

AUCKLAND UNITARY PLAN
INDEPENDENT HEARINGS PANEL

Te Paepae Kaiwawao Motuhake o te Mahere Kotahitanga o Tāmaki Makaurau

Report to Auckland Council
Hearing topic 074 Designations

Transpower Limited

Designations 8521 and 8524
Substation Designations

May 2016

Report first prepared by Harry Bhana in accordance with the Auckland Unitary Plan Independent Hearing Panel procedure and in accordance with section 142 of the Local Government (Auckland Transitional Provisions) Act 2010, on 26 August 2015 updated without amendment 5 October 2015. Further updated on 24 March 2016.

Adopted as Auckland Unitary Plan Independent Hearings Panel recommendations in accordance with the Auckland Unitary Plan Independent Hearing Panel procedure and in accordance with section 144 of the Local Government (Auckland Transitional Provisions) Act 2010 on date of signature.

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1. Introduction

The purpose of this report is to provide an assessment and recommendation in relation to designations, modifications and new designations classified by the Independent Hearings Panel as moderately complex.

2. Assessment

The assessment will address:

- i. effects on the environment of allowing the modification or requirement;
- ii. mitigation measures proposed by requiring authority including any proposed conditions;
- iii. other section 171 matters or section 168A(3) (if the requiring authority is Auckland Council) matters where relevant;
- iv. whether land is owned by the requiring authority.

See section 9 of this report for the assessment of each modification and requirement.

On the basis of the assessment, the report concludes that the following modifications/requirements should be modified as recommended in the section 9 assessment checklist:

8521 and 8524.

3. Expert input

To support appropriate assessment, expert advice has been obtained for this report on the following matters:

| Matter/issue | Advice obtained |
|---|--|
| Insertion of new technical conditions dealing with construction and maintenance noise, vibration, oil spill, and electromagnetic field exposure, and the use of substation earth grids. I requested Transpower to provide technical/expert advice to support the proposed conditions. | On 13 August 2015, the requiring authority provided the requested technical expert advice which supported the proposed conditions and also suggested some further amendments. I have advised Transpower that since the further amendments were not included in the modifications associated with the rollover or in submissions that were lodged it was not possible to incorporate these further amendments at this time. |

See section 11 of this report for expert technical advice.

4. Estimate of mediation required

As I have noted in section 9 there are matters which remain unresolved between third-party submitters and the requiring authority. I am satisfied that none of these matters would benefit from further mediation.

5. Estimate of hearing requirements, and matters subsequently addressed at the hearing

Based on the responses of the requiring authority as detailed in section 9, the following matters have been identified to progress to a hearing:

3424-38 M W Norton, 3738-91 Manukau Harbour Restoration Society, 4442-35 The Onehunga Enhancement Society, and 4484-21 Selwyn Street Properties Ltd seeking that all Transpower designations be amended to require notification to local boards and owners of property prior to making changes to overhead lines or towers and requiring Transpower to work with the Council and other organisations to place power lines underground. Transpower advises that it considers the relief sought in appropriate and unnecessary and it is attempting to resolve these issues prior to the hearing.

I have previously estimated hearing time for these submitters in the report on designations 8501 8503 8510 8511 8514 8518 8520 8522 8523 8525 and 8526.

Matters addressed at the hearing

Transpower gave evidence on the above matters and the parties identified above did not appear.

6. Recommendation to Panel

That the Panel:

- i. agrees to hear matters identified in section 5 above and subject to its determination of the matters at issue,
- ii. recommends that the notices of requirement for existing designations included in the Proposed Auckland Unitary Plan as Designations 8521 and 8524 be confirmed subject to the modifications set out in Attachment 1.

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| Author | Harry Bhana |
| Author's Signature |  |
| Date | 26 August 2015 updated without amendment 5 October 2015. Further amended 23 March 2016 to incorporate recommendations on Transpower proposed minor amendments that were not included in submissions. |

7. Panel recommendations to Auckland Council

Notices of requirement for existing designations included in the Proposed Auckland Unitary Plan with or without modification on which submissions have been lodged; and where issues have been resolved, by mediation, direct discussions, the evidence exchange process, or where submissions were not pursued, or left unrepresented by evidence at the hearing.

The Panel recommends to Auckland Council that it recommends to the requiring authority that the notices of requirement 8521 and 8524 be confirmed subject to the further modifications included in Attachment 1.

8. Panel reasons

The reasons for the Panel's recommendation are set out in section 9 below.

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| Panel Chair | David Kirkpatrick |
| Chair's Signature |  |
| Date | 18 May 2016 |

9. Assessment of modifications and submissions

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| Requiring authority | Transpower Ltd |
| Designation number (s) | 8521 and 8524 |
| Designation purpose | Electricity Transmission – Substations |
| Location | 8521 - Electricity transmission - the construction, operation, maintenance, replacement, renewal and upgrading of a 220kV switchyard, transmission lines, and ancillary facilities. 261 Quarry Road, Drury 8524 - Electricity transmission - Huapai electricity substation. 108 Matua Road, Huapai |
| Designations given effect to | Both have been given effect to. |
| Lapse date in operative plan | NA |
| Rollover designation with no modifications | 8521 |
| Description of the modification | Modifications to 8524 Minor modification to Condition 13 to update noise standard reference (NZS6802:1991 to NZS6802:2008.) |
| Assessment of Modifications | The modification simply updates the reference to the noise standard and will not have any effects on the environment. |
| Notice of requirement | Requirement to include existing designations subject to above modifications. |
| Land ownership | No |
| Land owned by the requiring authority | All land subject to designations is owned by the requiring authority. |
| Submitter | Designation 8521 3766-620 to 3766-630 by Transpower Ltd. 4500-122 Counties Power Ltd supporting retention of Designation 8521. Designation 8524 3766-653 to 3766-663 by Transpower Ltd. Designations 8521 and 8524 3424-38 M W Norton, 3738-91 Manukau Harbour Restoration Society, 4442-35 The Onehunga Enhancement Society, and 4484-21 Selwyn Street Properties Ltd. |
| Matters addressed in submission | Submissions to 8521 by the requiring authority i. Changes to the heading to the designations so they are consistent with the Schedule preceding the individual designations and changing the heading “Purpose” to ”Description/Activity” with minor additions to clarify the nature of the activity or its |

