

BEFORE THE WESTERN BAY OF PLENTY DISTRICT COUNCIL

IN THE MATTER OF the Resource Management Act 1991

AND of a resource consent application by Glen Isla Protection
Society Inc. under section 88 of the Resource
Management Act 1991 for the activities associated with
the construction and use of a coastal protection structure

STATEMENT OF EVIDENCE OF JAMES WHITLOCK – ACOUSTIC ENGINEER

25 JULY 2025

1. SUMMARY OF EVIDENCE

- 1.1 In this evidence I summarise my company's construction noise and vibration assessment to support the application to Council for resource consent of a new coastal protection structure near Glen Isla Place, Waihi Beach ("the Project").
- 1.2 The proposed structure is a rock revetment on the beach adjacent to the north-eastern property boundaries of 9, 11 & 12 – 16 Glen Isla Place, Waihi Beach ("the Site"). I was engaged by the Glen Isla Protection Society Inc. ("the Applicant") to carry out this assessment.
- 1.3 Our measurements and assessment indicate that the Project will comply with the relevant standards at all dwellings not owned by the Applicant, and the risk of vibration-induced building damage is very low.
- 1.4 Council, and their noise and vibration expert, agree with my findings in their Section 42A report.

2. INTRODUCTION

- 2.1 My name is James Andrew Travis Whitlock. I am a Principal at Marshall Day Acoustics with 24 years' experience as an acoustic engineer. My qualifications, memberships and relevant experience are set out below.
- 2.2 I have a Bachelor of Science in Physics, and a Master of Architectural Studies in Acoustics (1st class honours), both from the University of Auckland.
- 2.3 I am the Secretary and past-President of the Acoustical Society of New Zealand (MASNZ), a current member of the Resource Management Law Association and I was a Council Member of the National Foundation of the Deaf for 20 years until 2024.
- 2.4 I am a member of the Australian/New Zealand Standards Joint Technical Committee AV-001, the ISO Standards Technical Committee SC.43 –

Acoustics Industry Reference Group for New Zealand and the International Well Building Institute Advisory.

- 2.5 I have experience in undertaking construction noise and vibration predictions and assessments of infrastructure, commercial and residential developments. Some notable vibration-related projects of mine include Waterview Connection and City Rail Link in Auckland, and Cameron Road Stage 1, State Highway 29 improvements and Te Manawataki o Te Papa in Tauranga.
- 2.6 I was involved in developing the vibration performance controls in the Auckland Unitary Plan and NZ Transport Agency Waka Kotahi Construction and Maintenance Noise and Vibration Guide. In 2011, I published a peer reviewed paper in the NZ Acoustics Journal titled “A Review of the Adoption of International Vibration Standards in New Zealand”.
- 2.7 I have read the Code of Conduct for Expert Witnesses in the Environment Court Practice Note 2023. I have complied with the Code of Conduct in preparing this statement of evidence and confirm that I will do so in presenting my evidence to the hearing commissioners.
- 2.8 This evidence is within my sphere of expertise and I have not omitted to consider any material facts known to me that might alter or detract from the opinions I express.

3. INVOLVEMENT IN THE PROJECT

- 3.1 I was engaged by The Applicant in May 2024 to advise on potential noise and vibration levels from the Project.
- 3.2 I was involved in formulating the methodology for the rock drop trial in the Council reserve at 91 Seaforth Road on 9 July 2024 (“the Trial”). My colleague Miss Ayla Wesley, and I attended the trial and measured noise and vibration levels of the Trial activities, with a view to using that data to improve our prediction accuracy of noise and vibration levels from the Project.

