

PLAN CHANGE 1 – MINOR IMPROVEMENTS – NON HERITAGE TOPICS

SECTION 42A REPORT

25 July 2025

APPENDIX C.6 ACOUSTIC AND VIBRATION EVIDENCE

3 July 2025

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Dear Emma,

Plan Change 1 minor improvements – evidence on submissions

1.0 Introduction

Dunedin City Council (**DCC**) has engaged Styles Group to provide evidence on Plan Change 1 minor improvements.

Our brief is to provide further evidence on the notified changes PHS6 and TA3 with respect to matters raised in submissions by Port Otago Limited (s248), Totara-Dunedin Properties Limited (s271), and Marshall Day Acoustics (s302). We have read the submissions in full. We understand that matters regarding activity status will be addressed in planning evidence.

This evidence has been prepared in accordance with the requirements of Section 9 *Code of conduct for expert witnesses* of the Environment Court of New Zealand Practice Note 2023.

The key personnel involved in preparing this evidence are:

- Jamie Exeter, MASNZ, Assoc.NZPI, Principal (author)
- Jon Styles, MASNZ, Director and Principal (reviewer).

Jamie and Jon both have significant experience in the measurement and assessment of construction noise and vibration and regularly undertake reviews of construction noise and vibration assessments on behalf of local government authorities. Jamie is one of the three authors of the Association of Australasian Acoustics Consultants *Guideline for interpreting and applying NZS 6803:1999*¹. Jon has advised a considerable number of Councils throughout New Zealand in plan-making processes over the past 20 years. Further information on qualifications, experience, and professional affiliations is available on request.

2.0 Further evidence

This section sets out the summaries of the relevant submissions provided to us by Dunedin City Council and our evidence on the construction noise and vibration matters raised.

¹ <https://aaac.org.au/Guidelines-&-Downloads>

2.1 Port Otago Limited – Change PHS6

Port Otago Limited (s248) opposes the revised noise limits and assessment rules. The submission seeks to only include the construction noise standard as guidance, relying on BPO and noise management plans. In the alternative, it seeks higher limits, no application of lower limits for noise sensitive activities in the port and industrial zones, making some corrections for clarity regarding the port zones, removal of 3 day limits on exceedance, and removal of the non-complying activity status.

We do not support the requested relief to remove the permitted construction noise limits and only refer to NZS 6803:1999 *Acoustics – Construction Noise (NZS 6803)* for guidance. It is our experience that simple reliance on noise management plans can be effective in some cases when the developer and contractor are both engaged in managing construction noise and vibration effects and are averse to complaints and issues affecting their reputation. However, such attitudes towards management of noise effects are not always adopted, and the contractor, Council officer, and receivers may all have different views on what constitutes the Best Practicable Option (the **BPO**). The noise management plan and BPO approach can therefore lead to unreasonable noise effects when there are no noise limits. It is also difficult for contractors to be confident they are complying, and impracticable for Council to monitor and enforce if complaints are received about noise effects.

This requested approach is also not in accordance with NZS 6803. The Standard states that construction noise should not generally exceed its guideline limits and that numerical noise limits should be applied as rules in a plan or conditions in a resource consent. Section 7.3 *Setting noise limits* of the Standard states:

Noise limits in rules or resource consent conditions should be based on the appropriate table from this Standard, and should specify the actual numerical noise limits and the time periods for which the limits apply rather than simply referring to the tables in this Standard.

Section 7.3 also recommends that the basic elements of a noise rule or condition should be:

- a) The activity or class of activity to be regulated and any exceptions;
- b) Noise descriptors;
- c) Numerical noise limits and time periods of application;
- d) Reference to appropriate Standards for measurement and assessment methods (e.g. NZS 6803:1999, NZS 6801:1999).

We consider that the rules-based approach in the notified Plan Change is the most appropriate way to control and manage potential construction noise and vibration effects and it is in accordance with NZS 6803:1999.

We also do not support the requested relief to increase the permitted construction noise limits for noise sensitive activities in the Port and industrial Zones. We consider it appropriate to apply lower permitted limits outside buildings housing lawfully established noise sensitive activities – regardless of the zone. We consider that the noise limits in the Port and Industrial Zones must be kept at a reasonable level to allow the activities in those buildings to continue to operate with only an appropriate and reasonable level of disruption being permitted.

The night-time construction noise limits in the notified Plan Change that apply outside buildings housing noise sensitive activities in the Port and industrial Zones are considerably higher (less stringent) than those recommended by NZS 6803:1999 for residential zone receivers. Sections 7.2.3, 7.2.5, and 7.2.6 of the Standard discuss applying residential zone limits in industrial and commercial areas and are provided below for reference.

