Hokonui Windfarm
Bat Survey
Report for Hokonui Energy Ltd
5 March 2026

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1 Introduction

1.1.1 This report presents the findings of a bat survey of the area around the proposed Hokonui Wind Farm (the 'Site'). The Site is centred on WGS -45.998855, 168.610065, situated primarily on the northern aspects of the Hokonui Hills/syncline. The study and survey were carried out by Davidson-Watts Ecology (Pacific) Ltd on behalf of Hokonui Energy Ltd, and this baseline survey report is intended to inform an assessment of environmental effects of the proposed wind farm on native bat species (pekapeka).

1.1.2 The proposed wind farm consists of up to 83 wind turbines, covering an area of approximately 12000ha of extensively modified habitats dominated by sheep farming. The Site has an elevation range of approximately 250m to 650m above sea level (taken from Google Earth Pro). Habitats on site consist of a range of habitats primarily dominated by modified grassland, grazed by sheep and cattle. Patches of manuka scrub and native bush occur frequently in gullies, and there is mature exotic tree lined shelter belts present and mature forestry plantation. Extensive areas of native podocarp forest occur to the south and west.

1.1.3 The New Zealand long-tailed bat *Chalinolobus turbuculatus* and lesser short-tailed bat *Mystacina turburculata* pekapeka, are New Zealand's only native terrestrial mammals, and on South Island these species are classified as Threatened Nationally Critical and At Risk Recovering respectively (O'Donnell *et al*. 2023). Both species are primarily insectivores, with long-tailed bats predominantly foraging 'on the wing' taking invertebrates in flight. Both species are known to roost in trees, with beech trees being the most favoured roost type on South Island (Sedgeley and O'Donnell, 1999), although long-tailed bat is recorded to roost in other native and exotic trees (e.g. willow) where suitable roost cavities occur (Sedgeley and O'Donnell, 2004).

1.1.4 Little is known about the effect of wind farms on New Zealand bat species (DOC, 2023), as no species-specific studies have been undertaken, and only one wind farm with known presence of long-tailed bats has been monitored, and these results remains inconclusive (Boffa Miskell, 2014).

1.1.5 Based on overseas literature wind farms can pose a material risk to bat species from collisions with rotors (e.g. Cryan & Barclay 2009). Furthermore, bats may be specifically vulnerable to a phenomenon known as barotrauma where bat lungs can be damaged from changes in air pressure when flying close to the rotors (Baerwald et al. 2008). Long-tailed bat foraging and flight behaviour does suggest that this species could be at risk from collisions given that it is more adapted to open space flying and is an aerial insectivore (DOC, 2023).

1.2 OBJECTIVES

1.2.1 The aim of the bat survey and report was to:

- Determine the presence of New Zealand bat species/pekapeka in the area of the proposed wind farm, incorporating a range of representative habitats and elevations of the area.
- Where relevant describe the behaviour of any bats detected/confirmed using the Site.
- Where appropriate consider the risk to bats from the proposed wind farm and outline potential mitigation options for addressing any risks to bats.

2 Methodology

2.1 DESK STUDY

2.1.1 A data search of the Department of Conservation's bat databases, and of local project surveys was undertaken and considered. Any recent records of bats (last 20 years) within the maximum flying range (up to 25km) of this species have been reviewed as per best practice (DOC, 2024b). Long-tailed bats have recently been recorded flying over 22km in a single night in Otago (author's unpublished raw data).

2.1.2 In addition, records of bats further way have been considered to inform context of the Site and the likelihood of bats being present on the Site.

2.2 STATIC LOGGER SURVEY/ACOUSTIC BAT MONITORING (ABM)

2.2.1 The use of static bat detector loggers or automated bat monitoring units (ABMs) was the method of determining the presence of bats at the locations in which they were deployed within the study area. This included the proposed wind farm area and additional surrounding areas where bats could be present (see Figure 1).