- 3.3 The intention of the Trial was to demonstrate that the proposed activities would comply with the permitted standards and therefore, not require consent. And if the Trial identified a risk of exceedence, then a noise and vibration effects assessment would be undertaken and supplied as part of the application package.
- 3.4 Our measurements during the Trial led us to conclude that noise and vibration levels would comply with the permitted standards. Miss Wesley prepared a memorandum dated 12 July 2024, entitled “Noise and vibration trial summary”, which I reviewed. This memo is attached as Appendix I to the Application (“the Trial Memo”).
- 3.5 In December 2024 I received a Section 92 request for further information letter from Council (dated 8 November 2024). It contained questions about noise and vibration from their expert advisor, Mr Jon Styles. I responded to the noise and vibration aspects of the request in a memorandum dated 6 December 2024, entitled “Response to s92 queries”. This memo is attached as Appendix E to the Applicant’s s92 response dated 6 December 2024 (*“the Section 92 Response”*).
- 3.6 In March 2025 I received an additional Section 92 request for further information from Mr Styles (via Council), which I responded to in a memorandum dated 2 April 2025, entitled “Response to additional s92 query”. This memo is attached as Appendix D to the Applicant’s additional s92 response dated 15 May 2025 (*“the Additional Section 92 Response”*).
- 3.7 The process I have described above (the Trial measurements to assess compliance, and additional modelling in response to Mr Styles’ questions) has provided an appropriate level of detail to enable my assessment, with a particular focus on potential vibration damage. This was appropriate for the application process to date and will help the decision makers to understand the actual risks and potential effects of the Project.

4. SCOPE OF EVIDENCE

4.1 My evidence comprises the following sections:

- > A summary of content and conclusions in the *Trial Memo, Section 92 Response* and *Additional Section 92 Response*;
- > Additional context to support the use of the German Standard DIN 4150-3:2016 to manage cosmetic building damage risk;
- > My response to submissions that expressed concerns about vibration and/or noise; and
- > Recommended conditions of consent that should be imposed in relation to noise and vibration.

5. MEMORANDUM SUMMARIES

Trial Memo

5.1 Prior to the Trial, I discussed and refined the test arrangement with the Applicant, giving consideration to the following factors:

- > Measuring noise and vibration levels at distances that are directly relevant to the Project works themselves.
- > Using a contractor (Beach Contractors Ltd) who are regularly carry out work in Three Mile Creek and may be contracted to construct of the Project (subject to commercial agreement), whose machinery included:
 - Case 210 tractor with tipper trailer
 - Hyundai 235 (24 tonne) excavator with multi-grab bucket attachment
 - Transporter truck and trailer unit (for the excavator)
- > Keeping the Trial noise and vibration levels for neighbouring properties to a minimum. This is why the Trial rock drop was carried out on the northern side of Three Mile Creek – the creek embankments act as a vibration barrier, reducing levels received by the Glen Isla Place dwellings, which are all on the southern side of the creek. Note that we measured noise and vibration on both sides of the creek to collect the data we needed.

- > The particular vibration sensitivity of the dwelling at 7 Glen Isla Place, where a representative of the Applicant told me the owner had already expressed concern about the Project.
- 5.2 Section 4C.1.3.1 of the Western Bay of Plenty District Plan (“the District Plan”) adopts the New Zealand Construction Noise Standard NZS 6803:1999 to manage construction noise. In my opinion, this is the correct Standard to apply.
- 5.3 Its noise limits vary depending on the duration of construction works. At the time of writing the *Trial Memo*, we understood that The Applicant was seeking a construction period of less than 20 weeks, and to operate within the 7.30am – 6pm daytime period set out in NZS 6803:1999. So, we adopted the relevant noise limits (75 dB L_{Aeq} and 90 dB L_{AFmax}) from that Standard in our assessment.
- 5.4 However, the construction duration and hours of operation were subsequently modified, as addressed in the *Section 92 Response* (refer paragraph 5.12 below) and *Additional Section 92 Response* (refer paragraph 5.18 below). I note that these changes did not substantively alter the assessment outcomes.
- 5.5 The District Plan does not contain vibration limits. It has an Explanatory Statement in Section 4C.1 that “Vibration from activities has not been an issue in the District. In many cases Council can manage vibration effects through the management of noise emissions or through the provisions of the Health Act. Specific standards to manage vibration are therefore not proposed.”
- 5.6 In lieu of a District Plan control, I applied the most appropriate residential building cosmetic damage limits, as set out in German Standard DIN 4150-3:2016. This Standard is routinely applied by District Plans and Requiring Authorities throughout New Zealand (refer Section 6 of this evidence below). The relevant limits for short-term (transient) vibration events like rock drops and rattles/bumps from excavator movement are:

- > 5 mm/s peak particle velocity (PPV) for frequencies between 0 – 10 Hz;
- > 5 – 15 mm/s PPV for frequencies between 10 – 50Hz;
- > 15 – 20mm/s for frequencies ranging from 50 – 100Hz.

