



Te Ara Tupua Alliance
Shifting gear to connect past, present and future

Construction Noise and Vibration Management Plan

NKP-TAT-APW-MPN-GV-NS-000022





Document Control

Quality Assurance Statement			
Prepared by:	Lindsay Leitch		Acoustic / Noise Specialist
Reviewed by:	Darran Humpheson		Acoustic / Noise Specialist
Approved for release:	Ed Breese		Partnerships, Environment, Planning and Communications Manager
Approved for release:	Eddie Anand		Waka Kotahi Owner Interface Manager

Revision Schedule		
Rev. Number	Date	Description
<i>Internal reviews</i>		
A	25/11/2022	Draft document for information & internal reviews
B	8/02/2023	Draft document (second revision) for information and internal reviews
<i>Submission for certification</i>		
1	27/02/2023	Final CNVMP

Disclaimer

This report has been prepared by the Te Ara Tupua Alliance for the benefit of the Waka Kotahi NZ Transport Agency. No liability is accepted by the Alliance Partners or any employee of or sub-consultant to the Alliance Partners companies with respect to its use by any other person. This disclaimer shall apply notwithstanding that the report may be made available to other persons for an application for permission or approval or to fulfil a legal requirement.





Glossary

Acronym/Term	Description
Alliance	Te Ara Tupua Alliance
BOL	Block of Line
BPO	Best Practicable Option
CEMP	Construction and Environmental Management Plan
CNVMP	Construction Noise and Vibration Management Plan
Consent Holder	Waka Kotahi NZ Transport Agency
dB	Decibels
EMP	Ecology Management Plan
GWRC	Greater Wellington Regional Council
HCC	Hutt City Council
ICB	Integrated Clubs Building
JSEA	Job Safety and Environmental Analysis
Kororā	Little Penguin
LA _{eq}	Equivalent continuous sound pressure level
LAF _{max}	The maximum Sound Level with 'A' Frequency weighting and Fast Time weighting during the measurement period.
PAA	Project Alliance Agreement
PEP-C	Partnership, Environment and Planning
PPF	Protected premises and facilities
PPV	Peak particle velocity
Project	Ngā Ūranga ki Pito-One
RMA	Resource Management Act 1991
SH1	State Highway 1
SH2	State Highway 2
Suitably qualified person	A person (or persons) who can provide sufficient evidence to demonstrate their suitability and competence in the relevant field of expertise.
Waka Kotahi	Waka Kotahi NZ Transport Agency
Work Packs	For the purpose of this document a Work Pack refers to the summary and integration of all key information required to deliver the construction activity and includes but is not limited to environmental considerations, cultural considerations, design and health and safety.
WCC	Wellington City Council





Table of Contents

1	Introduction	3
1.1	Overview	3
1.2	Purpose and Objectives of the CNVMP	4
1.3	Submission and Updates to the CNVMP	4
1.4	Roles and Responsibilities	5
2	Project details	6
2.1	Overview	6
2.2	Proposed works	6
2.3	Duration of works	8
2.4	Hours of operation	8
3	Performance standards and limits	9
3.1	Consent conditions	9
3.2	Minimum Requirements	12
4	Noise and vibration sensitive receivers	13
4.1	Surrounding area	13
4.2	Residential receivers	16
4.3	Commercial / industrial receivers	17
4.4	Recreational users of Hōniana Te Puni reserve	17
4.5	Assets and underground services	18
4.6	Penguins	18
5	Construction noise and vibration levels	19
5.1	Equipment noise levels and setback distances	19
5.2	Construction scenarios	20
5.3	Predicted vibration levels	21
6	Noise and vibration management and mitigation	22
6.1	Schedules	22
6.2	General mitigation measures	23
6.3	Specific mitigation measures	24
6.3.1	Noise	24
6.3.2	Vibration	25
6.3.3	Penguins	25
6.4	Documentation	26
6.5	Staff training	26
7	Engagement	27
7.1	Council notification	27
7.2	Complaints response	28
7.3	Building condition surveys	29
8	Noise and vibration monitoring	30
8.1	Noise monitoring	30
8.2	Vibration monitoring	31
8.3	Exceedances	31

Appendix A : Time-location diagram

Appendix B: Key contacts

Appendix C : Standards and guides

Appendix D : Predicted noise contours from AECOM assessment

Appendix E : Template for Schedule to the CNVMP

Appendix F : Noise monitoring template

Appendix G : Penguin breeding habitat

Appendix H : Schedule of updates





1 Introduction

1.1 Overview

Waka Kotahi NZ Transport Agency (**Waka Kotahi**) has established the Te Ara Tupua Alliance (**the Alliance**) that will deliver a resilient, safe and connected walking and cycling route between Ngā Ūranga ki Pito-One (**the Project**) as shown on Figure 1.1. The Alliance is comprised of HEB Construction, Downer NZ, Tonkin + Taylor and Waka Kotahi. The Alliance is supported by Holmes Consulting, Isthmus and Boffa Miskell. Further details relating to the Project are described in Section 2 of this Construction Noise and Vibration Management Plan (**CNVMP**).



Figure 1.1. Project location





1.2 Purpose and Objectives of the CNVMP

This CNVMP is the core document for the management of noise and vibration and the resulting effects. It identifies the construction noise and vibration limits for the project and sets out the best practicable options (**BPO**) for noise and vibration management that will be implemented to mitigate and minimise noise and vibration produced during construction of the Project. It also outlines engagement that will be undertaken with surrounding receivers in relation to the noise and vibration aspects of the works. In addition, this CNVMP addresses the management of noise effects within proximity to nesting or moulting kororā (little penguin).

This document is intended to be a high level CNVMP which provides a framework for noise and vibration mitigation and management. For specific work sites, noise and vibration will be managed via site specific schedules (**Schedules**) to the CNVMP as appropriate.

This CNVMP shall be read in conjunction with the assessment of construction noise and vibration prepared by AECOM¹ and relies on the assumed noise levels in that assessment and the Construction and Environmental Management Plan (**CEMP**) prepared in accordance with Conditions CC.1 to CC.4A. The CEMP is the overarching environmental management plan for the Project and its purpose is to confirm the management procedures and construction methods to be used, in order to avoid, remedy or mitigate potential adverse effects arising from construction activities.

1.3 Submission and Updates to the CNVMP

This CNVMP is intended for submission², together with the Outline Plan³ for the Project, to Wellington City Council (**WCC**) and Hutt City Council (**HCC**). The CNVMP shall also be provided to Greater Wellington Regional Council (**GWRC**) for information⁴.

This CNVMP shall be implemented throughout the construction works⁵. It shall be considered a 'living document' that is expanded and updated as the Project progresses and working conditions become clearer. Updates will primarily be via Schedules to the CNVMP for specific work sites, but the overall CNVMP shall be updated if required. It is intended to be the primary tool to manage the Project's construction noise and vibration effects.

If the CNVMP is amended to reflect changes in design, construction methods or management of effects, then the amendments to the plan will be discussed with and submitted to the Manager, HCC and WCC (as relevant) for information without the need for a further Outline Plan process, unless the amendments once implemented would result in a materially different outcome to that described in the original Outline Plan⁶.

¹ AECOM Technical report 12. *Noise and vibration assessment*. Version E dated 14 September 2020

² In accordance with consent condition PC.2 to PC.4 of the resource consent

³ Outline Plans are required in accordance with appendi 176A of the Resource Management Act 1991.

⁴ In accordance with Condition CNV.1(d) of the resource consent.

⁵ Construction works are defined in the resource consent conditions as '*activities undertaken to construct the Project under these designations/resource consents, excluding Enabling Works*'.

⁶ In accordance with Condition PC.4(a) of the resource consent.





1.4 Roles and Responsibilities

The Project Director has the overall responsibility for complying with the requirements of this CNVMP. Table 1.1 sets out the contact details for key project personnel relevant to the implementation of this CNVMP. A record of the key contacts is maintained in Appendix B to this report.

Table 1.1: Contact details

Organisation	Role	Responsibilities
The Alliance	Project Director	Overall responsibility for the Project and ensuring all process are followed
	Project Ecologist	JSEA input Training (covering ecological matters) Inspections Involvement in kororā noise matters
	Environmental Advisor	Inspections and audits Monitoring of compliance with resource consent conditions
	PEP-C Manager	Oversight of construction activities and environmental management Review of JSEA's and Work Packs Training (covering environmental matters) Inspections and audits Receive feedback Incident and complaint management Record keeping Reporting
	Construction Manager	Review and Approval of JSEA and Work Packs Performance Monitoring Inspections
	Discipline Leads	Responsible for management of construction activities. Ensuring preparation of Work Packs and JSEAs, inductions and training, site inspections and reporting
	Health and Safety Lead	Assist in the development of Safety aspect of JSEA and Works Methodologies Review JSEA and Work Packs
	Noise expert	Advising on setback limits for works Advising on appropriate mitigation
	Project Liaison Person	Main point of contact for the public engagement
Regulatory Authorities		
HCC	Manager, Compliance Monitoring	Receipt of the CNVMP with the Outline Plan. Auditing to ensure consent conditions are being met
GWRC	Manager, Environmental Regulation	Receipt of the CNVMP for information. Auditing to ensure consent conditions are being met
WCC	Manager, Compliance Monitoring	Receipt of the CNVMP with the Outline Plan. Auditing to ensure consent conditions are being met

During works, a specific email address and 0800 number (0800 135 255) will be set up and monitored by the Project Liaison Person for the duration of the construction works.





2 Project details

2.1 Overview

Resource Consents have been obtained for the Project as recorded in the decision of the Expert Consenting Panel under clauses 37 and 40 of the Covid-19 Recovery (Fast-Track Consenting) Act 2020. On 4 April 2022, a variation to the existing consents was granted by GWRC in accordance with section 127 of the Resource Management Act (RMA) 1991. A suite of resource consent conditions were changed as part of this application. One of the changes included adopting a noise-based approach to the management of works in proximity to kororā.

This CNVMP covers noise and vibration from construction works of the Ngā Ūranga ki Pito-One Project. The Project runs is located between the Ngā Ūranga Junction, where State Highway 1 (SH1) and State Highway 2 (SH2) split approximately 5 km north of central Wellington, and Honiana Te Puni recreation reserve in Pito-One. The Project is located on the seaward side of the existing railway line that runs alongside Te Whanganui-a-tara.

The key element of the Ngā Ūranga ki Pito One shared path include:

- Shared path: 4.5km shared path with a 5m wide sealed surface on the seaward side of the Hutt Valley railway line.
- Ūranga (resting or landing places): Six ūranga located at key sites along the shared path's length providing areas for cultural placemaking, planting, landscaping, habitat creation, and gathering, resting, and viewing areas.
- Te Wharepōuri bridge at Ngā Ūranga: A new architecturally designed bridge providing shared path access over the railway.
- A revetment: 2.7km of X-bloc and rock embankment protecting the shared path and ūranga. These are designed with the ability to be modified in the future to adapt to sea-level rise.
- Seawalls: Six MSE seawall segments protecting the shared path, totalling 830m in length located and designed to avoid impact on high value habitat areas.
- Offshore habitats: Two small offshore habitats for coastal bird life, constructed of naturalised rock forms, at least 40m horizontal distance from the shoreline.
- Services: Utilities trench to provide ITS, power, CCTV, counting and VMS services. relocation of existing services and provision of a new KiwiRail traction/switching station building and services.
- Drainage: Culvert extensions, path and bridge drainage, and fish passage where required.
- Honiana Te Puni Reserve: Shared path facilities, Permanent Tawharaū Pods and canopy, water supply and services connections.
- Landscaping, urban design, street furniture including cultural artworks at bridge, Ūranga and Honiana Te Puni Reserve.

2.2 Proposed works

A high-level construction methodology is shown in Table 2.1, together with an indication of whether works are expected to encroach on the 20 m exclusion zone around penguin habitats. The works shown in Table 2.1 include enabling works. A time-location diagram is attached in Appendix A which gives an overview of the timing of different activities at different locations. This is approximate only and is subject to change.