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| | <p>location.</p> <ul style="list-style-type: none"> ii. Delete Condition 1 that relates to construction specifications. iii. Delete Condition 3 and replace with text that reads: <u>“Any new works or equipment shall be designed and constructed to limit the EMF... to the International Commission on Non-Ionising Radiation Protection Guidelines ... under maximum normal operating conditions (ie, when there are no faults in the transmission system).”</u> iv. Delete Condition 4 that refers to construction compliance in relation to electric field strength and magnetic flux density. v. Amend Condition 5 to read: “The site shall be designed and operated to limit public exposure to electric and magnetic fields, in accordance with the recommendations in Section 1, <u>Extremely low frequency fields</u> of the World Health Organisation monograph, <u>Environmental Health Criteria No. 238, December 2010.</u>” vi. Delete Condition 7 that relates to implementation of the landscaping plan. vii. Amend Condition 13 to read: “The switchyard shall be designed, constructed and operated in such a manner so that the noise level measured at the site boundaries of 261 Quarry Road shall not exceed the following limits: ... a. The noise levels shall be measured and assessed in accordance with the requirements of NZS 6801:1999 Measurement of Sound and NZS 6802:1999 Assessment of Environmental Sound <u>NZS 6801:2008 Acoustics - Measurement of Environmental sound and NZS 6802:2008 Acoustics- Environmental Noise.</u>” viii. Amend Condition 18 that relates to the procedures if works expose an urupā, traditional site, taonga (significant artefacts), kōiwi (human remains) or other archaeological site. ix. Add an advice note that reads: <u>“Any new works or equipment means those works which were not existing prior to the notification of the Auckland Unitary Plan.”</u> <p>Submissions to 8524 by the requiring authority</p> <ul style="list-style-type: none"> i. Changes to the heading to the designations so they are consistent with the Schedule preceding the individual designations and changing the heading “Purpose” to “Description/Activity” with minor additions to clarify the nature of the activity or its location. |
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| | <ul style="list-style-type: none"> ii. Delete Conditions 1 and 2. iii. Amend Condition 7 to read: “A security fence is to be erected maintained around the switching station substation. Warning signs are to be placed on this fence and a sign identifying the site as being owned by Transpower New Zealand Ltd (Transpower) is to be erected maintained at the site entrance. The sign at the site entrance shall comply with the Council’s signs bylaw.” iv. Amend Condition 8 to read: “Colours of Structures <ul style="list-style-type: none"> a. The 18.5 metre transmission pole and the 23 metre telecommunications pole are to be painted <u>and maintained as</u> a dark green colour, to blend in with the background hills.” v. Delete Condition 9 that relates to obtaining necessary consents prior to construction. vi. Amend Condition 13 to read: “The noise level generated by the switching station shall comply at all times with the following noise levels...Sound levels shall be measured in accordance with the requirements of NZS 6801:1999 Measurement of Sound and assessed in accordance with the requirements of NZS 6802:2008 Acoustic Assessment of Environmental <u>Sound NZS 6801:2008 Acoustics -Measurement of Environmental sound and NZS 6802:2008 Acoustics- Environmental Noise</u> except that all measurements shall be carried out within the notional boundary of any dwelling as defined above.” vii. Delete Conditions 14 to 17 that relate to noise during the construction period. viii. Delete Condition 18 and replace with a condition that reads: <u>“Any new works or equipment shall be designed and constructed to limit the EMF at or beyond the secure boundary of the substation site to the International Commission on Non-Ionising Radiation Protection Guidelines for limiting exposure to time-varying electric, magnetic, and electromagnetic fields (up to 300 GHz) (Health Physics 97(3):257-259; 2009) (ICNIRP Guidelines) public reference levels of 5 kV/m for electric fields and 200 µT for magnetic flux density at one metre above ground level under maximum normal operating conditions (ie, when there are no faults in the transmission system).”</u> ix. Delete Condition 20 that relates to uncovering archaeological remains and replace with a condition that specifies the procedures that apply should any urupa, traditional sites, taonga (significant artefacts) |
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| | <p>or koiwi (human remains) be exposed during site works.</p> <p>x. Add an advice note to read: <u>“Any new works or equipment means those works which were not existing prior to the notification of the Auckland Unitary Plan.”</u></p> <p>Submissions to 8521 and 8524 by others</p> <p>i. 3424-38 M W Norton, 3738-91 Manukau Harbour Restoration Society, 4442-35 The Onehunga Enhancement Society, and 4484-21 Selwyn Street Properties Ltd 3424-33 seeking that all Transpower designations be amended to require notification to local boards and owners of property prior to making changes to overhead lines or towers and requiring Transpower to work with the Council and other organisations to place power lines underground.</p> |
| <p>Engagement by requiring authority with submitters.</p> | <p>In regard to Mark Norton, The Manukau Harbour Restoration Society, The Onehunga Enhancement Society, Jackson Electrical Industries Ltd and Selwyn Street Properties Ltd it has advised that its position is that the relief sought is inappropriate and unnecessary and beyond the scope of Transpower’s existing designations. The requiring authority has advised that it will continue to engage with the submitters in an attempt to resolve the issues prior to the hearing.</p> |
| <p>Assessment and reasons</p> | <p>Assessment of submissions by the requiring authority seeking amendments to Headings and insertion of term Description/Activity</p> <p>I do not consider that the amendments to the heading of the individual designations and to the heading “Purpose” will add any significant clarification and will introduce an inconsistent approach to the style of heading used throughout the designation section of the Proposed Auckland Unitary Plan except the amendment proposed to the purpose of Designation 8524 to correct it from a switching station to a substation. Accordingly, apart from this latter amendment I do not recommend that the changes sought in those submissions by the requiring authority be confirmed.</p> <p>Assessment of submissions by the requiring authority seeking amendments to conditions</p> <p>I am satisfied that all of the amendments that the requiring authority has requested through its submissions are of a minor nature and include both updating of operational conditions and removal of conditions relating to construction which are no longer relevant. I recommend that these amendments be confirmed.</p> <p>Assessment of submissions by the requiring authority seeking the addition of maps to be added to each</p> |

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| | <p>designation.</p> <p>I have given consideration to the request that Transpower has made in respect of all of its designations. I consider that while the addition of maps will to some extent duplicate the mapping of the designations in the Unitary Plan map system, it will have benefits particularly in regard to more clearly indicating the location of lines and tunnels. I particularly note that the Proposed Auckland Unitary Plan currently contains a very large number of construction related plans that are no longer of relevance and simply add to confusion when the extent and effects of the designation of an existing work is being considered. I recommend that the requiring authority's submissions seeking the addition of new plans for each designation and the deletion of existing construction related maps be recommended for confirmation. This recommendation is subject to the requiring authority providing copies of marked up amendments to designation plan attachments to the Panel's satisfaction.</p> <p>Assessment of third-party submissions</p> <p>Submitters M W Norton, Manukau Harbour Restoration Society, The Onehunga Enhancement Society, Jackson Electrical Industries Ltd, and Selwyn Street Properties Ltd are concerned about potential effects arising from changes to transmission lines and towers and request that any such changes be publicly notified. I am of the view that the modifications to the conditions do not change the potential for effects arising from changes to transmission lines and towers authorised by the designation. The effects of the proposed modifications to conditions dealing with matters such as operational noise, and electromagnetic fields radio frequency, light spill and operational noise will provide additional mitigation of any potential adverse effects arising from the activities already authorised by the designations.</p> <p>Effects on adjacent properties and on wider environment</p> <p>For the reasons set out above I do not consider that there are any adverse effects on adjacent properties and on the wider environment that are more than minor and indeed any adverse effects from activities already authorised by the designation will be additionally mitigated by the proposed conditions.</p> |
| Recommendation to Panel | That the Panel recommends that the notices of requirement for existing designations included in the Proposed Auckland Unitary Plan as Designations 8521, and 8524 be confirmed subject to the modifications set out in Attachment 1. |
| Response from requiring authority | Agrees with the above recommendations to Panel. Wishes to be heard on the following matters: |

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| | <p>If submissions by third party submitters discussed above cannot be resolved and those parties advise the Panel that they require a hearing.</p> <p>Mediation requested on the following matters:</p> <p>Not required.</p> |
| Report writer's further amendments to recommendation.. | <p>The report writer has been advised by Ms Rebecca Eng of Transpower that it was not possible to provide the maps referred to in "Assessment of submissions by the requiring authority seeking the addition of maps to be added to each designation" within the time needed to complete the confirmation of the Panel's recommendations and for that reason that part of the Transpower submission would be withdrawn. Attachment 1 has been amended accordingly.</p> |
| Further Minor Amendments sought by Transpower not included in any submissions | <p>At the pre-hearing meeting for Topic 074 Designations on 16 September 2015 Transpower referred to a list of further amendments that were proposed in order to update technical information and prescriptions to conditions attached to its designations. These amendments were not included in any submissions lodged by the requiring authority or any other party. These amendments were considered by the requiring authority to be of a minor nature and unlikely to have more than minor adverse effect on the environment or on other persons or properties.</p> <p>In accordance with the Panel's direction at that meeting a set of documents setting out these amendments were forwarded to me by email from Rebecca Tompkins on 2 October 2015. I reviewed these further amendments and after the details of one item were adjusted to meet my concerns I agreed that the further amendments proposed were of a minor nature and would generally improve the operation of the designations through the updating of conditions to reflect current best practicable option.</p> |
| Report writer's recommendation in regard to further minor amendments received on 2 October 2015 | <p>I recommend that these further minor amendments, which are separately identified as "Pursuant to minor further amendments received 2-10-2015" under each of the designations referred to in attachment 1 below, be recommended to the Council for confirmation.</p> |
| Recommendation from Panel | <p>The Panel agrees with the report writer's recommendations.</p> |
| Panel Reasons | <p>The Panel agrees with the report writer's reasons.</p> |

10. Attachment 1 changes to text of Proposed Auckland Unitary Plan

Designation 8521

Delete condition 1 and renumber other conditions.

Pursuant to minor further amendments received 2-10-2015; delete Condition 3 and replace with text that reads:

Any equipment shall be designed and operated to limit the electric and magnetic field exposures to the International Commission on Non-Ionising Radiation Protection, Guidelines for limiting exposure to time-varying electric, and magnetic, fields (1Hz – 100kHz), (Health Physics 99(6):818-836; 2010) (ICNIRP Guidelines). That is the public reference levels of 5 kV/m for electric fields and 4200 µT for magnetic flux density at one metre above ground level under maximum normal operating conditions (ie, when there are no faults in the transmission system).

Delete Condition 4 and renumber other conditions.

Pursuant to minor further amendments received 2 October 2015, amend Condition 5 to read:

The site shall be designed and operated to limit public exposure to electric and magnetic fields, in accordance with the recommendations in Section 1, ~~Extremely low frequency fields~~ of the World Health Organisation monograph, Environmental Health Criteria No. 238 Extremely low frequency fields June 2007.

Delete Condition 7 and renumber other conditions.

Amend Condition 13 to read:

The switchyard shall be ~~designed, constructed and~~ operated in such a manner so that the noise level measured at the site boundaries of 261 Quarry Road shall not exceed the following limits:

| | Leq Levels | Leq Levels |
|------------------------------|------------|------------|
| Monday – Sunday 7am – 8pm | 55 dBA | |
| Monday– Sunday 8pm – 7am | 45 dBA | 75 dBA |

a. The noise levels shall be measured and assessed in accordance with the requirements of ~~NZS 6801:1999 Measurement of Sound and NZS 6802:1999 Assessment of Environmental Sound~~ NZS 6801:2008 Acoustics -Measurement of Environmental sound and NZS 6802:2008 Acoustics- Environmental Noise.

b. The noise shall be measured by a sound level meter complying with the International Standard IEC 651(1979): Sound Level Meters, Type 1.

c. Should the above standards be superseded then the most up to date standards shall apply.

