wellington City Council to improve outcomes for penguins, variable oystercatchers and reef herons through: • the provision of nesting boxes at locations near the runway extension; and • undertaking predator control at locations near the runway extension.

	(viii) Methods to determine whether remedial or mitigation measures have been successfully achieved; and (ix) Methods to manage construction activities to minimise the risks to wildlife of boat-strike, entanglement, contaminants and noise from pile-driving, including: • How the release of hydrocarbons into the coastal marine area will be minimised and contingency plans should a spill occur; • How the type and frequency of any marine mammal sighted before, during or after transiting to or from the reclamation site will be recorded; • How the risk of vessel collisions with any marine mammal will be minimised with the aim of zero mortality by: – Adopting best boating guidelines for marine mammals, including speed limits, to further reduce any changes of mortality from vessel strikes – Consider establishing a designated observer on a vessel and maintain a watch for marine mammals during any vessel-based reclamation activities during daylight hours; – Liaison with the Department of Conservation over the project period to help anticipate and mitigate potential seasonal interactions with any whale species sighted. • Minimise the avoidance (attraction) to, or potential for injury of marine mammals from pile-driving activities by: – Adoption of soft-start procedures and consider other noise dampening techniques. – Have trained marine mammal observers on the vessel to maintain a watch prior, during and post any pile driving activities during daylight hours – Consider seasonal restrictions on activities during whale migration periods, when practical and/or between stages of the project • Minimise entanglement and aim for zero mortality by: – Avoid loose rope and/or nets – Minimise potential for loss of rubbish and debris from vessels and activities with proper waste management plans in place – Ensuring the floating silt curtains are correctly installed and regularly maintained so that they are not a hazard to marine mammals
108	The certified EMMP shall be implemented and maintained throughout the Construction Phase of the Project and following construction as necessary, and updated if required.
109	**Design of the rock dyke** The Consent Holder shall ensure that in designing the rock dyke, the following measures are incorporated: a) The addition of roughened/pitted surfaces on 50% of each accropode to increase the range of microhabitats available for colonising marine algae and invertebrates, b) The inclusion of five shallow indented prisms along the arm of each accropode to increase the possibility of at least one forming a rock pool. c) The insertion of one $1m^3$ concrete block, with a truncated conical shaped hole in the top layer of the secondary armour, every 10m around the perimeter of the rock dyke somewhere between mean low spring and mean high spring tide levels.

	d) Accropodes are to incorporate holes of three sizes: small, medium and large. Each 1m^3 of accropode surface shall have a minimum of one hole of each size (i.e. three holes in total).
110	**Pre-construction field collection** Prior to the commencement of construction, the Consent Holder shall undertake field collection and, where practicable, tagging of mobile macro-invertebrates including, but not limited to, paua, kina, large gastropods and starfish from reefs within the coastal marine area within the reclamation area. These macro-invertebrates shall either be translocated to Hue te Taka peninsula or held during the construction period in suitable sea water facilities on land, and transferred back to new reef surfaces once construction is completed. The consent holder shall also remove any rocks from the area that will be disturbed by the proposed works where the unidentified red foliose alga[3] is growing and relocate these to an undisturbed area nearby before works begin.
111	**Reef and benthic environment survey** Within three years following the Construction Phase of the Project, the Consent Holder shall be required to undertake a survey of the reef and benthic environment, including meiofauna, along the rock dyke of the reclamation and other reefs within Lyall Bay. The purpose of this survey shall be to ascertain the level of recolonisation of benthic communities and undertake a comparative analysis of the success, compared to existing reefs in Lyall Bay. The results of this survey shall be submitted to the Manager GWRC within 30 days of the survey being completed.
