Before the Hearings Commissioner appointed by the Invercargill City Council

Under	the Resource Management Act 1991 (**Act**)
And	
In the Matter of	a notice of requirement for a designation under Section 168 of the Act to place a restriction on built form and electromagnetic interference around the Awarua Satellite Ground Station

Supplementary Statement of Evidence of **Craig Ian Morley** for Stewart Family Assets Limited (Engineering and EMI)

Dated: 16 November 2026

Lane Neave
Level 1, 2 Memorial Street
Queenstown
Solicitor Acting: Joshua Leckie / Hayley Mahon
Email: joshua.leckie@laneneave.co.nz / hayley.mahon@laneneave.co.nz
Phone: 03 409 0321

lane neave.

INTRODUCTION

1. My full name is Craig Ian Morley. I am a specialist in Electromagnetic Compatibility (**EMC**) and Radio Frequency Interference (**RFI**). My qualifications and experience are set out in my evidence in chief dated 21 September 2026 and my summary statement dated 28 September 2026 for Stewart Family Assets Limited (**SFAL**).

2. The purpose of this supplementary statement of evidence is to address the RSM protection zone matter raised by Space Operations New Zealand (**SpaceOps NZ**) during the course of the hearing from 28 to 30 September 2026.

Code of Conduct for Expert Witnesses

3. Although this is not an Environment Court hearing I have read and agree to comply with the Code of Conduct for Expert Witnesses in the Environment Court Practice Note 2023. This evidence is within my area of expertise, except where I state that I am relying on material produced by another person. I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

RSM DECISION IN PUBLIC INFORMATION BULLETIN 38

4. I confirm that there is no longer a requirement for a 2km protection zone as a result of the July 2025 release of PIB 38. This version supersedes any previous versions and is the regulatory policy in effect for the EMI controls around Warkworth, Mahia and Awarua.

5. I still consider the requirement for a 2km protection zone as flawed, arbitrary and ineffective. The latest evidence provided by Space Ops and the appended email from RSM supports this conclusion and in particular RSM have stated:[1]

   (a) 2km protection zone was removed as it conflicts (or is confused with) the protection criteria / co-channel interference;

   (b) the now removed ‘Earth station receive-protection zone’ did not provide useful protection measures; and

   (c) the 2 km protection area radius, is insufficient to provide protection.

[1] Email from RSM to Mr Hulston and Mr McNeill 28 Sept 2026 10:42am

6. I disagree with Mr McNeill's statement in paragraph 3, (referring to the PIB 38 removal of the 2km protection zone) that "SpaceOps was not aware of this occurring until it was discovered after the hearing had commenced." The email attachments in Mr McNeill's evidence indicate that that he was alerted to this by Graham Hulston on 31 August 2026, around a month prior to the hearing as he was copied into the email from Mr Hulston to Radio Spectrum Management (**RSM**).

7. I note that Mr Hulston did not recognise the removal of the 2km protection zone from PIB 38 until some 13 months after it was published.[2] "It is the responsibility of the Approved Radio Engineer (**ARE**) or Approved Radio Certifier (**ARC**) to ensure that they are familiar with the latest edition of these Rules".[3] Both Mr Hulston and Mr McNeill are both accredited ARE's.

8. Radio Spectrum Management announced the recent updates to PIB 38 in their July 2025 Business Update newsletter and website news section, published on 7 July 2025. The RSM Management Business Update is also emailed to their mailing list. The July 2025 version of PIB 38 (Issue 13) was officially released on July 15, 2025. The initial Notice of Requirement (NoR) from SpaceOps was lodged with the Invercargill City Council (ICC) on 29 July 2025

9. RSM have trialled the 2km protection zone between 2021 and July 2025 and found it did not provide useful protection measures for stations of the Space Operations Service.[4] A 2km EMI limitation area is therefore unjustified and ineffective. It unnecessarily burdens and creates uncertainty for SFA or any other occupier.

10. I understand that SpaceOps NZ's position in their application and evidence is that the designation will confirm the existing protections by RSM in the District Plan.[5] Consistent with that, two of the three Objectives of the designation are related to ensuring the District Plan is aligned with the "already established protection zone."[6] However, the "already established protection zone" did not exist at the time that the application and evidence by SpaceOps NZ were published. I note that Invercargill City Council's (**ICC**) planner and technical expert's evidence relied on the statements by SpaceOps regarding the mirroring of the protection zone from RSM regulations into the District Plan for the basis of their respective conclusions on whether the 2km EMI limitation area was appropriate.[7]

[2] Email – Mr Hulston, to RSM & Mr McNeill 31 August 2026 11:40am
[3] https://www.rsm.govt.nz/about/publications/pibs/pib-38
[4] Email from RSM to Mr Hulston and Mr McNeill 28 Sept 2026 10:42am
[5] Notice of Requirement Application, 24 March 2026 at page 14.
[6] Statement of Evidence of Robin McNeill, 14 September 2026 at page 3.
[7] Section 42A Recommendation Report, 31 August 2026 at [74], Review of Space Operations New Zealand Application, AnS Consulting, June 2026 at [5]

11. As we have now learned that RSM consider the 2km EMI limitation area as not providing "useful protection measures" and removed it from PIB 38 in July 2025, I consider that caution should be given to the conclusions of ICC's experts as to whether the EMI Limitation area is appropriate.