Table 2.1: Proposed construction methodology

Activity	Method	Potentially within 20m of penguin habitat?
Enabling works	Enabling works include: <ul style="list-style-type: none"> ▪ Ground investigations (boreholes, cone penetration tests and slot trenches); ▪ The establishment of the Ngā Ūranga and Pito-One Construction Yards; ▪ Establishment of the Tāwharau Pods and Integrated Clubs Building in Honiana Te Puni Reserve; ▪ Rail crossings at Ngā Ūranga; ▪ The establishment of the two barge landings; and ▪ The construction of two offshore habitats; ▪ Establishing ecology mitigation; and ▪ Modifying potential kororā habitat. These works include mobilise plant, equipment and materials to site; earthworks (where required); drilling (where required).	Y
Access establishment (staging in front of seawalls)	Mobilise plant, equipment and materials to site. Install staging with use of crane from staging. (When finished) remove staging with the use of a crane and transport off-site.	Y
Access construction (along top of current revetment)	Strip site adjacent to existing revetment Import fill materials to site with the use of trucks Roll and compact area	Y
Access construction (barge staging)	Mobilise plant, equipment and materials to site. Excavate foundation Drive piles with piling rig Install beams with crane Install decking with crane Establish barge and equipment Transport materials from barge to an onsite stockpile location	Y
Revetment construction (by land)	Establish plant and equipment adjacent to existing revetment. Stockpile materials adjacent to existing revetment with the use of dump trucks Excavate foundation of existing revetment with the sue of an excavator Place rocks adjacent to existing revetment	Y
Revetment construction (by sea)	Establish barge and equipment Transport materials to barge location Excavate foundation of existing revetment from barge with excavator Place rocks from barge to existing revetment Backfill revetment with trucks working along rail corridor	Y
Seawall construction	Mobilise plant and equipment on already constructed staging. Drill piles with piling rig Install H piles with piling rig or crane Concrete H Piles Install infills from staging Backfill behind seawall	Y





	Construct capping beam with means accessed from existing revetment	
Bridge construction	Mobilise plant and equipment Drill and construct piles with piling rig and concrete Construct columns Construct crossheads Install beams Construct deck Install barriers Fitout bridge	Y
Pavements and finishing	Trim subgrade with tractor grader Supply and install basecourse with use of trucks along already constructed revetment. Supply and place asphalt.	N

All construction activities will be subject to a Job Safety and Environmental Analysis (**JSEA**) process, the development of a work method statement and the creation of work packs to ensure that an appropriate level of environmental management is always applied and adhered to. The work pack approach will integrate environmental management and health and safety into the construction process. A full description of the JSEA and work pack process is available in the CEMP. Potential noise and vibration issues will be identified in conjunction with the development of each work pack.

2.3 Duration of works

Construction of the Project (excluding enabling works) is anticipated to commence in May 2023 with a total duration of three years. It is estimated that construction will be completed early 2026.

An indication of the work programme is provided in the time-location diagram, see Appendix A. This is approximate only and is subject to change. Updates will be provided to HCC, WCC and GWRC as required.

2.4 Hours of operation

Standard hours of work are 7:30 am to 6 pm Monday to Saturday. Works may be undertaken outside these times, for example if a block of line (**BOL**) is required for works close to the rail line, or if works are influenced by tidal conditions. If substantial works are required outside the standard hours of work a Schedule to the CNVMP is likely to be required.

Works on Sundays and public holidays will be avoided as far as practicable but may occur at times due to working constraints.

It is anticipated that the following works may require construction outside standard working hours:

- Refreshing rock stockpiles for revetment placement in the morning, and delivery of X-blocks. This will mostly be undertaken by barge;
- Any works within accepted safety setback from the Hutt Valley railway line that will require a BOL;
- 24-hour operation is expected during BOLs through Christmas and Easter periods to speed up critical works operations;
- Construction of the shared path bridge;
- Construction of the vertical seawalls utilising a crane where the toe of the seawall is at or below mean high water springs (**MHWS**); and
- Loading and unloading barges.

Regular updates will be provided to WCC and HCC regarding night works and works outside of standard working hours. Where possible at least 48 hours' notice will be given to WCC / HCC prior to any night works or night work periods to allow WCC / HCC to provide communications to Council stakeholders.





3 Performance standards and limits

3.1 Consent conditions

Table 3.1 identifies the conditions relating to noise and vibration and have been taken from the consent conditions for the Project (consent reference EPA210001). Standards and guidance referenced in these conditions are summarised in Appendix C.

Table 3.1: Project consent conditions relating to noise and vibration

Condition	Condition requirement	Location it is addressed
CNV.1	(a) A CNVMP shall be prepared prior to the Start of Construction.	This CNVMP has been prepared prior to the start of construction.
	(b) The purpose of the CNVMP is to provide a framework for the development and implementation of the best practicable option for the management of construction noise and vibration effects, and to minimise any exceedance	This CNVMP provides a framework for BPO to manage construction noise and vibration effects (Section 6) which will seek to minimise exceedances of consent criteria.
	(c) The CNVMP shall address noise and vibration from Project construction activities on land (including at Honiana Te Puni Reserve) and in the CMA.	Noise sensitive receivers are considered on land (dwellings, commercial / industrial receivers and recreational users of the Hōniana Te Puni Reserve, see Section 4.2 to 4.4) and in the CMA (penguins, see Section 4.5).
	(d) The CNVMP shall be submitted as part of the relevant Outline Plan in accordance with the process set out in Condition PC.2 – PC.4. A copy of the CNVMP shall be provided to GWRC for information.	This CNVMP is being submitted to WCC / HCC along with the Outline Plan for the Project.
CNV.2	The CNVMP shall be prepared in accordance with Annex E2 of the New Zealand Standard NZS6803:1999 'Acoustics – Construction Noise' (NZS 6803:1999) and the Waka Kotahi State highway construction and maintenance noise and vibration guide (version 1.1, 2019), or any subsequent version.	See Appendix C for the requirements of these documents. Requirements are incorporated into Sections 10-8 of this CNVMP.
CNV.3	Construction noise shall be measured and assessed in accordance with NZS 6803:1999 Acoustics – Construction Noise and shall comply, as far as practicable, with the construction noise criteria in Table CNV.1. [Table CNV.1]:	NZS 6803:1999 is summarised in Section Appendix C. Setback distances to meet the noise limits are provided in Section 5.1.

Day of week	Time period	L _{Aeq}	L _A F _{max}
Occupied Residential and other noise sensitive buildings			
Weekday	0630h - 0730h	55 dB	75 dB
	0730h - 1800h	70 dB	85 dB
	1800h - 2000h	65 dB	80 dB
	2000h - 0630h	45 dB	75 dB
Saturday	0630h - 0730h	55 dB	75 dB
	0730h - 1800h	70 dB	85 dB
	1800h - 2000h	45 dB	75 dB
	2000h - 0630h	45 dB	75 dB
Sunday and Public Holidays	0630h - 0730h	45 dB	75 dB
	0730h - 1800h	55 dB	85 dB
	1800h - 2000h	45 dB	75 dB
	2000h - 0630h	45 dB	75 dB
Industrial and commercial			
All	0730h - 1800h	70 dB	-
	1800h - 0730h	75 dB	-



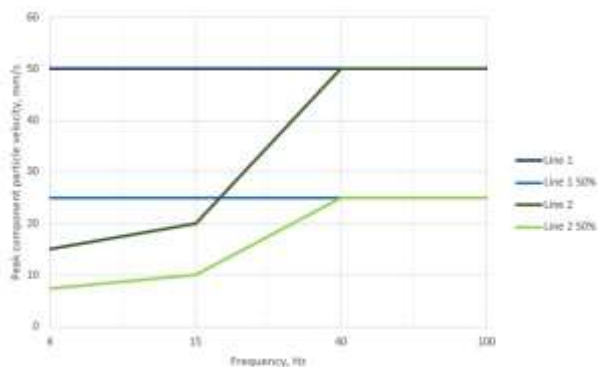


CNV.4	(a) Construction vibration shall be measured in accordance with <i>ISO 4866:2010 Mechanical vibration and shock – Vibration of fixed structures – Guidelines for the measurement of vibrations and evaluation of their effects on structures.</i>	ISO 4866:2010 is summarised in Appendix C.
	(b) The Category A criteria in Table CNV.2 shall be complied with as far as practicable. If measured or predicted vibration from construction activities exceeds the Category A criteria, a Suitably Qualified Person shall assess and manage construction vibration during those activities, and pre- and post-construction building condition surveys shall be undertaken.	Setback distances to construction vibration criteria are provided in Section 5.1. BPO for potential exceedances of limits is included in Section 6.3.
	(c) If measured or predicted vibration from construction activities exceeds the Category B criteria those activities shall only proceed if vibration effects on affected buildings are assessed, monitored and mitigated as recommended by a Suitably Qualified Person.	

[Table CNV.2]:

Receiver	Details	Category A	Category B
Occupied PPFs	Night-time 2000h-0630h	0.3mm/s ppv	1mm/s ppv
	Daytime 0630h - 2000h	1mm/s ppv	5mm/s ppv
Other occupied buildings	Daytime 0630h - 2000h	2mm/s ppv	5mm/s ppv
All other buildings	Vibration - transient	5mm/s ppv	BS 5228-2* Table B2
	Vibration - continuous		BS 5228-2* 50% of table B2 values

*BS 5228-2:2009 'Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration'



Note: the values from BS 5228-2 Table B2 are plotted above.





<i>Schedules to the CNVMP</i>		
CNV.5	(a) If noise or vibration from a construction activity is measured or predicted to exceed the criteria in Conditions CNV.3 or CNV.4 at a nearby receiver, a Schedule to the CNVMP for that activity shall be prepared in accordance with the Waka Kotahi State highway construction and maintenance noise and vibration guide (version 1.1, 2019) or any subsequent version.	Schedule template provided in Appendix E, setback distances to assess requirement for Schedule provided in Section 5.
	(b) The purpose of a Schedule to the CNVMP is to set out the best practicable option for the management of noise and/or vibration effects for a specific construction activity and/or location beyond those measures set out in the CNVMP.	BPO measures set out in Section 6. Any additional BPO will be assessed in the Schedules.
	(c) The Schedule shall identify: (i) activity location, start and finish dates; (ii) the nearest neighbours to the activity; (iii) a location plan for the activity; (iv) predicted noise/vibration levels and best practicable option mitigation for the activity and/or location; (v) communication and consultation with the affected neighbours; and (vi) location, times and type of monitoring.	Included in the Schedule template in Appendix E.
	(d) A copy of the any Schedule to the CNVMP shall be provided to GWRC for information.	
<i>Coastal Birds</i>		
EM.6C	(a) Within the 24 hours prior to each Enabling Works or each Construction Works activity undertaken between 16 June to 28/29 February, a penguin detector dog shall confirm the presence or absence of active nests or moulting penguin;	Contained in the Avifauna Management Plan, not specific to acoustics.
	(b) If an active nest or moulting penguin is discovered under clause (a), until such time that nesting or moulting is complete the following applies: i. No rock removal or piling activities shall be undertaken within 10 metres of the active nest of moulting penguin; and ii. People and plant are able to move past the active nest or moulting penguin to access other work sites across other works sites across the Project, subject to the movement occurring as quickly as practicable and avoiding unreasonable noise; and iii. Except as provided for my clauses (i) and (ii), no other activity may occur in proximity to an active nest or moulting penguin unless that activity can achieve a maximum sound level of 75 dB LAeq (15 min) as measured outside of the entrance of an active penguin nest or moulting penguin roost.	Setback distances to meet this limit are provided in Section 5.1. Specific mitigation measures are provided in Section 6.3.3.
	(c) If an active nest or moulting penguin is discovered in an area within 20 metres of the work site(s), fortnightly monitoring shall be undertaken to confirm whether nesting or moulting is ongoing at the site until nesting or moulting is complete.	N/A at this stage.





3.2 Minimum Requirements

Minimum requirements are attached to the Project Alliance Agreement (**PAA**). The Minimum Requirements contain conditions regarding construction noise and vibration in section 3.2. All works relating to the Project must meet these requirements. Table 3.2 highlights where these requirements have been addressed within this management plan.

Table 3.2. Minimum requirements

Reference	Condition	Comment
3.2.1	The Alliance are to complete all precondition surveys of all potentially affected properties and significant structures prior to any works commencing in that area as a baseline for any claims for property damage as a result of the works.	Section 7.3 of this CNVMP details the requirements for precondition surveys.
3.2.2	The Alliance must ensure that construction noise and vibration is assessed, mitigated and managed in accordance with the relevant conditions and Property Agreements.	Currently no specific noise requirements in Property Agreements
3.2.3	The Alliance must assess, mitigate and manage construction noise and vibration in accordance with the criteria and guidance contained in the NZTA State Highway Construction and Maintenance Noise and Vibration guide. (In addition to this guide there are various related guidance, tools, templates and record keeping facilities available to the Alliance on the Transport Agency Transport Noise website (www.nzta.govt.nz/acoustics)).	The Waka Kotahi Guide is summarised in Appendix C. Templates have been adopted for Schedules and noise monitoring (Appendix E and Appendix F).



4 Noise and vibration sensitive receivers

4.1 Surrounding area

The Project site is located on the west side of Te Whanganui-a-Tara between Ngā Ūranga junction and Honiana Te Puni Reserve in Pito-One, extending approximately 4.5 km around Wellington harbour. It is located on the seaward side of the railway line and SH2.

At the Ngā Ūranga end of the Project, there is an industrial area around SH1 as it heads inland. For much of the extent of the project, scattered residential receivers are located on the steep hillside to the northwest of the alignment in the suburb of Newlands.

Horokiwi Quarries Limited is located towards the northern end of the Project alignment. This is not considered to be a noise sensitive receiver. At the northern end of the alignment is Honiana Te Puni Reserve, where the Wellington Rowing Association Club and the Wellington Water Ski Club are sited. These clubs will be relocated at the start of the Project into the Integrated Clubs Building (ICB) away from the Project works and are not considered further. The reserve is used to access the water and for general recreation.

To the north of the Project at the northern end is an industrial area. Residential properties further to the north are approximately 450 m from the alignment.