112	**Biosecurity Management Plan** In accordance with condition 18, the consent holder shall prepare and submit a **Biosecurity Management Plan** (BMP) to prevent the introduction of species that are not native to the Wellington Region. The BMP shall, as a minimum, address the following: a) Compliance of vessels from overseas with the Ministry for Primary Industries' border standards, i.e. the mandatory Import Health Standard for ballast water and the Craft Risk Management Strategy for vessel biofouling; b) A biosecurity risk assessment for all vessels, construction equipment and materials that will come into direct or indirect (e.g. via surface runoff) contact with the marine environment; c) Mitigation measures to address any risks identified.
113	The certified BMP shall be implemented and maintained throughout the Construction Phase of the Project and following construction as necessary, and updated if required.
	Coastal bird flight paths and culling
114	**Coastal Birds Monitoring Plan** In accordance with condition 18, the consent holder shall prepare and submit a **Coastal Birds Monitoring Plan (CBMP).** The objective of the CBMP is to monitor flight paths and the number of coastal birds killed by birdstrike and culled by the consent holder for aircraft safety purposes. The CBMP shall include, but not be limited to: a) Details of pre-construction monitoring, for a period of 1 year, of: • The diversity and abundance of bird species that fly across the runway extension area; and • The number and species type of birds killed through birdstrike. This shall include records of numbers and species kept by pilots and records of numbers and species found dead on the runway; and • The number and species type of birds culled by the consent holder for the

[3] Identified during the baseline survey and reported in Technical Report 18.

	purposes of aircraft safety b) Details of post-construction monitoring, for a minimum period of 3 years, of: • The diversity and abundance of bird species that fly across the runway extension area; and • The number and species type of birds killed through birdstrike. This shall include records of numbers and species kept by pilots and records of numbers and species found dead on the runway; and • The number and species type of birds culled by the consent holder for the purposes of aircraft safety c) Details of what would constitute a significant effect of increased birdstrike and culling on the regional bird population for the species that will be monitored and why. d) Details of annual reporting of a) and b) to Wellington Regional Council.
115	The certified CBMP shall be implemented and maintained during the period specified in the plan and updated if required.
116	**Coastal Birds Monitoring Report** The consent holder shall, following the completion of the monitoring undertaken in accordance with the approved CBMP, engage a suitably qualified and experienced practitioner to prepare a report on the findings of the monitoring. The report shall be submitted to the Manager GWRC for approval within 6 months of completion of the monitoring in accordance with the approved CBMP. The report shall include, but not be limited to: a) An assessment of the diversity and abundance of bird species that fly across the runway extension area pre and post construction; b) An assessment of the number and species of birds killed through bird strike over the monitoring period; c) An assessment of the number and species of birds culled by the consent holder pre and post construction; d) An assessment of the impact of the runway extension of regional bird populations for those species monitored including an assessment of whether any adverse effects are considered to be significant using the criteria set out in the CBMP. e) If the assessment demonstrates that the adverse effects are significant, recommended actions to offset the adverse effects include timeframes for implementation. The applicant shall consider the principles in Schedule G of the Proposed Natural Resources Plan when recommending biodiversity offsets. The consent holder shall implement any offset mitigation in the approved monitoring report by the timeframes set out in the report to the satisfaction of the Manager GWRC.