7.2.3

These limits may also be appropriate for noise sensitive activities in other areas (see 7.2.5). Where the limit is shaded on the table, then the actual limits applied for areas other than residential zones and dwellings in rural areas should be determined after consideration of the factors in 7.2.6.

7.2.5

The night time limits in table 2 shall apply to activities carried out in industrial or commercial areas where it is necessary to prevent sleep interference, specifically where there are residential activities, hospitals, hotels, hostels, or other accommodation facilities located within commercial areas. The limits in table 2 may also be used to protect other specific noise sensitive activities at certain hours of the day.

7.2.6

When table 2 is used as the basis for setting noise limits for specific activities in commercial and industrial areas in accordance with 7.2.3, site-specific limits should be determined, taking into account the nature of land uses adjoining the construction site, community expectations, and other local conditions.

The submitter considers that the notified permitted construction noise limits are too restrictive. We consider the proposed numerical noise limits and time periods are appropriate, but we consider it restrictive to apply permitted noise limits for temporary construction noise outside unoccupied buildings.

We recommend that the permitted construction noise limits should only apply outside buildings that are occupied while the construction work is underway. This would require a change to rule 4.5.4.1.a to add the words '*at any building that is occupied during the construction works*'.

2.2 Port Otago Limited – Change TA3

Port Otago Limited (s248) considers the proposed vibration limits are too restrictive, and it seeks removal of limits and reliance on the general application of the construction noise standard NZS6803:1999 Acoustics Construction Noise. Port Otago opposes any non-complying activity status for rules contraventions.

The submitter opposes the construction vibration limits and the requirement for a Construction Noise and Vibration Management Plan (**CNVMP**) under the notified Plan Change standard 4.11.2. This section discusses these matters and provides recommendations for relief.

2.2.1 Vibration limits

We support the numerical values and time periods in the notified vibration standard 4.5.4.X as being adequate to mitigate the effects on the occupants of buildings. However, we agree with the submitter that the notified construction vibration standards are too restrictive overall because:

- i. The notified vibration limits are based on avoiding minor amenity and annoyance effects on the building occupants, but the notified rules apply the limits at unoccupied buildings.

This means that the rule could be infringed where there are no receivers to be affected and where the vibration levels are considerably lower than the guideline values for avoiding cosmetic building damage (under DIN 4150–3:2016).

The criteria for managing potential effects on people inside buildings are very different to those for avoiding building damage, and the level of construction vibration inside buildings depends on many factors – including the nature and response of the building itself. We consider that applying a low vibration limit to manage amenity effects at all surrounding buildings, including those that are unoccupied, will place unnecessary restrictions on developers and contractors. Complying with the lower amenity-based limit may mean that smaller or different equipment needs to be used, which could increase costs and extend the duration of the works. This may be appropriate when the receiving building is occupied, but not when it is unoccupied.

- ii. The notified vibration limits would apply at any dwelling that is on the same site as the works. This is uncommon in our experience and could lead to complications with consenting, monitoring, and enforcement. Particularly where the receiving dwelling is part of the development or otherwise inherently linked to the works being undertaken.

Overall, our view is that the numerical values and time periods in the notified vibration standard are appropriate for mitigating effects on the occupants of buildings, but they are too low to be used as controls for avoiding building damage. We recommend that they are not applied at unoccupied buildings or at buildings on the same site as the works, and that a separate vibration standard for avoiding building damage is applied.

2.2.2 Requirement for a CNVMP

Notified standard 4.11.2 requires information to be included in a CNVMP that we consider more relevant to an assessment of construction noise and vibration effects. A CNVMP is a document that sets out the procedures and methods for a contractor to manage and mitigate construction noise and vibration effects. It does not typically include construction noise and vibration level predictions, a compliance assessment against permitted standards, or an assessment of potential effects (as required by the notified standard). We recommend these requirements are removed from the rule, or that the rule is updated to require this information for assessments but not CNVMPs.

The notified standard states Council ‘may’ require a CNVMP. We support this discretion being stated in the criteria because CNVMPs are not typically necessary for smaller construction projects where the only infringements are brief and intermittent exceedances of vibration amenity standards.

2.2.3 Recommended relief

The submitter’s concerns may be addressed in part by applying separate criteria for avoiding building damage to make the standard less restrictive. We consider the guideline values of DIN

4150–3:2016 are typical and appropriate. We note that users of the proposed plan would already be required to access and navigate DIN 4150–3:2016 to understand the assessment criteria for discretionary performance standard contraventions (4.9.2.X.d) where vibration is predicted to exceed 2 mm/s peak particle velocity (**PPV**) in any building during the day.