The extent of the Project alignment and the surrounding receivers are shown in Figure 4.1 to Figure 4.6.



Figure 4.1: Overall location of noise sensitive receivers showing location of diagrams 1 to 5, see Figure 4.2 to Figure 4.6



Figure 4.2: Location of noise sensitive receivers – diagram 1



Figure 4.3: Location of noise sensitive receivers – diagram 2



Figure 4.4: Location of noise sensitive receivers – diagram 3



Figure 4.5: Location of noise sensitive receivers – diagram 4

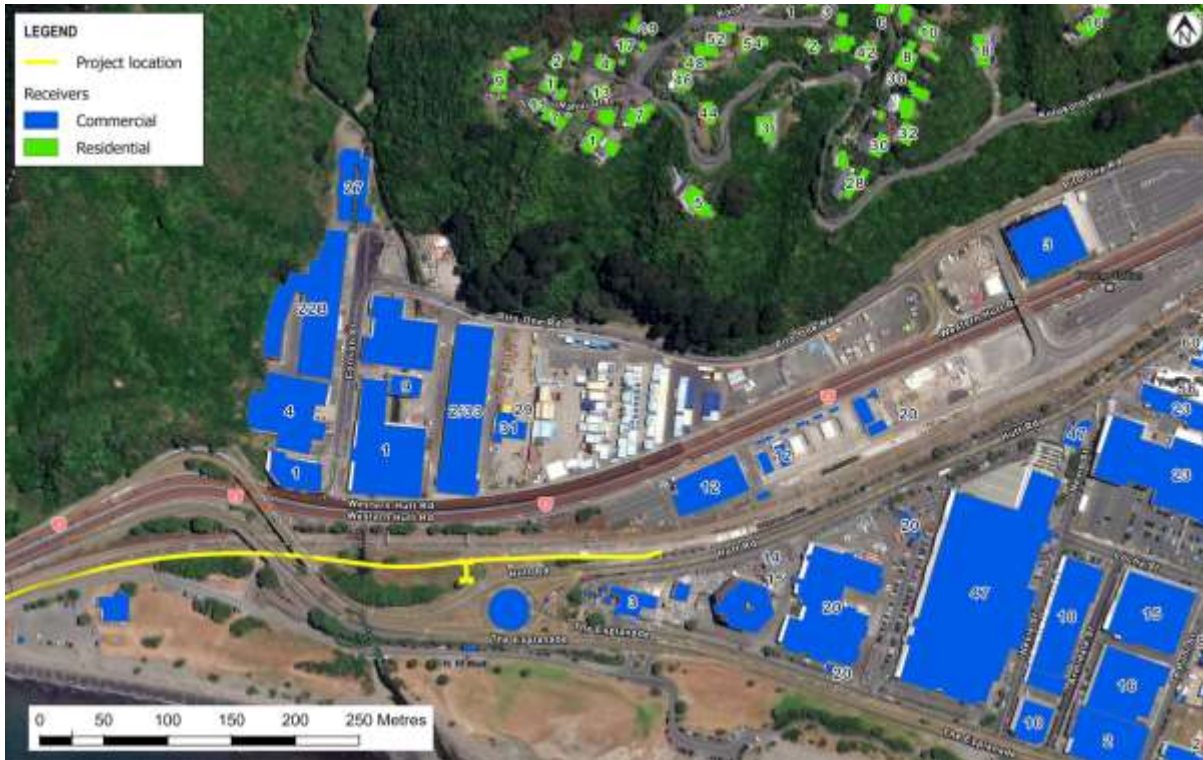


Figure 4.6: Location of noise sensitive receivers – diagram 5

4.2 Residential receivers

Nearby residential properties are located on the following roads (south to north):

- Fort Street
- Malvern Road
- Dungarvan Road
- Glanmire Road
- Cromwell Point
- Tamworth Crescent
- Bendigo Grove

Many of these properties will have line of sight to the Project due to their elevated location, although most are at least 150m from the Project alignment. Relatively high background noise levels are expected in these locations due to SH2 and the adjacent rail line, which may mask construction noise, particularly in day-time. The distance between the closest receivers and the construction footprint (at its closest point) are included in Table 4.1.



Table 4.1: Closest receiver distances to works

Location	Distance, m	Figure reference
4 Fort Street	180 to alignment 150 to laydown	1
21 Malvern Road	110	1
52 Dungarvan Road	150	2
39 Dungarvan Road	400	2
222 Glanmire Road	200	2
231 Glanmire Road	300	2
579 Hutt Road	80	2
27 Cromwell Point	300	3
73 Tamworth Crescent	300	3
21 Bendigo Drive	250	3
150 Horokiwi Road	600	4
5 Korokoro Road	250	5
11 Rahui Grove	300	5

4.3 Commercial / industrial receivers

There are commercial / industrial receivers around Ngā Ūranga interchange along SH1 at the southern end of the Project. These receivers are on relatively flat land on the far side of SH1 / SH2, behind the raised interchange and are unlikely to have line of sight to Project works.

Commercial / industrial receivers to the north of Hōniana Te Puni reserve are also on relatively flat land without line of sight to the Project.

None of the commercial uses are considered overly noise or vibration sensitive; for example, sensitive commercial receivers would include electronic manufacturing, vibration sensitive instrumentation or medical examination facilities including audiometric testing.

4.4 Recreational users of Hōniana Te Puni reserve

The western end of Hōniana Te Puni reserve will be used as a construction yard to support the Project and will be mostly closed to the public for approximately three years. Recreational users will therefore be limited to the eastern end of the reserve, i.e. further from construction works.

The reserve is used to access the water, for dog walking, general recreation and occasional events such as the Petone Summer Carnival. Some uses, such as dog walking, are transient and users will spend a limited time in one area, therefore reducing their exposure to construction noise. For other users, the extent of the park will enable users to locate themselves further from construction works if desired. Users accessing the water from the reserve are likely to be less noise sensitive than those spending more time in one location.





4.5 Assets and underground services

During the detailed design of the Project, the Alliance has identified services in proximity to the works area through both intrusive and desktop investigations. There is a potential that other services (not previously identified) could be encountered during works however, this is unlikely. The works also include the installation and construction of new services within the shared path. The detailed design of this is still currently being undertaken.

The services identified within the alignment generally include:

- Ngā Ūranga Yard – Communication lines; KiwiRail power/signal; and low voltage power
- Along the alignment (on the seaward side of the rail) – Vocus cable; and power.
- Along the alignment (between the rail and state highway) – gas; communications; KiwiRail power/signals; fibre; and wastewater.
- Honiana Te Puni Reserve – Gas lines; reticulated water; city link cable; communication lines; and low voltage power.

Assets and underground services will have limited sensitivity to vibration and no sensitivity to noise. These may need to be taken into consideration when high vibration activities (such as piling) are undertaken in close proximity. During the development of the work method statements, any necessary mitigation measures on assets and underground services will be identified and implemented prior to any works with the potential for high vibration. As no limits for assets and underground services are specified in the consent conditions these will be established on a case-by-case basis; in some cases, asset owners may specify vibration limits for specific assets.

4.6 Penguins

Kororā are known to be located along the extent of the Project alignment. The penguin potential breeding habitat is shown in Appendix G. For further details of penguin habitats and the applicable 20m exclusion zone for construction works please refer to the Ecology Management Plan (**EMP**).





5 Construction noise and vibration levels

5.1 Equipment noise levels and setback distances

Sound power levels are provided in Table 5.1 for the anticipated equipment for each stage of works. These are taken from the AECOM assessment report or from measurements of operating equipment. These levels are approximate only and may differ from equipment on site. Setback distances are provided for compliance with the daytime noise limit (70 dB LAeq), the limit for Sundays and public holidays (55 dB LAeq), the night-time residential limit (45 dB LAeq) and the limit for penguin burrows (75 dB LAeq(15min)).

Where multiple items of equipment will be operating simultaneously, the combined sound power levels will be calculated by logarithmically adding the sound power levels for each item of equipment and the appropriate setback will be calculated by the Project noise expert.

The closest residential receiver is 80 m from construction works, and receivers are typically at least 150 m. Limited exceedances of the 70 dB LAeq daytime limit are anticipated.

Table 5.1: Construction equipment noise levels without mitigation

Equipment	Sound power level dB LWA	Setback distance (m) to meet limit			
		70 dB LAeq (daytime)	55 dB LAeq (Sundays)	45 dB LAeq (night-time)	75 dB LAeq(15min) (penguins)
Excavator (2t)	93	8	40	100	3
Excavator (12t)	96	11	50	130	4
Excavator (14t)	99	16	70	175	6
Excavator (25t)	103	25	100	250	10
Excavator (35t)	105	30	120	300	13
D6 dozer	99	16	70	175	6
ADT	109	45	175	440	20
Vibratory roller (6t)	98	14	65	160	6
Vibratory roller (12t)	105	30	120	300	13
Tandem tipper	96	11	50	130	4
Road truck	96	11	50	130	4
Large bored piling rig	121	130	525	1320	45
Vibrohammer (5t)	116	85	330	830	30
Crane (20t)	93	8	40	100	3
Crawler crane (150t)	97	15	60	145	5
Concrete truck and pump	101	20	80	210	8
Asphalt paver	109	45	175	440	20
Freight train – engine	110	50	190	480	22
Freight train – tipping	113	65	250	630	21
Barge with 25t crane	110	50	190	480	22
Bored piling rig (30-60t)	118	100	400	1000	35
Tug / work punt boat	90	6	30	75	2
Compactor (600kg)	109	45	175	440	20
Loader	110	50	190	480	22





5.2 Construction scenarios

Construction activities will typically involve several items of equipment which may operate at the same time. Likely construction scenarios are reproduced below from the AECOM assessment report. The predicted noise contours from these scenarios (also from the AECOM assessment report) are presented in Appendix D.

Table 5.2: Construction scenarios (from Table 9 in AECOM assessment report)

Scenario	Item
Establishment / Stockpile areas	<ul style="list-style-type: none"> • Truck and trailer units • Light Utility Vehicles (LUVs)
Offshore habitats	<ul style="list-style-type: none"> • Floating barge/s (potentially a jack-up-barge also) • Tug boat • Work punt boats • 30-60t Drill rig • 100t Crane • 30-40 ton long-reach excavator
Seawalls	<ul style="list-style-type: none"> • 55-70 ton (or similar size) crawler crane/s • Crane-mounted drill table • Vibrohammer • 16-20 ton excavator • 4 WD dumpers or tippers • Vibrohammer attachment for excavator • Auger attachment for excavator • Readymix Concrete trucks • Concrete pumps
Rock and fill placement	<ul style="list-style-type: none"> • 6-wheeler trucks or articulated dumper trucks (Moxys or ADT's) • Water cart • Various sized excavators • Bulldozer • Rollers / compactors • Grader • Front End Loaders • Side dump rail wagons
Bridge construction	<ul style="list-style-type: none"> • Piling rigs • Vibro-hammers • Readymix Concrete trucks • Jinker trucks (bridge beam deliveries) • Mobile cranes • Crawler cranes • Concrete pump
Surface works	<ul style="list-style-type: none"> • Sealing plant • Topsoil spreaders (dump truck) • Topsoil spreaders (excavator) • Fencing equipment etc
Site wide (miscellaneous)	<ul style="list-style-type: none"> • 6-wheeler trucks or articulated dumper trucks (Moxys or ADT's)





Scenario	Item
	<ul style="list-style-type: none"> • Water cart • Various sized excavators • Bulldozer • Rollers / compactors • Grader • Front End Loaders • Side dump rail wagons (if materials delivered by rail) • Barges (if materials delivered by water) • Paving equipment
Honiana Te Puni Reserve construction	<ul style="list-style-type: none"> • Delivery trucks • Hand-held tools • Asphaltting plant • Excavators

Due to the nature and extent of the proposed works there will be a variety of construction plant used. Table 5.1 lists the expected significant items of plant. It is not feasible to provide an assessment of noise from all construction plant that will operate across these works. The AECOM predicted noise contours in Appendix D show the extent of receivers that may exceed the daytime, evening and night-time noise limits. It should be noted that the daytime limit is shown as 75 dB LAeq in these contours, where the Project limit is 70 dB LAeq. This will not make a material difference to the results.

If the predicted level at the nearest receiver is above the noise limit for the time of day (e.g. 45 dB for night works) or close to the limit (to allow for uncertainties with the sound power levels) then a Schedule will be required for the works.

5.3 Predicted vibration levels

The vibration level from impact and vibratory piling has been predicted using the equations presented in BS 5228-1: 2008⁷. The following setback distances are valid for the vibration limits in consent condition CNV.4. Other equipment, including haulage, is lower vibration and setback distances will not be significant.

Table 5.3: Predicted setback distances for vibration

Equipment	Setback distance (m) to meet vibration limit			
	0.3 mm/s PPV	1 mm/s PPV	2 mm/s PPV	5 mm/s PPV
Vibratory compaction (steady state)	60	27	16	9
Vibratory compaction (start up and run down)	80	35	20	10
Vibrohammer	70	55	33	17

All residential properties are at least 80 m from the closest works, which is further than the greatest setback distance predicted for the most stringent vibration limit (80 m to meet 0.3 mm/s PPV). Therefore, no issues with vibration are anticipated at residential properties and building condition surveys and monitoring of vibration during construction are not required at any residential receiver.