5.7 During the Trial, Miss Wesley and I set up five instruments (all with valid calibration certification), either side of Three Mile Creek. Figure 1 in the *Trial Memo* shows the instrumentation layout. In summary, we measured:

1. Vibration and noise at 35 metres and vibration at 65 metres from the rock drop location on the same (north) side of the creek. We chose these distances because they match how far the closest dwelling (9 Glen Isla Place) and neighbouring dwelling (7 Glen Isla Place) would be from the rock drop location during the Project; and
2. Vibration and noise at the 7 Glen Isla Place boundary, on the other (south) side of Three Mile Creek, 44 metres from the trial rock drop location and 32 – 45 metres from the construction machinery tracking back and forth.

5.8 Measurement setup 1 was to capture vibration and noise data at distances relevant to our assessment of the Project. Measurement setup 2 was to monitor vibration and noise from the Trial, in case the owner of 7 Glen Isla Place expressed concerns about the Trial (which he subsequently has in his submission – refer paragraph 7.3 of this evidence).

5.9 Our measurement location was approximately 15 metres closer to the Trial activities than the dwelling itself, so the noise and vibration levels we captured were higher than they would have been at the dwelling itself.

5.10 The *Trial Memo* sets out full details of the data we measured, but in summary our measurements indicated:

- > The Project will comply with the noise limits in the District Plan and vibration criteria in the German DIN 4150-3:2016 Standard.
We predicted the following levels at the closest dwelling (9 Glen Isla Place - distance 35 metres):

- Vibration – 0.7 mm/s PPV (the limit is 5 mm/s PPV); and
 - Noise – 63 dB $L_{Aeq,15min}$ and 84 dB L_{AFmax} (the limits we applied at the time were 75 dB L_{Aeq} and 90 dB L_{AFmax} – refer paragraph 5.3).
- > The Trial readily complied with the vibration and noise limits at 7 Glen Isla Place. We measured:
- Vibration – rock drop (0.45 mm/s PPV) and machinery movement (0.2 – 0.4 mm/s PPV) (the limit is 5 mm/s PPV); and
 - Noise – rock drop (73 dB $L_{Aeq,45sec}$) and machinery movement (60 dB $L_{Aeq,15min}$) (the limit we applied at the time was 75 dB L_{Aeq}).

5.11 On the Applicant's request, we also predicted vibration and noise levels at 20 metres (in case construction activities occur closer than 35 metres from the nearest dwelling). These levels were 0.9 mm/s PPV and 68 dB $L_{Aeq,15min}$ which comply with both the noise and vibration limits.

Section 92 Response

- 5.12 In this memo, I responded to seven questions from Mr Styles on behalf of the District Council. As noted in paragraph 3.3, I had not intended our *Trial Memo* to be taken as an assessment of effects report, but several of Mr Styles' questions related to potential noise and vibration effects. My colleague Mr Mathew Cottle and I carried out additional computer modelling, using the noise data we captured on site during the trial, to answer Mr Styles' questions. I summarise the additional information we provided below.
- 5.13 Mr Styles noted that the likely best-case scenario for the Project duration is four months, but the Applicant was seeking up to six months. The threshold between 'typical duration' and 'long-term duration' in NZS 6803:1999 is 20 weeks (or five months). I responded, confirming that our predicted noise levels also comply with the long-term noise limit of 70 dB L_{Aeq} (with one exception – see paragraph 5.15 below). I also confirmed that no Project work is proposed on Sundays or Public Holidays.
- 5.14 Mr. Styles queried the measurement distances we used in the Trial, comparing them to the shortest likely source-receiver distances during the

Project. We confirmed that the Trial distances were chosen to provide measurement data we could use for our predictions, and that works would be closer to some dwellings during the Project. But only the dwellings of GIPS members would be closer than the Trial distances, and they all provided written approval to the proposal.

- 5.15 Nonetheless, and as requested by Mr. Styles, we provided a table of predicted Project noise and vibration levels for all Glen Isla Place dwellings, plus 96 Seaforth Road (as specifically requested by Mr. Styles) and three 3D noise contour maps. These demonstrated vibration and noise compliance (with the 70 dB L_{Aeq} long-term noise limit) for all receivers, except 2 dB noise infringement at 16 Glen Isla Place (Mr. Alan Fraser, GIPS chairperson, who has provided written approval).
- 5.16 Mr. Styles requested a description of likely effects of vibration on people (as opposed to cosmetic building damage, which DIN 4150-3:2016 addresses), including at low frequencies (below 25 Hz). I provided a list of potential effects at various vibration levels between 0.14 and 10 mm/s PPV), based on British Standard BS 5228-2:2009 (the Standard typically adopted in New Zealand for such purposes), and confirmed that our predicted levels would be perceptible but typically acceptable with prior notification.
- 5.17 Mr. Styles noted our measurements during the Trial indicated that vibration attenuation with distance was less than what might typically be expected in sandy soils. I agreed, and noted that the water content of sandy soils can affect vibration propagation. But, regardless of propagation characteristics, the vibration levels we measured were very low. I address this matter further in my response to Mr. Fell's submission – refer paragraph 7.13.