	Landscape and Urban Design
117	In accordance with condition 18, the Consent Holder shall prepare a Landscape and Urban Design Management Plan (LUDMP).The purpose of the LUDMP is to outline the methods and measures that will be implemented by the Consent Holder to mitigate adverse effects on landscape, visual amenity and natural character that result from the runway extension, at Moa Point Road, Moa Point Beach, Airport Road and Moa Point Road intersection, Lyall Bay promenade and the roadway under the runway extension. The LUDMP shall be prepared by a suitably qualified and experienced urban designer and landscape architect, with input from other experts (e.g. terrestrial/aquatic ecologist) and stakeholders (e.g. the CLG, Wellington City Council, GWRC and Iwi) as appropriate. The LUDMP shall be based on the mitigation principles as outlined in the assessments prepared by Boffa Miskell Ltd and submitted as part of the application, entitled Urban Design, Assessment of Effects on the Environment, dated 11 March 2016, Wellington International Airport Ltd: Airport Runway Extension, Assessment of Landscape and Visual Effects, dated

	22 April 2016, and additional mitigation measures proposed by the applicant in the Moa Point Natural Character Mitigation and Restoration Plan (to be provided at or prior to the hearing). The LUDMP shall include details of design modifications for all new accropodes to be installed as part of this consent to render them more aesthetically fitting so as to create a more natural final landscape. The LUDMP shall include details of the beach re-creation at the junction between the runway extension and Moa Point embayment, measures to avoid, remedy and mitigate adverse effects on the environment when reinstating the beach and undertaking any beach nourishment works, and any ongoing maintenance requirements (e.g. beach nourishment, planting/weeding). The LUDMP shall include the ongoing maintenance requirements associated with the urban design features and how this will be managed in the long term, in agreement with WCC. Works associated with the LUDMP shall be completed by the Consent Holder prior to the completion of Stage K on the construction programme provided in accordance with condition 14. *Advice notes: 1. Any design modification to the accropodes and rock wall need to consider the ecological habitat objectives (refer to conditions 109)* *2. For works occurring on any land not owned by Wellington International Airport Ltd, landowner approval will be required prior to the commencement of Construction. The WCC Parks Sport & Recreation Unit and Transport Asset team should be included as stakeholders to the above condition.*
	Archaeology and Cultural
118	**Archaeological survey** Prior to commencement of Construction, the Consent Holder shall engage a suitably qualified maritime archaeologist to undertake an archaeological survey of the seabed within the reclamation area. The survey shall undertake an investigation, including reference to any relevant maritime documentation or previous seabed investigation works carried out within the area, and undertake additional sea bed investigation as may be necessary. If any archaeology is discovered it is to be appropriately recorded. Prior to undertaking the archaeological seabed survey, the methodology must be provided to and approved by the WCC Compliance Monitoring Officer. *Advice note: Any archaeological process followed will need to abide by any other legal requirements which may also apply, e.g. the Heritage New Zealand Pouhere Taonga Act 2014.*
119	**Accidental discovery protocol** The Consent Holder shall, in consultation with Iwi, and Heritage New Zealand, prepare an Accidental Discovery Protocol to be implemented in the event of accidental discovery of archaeological sites during the construction of the Project. This protocol shall be adhered to at all times during the construction of the Project. The protocol shall include, but not be limited to: a) Training procedures for all contractors regarding the possible presence of cultural or archaeological sites or material, what these sites or material may look like, and the relevant provisions of the Historic Places Act 1993, if any sites or materials are discovered; b) Parties to be notified in the event of an accidental discovery shall include, but need not be limited to Iwi, the Heritage New Zealand, GWRC, WCC, and if koiwi are discovered, the New Zealand Police; c) Procedures to be undertaken in the event of an accidental discovery (these shall include immediate ceasing of all physical work within 50m of the discovery); Procedures to be undertaken before any construction work can recommence within 50m of the discovery. These shall include allowance for appropriate tikanga

	(protocols), recording of sites or materials, recovery of any artefacts, and consulting with Iwi, and the Heritage New Zealand prior to recommencing work.
120	If taonga (Maori artefacts such as carvings, stone adzes, and greenstone objects) are discovered, the procedure set out for the discovery of archaeological sites (above) must be followed, and the following procedure will apply to the taonga themselves: a) The area of the site containing the taonga will be secured in a way that protects the taonga as far as possible from further damage. b) The Consent Holder will then inform Heritage New Zealand and the nominated tangata whenua representative so that the appropriate actions (from cultural and archaeological perspectives) can be determined. c) Work may resume when advised by Heritage New Zealand or the archaeologist. d) The archaeologist will notify the Ministry for Culture and Heritage of the find within 28 days as required under the Protected Objects Act 1975. This can be done through the Auckland War Memorial Museum. e) The Ministry for Culture and Heritage will consult with interested parties to establish claims for ownership. Ownership is ultimately determined by the Māori Land Court. If the taonga requires conservation treatment, the Ministry for Culture and Heritage should be contacted immediately and their staff will make the necessary arrangements.