⁷





6 Noise and vibration management and mitigation

6.1 Schedules

For a specific phase of works, a detailed construction methodology will be developed as part of the JSEA, work pack and work method statement process. This methodology will include equipment and activities, as well as the proposed times of day for the works. The nearest receivers will be identified from the location of works. As the information is compiled, the setback distances will be used as a screening tool to identify whether any noise issues are anticipated. If there are potential exceedances of the noise limits, i.e. works are within (or close to) the relevant setback distances, a Schedule to the CNVMP will be prepared in accordance with resource consent condition CNV.5. For works outside these setback distances a Schedule will not generally be necessary, however BPO will be implemented as set out in Section 6.

Any Schedule will include the following minimum information:

- A description of the work and equipment to be used;
- Justification for undertaking work outside standard construction hours;
- Predicted noise levels and potentially affected receivers;
- Proposed communication with closest affected receivers;

When noise levels are predicted to exceed recommended levels the following is also required:

- Details of dates and times when work is expected to exceed levels;
- Details of locations where noise will exceed levels;
- Details of mitigation methods to ensure the BPO is met;
- Predicted noise levels with mitigation undertaken;
- Details of initial measurements for the different types of construction when first undertaken to confirm setbacks;
- A monitoring plan for noise measurements;
- Contact details on the night (person(s) WCC or HCC can contact if there are any issues or complaints arise)

Using the setback distances in Table 5.1, the following scenarios are expected to require a Schedule to this CNVMP with a detailed assessment of noise levels and mitigation and management measures to be implemented. This is an indicative list only; other scenarios may also require a Schedule to be drawn up, for example if multiple items of equipment will be used or if measured sound power levels are higher than anticipated.

- All night works, unless it can be demonstrated that receivers are significantly outside the identified setback distances;
- Use of the large, bored piling rig, the 30t-60t bored piling rig or the vibrohammer on Sundays or public holidays;
- Use of the large bored piling rig, vibrohammer, barge with 20t crane or 30t-60t bored piling rig within respective setback distances from penguin habitats.

If other types of piling are required (sheet piling, impact driven piling) then these will need to be assessed on a case-by-case basis and are highly likely to require a Schedule.

Construction works within standard working hours (7:30 am to 6 pm) are generally not expected to require a Schedule and will instead rely on the noise mitigation and management framework in this CNVMP.

A copy of each Schedule to the CNVMP will be provided to GWRC for information, and to WCC and HCC on request.





6.2 General mitigation measures

This CNVMP contains a framework to help identify key construction activities that have the potential to cause noticeable noise and / or vibration to occupants. General mitigation controls are identified as:

- Stakeholder communication / consultation as per the Communications and Stakeholder Plan. The notice given to residents and / or other receivers will depend on the level of impact (high / medium / low impact). This will be determined as part of the work plan development process.
- Controlling timing of noisy / vibratory works to minimise disruption as far as practicable. Working hours may be restricted due to a Kiwirail BOL, see Section 2.4.
- Plant selection to minimise noise and vibration levels, such as - prioritise electric motors over diesel engines where practicable, equipment shall be suitably sized for the proposed task, equipment shall be maintained and fitted with exhaust silencers and engine covers.
- Good practice when operating machinery, avoiding unnecessary noise and vibration.
- Turning off plant when not in use.
- Limit vehicle horns to emergency purposes only.
- Minimise shouting / radios on site.
- Complaints management and response process in place.
- Noise monitoring to provide feedback to site operators.
- All equipment is to be well maintained - simple maintenance can reduce noise levels by as much as 50 per cent. For example, preventing tracked vehicles from 'squealing' will help to minimise disturbance.
- Be careful with tools and equipment. Place them down and do not drop them.
- Do not slam tailgates of vehicles.
- Do not drag materials on the ground. Place them down when you arrive at the work area.
- When loading and unloading trucks try not to drop material from a height. Load softer material at the bottom.
- If site staff see anything/anyone making unnecessary noise, then stop it/them. If the source cannot be stopped then report it to the Site Manager.
- It is essential that good relationships are maintained with local residents. Any queries from members of the public shall be responded to politely and referred to the Stakeholder Manager or the hotline number. Staff shall assist the public to make contact with this person. Staff shall not enter into a debate or argue with members of the public.
- No potentially noisy work will be conducted until all staff involved in the task understands the required noise controls for that task.





6.3 Specific mitigation measures

6.3.1 Noise

Noisy works which may exceed limits specified in Section 3.1 will be managed through a Schedule to this CNVMP, see 0 for Schedule template. Specific mitigation such as screening, timing of works, equipment selection etc will be assessed as part of each Schedule.

The following specific mitigation measures can be included as appropriate. Additional mitigation measures may be required depending on the specific circumstances of each work scope.

Notification:

- Notification to residents / building occupants that works will be in the local area. Communications will be as per the Communications and Stakeholder Plan and will depend on the level of noise impact (high / medium / low impact).
- Potentially affected residents / building occupants will be given specific notification when works are expected to exceed noise limits. This may require face-to-face communication as appropriate.
- Notification will be provided to HCC and / or WCC (as applicable) of dates / times when noisy / vibratory works will take place to pre-empt any noise complaints that the Councils may receive. This will typically be works that require a Schedule. WCC / HCC will be notified at least 48 hours in advance whenever practicable.

Rock / X-block deliveries:

- Deliveries of rocks and X-blocks from barges occurring at night will require active noise management and good practice from operators.
- All persons involved with night-time rock / X-block deliveries will be made aware of the importance of noise management and maintaining good relations with residents.
- Rocks and X-blocks should be placed and not dropped;
- Surfaces on which rocks are placed (barge container, laydown area) will be bedded in with softer material, such as smaller rocks / gravel to reduce impact noise;
- Rocks will not be scraped along surfaces, particularly metal containers on the barge;
- Rock deliveries should be timed to avoid core sleeping hours if practicable.

Hōniana Te Puni reserve:

- Consideration will be given to the likely location of recreational users of the park.
- The layout of noisy and non-noisy activities in the reserve will be taken into consideration, for example it may be possible to locate a quiet laydown area or site building close to areas that may be used by the public.
- Where potentially noisy activities are located close to recreational areas in the reserve, acoustic barriers and / or fencing may be appropriate.

Piling:

- Screening is unlikely to be effective mitigation for piling as both the noise source and receivers are likely to be elevated.
- Potentially affected receivers should be notified as appropriate.
- Timing of works should be considered, high-noise piling works should take place during daytime working hours as far as practicable. If night works are necessary, the noisiest works should be undertaken earlier during the evening if practicable to avoid core sleeping hours.
- Equipment should be appropriately sized for the activity.

General site equipment:

- Site vehicles and plant will be fitted with broadband alarms or rear sensors/ flashing lights as far as practicable to avoid having tonal reversing beepers.





6.3.2 Vibration

Condition CNV.4 (Section 3.1) requires that if measured or predicted vibration from construction activities exceeds the Category A criteria, a Suitably Qualified Person⁸ shall assess and manage construction vibration during those activities. Pre- and post-construction building condition surveys will be undertaken.

If measured or predicted vibration from construction activities exceeds the Category B criteria those activities shall only proceed if vibration effects on affected buildings are assessed, monitored and mitigated as recommended by a Suitably Qualified Person.

Due to the significant distances from works to the nearest vibration sensitive receivers, the vibration levels in Category A are not expected to be exceeded and specific vibration mitigation is unlikely to be required.

Building surveys would only be required if vibration is measured or predicted to exceed 5 mm/s. The lower vibration levels in Category A of Condition CNV.4 are amenity limits for building occupants; there will be negligible risk to buildings from vibration below 5 mm/s.

6.3.3 Penguins

The following specific noise and vibration mitigation measures will be implemented for works near an active penguin burrow (as defined in the Avifauna Management Plan) or moulting penguin. All noise control measures relating to penguins should be undertaken in accordance with the Avifauna Management Plan (a subsidiary plan to the Ecology Management Plan) or in consultation with the Project Ecologist. For the avoidance of doubt the Avifauna Management Plan and the Ecology Management Plan take precedence over this document in relation to noise management for avifauna.

- Identify the location(s) of penguin habitat (including active burrows) and setback distances for equipment that will be used for enabling and construction works. Setback distances for 75 dB LAeq will be identified;
- If the distance between the nearest active burrow and the works is smaller than the setback distance required to meet 75 dB LAeq(15min), mitigation must be implemented to reduce the predicted noise level to less than 75 dB LAeq(15min);
- If the distance between the nearest active burrow and the works is between the setback distances required to meet 75 dB LAeq, noise monitoring must be undertaken at the start of works to ensure that noise levels remain below 75 dB LAeq;
- No rock removal or piling activities will be undertaken within 10 m of an active nest or moulting penguin;
- Noise monitoring will be undertaken at the start of works outside the entrance of an active penguin burrow or moulting penguin (in communication with the Project Ecologist);
- Noise screening may be used to mitigate noise levels. The Project Ecologist will advise on the appropriate placement of the noise screen, which will not interfere with access to the burrow or the ocean; and
- People and plant are able to move past the active nest or moulting penguin to access other works sites across the Project, subject to the movement occurring as quickly as practicable and avoiding unreasonable noise.

Although there no known vibration limits for penguins, a cautious approach should be adopted when using high vibratory equipment in close proximity to penguin habitats.

⁸ A person (or persons) who can provide sufficient evidence to demonstrate their suitability and competence in the relevant field of expertise.





6.4 Documentation

All documentation relating to noise and vibration will be stored so that it can easily be accessed by site personnel. Where appropriate, specific documentation will be made available to WCC / HCC for review on request. Documentation will include:

- This CNVMP, together with any updates.
- All Schedules to this CNVMP.
- Record of stakeholder engagement (e.g. communications with local residents / occupiers). See Communications and Stakeholder Plan.
- Records of penguin location monitoring.
- Results of noise and vibration monitoring.
- Site survey sheets and photos (see Appendix F).
- Monitoring reports (both internal and submitted to Council).
- Details of equipment and calibration.
- Auditing of mitigation measures where Project or Schedule limits are exceeded.
- Results of noise measurements of equipment to establish setback distances.
- Communication and complaints register.

6.5 Staff training

All site personnel will be made aware of the need to control noise from site activities and any specific noise or vibration mitigation relating to site activities. This can be included in the site induction or toolbox talks. In particular, attention shall be given to the following matters related to implementation of this CNVMP:

- Construction noise and vibration limits (Section 3).
- Activities with the potential to generate high levels of noise and/or vibration (Section 5).
- Noise and vibration mitigation and management procedures (Section 6).
- The sensitivity of receivers and any operational requirements and constraints identified through communication and consultation.





7 Engagement

Stakeholder engagement will be a key aspect in the implementation of this CNVMP. See the Communications and Stakeholder Plan for details.

The Project Liaison Person for the Project is identified in the key contacts document.

The following communication shall be undertaken with the community regarding potential construction noise and vibration matters associated with the proposed works:

- The complaint hotline number will be readily available to the public as set out in the Communications and Stakeholder Plan.
- Where works are assessed as being within the noise setback distances (see Section 5.1) from receivers, an initial letter drop / other written communication with residents/occupiers of buildings within the from the works area will be undertaken which will provide the following information:
 - A brief overview of the works.
 - The consented working hours and expected duration of the project.
 - Informing receivers that the construction noise is likely to be experienced during these times and vibration may be perceptible.
 - The Project complaint hotline number.
 - Contact details for the Project Liaison Person to discuss any concerns or complaints regarding construction noise and vibration.
 - The notice period for residents / building occupiers will depend on the level of noise impact (low / moderate / high) as per the Communications and Stakeholder Plan.
 - Updates will be provided to potentially affected properties to advise when specific noisy phase of works will be starting, such as night works.
 - If residents raise valid concerns about noise levels, the opportunity will be provided for a discussion between residents and appropriate site personnel (e.g. Project Liaison Person, Construction Manager) which will include alternative arrangements if practicable, such as adjusting the timing of works.

7.1 Council notification

Where works will take place outside normal daytime hours, WCC and / or HCC will be notified at least 48 hours in advance.

HCC notification to be sent to enforcement@huttcity.govt.nz and will be copied to deanbentley@huttcity.govt.nz (Environmental Health)

WCC notification to be sent to noiseteam@wcc.govt.nz.





7.2 Complaints response

Any complaints received shall be recorded in the project complaints register; this will detail the information required in accordance with condition PC.12:

- The name, phone number and address of complainant (if applicable);
- Nature of the complaint;
- Date and time of complaint, and the location, date and time of alleged event giving rise to complaint;
- The weather conditions at the time of the complaints;
- Any other activities in the area, unrelated to the Project, that may have contributed to the complaint;
- Measures taken to respond to the complaint or confirmation of no action if deemed appropriate;
- The outcome of the investigation into the complaint; and
- A record of the response provided to the complainant.