2.2.2 The ABMs record ultrasonic echolocation signal emissions (hereinafter referred to as calls) made by the bats as they fly within range of the microphone of these devices. Many bat species navigate and find insect prey using echolocation. They produce sound waves at frequencies above human hearing, called ultrasound. The sound waves emitted by bats bounce off objects in their environment. Then, the sounds return to the bats' ears, which are finely tuned to recognize their own unique calls to form a sonic picture of their surroundings.

2.2.3 The ABMs automatically detect bat ultrasound and record the bat calls/bat passes when in listening mode. ABMs were programmed to switch on at 30 minutes before sunset and to stop 'listening' for bats 30 minutes after sunrise. Recordings were saved by the ABM as raw sound (.wav) files, retaining all the original sound frequencies and amplitude for playback and analysis of appropriate software, in this case BatExplorer Pro sound analysis V2 (Elekon AG, Luzern, Switzerland) and BatSound 4.4 (Pettersson AB, Sweden).

2.2.4 Static loggers/ABMs were deployed during three broad survey sessions of approximately four weeks each deployment, from November 2024 until May 2025. The locations of the ABMs are shown in Figures 1 and 2.

2.2.5 To provide as comprehensive data set as possible, various subsets of ABMs were deployed in approximately four weekly sessions to provide maximum area coverage. This included both the proposed footprint of the wind farm (eastern part of the study area) and potentially suitable bat habitat further towards the western parts of the Hokonui Hills, and areas of higher elevation in between.

2.2.6 Habitats most likely used by bats and examples of possible wind turbine locations were targeted for deployment ABMs. However, the locations and replicates of the ABMs locations changed through the overall survey period as different land parcels were either descoped or were added to the scope of the project.

2.2.7 All ABMs were Wildlife Acoustic Songmeter Minibat, full spectrum bat detector/logger systems. The frequency detection range was set from 25KHz to 120KHz, sampling frequency was set to 256KHz and length of recording was set to a maximum of 5 seconds. Gain was set for all ABMs at 6db (which is an increase of microphone gain over zero gain values). All ABMs microphones were tested for sensitivity using the Wildlife Acoustic Ultrasonic Calibrator device (which emits an ultrasonic signals and defined frequencies) and the ABM's firmware mic testing utility function. Where mic test resulted in a favourable response the (> -32dB), the ABM was passed for deployment.

2.2.8 All ABMs were full spectrum devices with the ability to record all parameters of the calls made by the bats without the need for conversion from ultrasound. This enabled both visual/algorithm inspection of the call parameters using a spectrogram, as well as being able to replay recordings acoustically to confirm the distinctive sounds made by bats over other high frequencies with similar properties that were not bats such as insects.

2.2.9 ABMs were deployed and rotated between locations within three survey sessions. A full breakdown of when each ABM location was surveyed and for how long is provided in Appendix A.

2.2.10 Survey sessions within which ABMs were deployed were as follows:

Survey session 1 was from 14 November 2024 – 6 January 2025

Survey session 2 was from 6 January 2025 – 22 February 2025; and

Survey session 3 was from 26 February 2025 – 22 April 2025.

2.2.11 The three survey sessions were designed to monitor the main part of the bat breeding season and mating season Nov/Dec- Jan/Feb and March/April/May (Sedgeley *et al* 2012).

2.3 ANALYSIS

2.3.1 ABM recordings were digitally recorded which provided the sound recording, date, time and ABM reference the metadata. ABM models were equipped with GPS/location connection with a smart phone app, which provided a GPS location of each recording.

2.3.2 The resulting dataset for ABMs provided the total number of bat passes, if any, recorded at each ABM for each survey session. Occasional equipment failure or bad weather such as rain could result in 1000s of false triggers filling SD cards and draining batteries.

2.3.3 To account for variation in recording time among ABMs and differences between daylight lengths through the season, if bat calls were detected, the number of bat calls per night were calculated to be the metric to measure bat activity at each ABM location in analyses.