Additional Section 92 Response

- 5.18 In his additional s92 query, Mr. Styles noted our assessment was for works between 7.30am – 6pm Monday to Saturday, and asked us to assess potential noise and vibration effects outside these hours. I reviewed relevant material and noted that the Applicant's documentation had in fact stated "no work will

take place before 6am or after 8pm”. These work hours extend outside the period Mr. Styles was querying, and outside the NZS 6803:1999 daytime period. So, I took the opportunity to review the Project hours of operation and make it clear which times the proposed works would comply, as follows.

- 5.19 My predicted Project noise levels (refer paragraph 5.10) comply with the NZS 6803:1999 long-term duration noise limits for the daytime (7.30am – 6pm) and weekday evening (6 – 8pm) periods, but not the night-time (8pm – 6.30am) or early morning (6.30 – 7.30am) periods.
- 5.20 Therefore, to ensure compliance, I recommended that Applicant amend their construction hours to 7.30am – 8pm weekdays and 7.30am – 6pm Saturdays. The Applicant has accepted this recommendation.

6. CONTEXT ON THE USE OF THE DIN 4150-3:2016 VIBRATION STANDARD

- 6.1 There are no New Zealand vibration standards that relate to building damage risk, so German Standard DIN 4150-3 is what we use.
- 6.2 The Standard is deeply ingrained in New Zealand construction management and is routinely applied throughout New Zealand. It is present in most city, district and regional plans that contain vibration controls, as well as the policy documents of other Requiring Authorities such as NZ Transport Agency, Kiwirail and Transpower. It is also referenced in the National Environmental Standard for Electricity Transmission Activities. Simply put, when it comes to managing vibration-induced building damage risk, DIN 4150-3 is the foremost Standard to adopt. To give the decision makers and submitters some comfort that it is the right Standard to apply for this Project, I quote some excerpts from it below.
- 6.3 The guideline values in DIN 4150-3:2016 have been:

“... obtained by experience from numerous measurements.

Experience shows that no damage due to vibration adversely affecting serviceability (see 4.5) will occur if these guideline values are complied with. If

damage nevertheless occurs, it is to be assumed that other causes are responsible. Exceeding the guideline values does not necessarily lead to damage...”

And Section 4.5 of the Standard states:

“... the serviceability is considered to have been reduced if, for example

- Cracks form in plastered or rendered surfaces of walls;*
- Existing cracks in a structure are enlarged;*
- Partitions become detached from load-bearing walls or floor slabs.*

These effects are deemed “minor damage”.

6.4 I have been using this Standard for 20 years to measure and assess vibration risk on 100+ projects. In that time, I am only aware of a handful of projects (fewer than five) where construction vibration-induced damage was proven to have occurred. And in all cases, that damage was minor (i.e. cracks in plasterwork) and relatively easily repaired at modest cost.

6.5 DIN 4150-3 is a conservative Standard and compared with other available building damage standards, it applies the most stringent limits. This is set out in my 2011 paper¹.

6.6 People are sensitive to vibration. We can feel vibration and become concerned about our homes at levels many times below those that would cause building damage. In round terms, people can sense vibration in their homes at around 0.5 mm/s PPV, cosmetic damage risk begins at around 5 mm/s PPV, and risk of structural damage begins at around 50 mm/s PPV.

¹ Whitlock, J. “A Review of the Adoption of International Vibration Standards in New Zealand”, New Zealand Acoustics, 24(2), pp. 24 – 32 (2011)

- 6.7 The levels I measured during the Trial, and those predicted for the Project (0.2 – 0.8 mm/s PPV) will likely be perceivable in some dwellings, but the risk of building damage is very low.

