

Before the Independent Hearing Commissioners at Porirua

under: the Resource Management Act 1991

in the matter of: submissions and further submissions in relation to
Variation 1 to the proposed Porirua District Plan

and: **Radio New Zealand Limited**
Submitter 73

Statement of Evidence of Steve White for Radio New Zealand
Limited

Dated: 24 February 2023

Reference: Ben Williams (ben.williams@chapmantripp.com)
Hadleigh Pedler (hadleigh.pedler@chapmantripp.com)

chapmantripp.com
T +64 3 353 4130
F +64 3 365 4587

PO Box 2510
Christchurch 8140
New Zealand

Auckland
Wellington
Christchurch



STATEMENT OF EVIDENCE OF STEVE WHITE FOR RADIO NEW ZEALAND LIMITED

INTRODUCTION

- 1 My full name is Stephen Charles White. I am a Transmission Engineer Specialist employed by Radio New Zealand Limited (*RNZ*).
- 2 I am a qualified Radio Technician, and Electrical Services Technician. I hold a current Radio Technician's Certificate and Supplementary RTC (Digital & Analog Electronics & Advanced Transmission Techniques). I have over 32 years experience all aspects of radio and television transmission engineering and maintenance in Australia, New Zealand and the Pacific. This has included:
 - 2.1 31 years extensive experience in the design, construction and commissioning of medium frequency antenna systems and coupling units throughout New Zealand, Australia and the Pacific.
 - 2.2 Extensive experience in the planning, and measurement of medium frequency and high frequency coverage.
 - 2.3 Extensive experience in the prediction, and measurement of medium frequency electromagnetic radiation (*EMR*).
- 3 I have worked for *RNZ* for 15 years, and have primary responsibility for the safe operation and maintenance of *RNZ's* AM transmission network.
- 4 I was involved in the preparation of *RNZ's* submission and further submission on Variation 1 to the proposed Porirua District Plan (*Variation 1*). I am familiar with these documents and adopt these as part of my evidence to the extent relevant. I am authorised to give evidence on *RNZ's* behalf.

SCOPE OF EVIDENCE

- 5 My evidence will deal with the following:
 - 5.1 Background and overview of *RNZ* and its facilities at Porirua;
 - 5.2 Health and safety risks associated with electromagnetic radiation;
 - 5.3 The process for *RNZ* to conduct a site-specific assessment and examples of suitable mitigation measures; and
 - 5.4 *RNZ's* requested relief.

INTRODUCTION

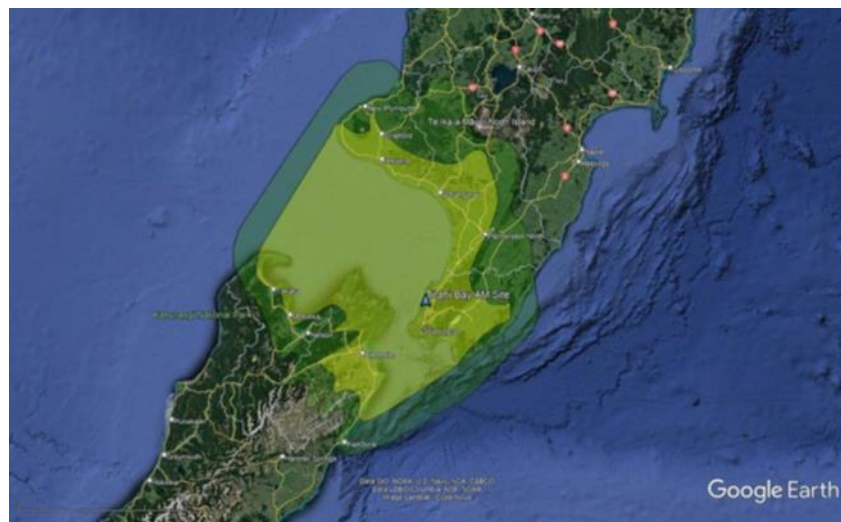
- 6 RNZ is primarily concerned that its facilities at Porirua are recognised as a “qualifying matter” in the Variation to ensure there is adequate recognition of, and provision for, the safety risks associated with elevated structures near RNZ’s radiocommunication transmitters.
- 7 The Section 42A Officer has recommended a new qualifying matter for “*Radio Transmission Height Control*”. RNZ supports the recommendation appreciates the steps taken by Council’s planning team to fully understand RNZ’s concerns and the reasons for its submission on the Variation. However, RNZ respectfully considers the specific rules proposed in the section 42A report do not adequately give effect to the qualifying matter, and will not adequately address the safety risks.
- 8 RNZ has provided Council with the following technical documents, which are **attached** to my evidence for the Panel’s reference:
- 8.1 **Appendix 1:** The technical document attached to RNZ’s submission explaining constraints and considerations for the development of land around the Porirua Site.