The record of complaints will be provided to the Manager on request in accordance with condition PC.14.

All complaints and enquiries shall be responded to within the timeframe required by the consent conditions (as soon as reasonably practicable). This timeframe aligns with the wider Te Ara Tupua alliance guidelines and include acknowledgment of any complaint or enquiry within 48 hours with a response to follow within three working days.

An exception is made for face-to-face meetings with response and resolution times to be set out at the conclusion of the meeting. All stakeholders should feel that any concerns they have are genuine and are taken seriously in order for the team to develop a trusting relationship with the community. Waka Kotahi will purchase a license for Consultation Manager and the Stakeholder team will manage all complaints and enquiries and ensure they are recorded and updated upon resolution.

A Project email address and Alliance 0800 number (0800 135 255) have been set up and will be monitored by the stakeholder team. These, alongside the Project name, and the name of the Project Liaison Person, shall be clearly noted on all publications in order to encourage the public to contact the Project team through these methods, although it is anticipated other ways may also be utilised.

A process will be developed for face-to-face interactions with the construction team and other site workers. The information gathered about the complaint will comply with the resource consent conditions.





The complaints procedure is shown on Figure 7.1.

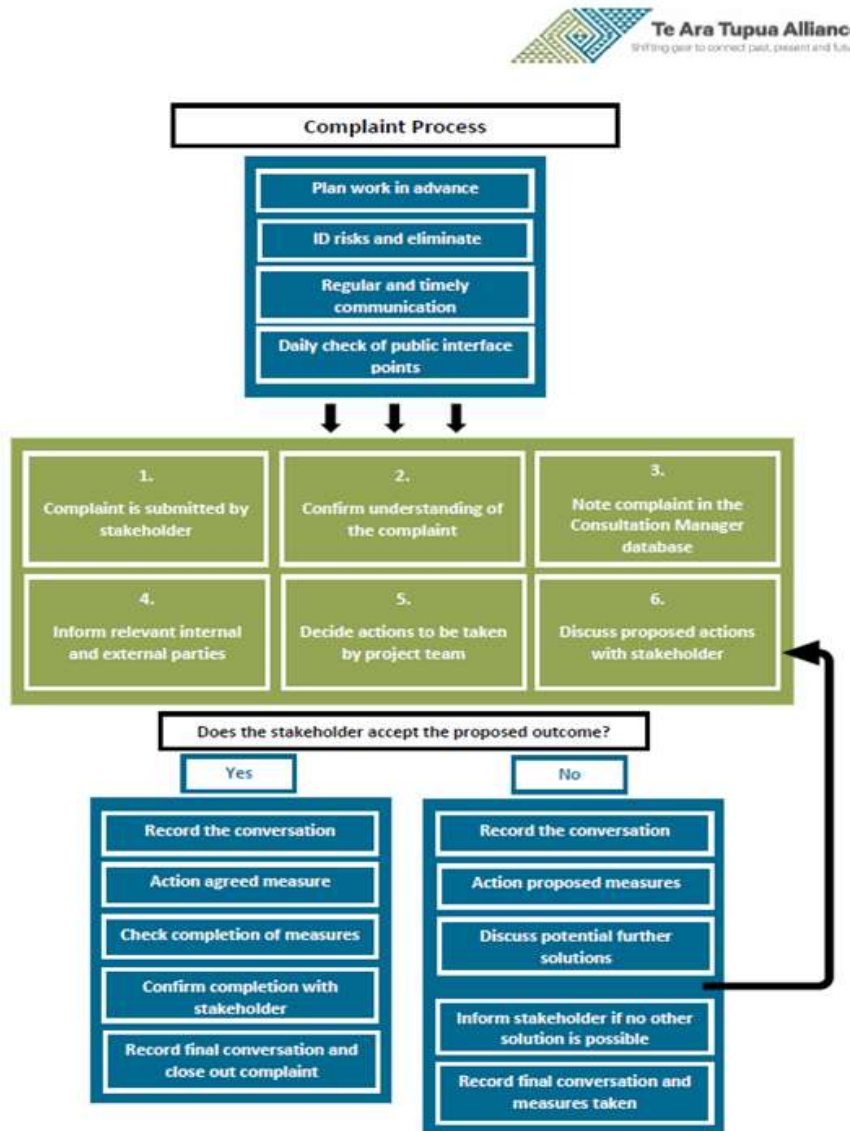


Figure 7.1. Complaints procedure

7.3 Building condition surveys

CNV.4 (Section 3.1) requires pre- and post-construction building condition surveys to be undertaken where predicted or measured vibration levels exceed the Category A vibration criteria.

Due to the large distances between the project alignment and vibration sensitive receivers the criteria for cosmetic building damage (5 mm/s) is unlikely to be exceeded. Therefore, no building condition surveys are expected to be required.





8 Noise and vibration monitoring

8.1 Noise monitoring

Noise monitoring will be undertaken in the following circumstances:

- In response to a reasonable noise complaint. Monitoring should be at a similar time of day and / or during similar site activities to those causing the complaint if practicable. The measurement location should be representative of the complainant's property. The background noise level at the property (both at the time of the complaint and during monitoring) will be relevant and weather conditions will need to be taken into account.
- In response to a reasonable request by WCC / HCC. Specific locations and / or monitoring times may be requested.
- At the start of night works at a specific location. Monitoring should cover representative activities that will be undertaken, which may require measurements at different times or on different nights.
- At the start of noisy works where noise limits are predicted to be exceeded at noise-sensitive receivers (i.e. one where a schedule is required). This could be works at any time of day, depending on the activities / equipment and proximity of receivers, but is more likely to be when noise limits are lower outside normal daytime working hours.
- Longer-term noise monitoring may also be desirable where there is a risk of on-going noise impacts on residents or where complaints are considered likely. This can be used to compare measured noise levels with activities on site and can be correlated with noise complaints. It will also provide an indication of the background noise level in the area, particularly if the monitor can be set up prior to works commencing.
- Noise measurements will be taken around new equipment and / or activities to establish the sound power levels and appropriate setback distances.
- Monitoring at the nearest penguin burrow if predicted noise levels at the burrow are within 5 dB of the penguin noise limit (75 dB LAeq(15min)). Monitoring may need to continue for the duration of works in proximity to the burrow unless it can be demonstrated that the limit is expected to be met for the remaining works.

The results of noise monitoring will be made available to WCC / HCC as soon as reasonably practicable, typically within five working days.

Noise monitoring will be in accordance with the requirements of NZS 6803, measured at 1 m from the façade of the most affected building (façade level) or appropriate proxy location. Where a freefield level is measured, a façade correction of +3 dB will be added to the monitoring results before comparing with the noise limits for occupied buildings. (This is not applicable to penguin burrows.) It should be ensured that the monitoring location has line of sight to the relevant site activities unless the affected receivers are also screened.

The LAeq and LAmx levels will be recorded over a representative period of 15 minutes as a minimum. An alternative sample period may be used if technical justification is provided, for example if an isolated event is captured, or if the noise source is steady state. The monitoring period should seek to record relevant equipment / activities on site, for example those that have been identified in a complaint, or the main noisy activities undertaken as part of night works.

The relevant Schedule should identify potentially affected noise-sensitive receivers, appropriate monitoring locations, the equipment / activities that are of concern for monitoring, and any justification required for not using a standard 15-minute monitoring period.





8.2 Vibration monitoring

Regular vibration monitoring is not expected to be required given the large separation distances between construction works and receivers. If a reasonable complaint about vibration is received, vibration monitoring will be undertaken at a location representative of the nearest vibration sensitive receiver or complainant as appropriate.

The vibration monitor will be installed at the foundation of the closest vibration sensitive receiver to the vibratory works (or at the complainant's property), as required by ISO 4866. Results of the noise and vibration monitoring will be readily available to site personnel and made available to WCC and PCC on request.

8.3 Exceedances

Where noise or vibration monitoring indicates exceedances of the Project limits, or of predicted levels as defined in a Schedule, it will be audited whether all mitigation identified in the Schedule has been implemented on site. This auditing will be documented.

The exceedance audit documentation should include:

- Details of noise levels measured;
- Applicable noise limits;
- Level of exceedance(s) of the noise limits and the nature and scale, for example there may only have been a short period of exceedance due to an isolated event or specific item of equipment, or on-going small exceedances;
- What equipment / activities were happening at the time;
- What mitigation (if any) was in place;
- Whether this mitigation is in accordance with that detailed in the Schedule;
- Any reasons why mitigation may not have been implemented;
- Actions taken.

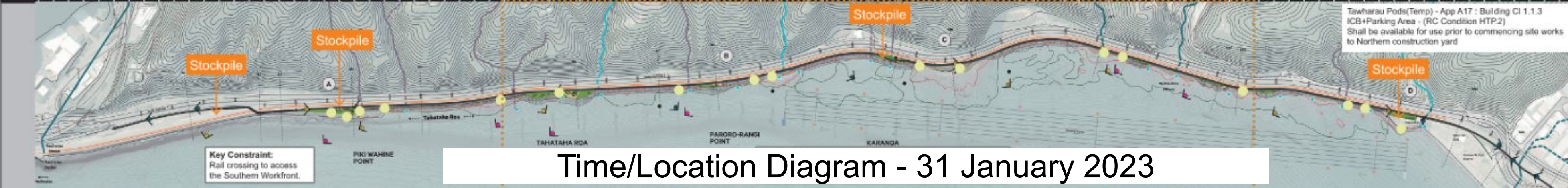
In the event that exceedances are recorded, WCC / HCC will be advised as soon as practicable and provided with a copy of the audit documentation in due course. Residents will also be advised when required.



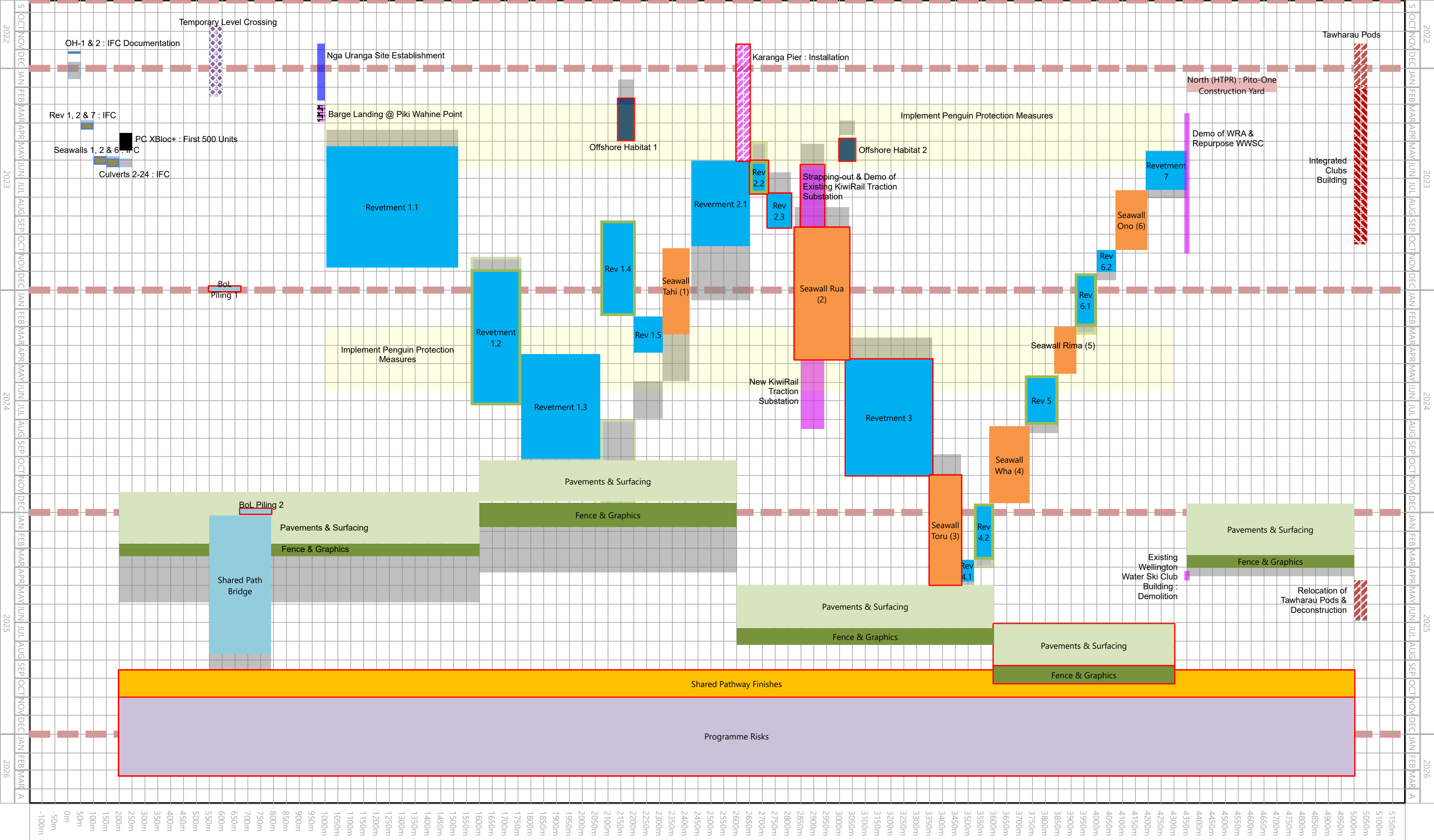


Appendix A: Time-location diagram





Time/Location Diagram - 31 January 2023



2022
 2023
 2024
 2025
 2026

2022
 2023
 2024
 2025
 2026

5 OCT NOV DEC JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC JAN FEB MAR A
 -100m 0m 50m 100m 150m 200m 250m 300m 350m 400m 450m 500m 550m 600m 650m 700m 750m 800m 850m 900m 950m 1000m 1050m 1100m 1150m 1200m 1250m 1300m 1350m 1400m 1450m 1500m 1550m 1600m 1650m 1700m 1750m 1800m 1850m 1900m 1950m 2000m 2050m 2100m 2150m 2200m 2250m 2300m 2350m 2400m 2450m 2500m 2550m 2600m 2650m 2700m 2750m 2800m 2850m 2900m 2950m 3000m 3050m 3100m 3150m 3200m 3250m 3300m 3350m 3400m 3450m 3500m 3550m 3600m 3650m 3700m 3750m 3800m 3850m 3900m 3950m 4000m 4050m 4100m 4150m 4200m 4250m 4300m 4350m 4400m 4450m 4500m 4550m 4600m 4650m 4700m 4750m 4800m 4850m 4900m 4950m 5000m 5050m 5100m 5150m