7. RESPONSE TO SUBMITTERS' CONCERNS

- 7.1 I have read the seven submissions that express concerns about noise and/or vibration effects. These submissions are:

- > Submission #2 – Mr. Doug Longdill (237 Seaforth Road)
- > Submission #3 – Ms. Rebecca Marshall (6 Glen Isla Place)
- > Submission #4 – Mr. Ian Marshall (6 Glen Isla Place)
- > Submission #6 – Mr. Russell Harray (address unknown)
- > Submission #7 – Mr. and Mrs. Barry and Lorraine Gallagher (address unknown, but submission indicates they are Glen Isla Place residents)
- > Submission #10 – Mr. Lorne Fell (7 Glen Isla Place)
- > Submission #23 – Mr. Keith Hay, on behalf of Katikati Waihi Beach Residents and Ratepayers Association

- 7.2 I have distilled these submitters' concerns into five broad categories, which I address in turn below. Note that I have not addressed concerns outside my area of expertise, such as insurance company involvement in past claims or the cover they offer in relation to vibration damage, or whether Council can be relied on to enforce conditions.

Concern about vibration damage to property

- 7.3 Six of the seven submissions expressed concern about the Project causing damage to their, or others' homes.
- 7.4 To address this risk, I measured the proposed construction activities during the Trial and confirm that measured and predicted vibration levels will readily comply with the most relevant and appropriate vibration standard. So I am confident that the risk of vibration-induced damage is very low.

- 7.5 For context, roading projects involving vibratory rollers typically produce higher vibration levels, and those projects occur all the time, NZ-wide.
- 7.6 Six submissions also claim that similar works that occurred in 2010, using the Three Mile Creek reserve for beach access, caused damage to three dwellings (6, 7 and 9 Glen Isla Place) and assert that the Project will do the same.
- 7.7 I had no direct involvement in those 2010 works, and have only learned of the issues through my review of submissions. While it is clear that some submitters consider those works caused damage, there appears to be no independent and substantive evidence that confirms it. By substantive evidence I mean comparing building condition (i.e. existence of cracks) before and after the works, or vibration level measurements on the dwelling during the works.
- 7.8 Mr. Fell's evidence includes a letter from Bert Kroon & Associates (structural engineers) in which Mr. Kroon expresses his opinion that "the damage is a consequence of the operating machinery's... shaking of Mr. Fell's house". But Mr. Kroon notes that he did not observe the construction activity at length or in detail, it was described to him by Mr. Fell. Other than a hand auger bore test to a depth of 2.1m, no other measurements or monitoring occurred.
- 7.9 In my view, Mr. Kroon's letter offers an opinion that supports Mr. Fell's assertion, but does not provide any evidence, or acknowledge any other potential causes of the damage such as wind loading – though he notes the house is in an exposed position.
- 7.10 I note that Mr. Fell claims that machinery movement (especially excavator tracking along the reserve, on the other side of Three Mile Creek to his house) is the highest vibration generating source – higher than rock dropping. But my observations and measurements during the Trial demonstrate otherwise – refer paragraph 5.10 above.
- 7.11 To my knowledge, the vibration measurements I made during the Trial are the only relevant dataset. They demonstrate that machinery similar to the 2010

works, carrying out the same activities at the same distances from Mr. Fell's dwelling produce vibration levels that may be perceivable but offer very low risk of vibration damage. And with the proposed conditions for measuring and managing vibration during the works (refer Section 8 of this evidence below) I am confident that actual vibration effects on dwellings and their occupants will be modest.

Activities during the Trial caused damage to property

- 7.12 Mr. Fell claims that the Trial caused vibration damage to his dwelling, but the levels I measured at his boundary (which is closer to the Trial works than his dwelling) demonstrate this was highly unlikely.

MDA assessment is not fit for purpose

- 7.13 Mr. Fell's submission highlights several quotes from our *Trial Memo* and Section 92 Response relating to vibration variations and ground conditions. He uses these to assert that our assessment is not fit for purpose, and that we admit the Project will generate vibration effects we cannot reliably predict.
- 7.14 I have not just predicted vibration levels, I have measured them on site. There are many factors in the transmission path from source to receiver such as equipment type, operator skill, ground conditions, foundation type and building quality that all introduce variables. By measuring the Trial vibration levels of actual equipment at relevant distances in the actual ground conditions applicable to the Project, I have eliminated those variables as much as possible.
- 7.15 I have accounted for other variables by applying a 100% safety margin to my predictions, as noted in the *Section 92 Response*, and still predict that vibration levels will readily comply (i.e. 7x below the limit). This is the most accurate and conservative assessment that can practicably be done, using industry-standard methods, and it gives me confidence in my predicted vibration levels and effects.