2.4 LIMITATIONS

2.4.1 Weather conditions such as strong winds, heavy rain and temperature are known to reduce activity of temperate bat species that rely on invertebrate prey. Several nights within the survey sessions were subject to poor weather conditions that would likely limit bat activity due to the adverse impact on flying invertebrates during these conditions. However, all recording nights have been used in the analysis to provide a representative dataset of conditions associated with backcountry areas within Southland, which can include nights of inclement weather.

2.4.2 Detection range of the ABM depends on a range of factors including the make and model of the microphone, direction of the calling bats in relation to the microphone, amplitude of the calls made by bats and the attenuation of sound will also vary due to environmental conditions (the habitat, wind, temperature humidity etc). Based on observations of flying long-tailed bats using similar, but handheld bat detector systems, bat calls are unlikely to be detected at ranges greater than 50m in ideal conditions. For short-tailed bats who have quiet echolocation calls, this distance is likely to be less than 20m.

2.4.3 Landowner access on parts of the proposed wind farm varied due to changes in their involvement with the project. Therefore, ABMs were moved on occasion to reflect this and there was not a consistent replication of all ABM locations through the season. This limitation was not considered to have affected the validity of the overall survey results, as the main objective was to determine the presence/absence of bats, and given the high number of ABMs deployed over the large area during the bat active period, any significant bat presence would likely have been detected. In addition, a sample of a wide variety of the representative habitats and areas was obtained.

3 Results

3.1 DATA SEARCH

3.1.1 The nearest known long-tailed bat populations are reported approximately 35km to the northeast of the Site in Leithen Bush (author's unpublished raw data), and Waikaia Bush 45km to the north (DOC database). Other long-tailed bat populations occur approximately 40km to the southeast of the Site at Slopedown/Mimihau (Contact Energy Southland Windfarm Bat report, 2024- see https://www.epa.govt.nz/assets/Uploads/Documents/Fast-track-consenting/Southland-Wind-Farm/Application-documents-/Amended-Docs-27Jun2024/Southland-Wind-Farm-Bat-Report-Addendum.pdf).

3.1.2 No large-scale bat surveys of the Hokonui Hills have been previously undertaken, however two small targeted ABM surveys were recently conducted. In December 2021 a four-week ABM survey at Dunsdale Recreation Reserve and the Dunsdale Stream using 12 full spectrum ABMs did not record bats (author's unpublished raw data). Further acoustic surveys (DOC AR4 ABMs) in the western parts of the Hokonui Hills near Dipton were undertaken in summer 2022/23 and no bats were recorded during these surveys (Catriona Gower, pers comm).

3.2 STATIC LOGGER/ABM RESULTS

3.2.1 Locations of ABMs are provided in Figures 1 and 2, with Figure 1 showing the full study area investigated, and Figure 2 showing the area of Phase 1 of the wind farm. The colour and shape of ABM symbols denote the number of sessions and which sessions they were deployed, i.e. either session 1, 2 or 3, or combinations thereof.

3.2.2 Appendix A provides the full details of the loggers, HLXX being the refence number for each ABM- (Hokonui Logger), their location, the survey sessions for which they were deployed and the number of nights they were deployed.

3.2.3 Overall, 98 ABMs were deployed between dusk and dawn for a total of 5847 monitoring nights between 14 November 2024 and 9 May 2025. Each ABM was deployed for a mean of circa 69 nights, although deployment nights ranged between 31 and 83 nights throughout this period and this variation was mainly because of land parcels changing. Of the 98 ABMs locations 88 ABMs were deployed in Session 1, 45 in Session 2 and 68 in Session 3.

3.2.4 Despite this considerable survey effort. No bats were detected on any of the ABMs.

4 Discussion

4.1 INTERPRETATION OF THE RESULTS

4.1.1 The ABM survey results suggest that long-tailed and short-tailed bats are not present within the study area. Based on these extensive surveys, it is likely these species are absent from the Hokonui Hills generally. This is supported by the small but recent surveys in Dunsdale and Dipton which also found not bats during those surveys.