Amend Condition 18 as follows:

Archaeological Deposits Cultural/spiritual

If any urupa, traditional sites, taonga (significant artefacts), koiwi (human remains) or other archaeological sites are exposed during site works then the following procedures shall apply:

- a. ~~Immediately it becomes apparent that an urupa, traditional site, taonga, koiwi or other archaeological site has been exposed, all site works~~ Works in the immediate vicinity of the site that has been exposed shall cease.
- b. The site supervisor shall immediately secure the area in such a way that ensures that any artefacts or remains are untouched ~~not further disturbed~~; and
- c. The site supervisor shall notify tangata whenua, the New Zealand Historic Places Trust, the Department of Conservation, the Auckland Council, and, in the case of human remains, the NZ police, and, ~~that an archaeological or traditional site has been exposed so that appropriate action can be taken. This includes such persons being given reasonable time as determined by the Council to record and recover archaeological features discovered before work may commence~~
- d. The notification in (c) above shall allow such persons being given a reasonable time to record and recover archaeological features discovered before work may recommence on the exposed site.

Add an advice note that reads:

Any new works or equipment means those works which were not existing prior to the notification of the Auckland Unitary Plan.

Designation 8524

Amend Condition 1 to read:

1. The purpose of the designation is to provide for a ~~switching~~ substation at Huapai.

Delete Condition 2 and renumber other conditions.

Amend Condition 7 to read:

A security fence is to be erected maintained around the ~~switching station~~ substation. Warning signs are to be placed on this fence and a sign identifying the site as being owned by Transpower New Zealand Ltd (Transpower) is to be ~~erected~~ maintained at the site entrance. The sign at the site entrance shall comply with the Council's signs bylaw.

Delete Condition 9 and renumber other conditions.

Amend Condition 10 to read:

Colours of Structures

a. The 18.5 metre transmission pole and the 23 metre telecommunications pole are to be painted and maintained as a dark green colour, to blend in with the background hills...

Amend Condition 13 to read:

The noise level generated by the switching station shall comply at all times with the following noise levels...

...Sound levels shall be measured in accordance with the requirements of ~~NZS 6801:1999 Measurement of Sound and assessed in accordance with the requirements of NZS 6802:2008 Acoustic – Assessment of Environmental Sound~~ NZS 6801:2008 Acoustics -Measurement of Environmental sound and NZS 6802:2008 Acoustics- Environmental Noise except that all measurements shall be carried out within the notional boundary of any dwelling as defined above.

Delete Conditions 14 to 17 and renumber other conditions.

Pursuant to minor further amendments received 22 October 2015, delete Condition 18 and replace with a condition that reads:

Any equipment shall be designed and operated to limit the electric and magnetic field exposures to the International Commission on Non-Ionising Radiation Protection, Guidelines for limiting exposure to time-varying electric, and magnetic, fields (1Hz – 100kHz), (Health Physics 99(6):818-836; 2010) (ICNIRP Guidelines). That is the public reference levels of 5 kV/m for electric fields and 4200 µT for magnetic flux density at one metre above ground level under maximum normal operating conditions (ie, when there are no faults in the transmission system).

Delete Condition 20 including the heading 'Archaeological Sites' and replace with the following:

Cultural /Spiritual

If any urupa, traditional sites, taonga (significant artefacts), or koiwi (human remains) are exposed during site works, and the following procedures shall apply:

- a. Works in the immediate vicinity of the site that has been exposed shall cease;
- b. The site supervisor shall immediately secure the area in a way that ensures that any remains or artefacts are untouched;
- c. The site supervisor shall notify representatives of relevant tangata whenua, the New Zealand Historic Places Trust, the Auckland Council and, in the case of human remains, the New Zealand Police; and,
- d. The notification in (c) above shall allow such persons being given a reasonable time to record and recover archaeological features discovered before work may recommence on the exposed site.

Delete Condition 21.

Add an advice note after the last condition to read:

Any new works or equipment means those works which were not existing prior to the notification of the Auckland Unitary Plan.

11. Attachment 2 changes to maps in Proposed Auckland Unitary Plan

Nil

12. Expert information

The attached letter providing expert advice supporting the technical conditions contained in the rollover also contained a further attachment (Attachment D) listing additional changes that the requiring authority requested but which were not covered in the original designation in the operative plan, or in the rollover, or in any submission. As discussed above these further amendments were subsequently assessed as being of a technical nature only and where relevant have been recommended as amendments which are separately identified as "Pursuant to minor further amendments received 2-10-2015".

13 August 2015

Harry Bhana
Director
Harry Bhana & Associates Ltd
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FROM: Rebecca Tompkins
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by email

Dear Mr Bhana

TOPIC 074 DESIGNATIONS - RESPONSE TO REQUEST FOR FURTHER INFORMATION

Introduction

- 1 We act for Transpower New Zealand Limited (*Transpower*) in relation to Topic 074 Designations of the Proposed Auckland Unitary Plan (*Unitary Plan*).
- 2 We refer to your email of 28 July 2015, requesting further information in relation to the changes sought by Transpower to conditions in its Notices of Requirement and designations to be rolled over into the Unitary Plan.

Further information provided

- 3 In response to your request, please find **attached**:
 - 3.1 As **Attachment A**, a table summarising the relevant conditions, further information requested and response provided by Transpower, including:
 - (a) Confirmation from Robert Deller, Transpower's Principal Engineer – Asset Engineering Lines, that:
 - (i) The proposed oil spill management conditions are in accordance with best practice and were accepted by the Board of Inquiry for the North Island Grid Upgrade Project (*NIGUP*);
 - (ii) The proposed light spill management conditions will adequately mitigate the effects of exterior lighting on the substation sites and were accepted by the Board of Inquiry for NIGUP;
 - (b) Confirmation from Robert Deller in relation to lines and Jitesh Raniga, Transpower's Senior Development Engineer – Asset Engineering Stations, in relation to substations, that the proposed conditions will adequately mitigate the effects of earth potential rise and ensure electrical safety from the facility, and were accepted by the Board of Inquiry for NIGUP; and

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- (c) Confirmation from Jitesh Raniga that the proposed conditions will adequately mitigate the effects of radio frequency interference emitted from the substation site or transmission line.
 - 3.2 As **Attachment B**, a letter from Lindsay Hannah and Malcolm Hunt, Malcolm Hunt Associates confirming that:
 - (a) The proposed conditions will adequately mitigate the effects of noise and vibration emitted during construction and maintenance; and
 - (b) The proposed conditions will adequately mitigate the effects of operational noise and vibration.
 - 3.3 As **Attachment C**, a letter from Matthew Walker, an Environmental Specialist at Transpower, confirming that the proposed conditions will adequately mitigate the effects of electric and magnetic fields emitted from the substation site or transmission line.
- Additional amendments sought**
- 4 In the course of assessing the proposed changes to the designation conditions in order to respond to your request, Transpower has identified some further, minor amendments to the conditions which, based on the advice of relevant experts, it considers are necessary.
 - 5 The further changes sought are shown in as track changes to Transpower's original submission on the Unitary Plan, **attached as Attachment D** to this letter. In summary, the changes are the:
 - 5.1 Deletion of the term "maintenance" in the construction noise and vibration conditions as it is already included within the definition of "construction" within NZS6803;
 - 5.2 Deletion of the unnecessary exception for noise limits for emergency works in the conditions as this is already provided for in NZS6803;
 - 5.3 Replacement of the term "audible noise" and the reference to the substation boundary as the assessment location in substation designation conditions;
 - 5.4 Removing the reference to NZS6081 and NZS6802 where there is no decibel noise limit specified within the designation conditions for the particular substation site;
 - 5.5 Amendments to Advice Note 11 of Designation 8513: Otahuhu Electricity Substation to refer to NZS6802:2008 for consistency with updated conditions;
 - 5.6 The removal of redundant noise and vibration conditions in relation to construction works that have already been completed; and

- 5.7 Minor revisions to the conditions in relation to electric and magnetic fields to correct errors made in its original submission, and to ensure that the most up to date guidance is referred to.
- 6 These changes are supported by the technical expert assessments provided, and are to correct errors and reflect current best practice. Accordingly, Transpower considers that the further changes will not alter the effects of the designations on the environment.
- 7 If you have any questions in relation to the further information provided, or the additional amendments to the conditions now sought, please feel free to contact Rebecca Eng, Transpower's Senior Environmental Planner on 027 578 5232 or rebecca.eng@transpower.co.nz

Yours sincerely



Luke Hinchey / Rebecca Tompkins
SENIOR ASSOCIATE / SENIOR SOLICITOR

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ATTACHMENT A – SUMMARY OF TRANSPOWER'S RESPONSE TO REQUEST FOR FURTHER INFORMATION