121	The Consent Holder shall, at least once every three months during the construction of the Project, and annually for a period of five years post construction, offer to meet with Iwi manawhenua and/or its representatives. The purpose of these meetings shall be to keep Iwi up to date on the progress of the Project, identify any issues during construction and to follow up on the results of the ecological mitigation set out in conditions 107 - 110.
	Ongoing maintenance of permanent structures
122	**Maintenance Management Plan** In accordance with condition 18, the Consent Holder shall prepare a Maintenance Management Plan (MMP). The purpose of the MMP shall be to confirm: a) The nature and scope of all inspection and maintenance work for the: • Toe of reclamation; and • The protection structure over the Moa Point Wastewater Treatment Plant Main Outfall Pipeline b) The likely frequency of inspections and maintenance; c) The likely methodologies for inspections and maintenance; d) Measures that will be used to mitigate adverse effects on the environment; and e) Procedures to notify the public, in particular recreational users, of maintenance activities, hazards and exclusion areas. Maintenance activities cannot commence until the Maintenance Management Plan has been certified by the Manager, GWRC. Any changes to the MMP shall be certified by the Manager, GWRC. *Note: Activities not included within the scope of those outlined in the Maintenance Management Plan and not complying with the permitted activity rules of the regional plans will require a separate resource consent.*
123	**Certification of maintenance methodology** The consent holder shall prepare and submit a maintenance methodology to the Manager, Greater Wellington Regional Council at **least 20 working days** prior to any maintenance works commencing, for authorisation that it is in accordance with the Maintenance Management Plan and all conditions of this consent. The works shall not commence until the maintenance methodology has been certified by the Manger, GWRC.

	The maintenance methodology shall include, but not be limited to, the following details: a) Details of the proposed maintenance work including a detailed methodology b) Roles and responsibility of key site personnel b) Identification of experienced person(s) to manage the environmental issues on site c) Details of any public access restrictions, protocols for ensuring the public is aware of any restrictions and what measures will be in place to minimise disruption of public access and use of the coastal marine area d) Proposed hours of maintenance works e) Details of processes/measures to be put in place to prevent the discharge/spillage of contaminants (e.g. oil, hydrocarbons or hydraulic fluid) to the coastal marine area; and f) Procedures to be undertaken in the event of a discharge/spillage of contaminants (e.g. oil, hydrocarbons or hydraulic fluid) to the coastal marine area The works authorised under this consent shall be carried out in accordance with the authorised maintenance methodology. Any amendments to the maintenance methodology shall be to the satisfaction of the Manager, GWRC.
124	**During maintenance work** All works affecting the coastal marine area including tidy up on completion of the works shall be completed to the satisfaction of the Manager, Greater Wellington Regional Council.
125	The consent holder shall take all practicable steps to minimise sediment loading and increased turbidity in the coastal marine area due to the works. These steps shall include, but are not limited to, the following: a) Completing all works in the minimum time practicable b) Ensuring any materials/structures placed in the coastal marine area are clean and free of contaminants prior to placement; and c) Disturbing the minimum area of seabed necessary
126	The consent holder shall take all practicable steps to ensure that no contaminants (including but not limited to oil, petrol, diesel and hydraulic fluid) are be released into water, including: a) No machinery/equipment shall be cleaned, stored or refuelled in the coastal marine area b) Ensuring any materials/structures placed in the coastal marine area are clean and free of contaminants prior to placement; and c) All machinery/equipment shall be well maintained at all times to prevent leakage or spillage of fuels, hydraulic fluids and lubricants into the coastal marine area
127	Upon completion of the works, all materials surplus to the works shall be removed from the coastal marine area and disposed of in an appropriate manner.