BACKGROUND

- 9 RNZ is a Crown entity established under the Radio New Zealand Act 1995. RNZ owns and operates radio transmission facilities at Whitireia Park, Porirua (*RNZ’s Facilities / the Porirua Site*). This consists of:
- 9.1 a main concrete block building containing four AM radio transmitters, an emergency generator and ancillary equipment;
- 9.2 a network of underground wires and cables;
- 9.3 a free standing fuel tank; and
- 9.4 a 137 metre guyed aerial mast, at the base of which there is a reinforced concrete building containing aerial coupling unit components.
- 10 Radiocommunication activities at the Porirua Site are carried out by RNZ and other broadcasters using equipment that is owned, maintained and operated by each broadcaster. RNZ maintains the infrastructure surrounding the equipment.
- 11 RNZ’s Facilities broadcast multiple radio programmes (and carry out civil defence functions) to the lower third of the North Island and

upper South Island, and surrounding areas. Existing AM transmission sites, such as at Porirua, around New Zealand were selected when it was possible to obtain the optimum locations from a coverage point of view.

- 12 **Figure 1** shows the range of RNZ's National AM coverage from the Porirua Site. The green area is the rural grade coverage areas and the yellow area is suburban grade coverage. The effect of the sea water path from the Porirua Site is demonstrated by the coverage up the west coast of the North Island and down the east coast of the South Island to Kaikoura.



- 13 It is important that the continued operation, maintenance and improvement of RNZ's national transmission network can occur unimpeded. RNZ's Facilities are an integral and important part of RNZ's national communication network, and it is appropriate that the Variation 1 recognises this and provides for RNZ's activities.
- 14 RNZ's Facilities perform an important role in, among other things, providing news and information to the public and performing a civil defence role (radio is a key communication tool in the event of natural disasters and RNZ is designated as a lifeline utility under the Civil Defence Emergency Management Act 2002).
- 15 As a lifeline utility, it is critically important that RNZ is not unduly restricted from carrying out activities that are fundamental to the ongoing operation of its transmission activities.
- 16 The Porirua RNZ Site is designated (K0201) for Radio Communication Facilities in the operative (and proposed) Porirua District Plan which allows effective operation and maintenance of the infrastructure. RNZ's submission on the Variation is primarily concerned with health and safety effects that can arise with tall

structures located nearby, but outside the area of RNZ's immediate control.

Health and safety concerns: electromagnetic radiation

- 17 The presence of high power AM transmission site presents some risks for the design, construction and occupancy of buildings and structures near RNZ's Facilities. There are several key characteristics that need to be considered for nearby development; relevant to Variation 1 is electromagnetic radiation (*EMR*).
- 18 As discussed in RNZ's submission, the effects of EMR from transmitter masts are not well understood across New Zealand. Radiation from the masts can induce dangerous EMR levels into nearby tall metallic objects through EMR coupling.
- 19 There are two types of physical effects which can arise from EMR exposure. When assessing the RF fields and determining the General Public Exclusion Zone, RNZ consider both of these effects:
- 19.1 Thermal effects are tissue heating and heat stress.
- 19.2 Athermal effects are electro-stimulation of the nervous system, acoustical sensations, and electrical shocks and burns associated with touching passively energised metallic objects in the RF field.
- 20 Outside the General Public Exclusion Zone (which RNZ technical staff determine on a site-specific basis), the primary concern for RNZ is parasitic re-radiation. This occurs when a tall structure absorbs and re-radiates energy from a mast, and is a common issue with cranes and 'Elevated Work Platforms' near AM transmitter sites. In some cases, people can receive contact burns from metallic objects, or work at heights that expose them to EMR levels above general public limits. Controls are therefore required around the crane or Elevated Work Platform to achieve compliance with safe standards.
- 21 RNZ manage the very high EMR levels close to the mast in line with current and international radiation standards. Closer to the mast is an area where no buildings (of any height) should be constructed. RNZ's ownership of the nearby land, and designation K0201, mean that RNZ has effective control of risky activities in this area. However, structures outside RNZ's immediate control, but nevertheless in close proximity to the masts, also need to be carefully managed.
- 22 There is a risk that developers of adjacent properties unknowingly design and build structures which do not meet NZ EMR regulations which is dangerous to both construction staff and occupants of those structures.

- 23 Unfortunately, these health and safety issues are not commonly realised or understood. The primary danger is lack of awareness, and RNZ are generally only alerted to health effects when people nearby working with elevated structures start receiving burns.
- 24 For example, the construction of the Lincoln Road overpass bridge over the North Western Motorway in Auckland was in close proximity to our Henderson site. Problems were encountered with staff receiving contact burns when working with cranes and also with crane control systems. Once contacted, RNZ was able to work with the contractor to establish safe working procedures to allow the work to be carried out safely. This included training staff as RF workers and the use of manual control cranes.
- 25 In the medium frequency band, radio waves propagate in the surface of the earth. Propagation is affected by ground conductivity more so than topography, so changes in ground height do not determine EMR risk.
- 26 A site by site assessment is carried out for EMR management as there are so many variables involved. The shape and height of the structure, the distance from the transmitter mast to the structure, where people are to be located on the structure, size of cranes and EWP's to be used around a structure, crane lifting plans etc. all come into play in assessing the EMR levels likely to be encountered.