Appendix B: Key contacts



Construction Noise and Vibration Management Plan Key Contacts List

Table 1. Key Contacts During Work

Role	Contact Person	Contact details
Acoustic Consultant	Lindsay Leitch	Email: lleitch@tonkintaylor.co.nz Phone: 021 266 7718
Project Ecologist	Bryn Hickson-Rowden	Email: Bryn-hicksonrowden@te-ara-tupua.co.nz Phone: 0272377149
Environmental Advisor	Sevi Hartley	Email: sevi.hartley@te-ara-tupua.co.nz Phone: 021 807 8400
PEP-C Manager	Ed Breese	Email: Ed-breese@te-ara-tupa.co.nz Phone: 021 333 726
Construction Manager	Jessica Pritchard	Email: Jessica.pritchard@te-ara-tupua.co.nz Phone: 021 879 663
Superintendent	James Robb	Email: james.robb@te-ara-tupua.co.nz Phone:
Project Liaison Person	Russell Obee	Email: Russell.obee@te-ara-tupua.co.nz Phone: 0274483523

Table 2. Overarching contacts

Role	Contact Person	Contact details
Project Director	Andrew Rose	Email: Andrew.rose@te-ara-tupua.co.nz
Health and Safety Lead	Elayne Gentry	Email: Elayne.gentry@te-ara-tupua.co.nz



Appendix C: Standards and guides

NZS 6803

NZS 6803:1999 includes guidance on recommended noise limits, which depend on the time of day and the duration of construction noise. Table C1 and Table C1.2 provide the relevant NZS 6803 noise limits for projects longer than 20 weeks for residential and commercial buildings.

In most cases, construction noise limits are less restrictive than the relevant operational noise limits, on the basis that the effects of construction activities are of limited duration. The Standard advises that resource consent may be required whenever noise from construction activities exceeds the guideline noise limits which are applicable to the construction project.

The Standard's noise limits apply at 1 m from external façades of occupied buildings. Noise is typically assessed over a representative 15-minute period of construction activity. A representative period of activity considers the number of construction plant present, how long they operate for and how the noise varies over the 15-minute period; i.e. whether constant or fluctuating.

Relatively high background sound levels from sources other than construction work can mean that construction limits based upon a background plus X dB approach may be more appropriate (where X could be up to 10 dB based on the character of the existing noise environment). Therefore, it is important to quantify the existing noise environment when formulating consent conditions.

NZS 6803 recognises that there may be situations when the recommended noise limits may be exceeded. In these situations, NZS 6803 states that the best practicable options (BPO) for noise avoidance or mitigation must be implemented. NZS 6803 includes a detailed section on managing construction noise including the preparation of construction noise (and vibration) management plans (CNMP). Section 8 of the Standard sets out a range of noise management measures:

- Noise management planning – via good project management to minimise noise problems arising;
- Noise reduction at source – including choice of machinery, noise enclosures and screens;
- Community relations – consultation and co-operation between the contractor and neighbours; and
- Site factors – such as the existing noise environment, distance between the activity and neighbours, sensitivity of the neighbours (residential / commercial), and duration and hours of working, etc.

Table C1.1: Construction noise limits for residential dwellings - NZS 6803 Table 1

Time of week	Time period	Noise limit dB	
		L _{Aeq}	L _{Amax}
Weekdays	6:30 am – 7:30 am	55	75
	7:30 am – 6:00 pm	70	85
	6:00 pm – 8:00 pm	65	80
	8:00 pm – 6:30 am	45	75
Saturdays	6:30 am – 7:30 am	45	75
	7:30 am – 6:00 pm	70	85
	6:00 pm – 8:00 pm	45	75
	8:00 pm – 6:30 am	45	75
Sundays and public holidays	6:30 am – 7:30 am	45	75
	7:30 am – 6:00 pm	55	85
	6:00 pm – 8:00 pm	45	75
	8:00 pm – 6:30 am	45	75





Table C1.2: Construction noise limits for commercial and industrial buildings - NZS 6803
Table 2

Time period	Typical duration of work dB L_{Aeq}
7:30 am – 6:00 pm	70
6:00 pm – 7:30 am	75

Annex E of NZS 6803:1999 sets out aspects of noise management that are recommended to be included in noise management plans.

Waka Kotahi Guide

The Waka Kotahi State highway construction and maintenance noise and vibration guide (version 1.1, 2019) (Waka Kotahi Guide) aims to provide an understanding of noise and vibration effects from state highway construction and maintenance, as well as providing guidance on how to assess potential adverse effects and manage noise and vibration from construction and maintenance works. The Waka Kotahi Guide is consistent with NZS 6803: 1999 and is aimed at both contractors and the public.

The Waka Kotahi Guide provides case studies and explanatory information about construction noise and vibration. It provides a three-tiered assessment of risk:

- Tier 1: Risk assessment, considering the length of the works and the location and number of protected premises and facilities (PPFs) within 200 m of the proposed alignment;
- Tier 2: Preliminary technical assessment: screening out which projects and works require a detailed assessment of noise and vibration;
- Tier 3: Technical assessment of noise and vibration resulting in an assessment report, a CNVMP or a Schedule.

Section 5 of the Waka Kotahi Guide sets out key measures in the management of noise and vibration. It lists the expected key documents for the management of construction and maintenance noise and vibration, including schedules to a CNVMP. Measures expected to be included in a CNVMP and / or Schedule to a CNVMP are:

- Communications with stakeholders and information that should be included in communications
- Mitigation and order of prioritising mitigation measures
- Staff education around noise and vibration issues
- Equipment, including vehicles and deliveries
- Noise propagation – the location of plant, barriers
- Scheduling – limiting working hours and identifying sensitive times
- Neighbouring buildings – offering temporary accommodation or means of ventilation such that windows can remain shut
- Additional measures for specific equipment
- Vibration
- Training
- Condition surveys
- Diversions
- Night works
- Complaints handling and response
- Monitoring
- Survey planning – guidance on noise and vibration measurements and reporting
- Documentation to include a project database, communication and complaint register, CNVMP, schedules, monitoring register





ISO 4866:2010

ISO 4866:2010 *Mechanical vibration and shock – Vibration of fixed structures – Guidelines for the measurement of vibrations and evaluation of their effects on structures* is equivalent to the British Standard BS 7385 *Evaluation and measurement for vibration in buildings Part 1 Guide for measurement of vibrations and evaluation of their effects on buildings* and Part 2 *Guide to damage levels from groundborne vibration*. It sets out the typical range of structural response in buildings to vibration from various sources, both continuous and transient. It specifies that the preferred position for measuring vibration is at the foundation of the building of interest, or low on the main load-bearing external wall at ground floor level when measurements on the foundations themselves are not possible. Where vibration response may be amplified within the building, measurements at several points within the building may be required. Other measurement set ups are described for specific circumstances.

Transducers should be well coupled with the structural element of interest or with the ground. A procedure for the evaluation of vibration data is included.

Part 2 of BS 7385 sets out transient vibration guide values for cosmetic damage, which are duplicated in BS 5228-2: 2009.

BS 5228-2

British Standard BS 5228-2: 2009⁹ discusses vibration levels at which adverse comment is likely from building occupants. The guidance values of Table B.1 of BS 5228-2: 2009 are provided in Table C1.3.

Table C1.3: Guidance on effects of vibration levels - BS 5228-2:2009

Vibration level (PPV)	Effect
0.14 mm/s	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.
0.3 mm/s	Vibration might be just perceptible in residential environments.
1.0 mm/s	It is likely that vibration of this level in residential environments will cause complaint but can be tolerated if prior warning and explanation has been given to residents.
10 mm/s	Vibration is likely to be intolerable for any more than a very brief exposure to this level in most building environments.

Table B.2 and Figure B.1 from the Standard present the response limits of buildings, which is affected by the type of foundation, the underlying ground conditions, the building construction and the state of repair of the building.

The Standard states that for continuous vibration which may give rise to dynamic magnification (particularly at the lower frequencies) these values may need to be reduced by 50 %. These values are also plotted in Table C1.4.

⁹ BS 5228-2: 2009 + A1: 2014 Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration





Table C1.4: Guidance on effects of vibration levels - BS 5228-2:2009 (from Table B.2)

Line (see Figure X)	Type of building	Peak component particle velocity in frequency range of predominant pules	
		4 Hz to 15 Hz	15 Hz and above
1	Reinforced or framed structures Industrial and heavy commercial buildings	50 mm/s at 4 Hz and above	50 mm/s at 4 Hz and above
2	Unreinforced or light framed structures Residential or light commercial buildings	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above

Note 1: Values referred to are at the base of the building

Note 2: For line 2, at frequencies below 4 Hz, a maximum displacement of 0.6 mm (zero to peak) is not to be exceeded

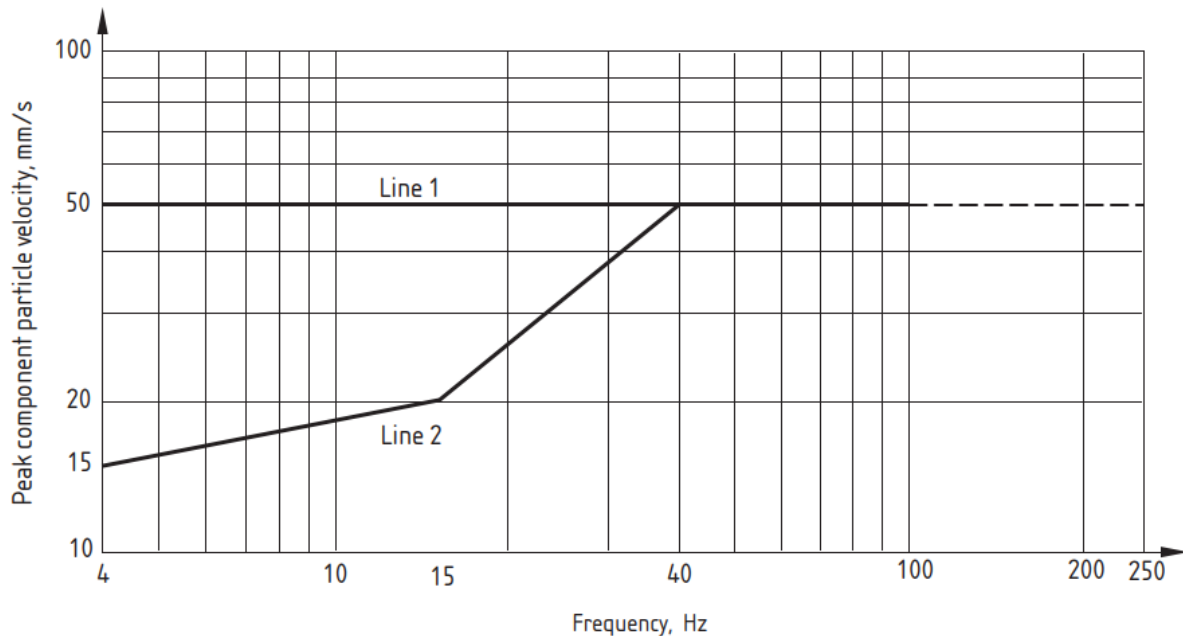


Figure 8.1: Transient vibration guide values for cosmetic damage (from Figure B.1)





Appendix D: Predicted noise contours from AECOM assessment





© Copyright AECOM New Zealand Limited, 2018. This map is confidential and shall only be used for the purposes of this project.