4.1.2 Although the surveys were focussed on parts of the Hokonui Hills that may be subject to a wind farm development and mainly included higher elevations, a range of habitats and elevations were sampled, providing a range of conditions and locations representative of the area. Other studies in similar sites (i.e. Southland Wind Farm), did confirm the presence of long-tailed bats on a regular basis using the same approach and equipment. Indeed, the SWF project used just 20 ABMs initially to confirm the presence of long-tailed bats at elevations of over 500m.

4.1.3 The main difference between this project area and sites such as the SWF however, is that the SWF project borders the Catlins Forest Park, which includes significant beech forest area, which are known to support populations of roosting long-tailed bats. Although an unanswered question at this stage, the untested data available related to bat roost locations in the Murihiku area (author's unpublished raw data) shows that long-tailed bats appear to roost more frequently in beech forest and not podocarp forest areas.

4.1.4 It is understood that beech forests generally have lower potential food sources for pests and predators such as rats, except during mast event years. Currently the Department of Conservation target pest control programmes in beech forest to anticipate mast events (DOC, 2024a), and this is likely to support the ability of long-tailed bats to persist in beech forests subject to such management.

4.1.5 However uncontrolled podocarp forests are likely to support substantial populations of pests and predators consistently, which is likely to be incompatible with the presence of species such as long-tailed bat. This could explain the absence of this species from the Hokonui Hills in general.

4.2 CONCLUSIONS

4.2.1 The surveys detected no bats within or adjacent to the proposed wind farm. Therefore, no special mitigation measures are required, as there are no anticipated impacts on bats resulting from the proposed wind farm.

4.2.2 Long-tailed bats are known to roost in podocarp forest elsewhere in New Zealand, especially in North Island. It is possible that the absence of bats in the Hokonui Hills is due to high and persistent presence of pest and predators, which combined with a cooler climate associated with South Island that requires bats to remain in torpor (a state of reduced energy expenditure) for longer periods, may result in bats in Southland being more vulnerable to predation events.

4.2.3 Therefore, although not necessary to address impacts on long-tailed bats, any proposed pest control programme developed as part of the wind farm scheme for other species or for biodiversity improvement generally, would likely be of benefit to bats, by potentially creating the appropriate conditions for long-tailed bats to reestablish in the native forests of the Hokonui Hills area.

5 References

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Figure 1 Overview of ABM surveys 2024-2025