	Stormwater Monitoring Plan
128	The consent holder shall engage a suitable qualified and experienced practitioner to prepare a Stormwater Monitoring Plan. The intent of the Stormwater Monitoring Plan is to outline how existing operational stormwater discharges from the Wellington Airport into Lyall Bay will be monitored to inform an assessment of the effects of operational stormwater discharges from the runway extension, the design of stormwater treatment and discharge devices and the development of a stormwater management plan for this area. The Stormwater Monitoring Plan shall be submitted for approval to the Manager, Environmental Regulation, Wellington Regional Council within **1 year of the granted date of this consent**. The Stormwater Monitoring Plan shall include, but not be limited to:

	a) A map showing sampling locations; b) The frequency that monitoring will be undertaken at the sample locations and when samples will be taken; c) Details of the number of samples to be collected to understand the expected concentration range of contaminants in operational stormwater discharges and the potential risks to the receiving environment. Monitoring is to be undertaken for a minimum period of 12 months; d) Who will undertake the sampling and details of best practice monitoring procedures to be employed by the monitoring officer (for example, timing and number of samples, equipment required, sample collection depth, storage of samples prior to analysis) e) Details of where samples will be taken to for analysis and what contaminants the samples will be analysed for; f) A monitoring record template. The approved monitoring plan is to be provided to the monitoring officer who is responsible for undertaking monitoring under this consent.
129	The consent holder shall undertake operational stormwater monitoring in accordance with the monitoring plan approved under condition 128.
130	All sampling techniques employed in respect of the conditions of this consent shall be carried out to the satisfaction of the Manager, Environmental Regulation, Wellington Regional Council and undertaken by suitably trained and experienced persons. All analysis undertaken in connection with this consent shall be performed by an International Accreditation New Zealand (IANZ) registered laboratory or otherwise as specifically approved by the Manager, Environmental Regulation, Wellington Regional Council.
	Stormwater monitoring and design solution report
131	The consent holder shall engage a suitably qualified and experienced practitioner to prepare a report on the likely volumes and contaminants levels in the operational stormwater discharges from the runway extension area, risks to the receiving environment and details of the selected stormwater design and treatment devices. The monitoring report shall be submitted to the Manager, Environmental Regulation, Wellington Regional Council for approval within **6 months** of completing the monitoring required by the Stormwater Monitoring Plan approved under condition 128. The monitoring report shall include, but not be limited to: a) Details of the expected volume of discharge from the runway extension area; b) An assessment of the quality of the discharge from the runway extension based on the monitoring results (including total suspended solids, clarity, volatile organic compounds, semi-volatile organic compounds, total petroleum hydrocarbons and metals); c) A description of the expected concentration range of the contaminants (e.g. as a 95% confidence range and median values); d) The detailed design of stormwater solution chosen by the consent holder (i.e. either a new stormwater outlet, an upgrade to existing stormwater outlet(s) or a soakage pit) e) A timeline for the implementation of the stormwater solution prior to the completion of the Airport Runway extension f) Where a soakage pit is to be used, details of the following is to be provided: • Hydrodynamic flow to the treatment basin – the expected design capacity it will be able to accommodate in a high intensity rainfall event. • What screening treatments (if any) will be used • What the surface area footprint the soakage pit will cover • An assessment of infiltration rates • Specification of filtration media and planting.

	• Long term site maintenance requirements (including any plants, rubbish accumulation, clogging) and performance/review schedule. g) Where the solution selected involves a discharge to the coastal marine area via a coastal outfall(s) the following is to be provided: • a description of the potential risks to the receiving environment and an assessment of whether the contaminant levels are acceptable for the receiving environment is to be provided; • Based on the assessment above, details of treatment requirements prior to discharge that are necessary to ensure contaminant levels are acceptable for the receiving environment and timeframes for the implementation of these; • Proposed contaminant trigger levels for ongoing discharges. h) A proposed reasonable mixing zone including justification for the reasonable mixing zone from the stormwater outlet(s) based on the monitoring information collected. The consent holder shall not install the selected stormwater solution until the stormwater monitoring and design solution report has been approved by the Manager, Environmental Regulation, Wellington Regional Council.