AECOM

CONSULTANT
AECOM New Zealand Limited
Level 2, 2 Hazeldean Road,
Addington, Christchurch, CAN 8024
tel +64 3 966 6000
www.aecom.com

Legend

Noise Levels dB LAeq

- 45
- 55
- 75

SHEET TITLE

Te Wharepouri Bridge Works - Predicted Noise

PROJECT

W2HV Link N2P

CLIENT

New Zealand Transport Agency

PROJECT NUMBER

60306339

DATE

10/07/2020

Sheet number

KEY PLAN



SPATIAL REFERENCE

Scale: 1:7,000 (A3 size)

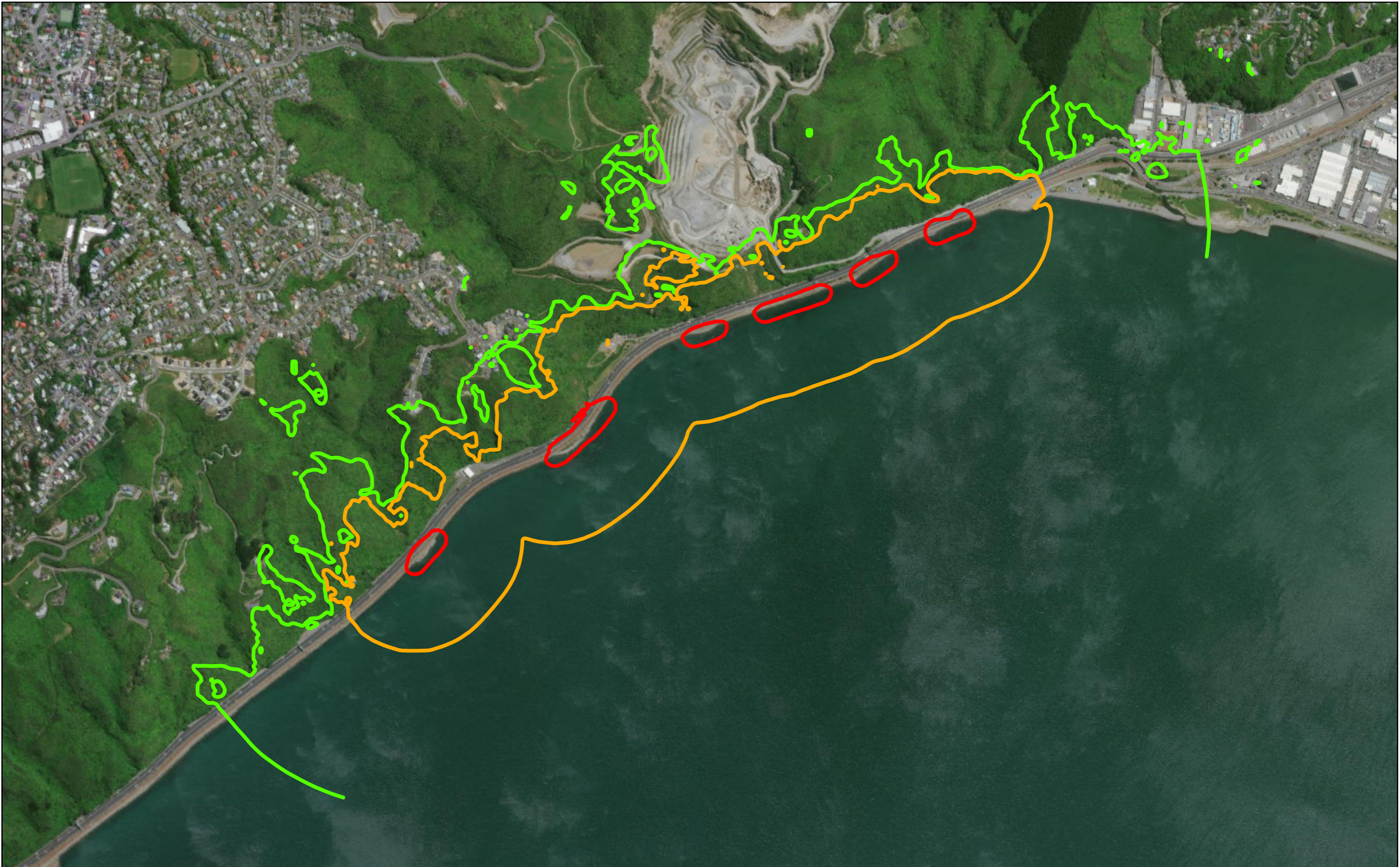
5025 0 50 100 150

Metres

Map features depicted in terms of NZTM

PROJECT MANAGEMENT

Approved	CD	Date	10/07/2020
Checked	CD	Date	10/07/2020
Designed	SJ	Date	10/07/2020
Drawn	SJ	Date	10/07/2020



© Copyright AECOM New Zealand Limited, 2018. This map is confidential and shall only be used for the purposes of this project.



CONSULTANT
AECOM New Zealand Limited
Level 2, 2 Hazeldean Road,
Addington, Christchurch, CAN 8024
tel +64 3 966 6000
www.aecom.com

Legend

Noise Levels dB LAeq

- 45
- 55
- 75

SHEET TITLE

Sea Wall Construction Works - Predicted Noise

PROJECT

W2HV Link N2P

CLIENT

New Zealand Transport Agency

PROJECT NUMBER

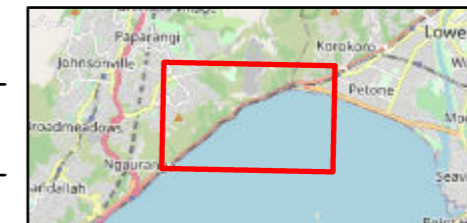
60306339

DATE

10/07/2020

Sheet number

KEY PLAN



SPATIAL REFERENCE

Scale: 1:10,000 (A3 size)

7035 0 70 140 210

Metres

Map features depicted in terms of NZTM

PROJECT MANAGEMENT

Approved	CD	Date	10/07/2020
Checked	CD	Date	10/07/2020
Designed	SJ	Date	10/07/2020
Drawn	SJ	Date	10/07/2020



© Copyright AECOM New Zealand Limited, 2018. This map is confidential and shall only be used for the purposes of this project.

AECOM

CONSULTANT

AECOM New Zealand Limited
Level 2, 2 Hazeldean Road,
Addington, Christchurch, CAN 8024
tel +64 3 966 6000
www.aecom.com

Legend

Noise Levels dB L_{Aeq}

- 45
- 55
- 75

SHEET TITLE

Rock and Fill Placement Works - Predicted Noise

PROJECT

W2HV Link N2P

CLIENT

New Zealand Transport Agency

PROJECT NUMBER

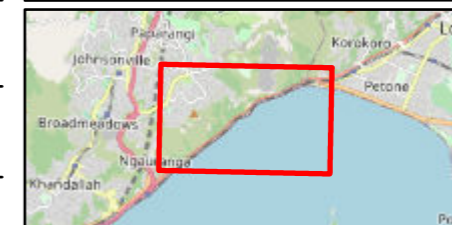
60306339

DATE

10/07/2020

Sheet number

KEY PLAN



SPATIAL REFERENCE

Scale: 1:10,000 (A3 size)

7035 0 70 140 210

Metres

Map features depicted in terms of NZTM

PROJECT MANAGEMENT

Approved	CD	Date	10/07/2020
Checked	CD	Date	10/07/2020
Designed	SJ	Date	10/07/2020
Drawn	SJ	Date	10/07/2020



© Copyright AECOM New Zealand Limited, 2018. This map is confidential and shall only be used for the purposes of this project.



CONSULTANT
AECOM New Zealand Limited
Level 2, 2 Hazeldean Road,
Addington, Christchurch, CAN 8024
tel +64 3 966 6000
www.aecom.com

Legend

Noise Levels dB L_{Aeq}

- 45
- 55
- 75

SHEET TITLE

Surface Works - Predicted Noise (Southern End)

PROJECT

W2HV Link N2P

CLIENT

New Zealand Transport Agency

PROJECT NUMBER

60306339

DATE

10/07/2020

Sheet number

KEY PLAN



SPATIAL REFERENCE

Scale: 1:10,000 (A3 size)
7035 0 70 140 210
Metres
Map features depicted in terms of NZTM

PROJECT MANAGEMENT

Approved	CD	Date	10/07/2020
Checked	CD	Date	10/07/2020
Designed	SJ	Date	10/07/2020
Drawn	SJ	Date	10/07/2020



© Copyright AECOM New Zealand Limited, 2018. This map is confidential and shall only be used for the purposes of this project.



CONSULTANT
AECOM New Zealand Limited
Level 2, 2 Hazeldean Road,
Addington, Christchurch, CAN 8024
tel +64 3 966 6000
www.aecom.com

Legend

Noise Levels dB L_{Aeq}

- 45
- 55
- 75

SHEET TITLE

Surface Works - Predicted Noise (Northern End)

PROJECT

W2HV Link N2P

CLIENT

New Zealand Transport Agency

PROJECT NUMBER

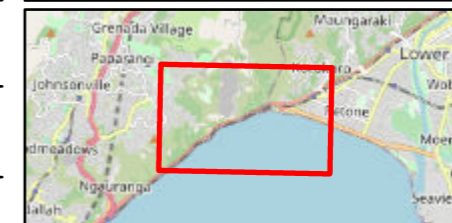
60306339

DATE

10/07/2020

Sheet number

KEY PLAN



SPATIAL REFERENCE

Scale: 1:10,000 (A3 size)

7035 0 70 140 210

Metres

Map features depicted in terms of NZTM

PROJECT MANAGEMENT

Approved	CD	Date	10/07/2020
Checked	CD	Date	10/07/2020
Designed	SJ	Date	10/07/2020
Drawn	SJ	Date	10/07/2020



© Copyright AECOM New Zealand Limited, 2018. This map is confidential and shall only be used for the purposes of this project.



Legend

- Noise Levels dB L_{Aeq}
- 45
 - 55
 - 75

CONSULTANT
 AECOM New Zealand Limited
 Level 2, 2 Hazeldean Road,
 Addington, Christchurch, CAN 8024
 tel +64 3 966 6000
 www.aecom.com

SHEET TITLE

Stockpiling Site (Southern End) - Predicted Noise

PROJECT

W2HV Link N2P

CLIENT

New Zealand Transport Agency

PROJECT NUMBER

60306339

DATE

10/07/2020

Sheet number

KEY PLAN

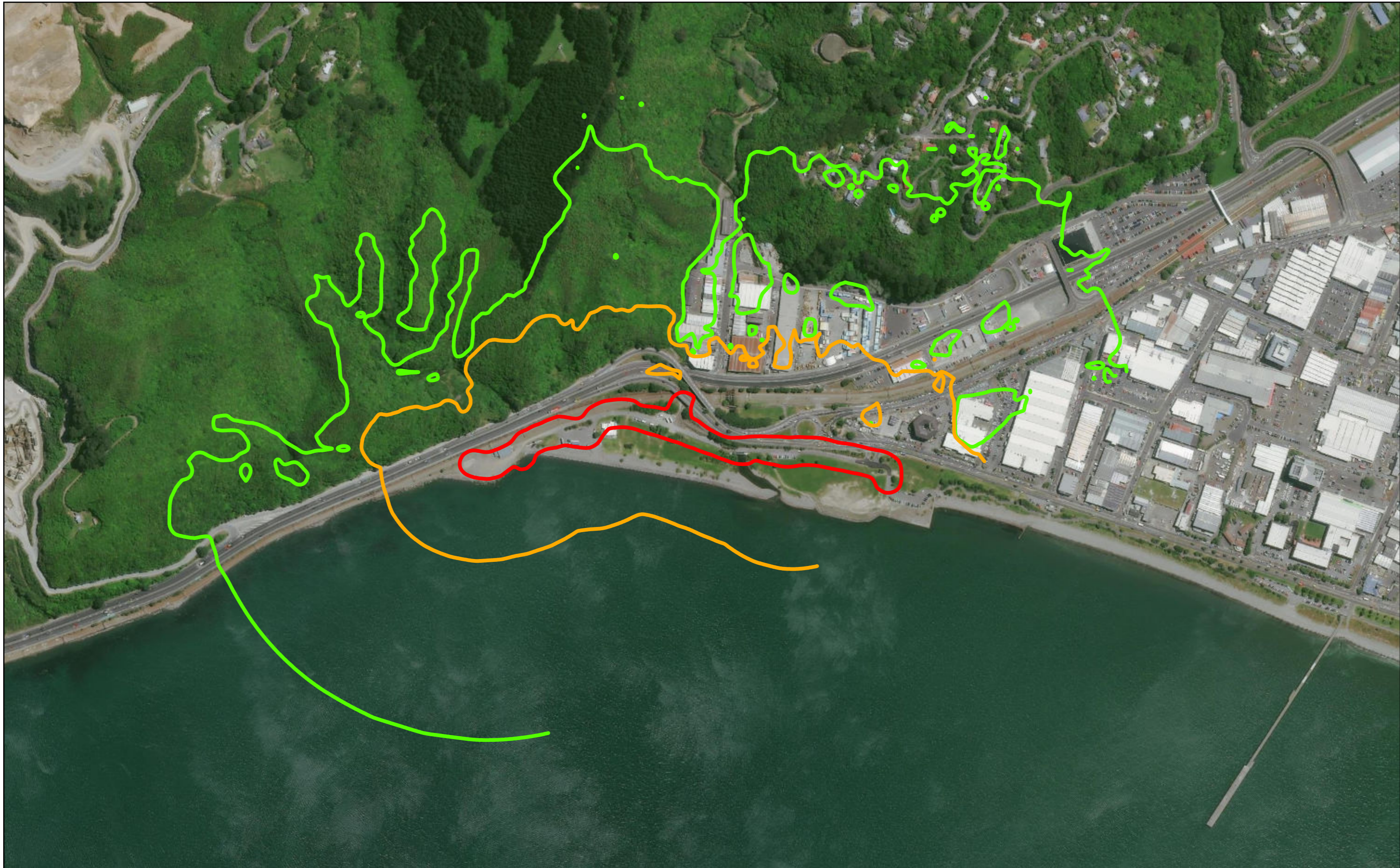


SPATIAL REFERENCE

Scale: 1:5,500 (A3 size)
 30 150 30 60 90
 Metres

PROJECT MANAGEMENT

Approved	CD	Date	10/07/2020
Checked	CD	Date	10/07/2020
Designed	SJ	Date	10/07/2020
Drawn	SJ	Date	10/07/2020



© Copyright AECOM New Zealand Limited, 2018. This map is confidential and shall only be used for the purposes of this project.