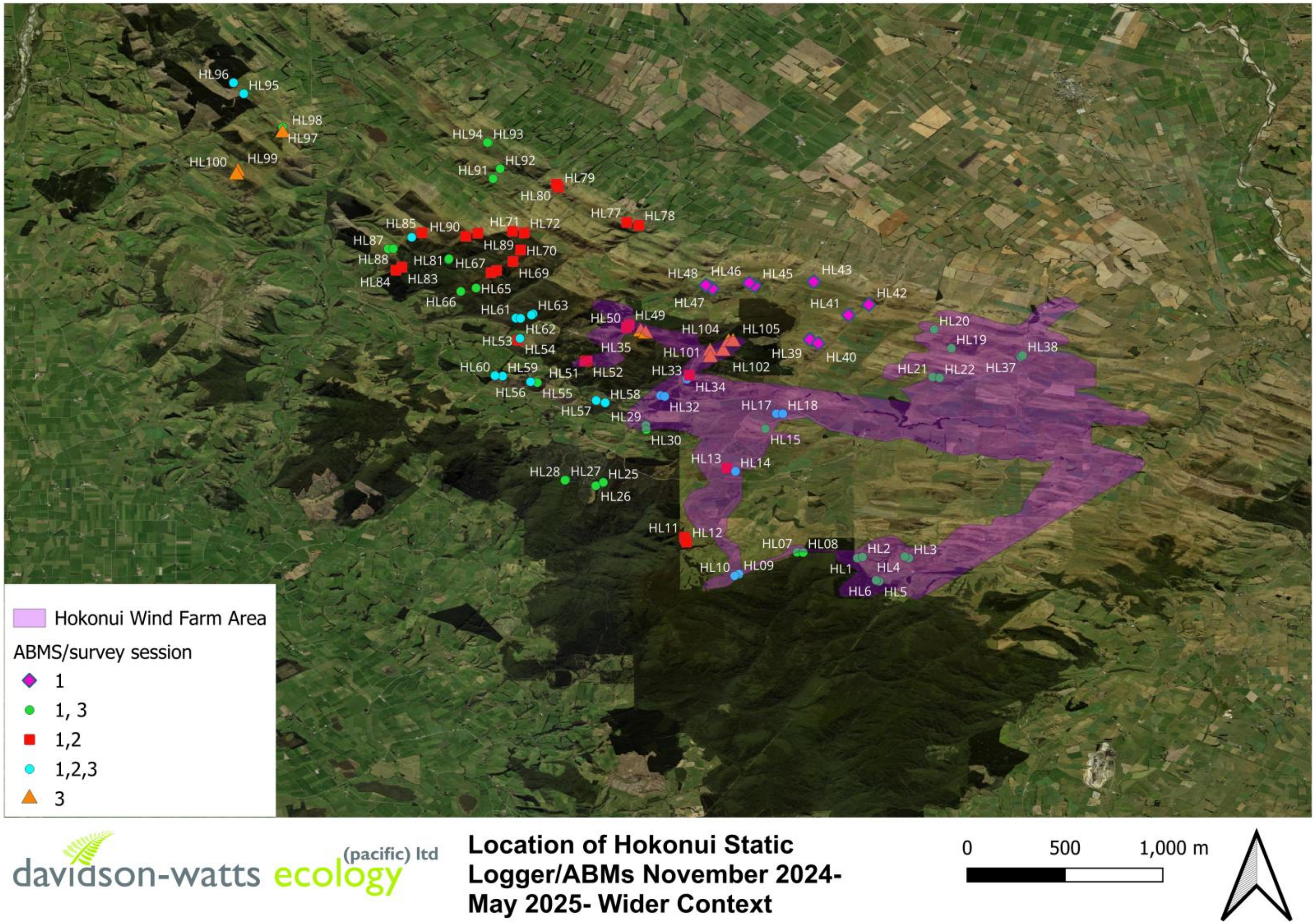

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