Site-specific analysis and mitigation

- 27 RNZ frequently works with other infrastructure providers and construction companies to maintain the safety of workers. EMR management is a process of analysing proposed work or structures and developing controls to ensure compliance with relevant standards.
- 28 RNZ conducts site-specific EMR assessments for nearby tall structures on a case-by-case basis as there are a number of variables involved. However these assessments are a relatively straightforward exercise for RNZ technical staff and further information can be provided on these assessments if required.
- 29 The EMR management process includes working with those infrastructure providers / construction companies to implement mitigation measures.
- 30 The primary controls used to eliminate the risk to people are down-powering the radio transmitters or turning them off for the duration of the work. This can result in work having to be carried out overnight when the transmitters can be turned off, to minimise the impact on radio listening audiences.

RNZ's relief

- 31 The risk of EMR coupling between RNZ masts and other structures is directly related to how far the structure is from the mast and the vertical height of the structure, along with the strength of the signal.
- 32 Evidence has established that there is a real risk of EMR coupling, and associated health effects, between RNZ's transmitter mast and buildings constructed above a certain height when these are located too close together. The only way to manage this risk is via height limits. EMR concerns are manageable so long as the height restrictions are adhered to both during construction and of the final structures.
- 33 RNZ has been concerned about safety risks from development near the Porirua Site for some time. The current height limit of 10m is the maximum RNZ considered compatible with public safety, this view is supported by the lack of reports of EMR issues.
- 34 It has been determined that for RNZ's Facilities at the Porirua Site:
- 34.1 At distances greater than 1km from the mast, the EMR risks are sufficiently small to not require active mitigation.
- 34.2 Structures greater than 10m in height within 528m of the mast **will most likely** result in EMR levels exceeding public limits. This raises the risk of shocks and/or burns from contact with large metallic objects, including temporary structures like cranes. This is a significant health and safety risk to workers and the public. It is therefore appropriate that buildings and structures within this area be restricted to 10 metres.
- 34.3 Structures greater than 10m in height between 528m and 1,057m of the mast **may** result in EMR levels exceeding public limits which again could result in shocks and/or burns from contact with large metallic objects. Within this area, it is appropriate for RNZ to complete site-specific and construction materials specific EMR assessment and for it to provide written approval before the structure is constructed.
- 35 I note that structures within 200m of the mast will be at even higher risk of EMR effects. RNZ's ownership of land immediately surrounding the transmitter, combined with RNZ's designation, means that it has not been necessary to seek a further 'no build' area closer to the mast where the risk is even higher. If RNZ did not have control of this land, more stringent controls would be needed closer to the transmitter.

Section 42A Report

36 I note the Section 42A Officer's recommendation to address these concerns as a "Radio Transmission Height Control Area A and B" in the Variation. With due respect to the careful analysis and assessment in the report, I do not consider the report's recommendations to be appropriate. The main reasons for this are:

- 36.1 Any development above 10m within 528m is *likely* to exceed public EMR limits. Safety measures may mitigate the risk somewhat, but the risk from EMR levels above the standards will remain. In these circumstances I consider the only safe approach is to prevent any further developments above 10m.
- 36.2 Between 528m and 1,057m the slightly lower risk may mean that mitigation measures can reduce elevated EMR to acceptable levels. However, mitigation measures will not be adequate for all developments or locations. As noted above, EMR levels can vary depending on the local conditions and there must be the ability to *refuse* consent for developments that are particularly at risk.

Potential costs to RNZ if relief not accepted

37 The potential cost to RNZ for failing to include height limits are as follows:

- 37.1 Mitigation of EMR issues in buildings, once established, could be complex and some issues may not even be solvable. Further, there is the added difficulty of who should bear the costs of mitigation.
- 37.2 At the extreme, it is possible that reverse sensitivity effects from intensification around RNZ's Facilities may force RNZ to have to relocate. As discussed above, this has occurred in other locations in the past. If RNZ were forced off the existing Porirua Site, there are no alternative locations that would be able to replicate the existing coverage, with implications for civil defence functions. In addition, it is now very difficult to obtain resource consent to construct a 137 metre mast. RNZ estimate a new site could run to \$5 million or more.

Kāinga Ora's further submission

38 Kāinga Ora made a further submission opposing the introduction of the proposed new qualifying matter, noting that Kāinga Ora did not consider RNZ had provided adequate reasoning to demonstrate why a 1m reduction from 11m to 10m within 528m was necessary.

39 I understand Kāinga Ora have instructed Mr Martin Gledhill to provide evidence on electromagnetic field safety. Kāinga Ora and RNZ are endeavouring to arrange a meeting between myself and Mr Gledhill to discuss the detailed technical calculations supporting

RNZ's reasoning. I will update the panel on the outcome of any discussions.

CONCLUSION

- 40 RNZ supports inclusion of a new qualifying matter for "Radio Transmission Height Control" in the Variation, as sought in RNZ's submission. It is important that:
- 40.1 there is no further development above 10m within 528m of RNZ's Facilities to protect public safety; and
 - 40.2 development above 10m between 528m and 1,027m of RNZ's Facilities can be assessed, on a case-by-case basis, and if necessary, consent can be refused.
- 41 I am happy to answer any questions from the Panel.

24 February 2023

Steve White