Construction Noise and Vibration Management Plan (CNVMP)

NZ TRANSPORT AGENCY
WAKA KOTAHI

1 MacKays to Peka Peka Expressway

Construction Noise & Vibration Management Plan (CNVMP) Revision History

Revision N°	Prepared By	Description	Date
1.0	Siiri Wilkening / James Whitlock	Update post BOI hearing	March 2013
2.0	Siiri Wilkening	Final for submission to Council	April 2013

Independent Review

Action	Name	Signed	Date
Reviewed by	Jon Styles		19/04/2013

Document Acceptance

Action	Name	Signed	Date
Prepared by	Siiri Wilkening/ James Whitlock (Marshall Day Acoustics)		March 2013
Reviewed by	Kylie Eltham/Anna Lewis		March 2013
Approved by	Alan Orange Alliance Project Manager		April 2013
on behalf of	M2PP Alliance		

Certification

Action	Name	Signed	Date
Regulatory Manager Approval	Andrew Guerin		26 August 2013
on behalf of	Kāpiti Coast District Council		

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Appendices

Quick Reference Guide to Conditions

Condition Number	Condition Requirement	Comments	Key Final CNVMP Reference
DC.29A	Objectives of managing construction noise and vibration	Objectives identified	Section 3. 9, 10, 11, 12,14
DC.30	Purpose; Matters to be addressed in CNVMP; Independent Review requirement; Certification requirement	Review and certification process and requirements	Sections 1 and 3
DC.31	Construction noise criteria	Noise Limits	Section 8
DC.32	Construction vibration criteria	Vibration Limits	Section 9
DC.33	Purpose and matters to be addressed in SSCNMP's; Certification requirements		Sections 14.1 and 14.3
DC.34	Purpose and matters to be addressed in SSCNMP's; Certification requirements		Sections 14.2 and 14.3
DC.34A	Pre-construction building condition survey of at risk buildings, services and structures	Building condition survey requirements	Section 11.4
DC.35	Engagement with occupiers	Stakeholder Communication processes	Section 11.1
DC.36	Detailed design of structural mitigation measures		Section 11.8
DC.37	Implementing noise mitigation measures		Section 11.8

1 Purpose

The purpose of this Construction Noise and Vibration Management Plan (CNVMP) is to fulfil the requirements of the MacKays to Peka Peka Expressway designation condition DC.30 which require:

DC.30 *a) "…shall be to provide a framework to manage construction noise/vibration appropriately for the variety of circumstances along the route by outlining the methods, procedures and standards for mitigating the effects of noise and vibration during construction of the Project in order to achieve the outcomes and standards required under Condition DC.29A.*

This management plan is submitted to the Manager in accordance with DC.30 a) for certification.

2 Project overview

This Construction Noise and Vibration Management Plan (CNVMP) forms part of a suite of environmental management plans within the Construction Environmental Management Plan (CEMP) for the MacKays to Peka Peka Expressway.

The Project Zone diagram is included in Appendix C of Construction Environmental Management Plan (CEMP), and provides an overview of the extent and works for the Project. This CNVMP covers all zones of the Project. For the purposes of the construction methodology and this CNVMP, the Project is split into 3 specific zones referred to as follows:

South Zone

This zone includes chainage 0 to 4500 and includes the following specific construction sections:

- Poplar Avenue (POP)
- Poplar Avenue-Raumati Road (POP-RAU)
- Raumati Road – Wharemauku Stream (RAU-WHA)
- Wharemauku Stream – Kapiti Road (WHA-KAP)
- Kāpiti Road Interchange (KAP).

Central Zone

This zone includes chainage 4500 to 11500 and includes the following specific construction sections:

- Kāpiti Road-Mazengarb Road (KAP-MAZ)
- Mazengarb Road Bridge

- Mazengarb Road- Otaihanga (MAZ-OT)
- Otaihanga Road Bridge
- Otaihanga Project Office/Yard
- Otaihanga Road – Waikanae River (OT-WAI)
- Waikanae Bridge
- Waikanae River – Te Moana Road (WAI-TEM).

Northern Zone

This sector includes chainage 11500 to 18050 and includes the following specific construction sections:

- Te Moana Interchange (TEM)
- Te Moana Road – Ngarara Road (TEM-NGA)
- Ngarara Road (NGA)
- Smithfield Road (SMI)
- Smithfield to CH15400 (SMI – 15400)
- 15400 to Peka Peka (15400 – PP)
- Peka Peka Interchange (PP).

3 Objectives and outcomes

The objective of this CNVMP is to provide a framework for the development and implementation of noise and vibration management and mitigation methodologies.