12. My evidence and position on the EMI limitations previously presented to the Commissioner[8] has not changed (specifically my paragraph 10 statement and paragraphs 26 to 29):

> *[10] The 2km boundary is flawed. The associated 2km restriction is arbitrary and ineffective; ITU Radio Regulations Appendix 7 (and RSM's November 2020 Re-planning document) recognize a 100km coordination area and define this area as "the area surrounding an earth station sharing the same frequency band with terrestrial stations, or surrounding a transmitting earth station sharing the same bidirectionally allocated frequency band with receiving earth stations, beyond which the level of permissible interference will not be exceeded and coordination is therefore not required". There is no 2km zone in the ITU Radio regulations. Such a zone would be trivial and ineffective compared to a 100km coordination area. Potential emitters outside the proposed 2km zone (such as the Invercargill CBD, airport, Tiwai Point smelter, and South Port) present a far higher risk because operators there may be unaware of frequency restrictions.*
>
> …
>
> *[26] The 2km protection zone seems to be arbitrary with no rationale provided for this specific distance. I am unfamiliar of any. It probably seemed a good round figure to use at the time. The ITU-R Radio Regulations do not specify fixed universal geographical protection zones.*
>
> *[27] Regardless of a 2km protection zone, the reality is that harmful interference can originate from anywhere outside of this zone which includes the coastal marine area, all public conservation land, Invercargill Airport, the CBD and anywhere else.*
>
> *[28] RSM's November 2020 Re-planning document[9] refers to Radio Regulations Appendix 7 and the requirement for a 100km coordination distance and that interference analysis is undertaken for any new applications deployed within it. The RSM document, section 3.3.2 includes a section of "Earth station receive-protection zone" where it is stated approved persons must undertake an interference analysis for any new applications deployed within 100km of the protection zone. This is based on the minimum coordination distance calculation from the International Radio Regulations, Appendix 7. Clearly ITU RR recognises that harmful interference is applicable to sources up to 100km distant. The 2km protection zone proposal is so insurmountably small that it does not address real interference risk.*

[8] Statement of Evidence of Craig Morley dated 21 September 2026
[9] 1c. NOR Application - Appendix 2_RSM Decision.pdf.

> *[29] The reality is that SFAL and future occupiers of the Industrial 4 Zone will now be aware of the restrictions of the 2200MHz to 2290MHz frequency band and present minimal risk, whereas other operators within a 100km radius present greatest risk of harmful interference as they would be unaware of these restrictions.*

EMI CONDITIONS

13. From a technical perspective, Condition 1 should be removed/deleted in full. As there is no regulatory requirement for an Electromagnetic Interference Limitation Area and it does not provide any useful protection, this clause is redundant.

14. With regard to Mr McNeill's Condition 3, the calculation provided by RSM in his supplementary evidence at Appendix 1 is correct. However, I consider its use needs to be applied with caution. The calculation derives the Receiver noise floor of an antenna (likely AWA4) as -144dBW/MHz. This is based solely on its system noise temperature of 290K. Previous evidence has given a system noise temperature of 200K.

15. This is now where PIB 38 section 5.7 has effect. The requirement is for an interfering co-channel to have a level 10dB lower than the receiver noise floor. This only applies to adjacent channels (side-by-side/co-channels). The intent is to minimise interference risk between operators using similar approved (licenced) frequencies/channels of intentional radiators.

16. Noting from paragraph 14 above, the receiver noise floor is -144dBW/MHz which means any signal below this is immeasurable as it is lost in the equipment noise. Hence a -154 dBW/MHz signal, as proposed in Condition 3 by Mr McNeill, cannot be directly measured and requires calculation. Any interfering co-channel would have to be greater than -144dBW/MHz level to result in detectable interference.

17. Mr McNeill's evidence adds reference to "out-of-band" or "spurious emissions" as being included as being within the 154dB/MHz limit in Condition 3. PIB 38 section 5.7 relies on any co-channel interference being licenced frequencies/channels as the licences detail the specification, parameters and technical characteristics of the transmission which are required to calculate if the levels are 10dB below the system noise floor. Calculations cannot be performed on spurious emissions or harmonics as the details are not accurately known therefore these emissions should not be considered under section 5.7. Section 5.7 does not explicitly state or encompass out-of-band or harmonic emissions.

18. Co-channel interference is only likely to occur when the interfering source is in the antenna beamwidth. This will be when the antenna angle is pointing close to the

horizon. At antenna elevations greater than ~10°, interference is most likely to be from non-terrestrial sources (other satellites, aircraft etc). There is also the possibility that Awarua SGS may generate co-channel interference from their own antenna & transmitters at their locale which can be received via side and rear lobes of a victim receiving antenna.