TRANSPOWER NEW ZEALAND LIMITED – AUCKLAND COUNCIL: S.142 REQUEST IN RELATION TO TOPIC 074 DESIGNATIONS

SUMMARY OF INFORMATION REQUESTED AND RESPONSE PROVIDED

| Topic | Condition | S142 information request | Transpower Technical Expert Response |
|---|---|---|---|
| Construction and Maintenance Noise | <p>2. Subject to condition 3 below, all construction and maintenance work shall be designed, managed and conducted to ensure that construction and maintenance noise from the site does not exceed the limits in NZS6803:1999 Acoustics–Construction Noise at locations set out in section 6.2 of that standard.</p> | <p>These conditions apply to substations. Confirmation from acoustic expert that the proposed conditions will adequately mitigate the effects of noise emitted during construction and maintenance is required.</p> | <p>See attached correspondence prepared by Malcolm Hunt Associates dated 6 August 2015 confirming that the condition is appropriate provided reference to "maintenance" is deleted. Transpower now seeks further refinement to this standard condition to delete reference to "maintenance" for the reasons detailed in the Malcolm Hunt Associates letter.</p> |
| | <p>3. The noise limits shall not apply to emergency work required to re-establish continuity of supply, work urgently required to prevent loss of life or other personal injury, or commissioning works at the substation site, but all practicable steps shall be undertaken to control noise and to avoid adverse noise effects, particularly at times when the stricter noise limits apply (e.g. at night-time).</p> | | |
| | <p>4. Prior to any significant construction work taking place, including any earthworks, a noise management plan shall be prepared, with the assistance of a suitably qualified and experienced person, that sets out the management procedures in terms of section 8 and Annex E of NZS6803:1999 and the works shall be undertaken in accordance with that noise management plan.</p> | | <p>See attached correspondence prepared by Malcolm Hunt Associates dated 6 August 2015 recommending support for the proposed wording with no revisions.</p> |

ATTACHMENT A – SUMMARY OF TRANSPOWER’S RESPONSE TO REQUEST FOR FURTHER INFORMATION

| Topic | Condition | S142 information request | Transpower Technical Expert Response |
|--------------------------|--|---|---|
| | <p>5. The noise management plan required by the above condition 4 shall be submitted to Council’s Consents Manager for approval, at least 20 working days prior to the works commencing. The Council’s Consents Manager shall respond within 20 working days indicating whether approval is given or refused. Approval shall not be unreasonably withheld.</p> | | <p>See attached correspondence prepared by Malcolm Hunt Associates dated 6 August 2015, confirming support for the proposed wording with no revisions.</p> |
| Vibration | <p>6. Vibration from all construction activities shall not exceed the limits of, and shall be measured and assessed in accordance with, German Standard DIN 4150-3 (1999-02) Structural Vibration – Effects of Vibration on Structures.</p> | <p>These conditions apply to substations and transmission lines. Confirmation from acoustic/vibration expert that the proposed conditions will adequately mitigate the effects of vibration emitted during construction and maintenance is required.</p> | <p>See attached correspondence prepared by Malcolm Hunt Associates dated 6 August 2015, confirming support for the proposed wording with no revisions.</p> |
| Operational noise | <p>13. A noise management plan shall be submitted for any new equipment (such as transformers, fans and circuit breakers) that is likely to generate noise audible at the designation site boundary.</p> | <p>These conditions apply to substations. Confirmation from acoustic expert that the proposed conditions will adequately mitigate the effects of noise emitted during construction and maintenance is required. Note submission by Transpower seeks to update reference to NZS6802:2008 so reference to this standard would be appropriate.</p> | <p>See attached correspondence prepared by Malcolm Hunt Associates dated 6 August 2015 confirming that the condition is appropriate provided that the reference to “audible noise” and the reference to the substation boundary as the assessment location is removed. Transpower now seeks that this condition is amended for the reasons detailed in the Malcolm Hunt Associates’ letter.</p> |
| | <p>14. Sound levels shall be measured and assessed in accordance with NZS6801:1999 Measurement of Sound and NZS6802:2008 Acoustic – Assessment of Environmental Sound.</p> | | <p>Wording proposed in Transpower submission supported by Malcolm Hunt Associates, where a designation has specified operational noise limits. Otherwise this condition is proposed to be deleted for the reasons detailed in the Malcolm Hunt Associates letter dated 6 August 2015.</p> |

ATTACHMENT A – SUMMARY OF TRANSPOWER’S RESPONSE TO REQUEST FOR FURTHER INFORMATION

| Topic | Condition | S142 information request | Transpower Technical Expert Response |
|------------------------------------|---|---|---|
| <p>Hazardous substances</p> | <p>7. Any new part of the facility containing oil shall be designed to comply with Transpower’s Oil Spill Management Policy (TP: GS.54.01), Issue 3, December 2011.</p> | <p>A simple confirmation that this condition is in accordance with best practice and has been accepted by the Environment Court or by a Board of Enquiry.</p> | <p>Transpower uses insulating oil in its transformers, circuit breakers and other transmission equipment. The quantities of oil used and the requirement to transport, store, handle and process large quantities of oil are a potential environmental hazard if suitable spill management practices are not established and used. This Policy standard covers the policies that are required for these spill management practices. It is periodically updated by Transpower to reflect changes in best practice.</p> <p>The Board of Inquiry (BOI) decision (September 2009) for the North Island Grid Upgrade Project (NIGUP) (NIGUP Decision) accepted a condition requiring compliance with this standard at a number of substations, including Brownhill, Pakuranga and Otahuhu. Transpower now respectfully requests that the reference to issue numbers and dates associated with the policy are deleted from the condition to ensure that it does not become obsolete during the current life of the requirement. This change is shown in further track changes to designation text provided in attachment D. Removing reference to the specific issue number and date will not change the effects of the designation(s) on the environment because Transpower will still be required to comply with the most up to date version of the policy.</p> <p>Robert Deiler: Principal Engineer – Asset Engineering Stations, Transpower New Zealand Limited</p> |

ATTACHMENT A – SUMMARY OF TRANSPOWER'S RESPONSE TO REQUEST FOR FURTHER INFORMATION

| Topic | Condition | S142 information request | Transpower Technical Expert Response |
|------------------------------------|---|--|--|
| Electric and Magnetic Fields (EMF) | 8. Any new equipment shall be designed and operated to limit the EMF exposure at or beyond the secure boundary of the substation site to the International Commission on Non-Ionising Radiation Protection Guidelines for limiting exposure to time-varying electric, magnetic, and electromagnetic fields (up to 300 GHz) (Health Physics, 1998, 74(4): 494–522) (ICNIRP Guidelines) public reference levels of 5 kV/m for electric fields and 100 µT for magnetic flux density at one metre above ground level under maximum normal operating conditions (i.e., when there are no faults in the transmission system). | These conditions apply to substations and transmission lines. Confirmation from a suitably qualified expert that the proposed conditions will adequately mitigate the effects of EMF emitted from the site/line is required. Note submission by Transpower seeks to update reference "(Health Physics 1998, 74(4): 494–522)" to (Health Physics 97(3):257-259, 2009). Please report on proposed updated reference. | See attached advice prepared by Matthew Walker of Transpower NZ Ltd dated 13 August 2015. Transpower now seeks further revisions to the conditions to correct errors made in its original submission, and to ensure that the most up to date guidance is referred to. The reasons for further amendments are detailed in the advice note prepared by Matthew Walker. |
| Radio frequency interference | 9. Any new works or equipment shall comply with NZS 6869:2004 Limits and Measurement Methods of Electromagnetic Noise from High-Voltage a.c. Power Systems, 0.15 to 1000 MHz. | These conditions apply to substations and transmission lines. Confirmation from a suitably qualified expert that the proposed conditions will adequately mitigate the effects of radio frequency interference emitted from the site/line is required. | For reasons given in its original submission, Transpower's preference is that Condition "10" is deleted. In the event that the Panel is minded to retain this condition it is confirmed that both conditions "10" and "11" were imposed on substation designations for NIGUP. |
| Earth potential rise | 10. In designing and constructing new works, Transpower shall give consideration to third-party conductive services to ensure compliance with regulations 58, 60, 69 and 87 of the Electricity Regulations 1997 as in force at the date of confirmation of the designation. | These conditions apply to substations. Confirmation from a suitably qualified expert that the proposed conditions will adequately mitigate the effects of Earth Potential Rise and to ensure electrical safety arising from the facility is required. Note submission by | Chapter 11 of the NIGUP Decision deals with Noise and Electronic Interference. This includes conclusions in the following specific topic areas: <ul style="list-style-type: none"> • Radio, television and other electronic |