The District Plan contains a false statement about vibration

- 7.16 Mr. Fell's and Mr. Hay's submissions highlight the statement in Section 4C.1 of the District Plan (also referenced by Section 18.4.1(t)) which states:

"Vibration from activities has not been an issue in the District. In many cases Council can manage vibration effects through the management of noise emissions or through the provisions of the Health Act. Specific standards to manage vibration are therefore not proposed."

- 7.17 I highlighted this section of the District Plan only to demonstrate that it does not contain vibration limits. I have not leveraged it to dismiss vibration submitters' concerns, nor downplay the potential vibration effects of the Project.

- 7.18 I have applied the most appropriate and conservative vibration Standard to ensure potential effects have been considered and addressed in line with industry best practice.

Concern that construction traffic will increase road noise

- 7.19 Mr. & Mrs. Gallagher's submission noted that the proposed 5 to 6 loads of rock is a significant increase in traffic both on Seaforth Road and through the reserve. I agree that it will increase the reserve traffic volumes, but my assessment indicates compliance with the relevant limits.
- 7.20 As for Seaforth Road, a full traffic noise assessment was not part of our scope, but in response to this query I reviewed the available traffic data (on mobileroad.org) for the relevant section of Seaforth Road. It currently has 90 – 180 heavy vehicles per day. In our opinion, an additional 12 vehicles is a very small increase that will not affect noise levels for road-facing dwellings.

The Project would be acceptable if the works occur private land

- 7.21 Several of the submissions I reviewed state they would not object to the Project if the works only occurred on private land. I note that if that change were made, noise and vibration levels would be higher than for the current

proposal. This is because the rock wall location would move south-west, towards Glen Isla dwellings, and if private land were used for access, the tractor and excavator may use Glen Isla Place itself.

- 7.22 To my mind this indicates that for some submitters, vibration effects are a secondary concern because if the Project was altered to their satisfaction they would accept higher noise and vibration levels.

8. PROPOSED CONDITIONS OF CONSENT

- 8.1 I have reviewed the updated conditions of consent, proposed by Styles Group in their updated Acoustics review memo (dated 12 June 2025).
- 8.2 I agree with them subject to a minor change, which may have been a typo in the Styles Group memo.
- 8.3 Proposed Condition 3 refers to the proposed construction hours as 07:30 – 17:00, rather than 07:30 – 18:00 (as contained in the Application and NZ Construction Noise Standard NZS 6803:1999). We consider that it may have been a typo because Styles Group memo refers to 18:00 in other sections, including proposed Condition 4, and does not mention it as a proposed change.
- 8.4 We have transcribed the agreed conditions below, with the modifications shown as the conventional ~~striketrough~~ and **bold underlined** text.
1. The consent holder must submit a Construction Noise and Vibration Management Plan (CNVMP) to WBPDC for certification no less than 14 days before the construction works authorised by this consent begin. The objectives of the CNVMP are to identify and adopt the best practicable option for minimising adverse construction noise and vibration effects on neighbours, and to define the procedures to be followed to ensure that the authorised noise and vibration limits are complied with.

The CNVMP must include the details of all work undertaken between 07:30 and 20:00, and provide specific details of the mitigation measures

that will be adopted to ensure that the consented construction noise and vibration limits are complied with at these times.

The CNVMP must be prepared with reference to Annex E of NZS 6803:1999 Acoustics – Construction Noise and by a suitably qualified and experienced person.

The CNVMP must set out methods and procedures requiring vibration monitoring to demonstrate compliance with the limits set out in this consent.

All construction work and subsequent maintenance work must be carried out in accordance with the certified CNVMP

2. The consent holder must advise the occupants of all buildings within 100 m of the site boundary of the construction and maintenance works at least five days before the construction work or maintenance begins. The advice must be provided in writing and include the following information:
 - i. A general description of the construction or maintenance works including the duration of the project and the working hours on site.
 - ii. The approximate dates and durations of the activities that will generate the highest levels of construction noise and vibration.
 - iii. A contact name and phone number to advise of any sensitive times for high noise levels and for any questions or complaints regarding noise and vibration throughout the project.
3. The permitted days and hours for construction work and maintenance and associated heavy vehicle movements are:
 - i) Between 07:30 and ~~17:00~~ **18:00** Monday to Friday;
 - ii) On up to three days in every two-week period:
 - a. Between 07:30 and 20:00 from Monday to Friday

b. Between 07:30 and 18:00 on a Saturday

No construction work is permitted on Sundays or Public Holidays.