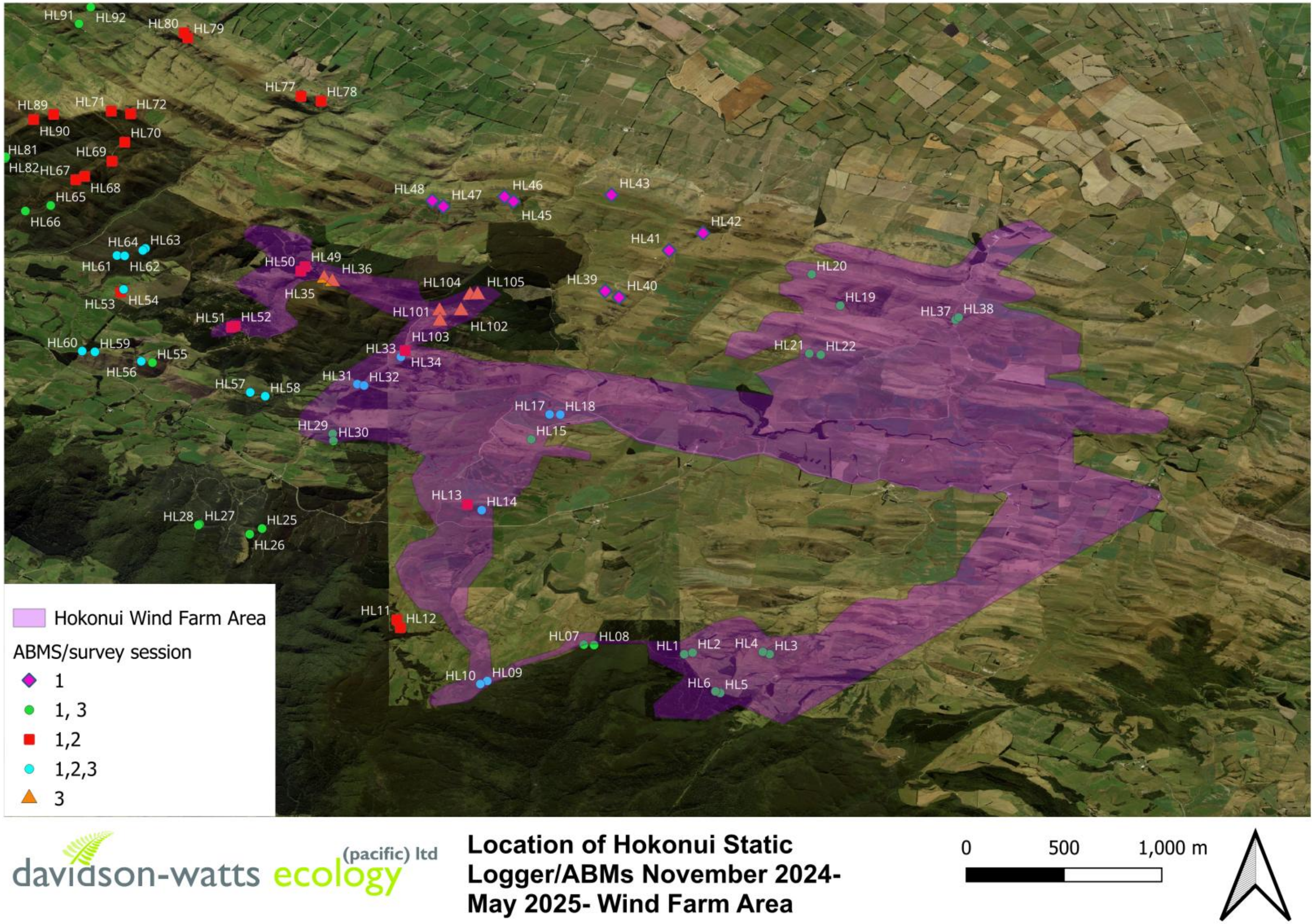
Figure 2 ABM surveys 2024-2025