ATTACHMENT A – SUMMARY OF TRANSPOWER'S RESPONSE TO REQUEST FOR FURTHER INFORMATION

| Topic | Condition | S142 information request | Transpower Technical Expert Response |
|-------|---|---|--|
| | <p>11. Any new substation earth grids shall be designed, built, and tested to ensure electrical safety at or beyond the designation boundary in accordance with Transpower Standard Design of Substation Earthing (TP.DS.52.01, Issue 2, January 2005).</p> | <p>Transpower seeks to update Condition to read: "Any new works or equipment shall be designed and constructed to comply with the Electricity Safety Regulations 2010. Alternatively, delete condition 10." Please report on amendment.</p> | <p>Interference</p> <ul style="list-style-type: none"> • Earth potential rise and transferred voltages associated with overhead line <p>Paragraph 1849 of the NIGUP Decision states:</p> <p>"At the closing of the inquiry hearing, Transpower submitted to the Board proposed conditions for the designation requirements [and for the resource consents]. The Board sets out those conditions in Appendixes (sic) to this report [as follows]."</p> <p>Paragraph 1852 goes on to state:</p> <p>"The Board is satisfied that, if the requirements are confirmed and if the resource consents are granted, the proposed conditions in those appendixes should be imposed."</p> <p>With regard to condition "11" Transpower now respectfully requests that the reference to issue numbers and dates associated with the policy are deleted from the condition to ensure that it does not become obsolete during the current life of the requirement. This change is shown in further track changes to designation text (Attachment D).</p> <p>Removing reference to the specific issue number and date will not change the effects of the designation(s) on the environment because Transpower will still be required to comply with the most up to date version of the standard.</p> <p>Jitesh Raniga: Senior Development Engineer – Asset Engineering Lines, Transpower New Zealand Limited</p> |

ATTACHMENT A – SUMMARY OF TRANSPOWER’S RESPONSE TO REQUEST FOR FURTHER INFORMATION

| Topic | Condition | S14.2 information request | Transpower Technical Expert Response |
|-------------|---|--|--|
| Light spill | <p>12. All exterior lighting shall comply with:(a) AS/NZS 1158 Lighting for Roads and Public Spaces 2005 Part 3.1; and (b) Transpower’s Guidelines and Information for Switchyard and Grounds Lighting, TP DS 40.03, Issue 1, April 2012; and (c) AS 4282 1997, Control of Obtrusive Effects of Outdoor Lighting.</p> | <p>These conditions apply to substations. Confirmation from a suitably qualified expert that the proposed conditions will adequately mitigate the effects of exterior lighting on the site is required. Note submission by Transpower seeks to update Condition (b) to “b. Transpower’s guidelines and information for switchyard and grounds lighting TP.DS 40.03, Issue 1, 2012. Please report on amendment.</p> | <p>Robert Deller: Principal Engineer – Asset Engineering Stations, Transpower New Zealand Limited</p> |
| | | | <p>The purpose of TP DS 40.03 “Information for Switchyard and Grounds Lighting” is to provide guidelines and information for the design and installation of new or replacement lighting in HVAC and HVDC switchyards and grounds. It is periodically updated by Transpower to reflect changes in best practice. The policy has been developed to establish a consistency in the lighting requirements for outdoor switchyards and grounds.</p> <p>The NIGUP Decision accepted a condition requiring compliance with this standard at a number of substations, including Brownhill, Pakuranga and Otahuhu. Transpower now respectfully requests that the reference to issue numbers and dates associated with the policy are deleted from the condition to ensure that it does not become obsolete during the current life of the requirement. This is particularly relevant given that the policy was updated in July 2015 which means that the version referred to in the submission is out of date.</p> <p>This change is shown in further track changes to designation text at attachment D. Removing reference to the specific issue number and date will not change the effects of the designation(s) on the environment because Transpower will still be required to comply with the most up to date version of the standard as required by the condition.</p> |

ATTACHMENT A – SUMMARY OF TRANSPOWER’S RESPONSE TO REQUEST FOR FURTHER INFORMATION

| Topic | Condition | S142 information request | Transpower Technical Expert Response |
|-------|-----------|--------------------------|--|
| | | | Robert Deller: Principal Engineer – Asset Engineering Stations, Transpower New Zealand Limited |

ATTACHMENT B

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Document Prepared By: Lindsay Hannah and Malcolm Hunt

Transpower NZ Limited Re: Review Of Transpower's Submission on PAUP Designations *Noise & Vibration Matters*

1.0 Introduction

Malcolm Hunt Associates [MHA] have been commissioned by Transpower to conduct a review on technical noise and vibration matters associated with its submissions on Designation Conditions of the Proposed Auckland Unity Plan (PAUP).

Designations are shown in the Unitary Plan as:

- A schedule for each requiring authority which summarises the designations and notices of requirement (NoRs) they are responsible for;
- A full text version of each designation and NoR, which includes the purpose of the designation and any conditions; and
- An overlay on the planning maps for each designation and NoR, which shows the extent of the designation boundaries.

Section 176(1)(a) of the RMA states that the usual provisions of the District Plan do not apply to a public work, project or work undertaken by a requiring authority under a designation. This means the normal provisions of the Unitary Plan (district plan provisions) do not apply to a designation and the requiring authority is allowed to use the land for

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any activity within the scope of the designation. Activities that fall outside the scope of a designation are subject to the normal provisions of the Unitary Plan.

Without the normally applied PAUP noise and vibration provisions applying, any specific noise or vibration requirements of the designation conditions would have to be complied with. Thus the wording of these conditions becomes critical.

Apart from recommendations made below to improve the wording of designation conditions where necessary, our review has found the noise and vibration conditions set out within the PAUP, as proposed, are adequate to control and mitigate noise and vibration effects of the designations on the environment.

2.0 Overview

Transpower's Auckland transmission network distributes power within the region and provides through transmission to the Northland region. It consists of three layers: the 220 kV network, and the 110 kV network. The Auckland region has some of the highest load densities in New Zealand, coupled with relatively low levels of local generation. Designations within the PAUP play an important role in enabling the on-going operation of this critical infrastructural asset.

While approved designations may not include any controls over noise or vibration arising from carrying out of designation activities, it is accepted that from time to time it is appropriate for Designations to include such controls as limits on noise and vibration effects.

This report reviews the technical basis for changes Transpower has sought in relation to construction noise and vibration as well as operational noise associated with the activities conducted on the designated Transpower sites. It is noted the designations are largely sought to be "rolled over" which also acknowledges the need for a continuance of any limits or restrictions on noise or vibration at the same limits and time periods, unless there are good reasons to amend the conditions within the current roll over process.

In this regard Transpower have rightfully identified this opportunity to amend and update references to specific Standards and procedures, as well as correct any obvious errors or omissions. We agree these types of changes in the wording of designation conditions are necessary as they ensure "...the designations are all consistent, effective and clear – especially when read in the context of the wider Proposed Plan" (ref. Page 1 Transpower's Submission to the PAUP submitter no. 3766).

Based on experience with best practice and developing effective and workable noise rules in District Plans, the finding is that the approach sought by Transpower within its 'decisions sought' is entirely reasonable and technically supportable.

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The comments below are based on a best practice approach to controlling noise and vibration effects to reasonable levels.

Recommendations are set out below for the wording of designation conditions to suitably control noise and vibration from the construction and operation of equipment within Transpower's designated sites. Accepting these recommendations will require amendments and adjustments beyond those forwarded to Council within the changes requested in Appendix 3 to the Transpower submission, however the amendments are supported to ensure the PAUP designation conditions are correct, simple to follow and enforceable at law.

3.0 Construction Noise

The approach taken with respect to construction noise is to correctly refer to the relevant NZ Standard NZS6803:1999 *Acoustics – Construction Noise*.

This Standard is employed within the standardized approach adopted within Transpower's designations as follows:

| Condition | Comment |
|--|--|
| Subject to condition 3 below, all construction and maintenance work shall be designed, managed and conducted to ensure that construction and maintenance noise from the site does not exceed the limits in NZS6803:1999 <i>Acoustics – Construction Noise</i> at locations set out in section 6.2 of that standard. | 1. The term "maintenance" is already included within the definition of "construction" within this Standard'. 2. These words are not necessary. |
| The noise limits shall not apply to emergency work required to re-establish continuity of supply, work urgently required to prevent loss of life or other personal injury, or commissioning works at the substation site, but all practicable steps shall be undertaken to control noise and to avoid adverse noise effects, particularly at times when the stricter noise limits apply (e.g. at night-time). | 1. This exception is not needed as the construction noise Standard NZS6803:1999 states at clause 1.5 "This Standard does not apply to emergency works as defined in the Resource Management Act 1991." |
| 4. Prior to any significant construction work taking place, including any earthworks, a noise management plan shall be prepared, with the assistance of a suitably qualified and experienced person, that sets out the management procedures in terms of section 8 and Annex E of NZS6803:1999 and the works shall be undertaken in accordance with that noise management plan. | Support this wording |
| 5. The noise management plan required by the above condition 4 shall be submitted to Council's Consents Manager for approval, at least 20 working days prior to the works commencing. The Council's Consents Manager shall respond within 20 working days indicating whether approval is given or refused. Approval shall not be unreasonably withheld. | Support this wording |

The amended wording will ensure Noise Management Plans are applied effectively and efficiently to reasonably control construction noise, in a manner consistent with best practice in this area.

¹ NZS6803:1991: definition of "Construction" is attached as **APPENDIX A**.