A record of all days and times when construction work has taken place outside of 07:30 and ~~17:00~~ **18:00**, Monday to Friday must be kept by the consent holder and provided to WBPDC on request.

4. Construction noise must comply with the following noise limits at any occupied building that is not part of the application site or where written approval to the application was not provided:

- 07:30 AM to 18:00 PM – 70 dB L_{Aeq} and 85 dB L_{Amax} Monday to Saturday

- 18:00 PM to 20:00 PM – 65 dB L_{Aeq} and 80 dB L_{Amax} Monday to Friday

Construction noise must be measured and assessed in accordance with NZS 6803:1999 Acoustics – Construction noise.

5. Construction vibration must comply with the guideline values set out in the German Industrial Standard DIN 4150-3:2016: Vibrations in buildings – Part 3: Effects on structures at all times when measured in accordance with that Standard on any structure not on the same site and where written approval to the application was not provided.

6. Vibration monitoring must be undertaken by a suitably qualified person during the first two weeks of heavy machinery being used on the site. The results must be used to assess compliance with the project vibration limits for avoiding building damage and reported in writing to WBPDC within two weeks of the measurements being undertaken. If non-compliance with the relevant limits is identified, the work responsible must stop and not resume until a report has been provided to, and verified by, WBPDC to set out the measures and methodology that will be adopted to ensure ongoing compliance. In the event of any non-compliance, building condition surveys must also be undertaken at the affected buildings by a suitably qualified person before the construction work continues. Further vibration monitoring must be undertaken once

the construction work resumes for a period of at least one week to determine compliance with the project limits.

9. RESPONSE TO COUNCIL'S S42A REPORT AND CONDITIONS

- 9.1 We have reviewed the Council Planner's Section 42A report. It raised no substantive issues, notes that Mr. Exeter and Mr. Styles have agreed with my assessment and proposed management of submitters' concerns and building damage risk using a CNVMP.
- 9.2 The report concludes by saying that "the noise and vibration construction and maintenance effects can be adequately managed through the conditions of consent to ensure the effects will be less than minor."
- 9.3 But, in response to comments in the Section 42A report relating to other disciplines, the Applicant has explored an alternative location for the rock revetment. The alternative location is west of the original location at the southern end of the revetment, closer to the Glen Isla Place beachfront properties (1.5 metres from the boundary at its closest point). Refer to the evidence of Mr Davis for further description of the alternative location..
- 9.4 As I noted in Paragraphs 7.2.1 and 7.2.2 above, moving the revetment closer will increase noise and vibration levels for residents of Glen Isla Place. I have updated the acoustic model and found that noise and vibration levels from revetment construction in the alternative location will:
- > Increase noise levels by 2 - 5 dB L_{Aeq} at both GIPS-owned and non-GIPS owned dwellings.
 - > Increase vibration levels by up 0.05 - 0.1 mm/s PPV for all dwellings.
 - > Not change the compliance status of predicted noise and vibration levels at non-GIPS owned dwellings.
 - > Mean that noise at one additional GIPS-owned dwelling (15 Glen Isla Place) may infringe the limits.

- 9.5 In summary, I predict that the compliance status for non-GIPs dwellings will be the same for both revetment location options. But in my opinion, the original location is preferable because noise and vibration levels will be lower.

10. CONCLUSION

- 10.1 I have reviewed the potential noise and vibration effects from the Project by measuring the proposed activities on site, and carrying out subsequent calculations.
- 10.2 My findings indicate that the activities will comply with the relevant noise and vibration limits at all dwellings not owned by the Applicant.
- 10.3 Vibration-induced building damage is a significant concern for the neighbours, but my assessment indicates the risk of Project causing damage is very low.
- 10.4 The Council expert (Styles Group) agrees with my assessment methodology and findings. We agree that the proposed consent conditions will ensure that the Project noise and vibration will be mitigated and managed in accordance with the best practicable option. The Council planner has concluded that, as a result, the noise and vibration effects will be less than minor.