Appendix A ABM deployment

			Session 1		Session 2		Session 3						
ABM	Lat	Long	Session Start	Session End	Session start	Session end	Session start	Session end	Sessions	Nights deployed session 1	Nights deployed session 2	Nights deployed session 3	Total nights deployed
HL1	-46.070916	168.6642	5/12/2024	6/01/2025			3/03/2025	26/03/2025	1, 3	32	0	23	55
HL2	-46.070567	168.666	5/12/2024	6/01/2025			3/03/2025	26/03/2025	1, 3	32	0	23	55
HL3	-46.070908	168.6828	5/12/2024	6/01/2025			3/03/2025	26/03/2025	1, 3	32	0	23	55
HL4	-46.070391	168.6813	5/12/2024	6/01/2025			3/03/2025	26/03/2025	1, 3	32	0	23	55
HL5	-46.079343	168.672	5/12/2024	6/01/2025			3/03/2025	26/03/2025	1, 3	32	0	23	55
HL6	-46.079001	168.671	5/12/2024	6/01/2025			3/03/2025	26/03/2025	1, 3	32	0	23	55
HL07	-46.06881	168.6423	5/12/2024	15/01/2025			3/03/2025	26/03/2025	1, 3	41	0	23	64
HL08	-46.068899	168.6445	5/12/2024	15/01/2025			3/03/2025	26/03/2025	1, 3	41	0	23	64
HL09	-46.076742	168.6212	14/11/2024	6/12/2024	15/01/2025	22/02/2025	3/03/2025	26/03/2025	1,2,3	22	38	23	83
HL10	-46.077407	168.6197	14/11/2024	6/12/2024	15/01/2025	22/02/2025	26/02/2025	29/03/2025	1,2,3	22	38	31	91
HL14	-46.039473	168.62	14/11/2024	6/12/2024	6/01/2025	16/02/2025	2/04/2025	22/04/2025	1.2.3	22	41	20	83
HL15	-46.02402	168.6308	5/12/2024	6/01/2025			2/04/2025	22/04/2025	1, 3	32	0	20	52
HL17	-46.018566	168.6348	14/11/2024	6/12/2024	6/01/2025	16/02/2025	2/04/2025	22/04/2025	1.2.3	22	41	20	83
HL18	-46.018609	168.6371	14/11/2024	6/12/2024	6/01/2025	16/02/2025	2/04/2025	22/04/2025	1.2.3	22	41	20	83
HL19	-45.994842	168.6982	14/11/2024	6/01/2025			3/03/2025	26/03/2025	1, 3	53	0	23	76
HL20	-45.987989	168.692	5/12/2024	6/01/2025			3/03/2025	26/03/2025	1, 3	32	0	23	55
HL21	-46.005271	168.6915	5/12/2024	6/01/2025			3/03/2025	26/03/2025	1, 3	32	0	23	55
HL22	-46.005552	168.694	5/12/2024	6/01/2025			3/03/2025	26/03/2025	1, 3	32	0	23	55
HL25	-46.04348	168.572	5/12/2024	6/01/2025			3/03/2025	26/03/2025	1, 3	32	0	23	55
HL26	-46.044721	168.5693	5/12/2024	6/01/2025			3/03/2025	26/03/2025	1, 3	32	0	23	55
HL27	-46.042557	168.5584	5/12/2024	6/01/2025			3/03/2025	26/03/2025	1, 3	32	0	23	55
HL28	-46.042704	168.5581	5/12/2024	6/01/2025			3/03/2025	26/03/2025	1, 3	32	0	23	55