CONSULTANT
AECOM New Zealand Limited
Level 2, 2 Hazeldean Road,
Addington, Christchurch, CAN 8024
tel +64 3 966 6000
www.aecom.com

Legend

Noise Levels dB L_{Aeq}

- 45
- 55
- 75

SHEET TITLE

Stockpiling Site (Northern End) - Predicted Noise

PROJECT

W2HV Link N2P

CLIENT

New Zealand Transport Agency

PROJECT NUMBER

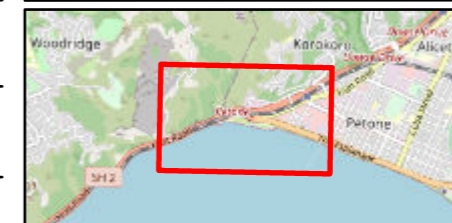
60306339

DATE

10/07/2020

Sheet number

KEY PLAN



SPATIAL REFERENCE

Scale: 1:5,500 (A3 size)
30150 30 60 90
Metres

Map features depicted in terms of NZTM

PROJECT MANAGEMENT

Approved	CD	Date	10/07/2020
Checked	CD	Date	10/07/2020
Designed	SJ	Date	10/07/2020
Drawn	SJ	Date	10/07/2020



© Copyright AECOM New Zealand Limited, 2018. This map is confidential and shall only be used for the purposes of this project.



Legend

- Noise Levels dB L_{Aeq}
- 45
 - 55
 - 75

CONSULTANT
 AECOM New Zealand Limited
 Level 2, 2 Hazeldean Road,
 Addington, Christchurch, CAN 8024
 tel +64 3 966 6000
 www.aecom.com

SHEET TITLE

Honiana Te Puni Reserve Works - Predicted Noise

PROJECT

W2HV Link N2P

CLIENT

New Zealand Transport Agency

PROJECT NUMBER

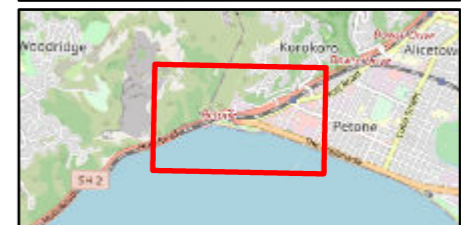
60306339

DATE

10/07/2020

Sheet number

KEY PLAN



SPATIAL REFERENCE

Scale: 1:5,500 (A3 size)

30 150 30 60 90

Metres

Map features depicted in terms of NZTM

PROJECT MANAGEMENT

Approved	CD	Date	10/07/2020
Checked	CD	Date	10/07/2020
Designed	SJ	Date	10/07/2020
Drawn	SJ	Date	10/07/2020



Appendix E: Template for Schedule to the CNVMP



Construction noise management schedule

[click and type project name]

[click and type site/activity name]

[click and type date of issue]

[click and type document reference]

Record of amendment

Amendment number	Description of change	Effective date	Updated by

Contents

Introduction	3
Activity	3
Neighbours	3
Location plan	4
Predictions and mitigation	5
Discussion	6
Communications	6
Monitoring	6
Staff	6

[This is a template that may be used to help prepare a schedule to a construction noise management plan, for a specific activity or location for construction works.

All notes in square brackets should be deleted or edited and should not form part of the plan without modification.

Template version 1.2, November 2012]

Introduction

Activity

This is a schedule to the construction noise and vibration management plan for [click and type project name] dated [click and type date]. The plan should be read in conjunction with this schedule as it contains details of the project, noise criteria and procedures followed. This schedule provides specific assessment of the following activity:

- Activity location: [click and type location]
- Activity start date: [click and type date]
- Activity finish date: [click and type date]

[click and add a description of the activity/location including timeframes]

Neighbours

The nearest neighbours to this activity are:

Reference	Address	Building type/comments	Distance to works
A			
B			
C			
D			
E			

Location plan

[Insert an aerial photograph showing the activity location and nearest neighbours.

If required, aerial photographs can be copied from the NZTA Spatial Viewer - <https://spatialviewer.nzta.govt.nz/>]

Predictions and mitigation

Basic step of activity	Equipment	Time / duration	Predicted noise (no mitigation)			Mitigation required
			Neighbour	L _{Aeq(60min)}	L _{AFmax}	

Basic step of activity	Equipment	Time / duration	Predicted vibration (no mitigation)		Mitigation required
			Neighbour	ppv	



Appendix F: Noise monitoring template



Construction noise survey

Construction location:	Date: _ _ / _ _ / 202 _
Construction activity, description of work :	Noise monitor operator:
List equipment used:	

WEATHER

At measurement locations	Wind speed	_ _ m/s	Weather observations:
	Wind direction		
At source/propagation path	Wind speed	_ _ m/s	Cloud: clear / few / scattered / broken / overcast
	Wind direction		Precipitation: none / drizzle-mist / light rain (circle option)

LOCATIONS

High resolution aerial photograph attached - tick to confirm

Marked on aerial:

<input type="checkbox"/> Location of site activity	Ref.	Street Address	Distance to façade	Microphone height
<input type="checkbox"/> Measurement locations	1		_ m	1.5 m
<input type="checkbox"/> Location of reflecting surfaces (e.g. walls/buildings)			(default: 1 m)	(default: 1.2 m)
<input type="checkbox"/> Relative heights of site activity, measurement locations and any intervening barriers/terrain				
<input type="checkbox"/> Locations of any unrelated sound sources (e.g. road traffic)				
<input type="checkbox"/> Handheld photograph locations/directions	Photo ref. numbers:			

Monitoring EQUIPMENT

Sound level meter kit: Kit reference Protech QM1598, - tick to confirm

Sound level meter settings: F-time-weighting - FAST wind shield fitted

START CALIBRATION FIELD CHECK

Time:	_ _ _ _ h	Calibration level:	94 dB	Adjustment made to meter:	To 94 dB
-------	-----------	--------------------	-------	---------------------------	----------

MEASUREMENTS (continue overleaf if required)

Location reference	Time	Duration, t (default 15 minutes)	L _{Aeq} (t)	L _A F _{max}	Equipment operating on site	Sounds heard at measurement (note dominant and L _A F _{max} sounds)	
						Construction equipment	Other sources
	_ _ _ _ h	_ _ min	_ _ . . dB	_ _ . . dB			

END CALIBRATION FIELD CHECK

Time:	_ _ _ _ h	Calibration level:	_ _ . dB	Level displayed on meter:	_ _ . . dB
-------	-----------	--------------------	----------	---------------------------	------------

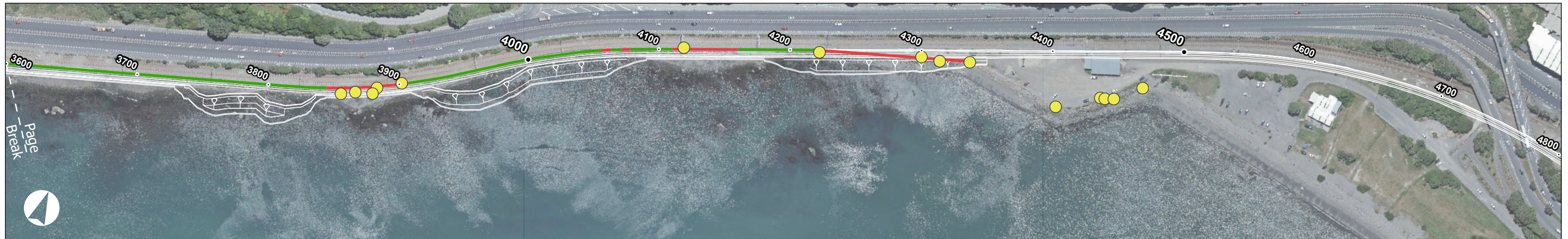
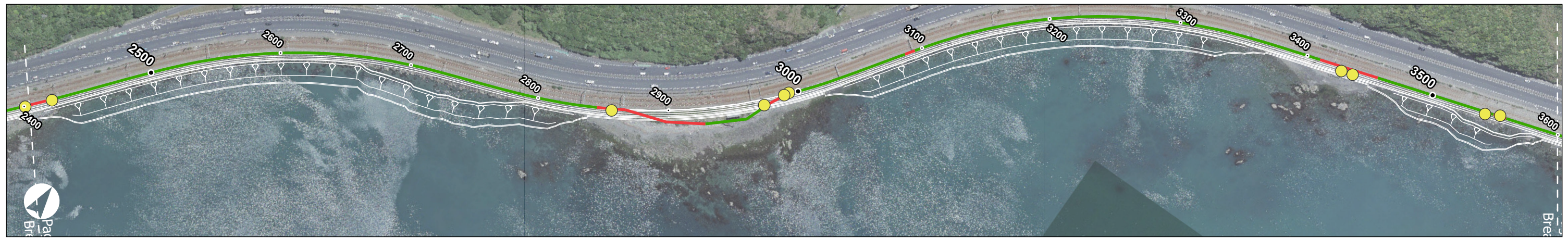
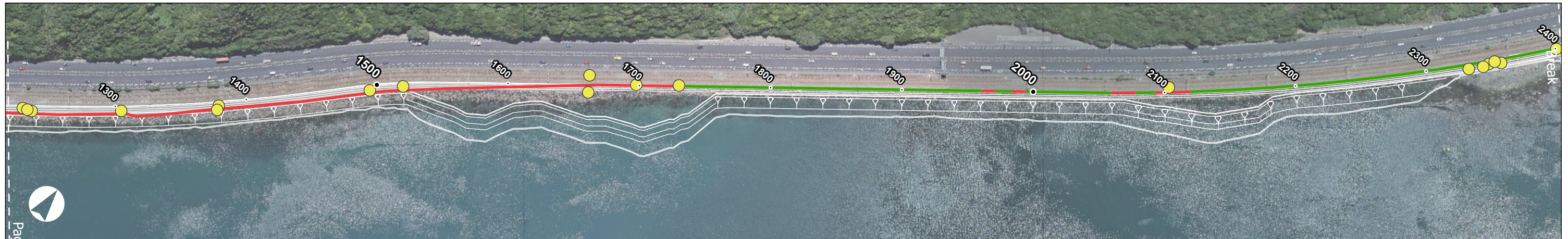
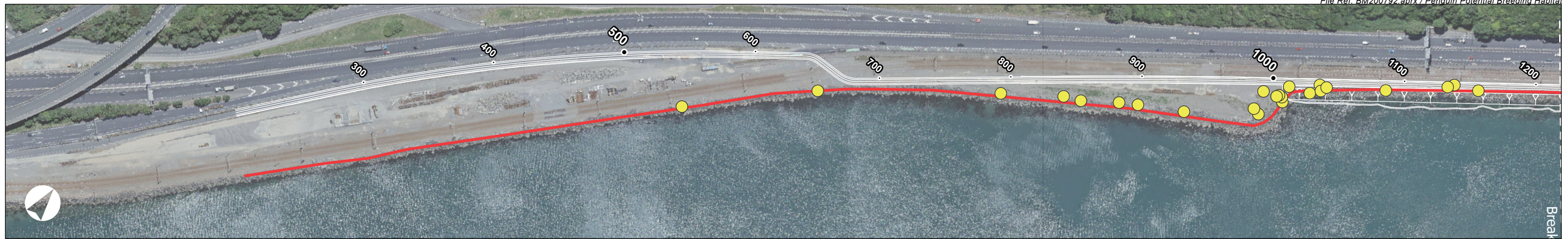
Screen shot of recording

Photos: (including calibration @94db, equipment used, general vicinity)



Appendix G: Penguin breeding habitat







Appendix H: Schedule of updates

Date	Person responsible for amendments	Reason for amendments	Summary of amendments