19. PIB 38 considers co-channel interference (section 5.7) for Space services. It does not specifically make reference to, or include harmonic or spurious emissions. While ITU Radio Regulations include a definitions section (Article 1, Section VI), no reference to harmonic or spurious emissions are included in the co-channel interference criteria (section 5.7 of PIB 38), adjacent channel interference criteria (section 5.8 of PIB 38) or S band Earth station coordination with terrestrial services of PIB 38).

20. Arbitrary RF signals when added together do not have an arithmetic sum (i.e. twice the level for 2 signals, 3 times the level for 3 signals etc.). Signals exist in different spectral (frequency) and time (phase) domains. It can be thought of as adding a glass of salt to a glass of water. Two single units on their own but when added there will not be 2 units. The cumulative effect is not linear as Mr McNeill's paragraph 7(b) evidence suggests. A 3dB (direct doubling of 2 combined signals) is possible for a short instance in time, however when measured over time the combined level will be significantly less. See **Appendix 1**.

21. There is no requirement to measure the level of interference in condition 3. It has to be calculated and this requires knowing very specific characteristics of the main signal (carrier or fundamental) and any unintentional harmonics or other emissions as a result/bi-product of the main signal. This is why section. 5.7 of PIB 38 refers to co-channel interference rather than harmonic or spurious emissions which could emanate from unintentional sources. The co-channel characteristics are known because the channels must be licensed to use in the band we are considering (S-band). The license contains specific details that should allow these calculations.

22. Spurious and out-of-band emissions are just that – the source and the core wave attributes are unknown so the interfering level cannot be calculated. The calculations would require RF design Engineer expertise and even so, many assumptions and "rules of thumb" must be made to approximate calculations of these very low levels. The accuracy is contestable and I would suggest beyond the ability of an ARE. If Condition 3 is retained, I would recommend deletion of the last sentence of Condition 3 in Mr McNeill's supplementary evidence to remove any reference to "out of band" or "spurious emissions".

23. Condition 3, if retained more or less in its current form, should be changed to read:

"No new individual terrestrial radiocommunication service established after [date of confirmation of designation] shall cause co-channel interference to channels actively used by Space Operations New Zealand Limited within the 2200–2290 MHz frequency range. Any such interference shall be calculated as being 10dBW/MHz less than the receiver noise floor. There are multiple s-band antenna at Awarua SGS which will have different noise floor limits. In the case of licence (LIC ID 404221) the noise floor is -144dBW/MHz."

24. With regard to my suggested edits to Condition 3 above:

(a) the phrase "*Within the Electromagnetic Interference Limitation Area shown on the Designation Plan*" is removed from the proposed Condition 3 because there is no longer a regulatory requirement for a 2km protection zone;

(b) my suggested wording for Condition 3 clarifies the intent of PIB 38 section 5.7 which only considers co-channel interference and a requirement to calculate this to 10dB below the system noise floor;

(c) PIB 38 section 5.7 does not explicitly refer to or include out-of-band and spurious emissions which voids reference to "1.144 out-of-band emission" and 1.145 spurious emission" from the proposed Condition 3; and

(d) my suggested wording for Condition 3 takes into account the different levels for the calculated interference limit that is respective of the actual antenna system in use and its unique system noise temperature.

25. I agree with Mr McNeill's statement in paragraph [10] that the RSM decision now provides more protection. However, I disagree that Condition 3 is less restrictive. The inclusion of a 2km protection zone in Condition 3 incurs significant restriction on SFAL and third parties.

26. My suggested changes to the proposed Condition 3 clarify and define the specific requirements of section 5.7 of PIB 38. This minimises interpretation risk and uncertainty to SFAL and other 3rd parties. It also means that SFAL do not carry the responsibility of interference risk that could originate from anywhere outside a 2km zone. It is now the responsibility of every radio transmitting user to ensure their equipment does not cause undue interference to SpaceOps. The changes also highlight that SpaceOps are required to demonstrate by calculation, any co-channel interference.

27. However, I have an overall concern that Condition 3 is too complex for a user of the District Plan to understand and/or calculate. It is also difficult for SFAL to communicate what Condition 3 means in a practical sense to their customers or

future purchasers. Given that SpaceOps NZ's position in their application and evidence has been that the designation is essentially confirming the existing protections by RSM and inserting them into the District Plan, I consider a simpler outcome for the conditions would be just to rely on the Radio Licence Certification Rules PIB 38 dated July 2025. For example, if the EMI Limitation area is retained (which I do not agree with), Condition 1 could become:

> *Within the Electromagnetic Interference Area shown on the Designation Plan, any new individual terrestrial radiocommunication service established after [date of confirmation of designation] must comply with the Radiocommunication Regulations 2001 and the Radio Licence Certification Rules (PIB 38), Issue 13, dated July 2025.*

28. For clarity, as PIB 38 no longer includes the 2km Protection Area, there are underlying wider Protection Areas within the ITU Regulations which would apply.[10] Reference to the 2km Electromagnetic Interference Area is therefore a planning and legal matter as there is no engineering and EMI basis for it.