132	The consent holder shall implement any stormwater management and treatment solution approved under condition 131 within the timeframes specified in the approved report and to the satisfaction of the Manager, Environmental Regulation, Wellington Regional Council.
133	**As built certification of soakage pit** If a soakage pit is selected by the consent holder as the stormwater management and treatment solution for the runway extension area, prior to the commissioning of the soakage pit the consent holder shall provide to the Manager, Environmental Regulation, Wellington Regional Council a certificate signed by an appropriately qualified and experienced engineer to certify that the stormwater treatment system has been constructed in accordance with the design submitted and approved by GWRC under condition 131 (the stormwater monitoring and design solution report). Certification shall include, but not be limited to, the following: a) Confirmation of contributing catchments, dimensions and storage volumes the soakage area and associated infrastructure as applicable b) As-built plans of the soakage area c) Details of planting and filtration media c) Any other details that will facilitate assessment of compliance with the authorised design Certification that the appropriate design has been constructed shall be submitted to the Manager, Environmental Regulation, Wellington Regional Council within 5 working days of completing the survey on site.
	Stormwater Management Plan
134	The consent holder shall engage a suitably qualified and experienced practitioner to prepare a Stormwater Management Plan for operational stormwater discharges from the runway extension area. The Stormwater Management Plan shall be submitted to the Manager, Environmental Regulation, Wellington Regional Council for approval within **6 months** of completing the monitoring required by the Stormwater Monitoring and Design Solution report approved under condition 131 The Stormwater Management Plan shall include, but not be limited to: a) The purpose of the plan; b) Review dates for the plan; c) Site management practices that will be undertaken to prevent contaminants entering the network and how frequently they are undertaken; d) Any triggers for additional management outside of the routine site management

	practices (e.g. predicted rainfall) e) How the management practices are undertaken, checked and recorded; f) Example forms or checklists used to record daily activities; g) What training is given to staff to ensure consistency; h) Contingency plan for any spills on site; i) For discharges to the coastal marine area via a coastal outfall only: • A stormwater monitoring programme (), including: • Sampling location and frequency and methods of collection; • What contaminants samples will be analysed for; • Trigger levels for contaminants; • Recoding of monitoring and monitoring results; • Actions required if any monitoring trigger levels are exceeded including reporting exceedances to Wellington Regional Council; • Maintenance requirements for all treatment devices j) The reasonable mixing zone which condition 136 applies including a plan showing the stormwater outlet(s) and extend of the reasonable mixing zone. k) For discharges via a soakage pit only: • Details of the long term maintenance and performance/review schedule for the soakage pit including any plants, rubbish accumulation, and clogging. l) Contact details of the person responsible to implementing and updating the plan. Any updates to the Stormwater Management Plan shall be confirmed in writing by the Manager, Environmental Regulation, Wellington Regional Council prior to the implementation of any amendments proposed.
135	The consent holder shall manage operational stormwater discharges from the runway extension area in accordance with the approved Stormwater Management Plan under condition 134.
136	**Reasonable Mixing Zone** Notwithstanding the requirements of any other conditions of this consent the discharge shall not give rise to any of the following effects in the coastal marine area (CMA) after reasonable mixing zone in the CMA: a) The production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials; or b) Any conspicuous change in the colour or visual clarity; or c) Any emission of objectionable odour; or d) Any significant adverse effects on aquatic life Advice notes 1. The reasonable mixing zone is to be established set out in the Stormwater Management Plan. 2. Where the above effects are experienced beyond the reasonable mixing zone then enforcement action may be taken.