4.0 Construction Vibration

Vibration effects are only relevant where construction activities take place at substations or transmission pylons. As with construction noise, affected communities can tolerate construction vibration effects where they are temporary in nature. Thus, best practice in this area has been to adopt designation conditions for construction vibration which control the worst effects of construction vibration, such as vibration levels sufficient to potentially damage buildings. This is the approach adopted below which is consistent with best practice to control construction vibration effects on the environment.

The following comments are made with respect to the generic wording of the following condition applying to construction vibration:

| Condition | Comment |
|--|----------------------|
| 6. Vibration from all construction activities shall not exceed the limits of, and shall be measured and assessed in accordance with, German Standard DIN 4150-3 (1999-02) Structural Vibration – Effects of Vibration on Structures. | Support this wording |

There are no New Zealand Standards directly dealing with the vibration effects on buildings. An expert paper has been recently published regarding the review of the various international vibration standards commenting on the usefulness of each Standard and comparing the degree of "protection" each standard afforded². The review considered the following standards:

- ANSI S2.71-1983 (R 2006) "Guide to the Evaluation of Human Exposure to Vibration in Buildings", American National Standards Institute, 2006
- AS 2670-2:1990 "Evaluation of human exposure to whole-body vibration – Part 2: Continuous and shock-induced vibration in buildings (1 to 80 Hz)", Standards Australia, 1990
- BS 5228-2:2009 "Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration", British Standards Institute, 2009
- BS 6472-1:2008 "Guide to evaluation of human exposure to vibration in buildings – Part 1: Vibration sources other than blasting", British Standards Institute, 2008
- BS 6472-2:2008 "Guide to evaluation of human exposure to vibration in buildings – Part 2: Blast induced vibration", British Standards Institute, 2008
- BS 7385-1:1990 "Evaluation and measurement for vibration in buildings – Part 1. Guide for measurement of vibration and evaluation of their effects on buildings", British Standards Institute, 2008 BS 7385-2:1993 "Evaluation and measurement for vibration in buildings – Part 2. Guide to damage levels from ground borne vibration", British Standards Institute, 1993
- DIN 4150-2:1999 "Structural vibration – Part 2: Human exposure to vibration in buildings", Deutsches Institute für Normung, 1999
- DIN 4150-3:1999 "Structural vibration – Part 3: Effects of vibration on structures", Deutsches Institute für Normung, 1999

Regarding the German Standard DIN 4150-3 (1999-02), the review reported "The adoption of a statistical approach to the implementation of DIN 4150-3:1999 is

² A Review of the Adoption of International Vibration Standards in New Zealand by James Whitlock, Marshall Day Acoustics, Auckland. New Zealand Acoustics Vol. 24 / # 2

considered pragmatic, and promotes comprehensive monitoring and assessment of vibration activities such as construction works.”

The review goes on to say “The DIN 4150-3:1999 standard is therefore considered most suitable to assess and quantify the risk of building damage from vibration.”

We support the above review findings and therefore recommend the reference to DIN 4150-3 (1999-02) be retained in the designation conditions for the effective and efficient control of vibration effects on buildings.

5.0 Operational Noise

Designation conditions covering noise from on-going operation of equipment operating on Transpower sites in accordance with the PAUP designations are found within designations conditions for some Transpower designated sites.

The following two generic operational noise conditions are included in the PAUP Transpower designations:

| Condition | Comment |
|--|-------------------------------------|
| A noise management plan shall be submitted for any new equipment (such as transformers, fans and circuit breakers) that is likely to generate noise audible at the designation site boundary <u>received within any residentially zone site or the notional boundary to any rural dwelling.</u> | Support this wording <u>in part</u> |
| Sound levels shall be measured and assessed in accordance with NZS6801:1999 Measurement of Sound and NZS6802:2008 Acoustic – Assessment of Environmental Sound. | Remove OR Amend |

Each of these two conditions are discussed as follows:

5.1 Noise Management Plan

The “noise management plan” approach is supported. We agree at some sensitive sites noise from new equipment needs to be carefully managed at times when new equipment is installed³.

However this approach is not needed in all situations. Noise and vibration only needs to be reasonably limited at noise sensitive sites. Controlling audible noise for locations

³ We have hands on experience in the assessment of noise from Transpower’s substations both before and after certain capital works are carried out.

beyond the designation site boundary may not be efficient for sites where land uses in the vicinity are not noise sensitive.

We consider it is acceptable to require a Noise Management Plan where "new equipment" is to be installed, however we recommend the wording be amended so that a Noise Management Plan to control operational noise effects is only necessary where nearby sites are classified as noise sensitive (residentially zoned sites or the national boundary to dwellings in rural areas).

We also recommend removing the term "audible noise" as this invites the interpretation that any audible sound from the site could be classified as "noise" and thereby considered unreasonable. In reality, the PAUP provides both generic and in some cases specific guidance on what reasonable levels of noise emission from Transpower sites should be. These are the objective limits that should be met, as opposed to whether or not a sound is "audible" (which can vary due to a host of factors including the weather and levels of ambient sound found in the area).

In summary, our recommendation is to:

- A. Retain the current requirements to prepare a "Noise Management Plan" where this is already referred to in conditions, and;
- B. Amend condition wording (as above) to remove the term "audible noise" and the reference to the substation boundary as the assessment location.

5.2 NZ Standards

Best practice with respect to writing noise rules is dictated by the relevant recommendations of Section of NZS6802:2008 Acoustics – Environmental Noise. This Standard recommends that under Section 8.1.3 noise limits should include a number of basic elements, including "reference to Standards for measurement and assessment methods" (ref. NZS6802:2008 Section 8.1.3(F)).

This is because the correct interpretation, application and compliance testing will rely on these Standards to ensure the limits are enforced consistently and with the desired effect.

However, within 33 designations published in the PAUP for Transpower sites, only 6 (six) designations include decibel noise limits which would trigger the need to include any reference to NZ noise and acoustic Standards.

Thus, where the designation conditions refer to a decibel noise limit, we recommend retaining the reference to NZ Standards NZS6801 and NZS6802 as this is a key requirement which ensures the noise limit is enforceable and can be enforced in a consistent manner.

We recommend removing the reference to NZ Standards where there is NO decibel noise limit specified within the designation conditions for the site. This because the

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reference to these two Standards is not necessary and does not provide any useful guidance.

Attached as **APPENDIX B** are specific recommendations for amending Transpower designations in the PAUP where NZS6801 / NZS6802 are mentioned. The recommendations are based on the above discussion but have been translated into a single document setting out specific recommendations to deal with the NZS6801/NZS6802 matter.

5.3 Use Of 2008 NZ Standards With L10 Noise Limits

Numerical noise limits are specified only within the following designations in the PAUP:

| <i>Designation No.</i> | <i>Designation Name:</i> |
|------------------------|---|
| 8512 | Brownhill to Whakamaru Overhead Transmission Line |
| 8513 | Otahuhu Substation |
| 8514 | Pakuranga Substation |
| 8515 | Brownhill Road Substation |
| 8521 | Drury Substation |
| 8524 | Huapai substation |

Reference to the two NZ Standards NZS6801 and NZS6802 only needs to occur within the designation conditions for designations that stipulate an enforceable noise limit. Else, the inclusion of the names of these two Standards serves no useful purpose.

For the above-identified SIX designations where noise limits are included, we the notified PAUP contained reference to the following versions of NZS6801 and NZS6802:

Published 1991:

NZS 6801:1991 *Measurement of Environmental Noise*
 NZS 6802:1991 *Assessment of Environmental Noise*

Published 1999

NZS 6801:1999 *Acoustics – Measurement of Sound*
 NZS 6802:1999 *Acoustics – Assessment of Environmental Sound*

Published 2008:

NZS 6801:2008 *Acoustics – Measurement of Environmental Sound*
 NZS 6802:2008 *Acoustics – Environmental Noise*

As publicly notified, conditions applying to noise from Transpower on-going operations on designated sites where a specified noise limit is applied in FIVE of the SIX cases correctly quote both NZS6801 and NZS6802 as a "pair" (that is, as they are designed to be used together).

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However, within the PAUP designation conditions we find the versions of the NZ Standards referred to are often mis-matched with no consistent picture emerging.

Our recommendation is that a reference to the relevant NZ acoustic standards is necessary wherever the designation conditions specify an operational noise limit to be complied with. In this case we recommend the technically most up to date 2008 versions. Thus, wherever a noise limit is specified within conditions BOTH the following standards should also be included within the designation conditions;

NZS 6801:2008 Acoustics – Measurement of Environmental Sound
NZS 6802:2008 Acoustics – Environmental Noise

While these Standards were designed for use with the LAeq noise unit as the basis for noise assessment, there are no technical barriers if these 2008 standards are applied to the measurement and assessment of noise quantified in terms of L10 units.