29. For the reasons described above I consider there is no technical basis for the 2km EMI limitation sought by SpaceOps and I do not consider it appropriate. However, in the event that continues to be sought I have included a full set of proposed conditions with amendments I consider will assist the workability of the controls at **Appendix 2** to assist the Commissioner.

CONCLUSION

30. My position on the requirement for a 2km protection zone has only strengthened, now supported by RSM statements that the zone is effectively arbitrary and ineffective. It is not reasonably necessary and appropriate to continue with the 2km protection zone.

31. The requirement for a 2km protection should be removed as it insufficient to provide protection, nor does it provide useful protection measures[11].

32. Condition 3 should be amended to reduce uncertainty, however, I consider it would be much simpler for users of the District Plan if the conditions just referred to the Radiocommunication Regulations 2001 and PIB 38. Given the reliance of SpaceOps NZ throughout this process of the District Plan mirroring the RSM regulations, I

[10] "Coordination distance" ITU Radio regulations APPENDIX 7 (REV.WRC-23)
[11] Email from RSM to Mr Hulston and Mr McNeill 28 Sept 2026 10:42am

consider that the conditions reflecting the RSM regulations and PIB 38 at the current date is the most reasonable outcome.



Craig Ian Morley

16 November 2026

Appendix 1: Combined Signal Level Figures

Addition of two arbitrary sine signals

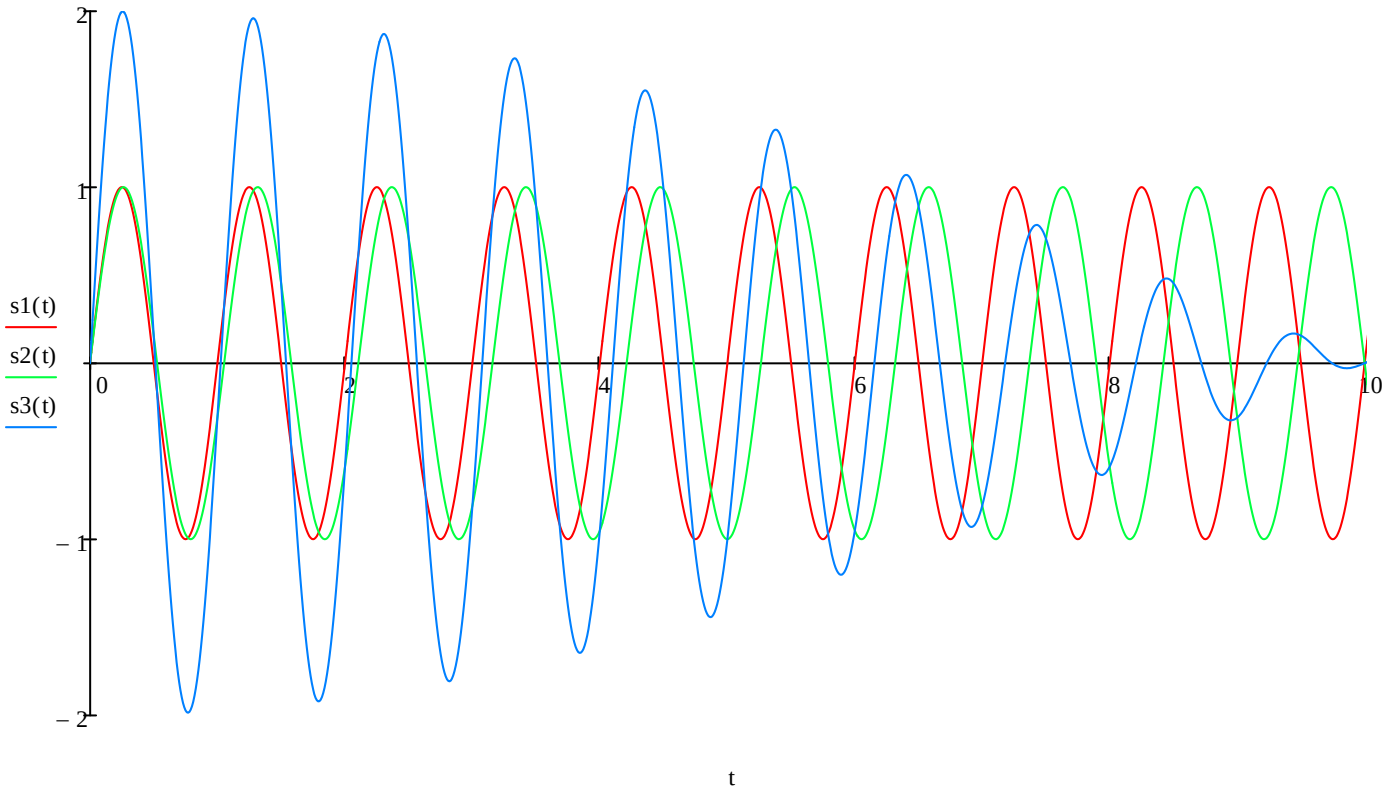
Craig Morley
8 Nov 2026

$\Delta t := 0.95$ $Ns := 15.925 \cdot \pi$ $Ns = 50.03$

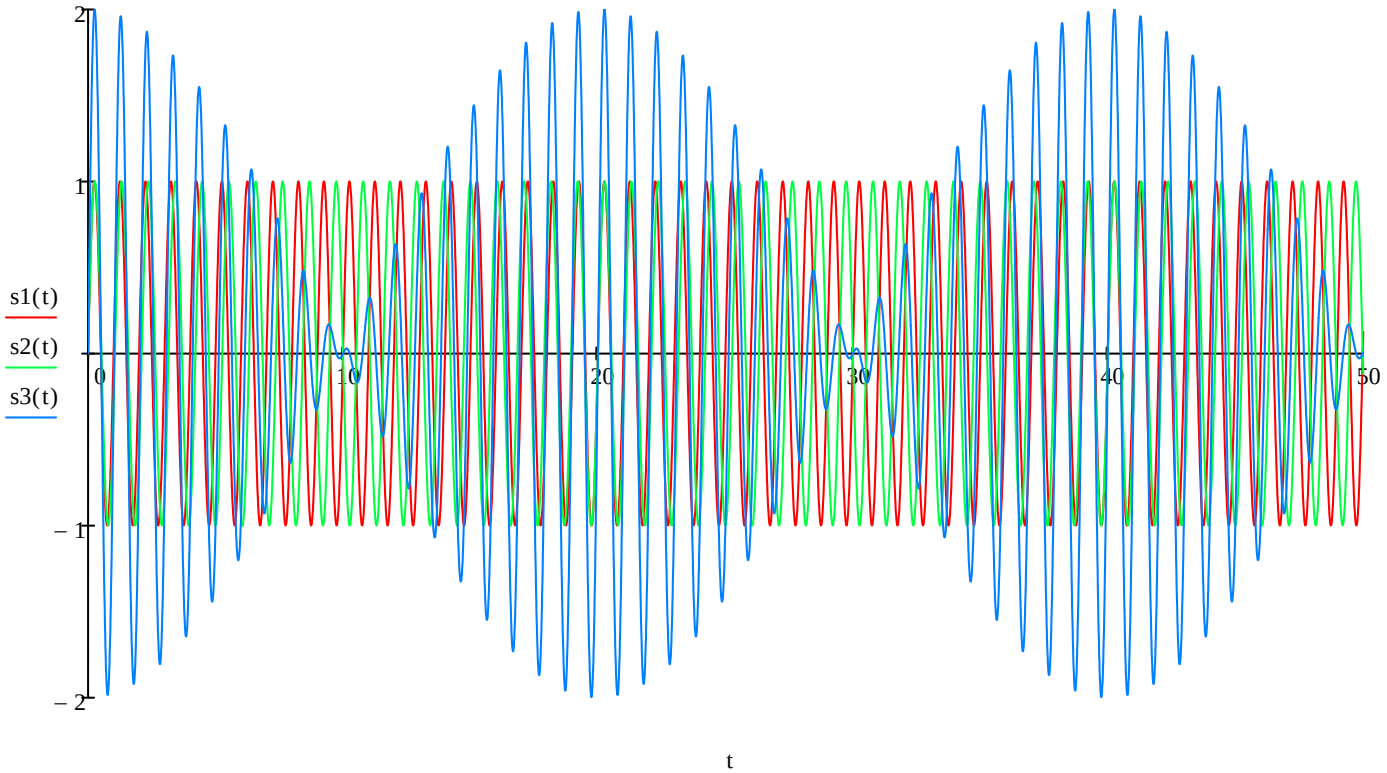
$t := 0, 0.01 .. Ns$

$s1(t) := \sin(2 \cdot \pi \cdot t)$ $s2(t) := \sin(2 \cdot \pi \cdot t \cdot \Delta t)$ $s3(t) := s1(t) + s2(t)$ $s3(1) = -0.309$

The first plot shows two signals (red and green) of the same amplitude and slightly different frequency, added to show a resulting signal (blue). Over time the original signals get out of phase and result in complete cancellation. Over a longer time the signals combine to give cyclic maxima and minima amplitudes.



Over a longer time;