We support the following changes being made:

- i. Reduce the minimum requirements for a CNVMP under 4.11.2 to be consistent with Section 3.8 of Association of Australasian Acoustical Consultants *Guideline for interpreting and applying NZS 6803:1999*. We consider that criteria 1.c, 1.d, and 1.f of the notified standard 4.11.2 should be deleted or the rule is updated to only require this information for assessments (and not CNVMPs).
- ii. Improve certainty for plan users by specifying the criteria for a CNVMP being required by Council under notified standard 4.11.2 when there are proposed infringements of the construction noise and vibration standards and state when the document must be submitted.

2.3 Totara-Dunedin Properties Limited – Change TA3

(Totara-Dunedin Properties Limited) Opposes the amendments so that up to 10 daily exceedances of the 2mm/s limit are permitted; contraventions are a controlled activity rather than a discretionary or non-complying activity; Council's control is limited to amenity effects; and Policy 13.2.1.10, Rule 13.7.3.1, and Rule 13.9.4.3 are deleted.

The submitter provides the following comments (Section 2.7):

We note from experience with demolition where the proposed vibration limits have been exceeded, no damage occurred to the buildings of concern. That experience also indicates that vibration, at times, will exceed the standards proposed by this plan change. However, they do not appear to exceed the standards proposed for construction work in the Styles Group report that informed the plan change provisions. This is because the standards incorporated into the Plan appear to be based on amenity concerns as opposed to building damage concerns. These are two entirely different matters and amenity concerns can be managed in a number of different ways. While complying with the amenity standard is likely to ensure no building damage occurs using that one standard as the trigger for consent it imposes increased regulatory hurdles in place.

We agree with the submitter that managing vibration effects on people and buildings are different matters and require different approaches.

The effects of temporary construction vibration on people are typically mitigated by appropriate scheduling of vibration-generating activities and providing advance notice of the timing and duration of the vibration, together with confirmation that it will remain below thresholds for avoiding cosmetic building damage. It is also our experience that construction and demolition activities can exceed amenity-based vibration limits when there are occupied buildings nearby but can often be managed to comply with the guideline values of DIN 4150–3:2016 to ensure that building damage does not occur.

The relief sought by the submitter includes allowing daily exceedances of the amenity limit of 2 mm/s PPV and deletion of standard 13.7.3, which sets out guidance for the assessment proposed infringements of 2 mm/s PPV in heritage buildings.

We agree with the submitter that enabling limited exceedances of 2 mm/s PPV is appropriate for a construction vibration amenity standard. However, we consider that enabling several construction vibration events of more than 2 mm/s PPV in occupied buildings on any day during a construction project is too permissive for a permitted activity because of the potential for annoyance and disruption to residential and commercial activities. There would also be issues with the practicality of monitoring and enforcement (e.g., vibration measurements would be required over the whole day to determine compliance).

We consider that limiting the number of whole days when these events could occur is more appropriate, so the receivers know when and for how long the effects will be experienced (as discussed in our original evidence).

The submitter's concerns could be addressed in part by adopting the DIN 4150-3:2016 guideline values as separate criteria for avoiding building damage from construction vibration. We support this change.

2.4 Marshall Day Acoustics – Change TA3

Reject Change TA3, but if the change is not rejected, amend Rule 4.5.4.1.b to adopt the vibration limits of German Standard DIN 4150-3 and make it clear that this rule relates to cosmetic building damage and not to vibration amenity limits. This is because the proposed vibration limits in the 2GP are very strict, and are not based on any known vibration standard, and it is unclear whether the limits are intended to address cosmetic building damage or vibration amenity effects. The submitter states that the German Standard DIN 4150-3 is the most commonly adopted cosmetic building damage standard, and it sets higher (more permissive) limits than proposed.

We agree with the submitter that the notified vibration limits are too stringent as a control for avoiding building damage. We also agree that compliance with the guideline values of DIN 4150-3:2016 would be an appropriate standard for avoiding building damage. We don't agree that construction vibration amenity limits should be removed.

In our experience in the measurement and assessment of construction vibration, the notified vibration limits are appropriate as a permitted standard for effects on people inside buildings. They are consistent with guidance provided in the British Standard BS 5228-2:2009 *Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration* and with typical descriptions of the potential effects of vibration up to 2 mm/s inside buildings by relevant experts in New Zealand.