The unit L10 is defined within the 2008 Standards and there is a high degree of similarity in approach between the 1991 / 1999 versions of this Standard. There are no barriers to using the above 2008 NZ acoustic Standards to assess the measured L10 noise levels. This approach will require the user to adopt the measured L10 value as if it were the measured LAeq, within the NZS6802:2008 assessment process. Thus, the finally produced "Lr" level within NZS6802:2008 would be found by adjusting the measured L10 level and adjusting as required for tonality, background sound, etc.

While acknowledging use of measured L10 sound level in place of a measured LAeq sound levels is not an ideal approach, there are no technical difficulties with enforcement. Retaining the L10 noise limits and applying the 2008 NZ Standards has the advantages of:

1. Avoiding technical arguments around whether L10 or LAeq would allow different amounts of noise emission. Traditionally LAeq and L10 measure quite close to each other (for the same sound level), which is especially so where the sound source is fairly uniform in output (such as substation sounds) – in those situations the typical difference between these two types of measurement units would be 1 dB or less.
2. Being able to adopt the more recently developed noise measurement and assessment methodologies of the 2008 versions of NZS6801 and NZS6802, such as allowing for the contaminating effects of residual sound.

Thus, the overall advantage is that the 2008 versions of the two relevant NZ Standards can be incorporated into the designation conditions to control operational noise (where necessary) without opening up potentially difficult technical arguments around whether L10 or Leq may allow for different levels of noise emission.

In relation to Designation 8513 "Otahuhu Electricity Substation" we note in the "Advice Note" to Condition 11 that the 1991 version of NZS6802 is referred. As above, we

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recommend this be amended to the 2008 version of NZS6802. This will cause a minor consequential wording change to the advice note as follows:

The 1991 version of that Standard recommends that a 5dB "penalty" apply where a sound is assessed as possessing "special audible character" to account for the added annoyance such sounds may generate. That is why the Advice Note states "These sound levels contain special audible characteristics and an assessment using NZS6802:1998 would cause any performance standard to be reduced by 5 dB." However, this same adjustment under where the 2008 version of NZS6802 is slightly different as the "penalty" is applied by adding 5 dB to the measured level to account for the added annoyance of sound which contain "special audible characteristics". Thus the last sentence of the "Advice Note" under Condition 11 be re-written as:

These sound levels may contain special audible characteristics. Assessment under NZS6802:2008 may require sound levels measured at sensitive receiver sites to be increased by 5 dB to reflect the potential added annoyance such sounds may generate".

This amendment retains the original intent of the advice note, but updates its commentary to relate to the 2008 version of standard NZS6802 (in place of the 1991 version currently referred to).

6.0 Removal Of Redundant Noise & Vibration Requirements

The PAUP will also be improved by removing unnecessary wording relating to construction works that have already been completed.

For example, Designation 8507 : 8507 Pakuranga to Penrose Underground Transmission Cables includes conditions that refer to the control of noise and vibration during construction, including the production of a Noise & Vibration Management Plan. As we understand these works are completed, we see no reason for these requirements to remain in the designation conditions.

7.0 Summary

We have undertaken a review of noise and vibration conditions attached to Transpower's designations in the PAUP. This review has found a number of deficiencies in the noise and vibration conditions as notified, however recommendations have been made that will remove these deficiencies and result in a set of noisier and vibration designation conditions that will be well suited to controlling potential noise and vibration effects of designation activities have on the environment.

Amendments have been recommended in order to update the conditions in accordance with "best practice", and improve workability. The most significant change relates to noise and acoustic standards referred to "Operational Noise" conditions. We

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have identified references to different versions of NZ Standards NZS6801 and NZS6802 throughout the designation conditions, however none of these references are considered necessary unless a specific noise performance standard is set out within the conditions.

Overall, with amendments in place, noise and vibration effects of construction and on-going operation of Transpower's assets covered by the designations will be able to be measured, assessed and controlled in accordance with best practice and the methods for measuring and assessing noise found elsewhere within the PAUP. Thus, the amended designation conditions will be efficient and effective in controlling noise and vibration effects on the environment.

Malcolm Hunt Associates


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Consultant

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Document Sign off

Malcolm Hunt [12 August 2015]

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APPENDIX A – Definition of “Construction Noise”

Ref. Section 3, NZS6803:1999 *Acoustics – Construction Noise*

CONSTRUCTION WORK means any work in connection with the construction, erection, installation, carrying out, repair, maintenance, cleaning, painting, renewal, removal, alteration, dismantling, or demolition of:

- (a) Any building, erection, edifice, structure, wall, fence or chimney, whether constructed wholly or partly above or below ground level;
- (b) Any road, motorway, harbour or foreshore works, railway, cableway, tramway, canal, or aerodrome;
- (c) Any drainage, irrigation, or river control work;
- (d) Any electricity, water, gas, or telecommunications reticulation;
- (e) Any bridge, viaduct, dam, reservoir, earthworks, pipeline, aqueduct, culvert, drive, shaft, tunnel, or reclamation; or
- (f) Any scaffolding.

Construction work includes:

- a) any work in connection with any excavation, site preparation, or preparatory work, carried out for the purpose of any construction work;
- b) the use of any plant, tools, gear, or materials for the purpose of any construction work;
- c) any construction work carried out underwater, including work on ships, wrecks, buoys, rafts, and obstructions to navigation; and
- d) any inspection or other work carried out for the purpose of ascertaining whether construction work should be carried out.

CONSTRUCTION NOISE means noise arising from any *construction work*, as defined above.

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APPENDIX B – Recommendations: Operational Noise Provisions PAUP

Noise conditions technical assessment – Operational Noise ONLY

| Number | Name | Designation Condition Mentioning 6801 or 6802? | Standards Referenced | Noise LIMITS Stated? | Recommended Action |
|--------|---|--|------------------------|----------------------|--|
| 8500 | Ash Street Overhead Transmission Lines | Nil | - | - | - |
| 8501 | Penrose Substation | Condition 14 | 6801:1999 6802:2008 | No | Recommend Remove Condition and ref to 6801/6802. |
| 8502 | Pakuranga to Penrose Transmission Lines | Nil | - | - | - |
| 8503 | Mount Roskill Substation | Condition 14 | 6801:1999 6802:2008 | NO | Recommend Remove Condition and ref to 6801/6802. |
| 8504 | Boundary Road Overhead Transmission Lines | Nil | - | - | - |
| 8505 | Haycock Avenue Overhead Transmission Lines | Nil | - | - | - |
| 8506 | Barrack Road Overhead Transmission Lines | Nil | - | - | - |
| 8507 | Pakuranga to Penrose Underground Transmission Cable | Nil | - | - | - |
| 8508 | Richardson Road Overhead Transmission Line | Nil | - | - | - |
| 8509 | Luke Street Overhead Transmission Line | Nil | - | - | - |
| 8510 | Glenbrook Substation | Condition 14 | 6801:1999 6802:2008 | NO | Recommend Remove Condition and ref to 6801/6802. |
| 8511 | Bombay Substation | Condition 14 | 6801:1999 6802:2008 | NO | Recommend Remove Condition and ref to 6801/6802. |

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| | | | | | |
|------|--|---|------------------------|-----|--|
| 8512 | Brownhill to Whakamaru Overhead Transmission Line | <u>that part of the line between towers 5 & 33</u> Condition 14 | 6801:1991 6802:1991 | Yes | Replace ref to older versions with 2008 versions |
| | | <u>that part of the line between towers 33A and 65:</u> Condition 15 | 6801:1999 6802:2008 | YES | Replace ref to older versions with 2008 versions |
| 8513 | Otahuhu Substation | Condition 12 Conditions 15-18 inclusive | 6802:1991 (only) | YES | Replace ref to older versions with 2008 versions Also amend "Advice note 1" to refer to NZS6902:2008 |
| 8514 | Pakuranga Substation | Conditions 13 | 6801:1991 6802:2008 | YES | Replace ref to older versions with 2008 versions |
| 8515 | Brownhill Road Substation | Conditions 11 | 6801:1991 6802:1991 | Yes | Replace ref to older versions with 2008 versions |
| 8516 | Brownhill to Pakuranga Underground Transmission Cable | Nil | - | - | - |
| 8517 | Brownhill Road to Otahuhu Underground Transmission Cable | Nil | - | - | - |
| 8518 | Albany Substation | Condition 14 | 6801:1999 6802:2008 | NO | Recommend Remove Condition |
| 8519 | North Shore Underground Transmission Cable | Nil | - | - | - |
| 8520 | Takenini Substation | Condition 14 | 6801:1999 6802:2008 | NO | Recommend Remove Condition |
| 8521 | Drury Substation | Condition 13 | 6801:1999 6802:1999 | Yes | Replace ref to older versions with 2008 versions |
| 8522 | Wellsford Substation | Condition 15 | 6801:1999 6802:2008 | NO | Recommend Remove Condition |
| 8523 | Silverdale Substation | Condition 14 | 6801:1999 6802:2008 | NO | Recommend Remove Condition |
| 8524 | Huapai substation | Condition 13 | 6801:1999 6802:2008 | Yes | Replace ref to older versions with 2008 versions |