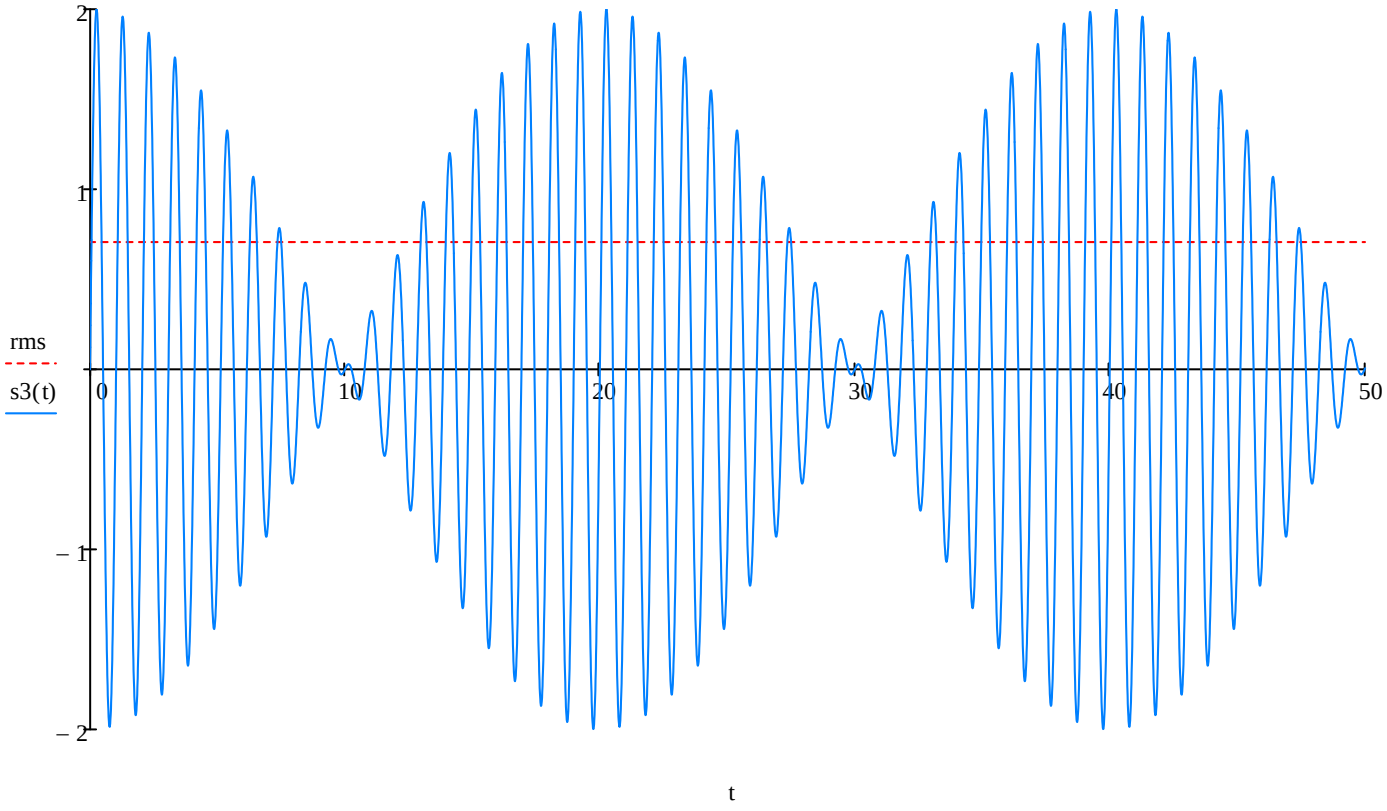
Calculating the RMS (root mean square) voltage of two similar waveforms combined over time. RMS detectors are usually used in spectrum analyzers & EMC receivers to measure power levels

The RMS level of a single sinewave with peak amplitude = 1 is 0.707)
(as used for each of the original red/green signals)

$$samples := 50$$

$$rms := \sqrt{\sum_{t=0}^{samples} \frac{s3(t)^2}{samples}}$$

$$rms = 0.707$$



Appendix 2: Updated EMI Limitation Conditions

Appendix [~~A~~2] – Proposed Conditions

Condition 1: Detailed Technical Assessment Pathway

1. The designation comprises the following:

    a. **Electromagnetic Interference Limitation Area:** all land and airspace within a 2 km radius measured from any point of the boundary of Designation 97 – Awarua Satellite Ground Station and Ancillary Operations, being Lot 1 DP 483454, Lot 1 DP 524692 and Lot 2 DP 524692, as it relates to electromagnetic interference from terrestrial radiocommunication services covered by either individual radio spectrum licences, of General Use Radio~~n~~ Licenses (GURL).
    b. **Horizon Mask Airspace Limitation Surface:** all airspace above a surface commencing at a height of 2 m at the boundary of Designation 97 and extending outward at an angle of 5 degrees for a horizontal distance of 3 km.
    c. Land within the coastal marine area and public conservation land is excluded from the designation.

Condition 2 (Option A): Penetration of Horizon Mask

2. No new building, structure or temporary object, no extension or increase in height of an existing building or structure, and no vegetation may penetrate the Horizon Mask Airspace Limitation Surface unless prior written approval has been obtained from Space Operations New Zealand Limited under section 176(1)(b) of the Resource Management Act 1991 in accordance with this condition.

    Information Requirements:

    2.1 An application for written approval must include, to the extent relevant to the proposed penetration:
        a. a site plan identifying the location of the proposed penetration relative to Designation [Insert Number];
        b. the existing ground level, maximum height or reduced level of the proposed object, and the maximum vertical extent of penetration above the Horizon Mask Airspace Limitation Surface;
        c. the dimensions, physical form, profile, construction materials and any moving or rotating components of the proposed object;
        d. whether the penetration is permanent or temporary and, if temporary, its proposed duration, frequency and timing;
        e. any alternative siting, design or mitigation measures that have been considered; and
        f. a technical assessment prepared by a suitably qualified and experienced person addressing the matters in Condition 2.2, unless SpaceOps advises in writing that such an assessment is not reasonably necessary given the nature and scale of the penetration.