HL29	-46.022802	168.5874	5/12/2024	6/01/2025			3/03/2025	26/03/2025	1, 3	32	0	23	55
HL30	-46.024354	168.5876	5/12/2024	6/01/2025			3/03/2025	26/03/2025	1, 3	32	0	23	55
HL31	-46.011967	168.5928	14/11/2024	6/12/2024	6/01/2025	16/02/2025	2/04/2025	22/04/2025	1.2.3	22	41	20	83
HL32	-46.012268	168.5943	14/11/2024	6/12/2024	6/01/2025	16/02/2025	2/04/2025	22/04/2025	1.2.3	22	41	20	83
HL33	-46.006021	168.6023	14/11/2024	6/12/2024	6/01/2025	16/02/2025	2/04/2025	22/04/2025	1.2.3	22	41	20	83
HL35	-45.9889	168.5856					26/02/2025	29/03/2025	3	0	0	31	31
HL36	-45.989637	168.5874					26/02/2025	29/03/2025	3	0	0	31	31
HL37	-45.997922	168.7234	5/12/2024	6/01/2025			26/02/2025	29/03/2025	1, 3	32	0	31	63
HL38	-45.997395	168.7241	5/12/2024	6/01/2025			26/02/2025	29/03/2025	1, 3	32	0	31	63
HL54	-45.99128	168.5418	14/11/2024	6/12/2024	6/01/2025	16/02/2025	2/04/2025	22/04/2025	1.2.3	22	41	20	83
HL55	-46.007265	168.5481	14/11/2024	6/12/2024			2/04/2025	22/04/2025	1, 3	22	0	20	42
HL56	-46.006968	168.5457	14/11/2024	6/12/2024	6/01/2025	16/02/2025	2/04/2025	22/04/2025	1.2.3	22	41	20	83
HL57	-46.013763	168.5694	14/11/2024	6/12/2024	6/01/2025	16/02/2025	2/04/2025	22/04/2025	1.2.3	22	41	20	83
HL58	-46.014589	168.5727	14/11/2024	6/12/2024	6/01/2025	16/02/2025	2/04/2025	22/04/2025	1.2.3	22	41	20	83
HL59	-46.004928	168.5355	14/11/2024	6/12/2024	6/01/2025	16/02/2025	2/04/2025	22/04/2025	1.2.3	22	41	20	83
HL60	-46.004756	168.5328	14/11/2024	6/12/2024	6/01/2025	16/02/2025	2/04/2025	22/04/2025	1.2.3	22	41	20	83
HL61	-45.983889	168.5404	14/11/2024	6/12/2024	6/01/2025	16/02/2025	2/04/2025	22/04/2025	1.2.3	22	41	20	83
HL62	-45.983967	168.542	14/11/2024	6/12/2024	6/01/2025	16/02/2025	2/04/2025	22/04/2025	1.2.3	22	41	20	83
HL63	-45.982355	168.5466	14/11/2024	6/12/2024	6/01/2025	16/02/2025	2/04/2025	22/04/2025	1.2.3	22	41	20	83
HL64	-45.982767	168.546	14/11/2024	6/12/2024	6/01/2025	16/02/2025	2/04/2025	22/04/2025	1.2.3	22	41	20	83
HL65	-45.97298	168.5259	6/12/2024	31/12/2024			26/02/2025	29/03/2025	1, 3	25	0	31	56
HL66	-45.97419	168.5204	6/12/2024	15/01/2025			26/02/2025	29/03/2025	1, 3	40	0	31	71
HL81	-45.962702	168.516	6/12/2024	15/01/2025			26/02/2025	29/03/2025	1, 3	40	0	31	71
HL82	-45.96237	168.5161	6/12/2024	15/01/2025			26/02/2025	29/03/2025	1, 3	40	0	31	71
HL86	-45.954587	168.5026	14/11/2024	6/12/2024	15/01/2025	22/02/2025	26/02/2025	29/03/2025	1.2.3	22	38	31	91
HL87	-45.95875	168.494	6/12/2024	15/01/2025			26/02/2025	29/03/2025	1, 3	40	0	31	71
HL88	-45.95869	168.4959	6/12/2024	24/12/2024			26/02/2025	29/03/2025	1, 3	18	0	31	49
HL91	-45.933303	168.5321	6/12/2024	14/01/2025			26/02/2025	29/03/2025	1, 3	39	0	31	70
HL92	-45.929697	168.5346	6/12/2024	14/01/2025			26/02/2025	29/03/2025	1, 3	39	0	31	70
HL93	-45.920231	168.5304	6/12/2024	14/01/2025			26/02/2025	29/03/2025	1, 3	39	0	31	70

HL94	-45.92018	168.53	6/12/2024	14/01/2025			26/02/2025	29/03/2025	1, 3	39	0	31	70
HL95	-45.902471	168.4417	14/11/2024	6/12/2024	6/01/2025	16/02/2025	2/04/2025	22/04/2025	1.2.3	22	41	20	83
HL96	-45.898469	168.438	14/11/2024	6/12/2024	6/01/2025	16/02/2025	2/04/2025	22/04/2025	1.2.3	22	41	20	83
HL97	-45.914655	168.4558	14/11/2024	6/12/2024			2/04/2025	22/04/2025	1, 3	22	0	20	42
HL98	-45.916749	168.4558					6/01/2025	16/02/2025	3	0	0	41	41
HL99	-45.930722	168.4395					26/02/2025	29/03/2025	3	0	0	31	31
HL100	-45.932	168.439					26/02/2025	29/03/2025	3	0	0	31	31
HL101	-45.996027	168.6108					26/02/2025	29/03/2025	3	0	0	31	31
HL102	-45.995992	168.6155					26/02/2025	29/03/2025	3	0	0	31	31
HL103	-45.99826	168.6108					26/02/2025	29/03/2025	3	0	0	31	31
HL104	-45.992589	168.6174					26/02/2025	29/03/2025	3	0	0	31	31
HL105	-45.99249	168.6191					26/02/2025	29/03/2025	3	0	0	31	31