We do not share the concerns expressed about the Auckland Unitary Plan (**AUP**) provisions referenced by the submitter. In our experience, the AUP vibration amenity standard can typically be complied with on small construction projects, and a permitted standard should not enable 'minor' effects. Many moderate to large construction projects will require consent for infringements of other permitted standards, and short duration infringements of the vibration amenity rule are

generally considered acceptable if there is prior communication with the building occupants and the permitted standard for avoiding building damage is complied with.

We expect that the submitter's concerns regarding vibration amenity standards can be addressed by clearly set out by the rule framework and matters for assessment and assessment criteria to guide an applicant through the process for assessing the effects when an infringement of the standard is proposed. This process should deliver a BPO approach to reducing the potential effects while being commensurate with the scale of the project and the degree of the infringement.

The submitter states:

Also, adopting a separate measurement standard (ISO 4866:2010) makes no sense, when DIN 4150-3 itself sets out its own measurement protocols. ISO 4866 is only used in NZTA guidelines, and was adopted for a very specific reason that is not relevant for this District Plan.

Chapter 15 *Noise and Vibration Metrics Standard* of the National Planning Standards requires any plan rule to manage damage to structures from construction vibration to be consistent with the metrics for PPV in ISO-4866:2010 *Mechanical vibration and shock*. This means that any permitted standard for avoiding building damage from vibration must be in terms of PPV and should state that the metric is defined in the International Standard ISO-4866:2010 *Mechanical vibration and shock*. The National Planning Standards does not require vibration to be measured in accordance with the ISO Standard, as stated notified rule 4.5.4.x.b.i.

The submitter's concerns may be addressed in part by adopting the DIN 4150-3:2016 guideline values as separate criteria for avoiding building damage from construction vibration and requiring construction vibration to be measured in accordance with that Standard. We support these changes and recommend that the reference to the ISO Standard in notified rule 4.5.4.x.b.i is replaced with the following to comply with Chapter 15 of the National Planning Standards:

Peak particle velocity (PPV) is defined in the International Standard ISO-4866:2010 *Mechanical vibration and shock*.

3.0 Summary of recommendations

The following is a summary of our recommendations based on our review of the matters raised and the notified standards referenced by the submitters. These are consistent with our original evidence. The submissions have not resulted in any changes to our overall recommendations.

1. We consider that the rules-based approach in the notified Plan Change is a more appropriate way to control and manage potential construction noise and vibration effects compared with adopting a management plan / best practicable option approach without noise limits. NZS 6803:1999 states that permitted rules should include numerical construction noise limits based on the guideline limits of the Standard.
2. We do not support making the permitted construction noise limits for noise sensitive activities in the Port and industrial Zones more permissive than the limits in the notified Plan Change. We consider that the noise limits in the Port and Industrial Zones should

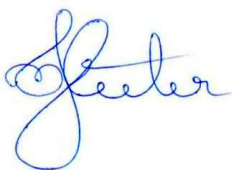
enable lawfully established noise sensitive activities to continue to operate without unreasonable disruption.

3. We recommend that the permitted construction noise limits should only apply outside buildings that are occupied while the construction work is underway. This would require a change to rule 4.5.4.1.a to add the words '*at any building that is occupied during the construction work*'.
4. We consider that the numerical values and time periods in the notified vibration standard are appropriate for mitigating effects on the occupants of buildings but are too low to be used as controls for avoiding building damage.
5. We recommend that amenity-based vibration standards should not apply at unoccupied buildings or at buildings on the same site as the construction work. We consider that infringements of a 2 mm/s PPV limit on a limited number of days is appropriate for a permitted vibration amenity standard (refer to our original evidence).
6. We consider that a separate permitted vibration standard for avoiding building damage based on the guidance of DIN 4150–3:2016 would be more appropriate than using amenity-based limits to trigger an assessment. The amenity limits should only apply in occupied buildings because they are only relevant to effects on people. The building damage limits should apply in all buildings (occupied or otherwise).
7. We recommend updating the minimum requirements for a CNVMP under 4.11.2 to be consistent with Section 3.8 of Association of Australasian Acoustical Consultants Guideline for interpreting and applying NZS 6803:1999. This can be achieved by deleting criteria 1.c, 1.d, and 1.f of the notified standard, or specifying that they are only required in assessments (and not CNVMPs). The standard should specify the criteria for Council requiring a CNVMP and state when it must be submitted.
8. We recommend that any requirement to measure vibration in accordance with the Standard ISO-4866:2010 is deleted. The following statement should be inserted where it will apply to all vibration standards – to comply with Chapter 15 of the National Planning Standards:

Peak particle velocity (PPV) is defined in the International Standard ISO-4866:2010 Mechanical vibration and shock.

Please contact me for further information.

Yours sincerely,



Jamie Exeter, MASNZ, Assoc. NZPI
Principal