    Technical assessment:

    2.2 In determining whether to provide written approval, SpaceOps must consider, to the extent relevant:

a. the location, azimuth or direction, elevation and distance of the penetration relative to the Ground Station;
b. the height and extent of penetration above the Horizon Mask Airspace Limitation Surface;
c. the dimensions, width, bulk, profile, construction materials and other relevant physical characteristics of the object;
d. whether the object is static, moving or rotating;
e. whether the penetration is permanent or temporary and, for temporary penetrations, its duration, frequency and timing;
f. the satellite acquisition, tracking, telemetry, command and communication requirements of the Ground Station within the affected sector;
g. the effect of the penetration on the ability of the Ground Station to acquire, track and communicate with spacecraft, including any effect on available communication windows;
h. any existing or approved penetrations within the affected sector where these are relevant to determining the operational effect of the proposal; and
i. any measures proposed to avoid or mitigate the operational effects of the penetration, including changes to location, height, dimensions, timing or duration.

Approval:

2.3 SpaceOps must grant written approval where it is satisfied that, either as proposed or subject to reasonably necessary mitigation measures, the penetration will not materially compromise the ability of the Awarua Satellite Ground Station to acquire, track or communicate with spacecraft within the affected sector.

2.4 Written approval may be subject to conditions where those conditions are reasonably necessary to avoid or mitigate the operational effects of the penetration on the Ground Station.

Processing:

2.5 Within **10 working days** of receiving an application, SpaceOps must advise the applicant whether:

a. sufficient information has been provided to assess the application; or
b. further information is reasonably necessary, identifying the information required and the reason it is necessary.

2.6 SpaceOps must determine an application within **20 working days** after sufficient information has been provided, unless a longer period is agreed in writing between SpaceOps and the applicant.

2.7 Where approval is declined, or approval is granted subject to conditions, SpaceOps must provide written reasons for its decision.

Independent Technical Review:

2.8 Where a material technical disagreement remains between SpaceOps and the applicant concerning the effect of a proposed penetration, the applicant may request that the matter be independently peer reviewed by a suitably qualified and experienced person who is independent of both parties.

2.9 The independent reviewer is to be agreed between SpaceOps and the applicant. If agreement cannot be reached within 5 working days, the reviewer may be nominated by the President of Engineering New Zealand, or their nominee.

2.10 SpaceOps must have regard to the conclusions of the independent peer review before making or reconsidering its decision under Condition 2.3. For the avoidance of doubt, the peer review informs, but does not replace, SpaceOps' statutory decision under section 176(1)(b).

Temporary Penetrations:

2.11 Applications for temporary penetrations, including cranes, construction machinery or other temporary equipment, must be processed on an expedited basis.

2.12 SpaceOps must determine an application for a temporary penetration within **10 working days** of receiving sufficient information, unless otherwise agreed with the applicant.

2.13 An approval for a temporary penetration may include reasonable requirements relating to maximum height, location, timing and duration where necessary to avoid or mitigate effects on Ground Station operations.

Condition 2 (Option B): Penetration of Horizon Mask

2. No new building or structure, extension or increase in height of an existing building or structure, or vegetation that penetrates the Horizon Mask Airspace Limitation Surface shall be established or permitted except where:

   a. the party on whose land the object is located, or who is otherwise responsible for the object, has provided to Space Operations New Zealand Limited a technical assessment prepared by a suitably qualified and independent person which determines that the penetration will not materially compromise the efficient operation of the Awarua Satellite Ground Station;
   b. that technical assessment has been accepted by Space Operations New Zealand Limited; and
   c. Space Operations New Zealand Limited has provided its written approval under section 176(1)(b) of the Resource Management Act 1991 to the penetration

2.1. A temporary short-term penetration of the Horizon Mask Airspace Limitation Surface by a crane, construction machinery or other temporary equipment may occur where it has been authorised in writing by Space Operations New Zealand Limited.

Advice Note: The technical assessment may consider the location, azimuth, elevation, distance, size and physical characteristics of the proposed penetration and the Ground Station operations potentially affected

Condition 3 – Electromagnetic Interference Limitation Area:

3. Within the Electromagnetic Interference Limitation Area shown on the Designation Plan, ~~no~~ any new individual terrestrial radiocommunication service established after [date of confirmation of designation] must comply with the Radiocommunication Regulations 2001 and the Radio Licence Certification Rules (PIB 38), Issue 13, dated July 2025.~~shall cause interference to Space Operations New Zealand Limited from that service within the 2200–2290 MHz protection frequency range to that exceeds -154 dBW/MHz at the input of a Space Operations receiver.at the Awarua Satellite Ground Station. This includes any out-of-bad or spurious emissions as defined in *ITU Radio Regulations* (Article 1, Section VI), namely:~~

~~1.144 out-of-bad emission*: Emission on a frequency of frequencies immediately outside the necessary bandwidth which results from the modulation process, but excluding spurious emissions.~~

~~1.145 spurious emissions*: Emission on a frequency or frequencies which are outside the necessary bandwidth and the level of which may be reduced without affecting the corresponding transmission of information. Spurious missions include harmonic emissions, parasitic emissions, intermodulation products and frequency conversion products, but exclude out-of-band emissions.~~

3.1 For the purposes of Condition 3, a terrestrial radiocommunication service means a service involving the transmission, emission and/or reception of radio waves for specific telecommunication purposes, other than any radiocommunication involving the use of one or more space stations, or the use of one or more reflecting satellites or other objects in space.