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| | | | | | |
|-------|---|--------------|------------------------|----|----------------------------------|
| 8525 | Henderson Substation | Condition 17 | 6801:1999 6802:2008 | NO | Recommend Remove Condition |
| 8526 | Hepburn Road Substation | Condition 16 | 6801:1999 6802:2008 | NO | Recommend Remove Condition |
| 8527 | Rua o te Whenua Telecommunications Facility | nil | - | - | - |
| 8528 | Massey North Underground Transmission Cable | nil | - | - | - |
| R8529 | Mangere Substation | Condition 14 | 6801:1999 6802:2008 | NO | Recommend Remove Condition |
| R8530 | Hobson Street Substation | Condition 14 | 6801:1999 6802:2008 | NO | Recommend Remove Condition |
| R8531 | Wairau Road Substation | Condition 14 | 6801:1999 6802:2008 | NO | Recommend Remove Condition |
| R8532 | Highbrook Underground Transmission Cable | Condition 6 | 6801:1999 6802:2008 | NO | Recommend Remove Condition |

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ATTACHMENT C



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13 August 2015

Harry Bhana
Director
Harry Bhana & Associates
6 Modena Crescent
Glendowie
Auckland 1071

Dear Mr Bhana

Transpower's submission on pAUP Designations – Advice on Electric and Magnetic Fields Conditions

I am an Environmental Specialist in Transpower New Zealand Limited. I am a member of the New Zealand Government's Interagency Committee on Non-Ionising Radiation and Health and am on the joint Australia/New Zealand standards committee, TE-007 Human Exposure to Electromagnetic Fields. I am also a member of the Australian Energy Network Associations EMF Committee. I often assist the public in addressing their health concerns related to electric and magnetic field (EMF) exposure and have addressed a range of occupational exposure scenarios faced by workers on the National Grid. I have worked in this capacity at Transpower for 10 years.

I have reviewed the EMF conditions in Transpower's designations on the Proposed Auckland Unitary Plan (pAUP) and my expert opinion is that the conditions outlined below will adequately mitigate the effects of EMF emitted from the substation site or transmission line.

1. Transmission lines

1.1 Transpower seeks the following EMF condition be included as a replacement condition in relation to specific designations for transmission lines:

Condition

"Any new equipment shall be designed and operated to limit electric and magnetic field exposures to the International Commission on Non-Ionising Radiation Protection Guidelines for limiting exposure to time-varying electric and magnetic fields (1Hz - 100kHz), (Health Physics 99(6):818-836, 2010) (ICNIRP Guidelines). That is, the public exposure reference levels of 5 kV/m for electric fields and 200 μ T for magnetic flux density at one metre above ground level under maximum normal operating conditions (i.e. when there are no faults in the transmission system)."

1.2 This condition would replace the EMF condition in the following Transpower designations:

- 8500 (condition 2)
- 8502 (condition 3)
- 8504 (condition 2)

- 8505 (condition 2)
- 8506 (condition 2)
- 8508 (condition 2)
- 8509 (condition 2)
- 8512 (condition 7)

Reason for changes to the EMF condition

(a) Revision of the ICNIRP guidelines

- 1.3 The designations listed in 1.2 above refer to the International Commission on Non-Ionising Radiation Protection (ICNIRP) Guidelines "Non-ionising Radiation Protection Guidelines for limiting exposure to time varying electric magnetic fields (up to 300 GHz) (Health Physics, 1998, 74(4): 494-522)" (1998 ICNIRP Guidelines).
- 1.4 The ICNIRP guidelines were revised in 2010. Policy 9 of the National Policy Statement on Electricity Transmission requires that provisions dealing with electric and magnetic fields must be based on any revisions to the Guidelines.
- 1.5 Transpower seeks that the condition be amended to refer to the latest version of the ICNIRP Guidelines, i.e "the International Commission on Non-Ionising Radiation Protection Guidelines for limiting exposure to time-varying electric and magnetic fields (1Hz - 100kHz) (Health Physics 99(6):818-836, 2010" (2010 ICNIRP Guidelines).
- 1.6 The NZ Ministry of Health confirm that the 2010 ICNIRP Guidelines are the appropriate basis for the protection of human health with regard to EMF exposures (see page 11 of the Ministry of Health booklet *Electric and Magnetic Fields and Your Health*, which deals with electric and magnetic field exposures from transmission lines). This is available on the Ministry's web site at <http://www.health.govt.nz/publication/electric-and-magnetic-fields-and-your-health>.
- 1.7 For transmission line assets the result of the 2010 ICNIRP Guidelines revision is an increase in the general public reference level for magnetic flux density from 100 μ T to 200 μ T. The electric field public exposure level remains unchanged at 5 kV/m.
- 1.8 Therefore, for each of the relevant designation conditions, Transpower seeks the general public reference level for magnetic flux density be revised to 200 μ T. The NZ Ministry of Health booklet *Electric and Magnetic Fields and Your Health* confirms the magnetic field public exposures reference level on page 12.

(b) Deletion of reference to "new works"

- 1.9 The EMF condition only needs to apply to "equipment" that is operational, and not "new works". This is because there is no EMF associated with new works (i.e when undertaking the construction of new equipment). At the construction stage, equipment is not energised and hence no EMF is associated with the "works".

2. Substations and switching stations

2.1 Transpower seeks the following EMF condition be included as a replacement condition in relation to specific designations for substations and switching stations:

Condition

“Any equipment shall be designed and operated to limit electric and magnetic field exposures at or beyond the secure boundary of the substation site to the International Commission on Non-Ionising Radiation Protection Guidelines for limiting exposure to time-varying electric and magnetic fields (1Hz - 100kHz) (Health Physics 99(6):818-836, 2010) (ICNIRP Guidelines). That is the public exposure reference levels of 5 kV/m for electric fields and 200 µT for magnetic flux density at one metre above ground level under maximum normal operating conditions (ie, when there are no faults in the transmission system).”

2.2 This condition would replace the EMF condition in the following Transpower designations for substations and switching stations:

- 8501 (condition 8)
- 8503 (condition 8)
- 8510 (condition 8)
- 8511 (condition 8)
- 8513 (condition 2)
- 8514 (condition 7)
- 8515 (condition 4)
- 8518 (condition 8)
- 8520 (condition 8)
- 8521 (condition 3)
- 8522 (condition 9)
- 8523 (condition 8)
- 8524 (condition 18)
- 8525 (condition 11)
- 8526 (condition 10)
- 8529 (condition 8)
- 8530 (condition 8)
- 8531 (condition 8)

Reason for changes to the EMF condition

(a) *Revision of the ICNIRP guidelines and deletion of reference to “new works”*

2.3 The reasons for the changes to the condition include those set out in paragraphs 1.3-1.9 above.

(b) *Exposures beyond the secure site boundary*

- 2.4 For designations 8501 (condition 8), 8503 (condition 8), 8510 (condition 8) and 8511 (condition 8), reference to the exposure levels applying at or beyond the secure boundary of the substation site should be added.
- 2.5 This wording is already included in all other substations designations. The wording should be added as there is no public access inside the secure boundary of the substation site and therefore it is inappropriate to apply public reference levels in this area.
- 2.6 Drury 8521 condition 4 should be removed as previously requested in Transpower's submission.
- 2.7 Drury 8521 condition 5 should be amended as follows in order that the reference is thoroughly and properly provided (the date previously provided was incorrect).

"The site shall be designed and operated to limit public exposure to electric and magnetic fields, in accordance with the recommendations in Section 1, of the World Health Organisation monograph, Environmental Health Criteria No. 238, Extremely low frequency fields June 2007"

3. Cables

- 3.1 Transpower seeks the following EMF condition be included as a replacement condition in relation to specific designations for underground cables:

Condition

"Any equipment shall be designed and operated to limit the magnetic field exposures to the International Commission on Non-Ionising Radiation Protection Guidelines for limiting exposure to time-varying electric and magnetic fields (1Hz - 100kHz) (Health Physics 99(6):818-836, 2010) (ICNIRP Guidelines). That is the public exposure reference level of 200 μ T for magnetic flux density when measured at 1 metre above ground level directly above any cable under normal operating conditions (ie, when there are no faults in the transmission system)."

- 3.2 This condition would replace the EMF condition in the following Transpower designations for underground cables:
- 8507 (condition 35)
 - 8516 (condition 3)
 - 8517 (condition 3)
 - 8519 (condition 4)
 - R8532 (condition 2)

Reason for changes to the EMF condition

Revision of the ICNIRP guidelines and deletion of reference to "new works"

- 3.3 The reasons for the changes to the condition include the reasons set out in paragraphs 1.3-1.9 above.

3.4 For your information, due to shielding by the cable sheath, there is no electric field around an underground cable and therefore the designation conditions for cables refer only to the magnetic field public exposure reference levels.

I trust the above information is of assistance. Please do not hesitate to contact me if you have any queries.

Yours faithfully,

A handwritten signature in black ink that reads "M. Walker". The signature is written in a cursive, slightly slanted style.

Matthew Walker
Environmental Specialist

ddi: 04 5906995