3.2 Terrestrial radiocommunication services include, but are not limited to:

a. radio and television broadcasting services;
b. cellular mobile networks and their base stations;
c. fixed wireless access and wireless broadband services;
d. point-to-point and point-to-multipoint microwave links;
e. land-mobile radio systems, including private and business radio, trunked radio and paging services;
f. radio telemetry, SCADA and other remote monitoring or control radio systems;
g. maritime and aeronautical mobile radio services;
h. radionavigation and radiolocation services, including radar; and
i. amateur radio services.

3.3 A terrestrial radiocommunication service does not include equipment which produces radiofrequency emissions only as an incidental by-product of its operation and not for telecommunication purposes.

3.4 For the avoidance of doubt, Condition 3 does not apply to buildings, structures, electrical infrastructure or electrical equipment that do not constitute, or contain as a component, a terrestrial radiocommunication service. This includes, without limitation:

a. wind turbines;
b. solar panels;
c. generators;
d. tranformers and substations;
e. motors and variable-speed drives;
f. inverters and switchgear;
g. battery energy storage systems;
h. pumps and treatment equipment; and
i. other industrial or agricultural equipment,

where any radiofrequency emissions are only an incidental by-produce of their operation.

3.5 Where an activity identified in Condition 3.4 incorporates a terrestrial radiocommunication service, including a microwave link, radio telemetry or radio-based SCADA system, Condition 3 applies only to that terrestrial radiocommunication component.

3.6 Condition 3 applies to each individual new terrestrial radiocommunication service and does not impose a cumulative interference standard by aggregating emissions from separate services.

3.7 Where clarification is required as to whether a particular service constitutes a terrestrial radiocommunication service, reference is to be made to Sections I and III of Article 1 of the ITU-R Radio Regulations.

Condition 4: Existing Lawfully Established Activities

4. Nothing in Conditions 2 or 3 requires the removal, cessation or modification of a building, structure, vegetation or terrestrial radiocommunication service lawfully established (including compliance with RSM Decisions) before the date this designation is confirmed solely because that activity does not comply with those conditions

Condition 5: Electricity Distribution Infrastructure Within Legal Road

5. Where new or upgraded electricity distribution infrastructure located within legal road inside the Horizon Mask Airspace Limitation Surface:

   a. would penetrate the Horizon Mask Airspace Limitation Surface; and
   b. SpaceOps does not provide written approval to the penetration under Condition 2,

   SpaceOps shall meet the reasonable additional cost directly attributable to the requirement to underground or relocate that infrastructure solely as a consequence of compliance with this designation.

For the avoidance of doubt, SpaceOps shall not be responsible for:

a. costs that would have otherwise been incurred in constructing, renewing or upgrading infrastructure;
b. betterment or enhancement costs;
c. additional capacity costs;
d. costs not directly attributable to the Horizon Mask Airspace Limitation Surface.

Condition 6: Overlapping Designations

6. Where this designation overlaps:
   a. Designation 48 – State Highway 1; or
   b. Designation 55 – Railway Purposes,

   those existing designations shall be the primary designations and SpaceOps restrictive designation shall be secondary.

Advice Notes:

1. Meaning of objects:

   For the purposes of Condition 2, buildings, structures and temporary objects include, but are not limited to buildings, wind turbines, masts, poles, aerials, antennas, cranes, construction machinery and other equipment capable of penetrating the Horizon Mask Airspace Limitation Surface on either a temporary or permanent basis.

2. For initial screening purposes, the height of the Horizon Mask Airspace Limitation Surface may be calculated as:

   $H = 2 + d \times \tan(5°)$

   where:

   H = height of the limitation surface above the originating datum; and
   d = horizontal distance in metres from the boundary of Designation [Number Reference].

   As tan(5°) = approximately 0.08749, indicative heights are approximately 10.7 m at 100m, 23.9m at 250m, 45.7 m at 500 m, 89.5m at 1 km, 176.9m at 2km and 264.5m at 3km. The s42A report used the same calculation.

   Where precise compliance is material, the mapped/surveyed Horizon Mask Airspace Limitation Surface prevails over these indicative calculations.

3. Compliance with the underlying District Plan does not remove the requirement to obtain SpaceOps' written approval where Condition 2 is triggered. Conversely, no SpaceOps approval under Condition 2 is required where a proposed building, structure or vegetation remains wholly beneath the Horizon Mask Airspace Limitation Surface.