This CNVMP identifies the noise and vibration performance standards that shall be complied with during the construction of this Project. It also sets out best practicable options for noise and vibration management and mitigation, and methodologies for responding appropriately to non-compliance with the noise and vibration performance standards.

The outcome of the implementation of the management and mitigation measures set out in this CNVMP is to avoid or reduce adverse construction noise and vibration effects on health and amenity of residents, and adverse impacts on the wider environment. In summary, this will be achieved by the following means:

- Compliance with the construction noise and vibration performance standards;
- The development of Site specific noise and vibration management plans where compliance with these standards cannot practicably be achieved;

- Monitoring of noise and vibration levels at locations where there is a risk of exceedance of the criteria;
- Pre-construction building condition surveys for houses at risk of receiving vibration levels above the performance standard;
- Proposed communication and consultation that will be undertaken with affected residents; and
- Implementation of effective mitigation measures, e.g. barriers, where appropriate.

In order to fulfil its function effectively, this CNVMP will be updated, with the necessary approval, throughout the course of the Project to reflect material changes associated with any changes to the construction methodologies or techniques or the natural environment. The document shall be reviewed annually to ensure that any changes are reflected.

A Glossary of technical terms is contained in Appendix A.

This CNVMP will be implemented in accordance with information, management tools and standards as specified on the NZTA website for the management of transport noise located at http://acoustics.nzta.govt.nz/tools.

4 Roles and responsibilities

The Alliance Project Manager has the overall responsibility for meeting the requirements of this CNVMP and the Alliance Environmental Manager will implement the plan, including all required noise and vibration monitoring, and leading the review of results with appropriate communication to Local Authorities. Refer to the Construction Environmental Management Plan (CEMP) for more detail on the roles and responsibilities.

5 Key construction noise and vibration effects

The Project construction involves a significant amount of equipment operating in close proximity to noise and/or vibration sensitive receivers, e.g. dwellings and retirement villages. There is limited night-time construction required in certain areas associated with the bridge beam placement and the tie-ins with SH1.

The primary effects of construction noise relate to annoyance and disturbance of people.

The primary effect of construction vibration relates to structural damage of dwellings, private structures such as garages or swimming pools and infrastructure assets such as roads and pipes. Secondary vibration effects relate to annoyance and disturbance of people, and the possible damage of property inside dwellings (e.g. ornaments if they are not well secured or not sitting on level surfaces).

Responding to, and mitigating, the primary vibration effect often alleviates the secondary (annoyance) effects, and communication and prior warning of any high-vibration activities can mitigate the effects on residents and internal property.

A list of the predominant noise and vibration generating activities in each Sector are outlined in Table 5.1 below:

Table 5.1: Key construction noise and vibration activities

Zone	Noise generating activities	Vibration generating activities
South	Fill delivery for preload construction Excavation and fill Off-road earthworks transport Road base course and sealing works Bridge construction, including piling & vibro-replacement Local road realignment and resurfacing	Vibratory rollers for road base course and surfacing works Off-road fill transport Excavators cutting and filling close to receivers' boundaries Vibro-hammer or cast-in-place piling for bridge construction
Central	Excavation and fill Off-road earthworks transport Road base course and sealing works Bridge construction, including piling & vibro-replacement Construction of permanent traffic noise barriers Local road realignment and resurfacing	Vibratory rollers for road base course and surfacing works Off-road fill transport Excavators cutting and filling close to receivers' boundaries Vibro-hammer or cast-in-place piling for bridge construction
North	Fill delivery for preload construction Excavation and fill Off-road earthworks transport Road base course and sealing works Bridge construction, including piling & vibro-replacement Local road realignment and resurfacing	Vibratory rollers for road base course and surfacing works Off-road fill transport Excavators cutting and filling close to receivers' boundaries Vibro-hammer or cast-in-place piling for bridge construction

Other construction machinery and activities, not specified in the above table, may produce noise and ground vibration also, but generally to a lesser degree.

Consideration must also be given to the potential for damage to existing roads and structures from high-vibration activities, particularly at tie-ins. These effects shall be managed in a manner similar to sensitive receivers through consultation, monitoring and repairing any damage attributable to the Project.

Tables of common sound power levels of construction equipment are contained in Appendix B.

6 Timeframe

The staging programme for the Project is attached in Appendix C. This identifies the general areas of construction activities throughout the Project.

The durations noted in the Tables in Appendix D relate to the entire activity and would not occur continuously in the vicinity of individual receivers. Each receiver will be subject to varying noise levels throughout the construction period.

Management and mitigation of construction noise and vibration effects shall be applied as appropriate (i.e. as machinery progresses along the alignment) in accordance with Sections 11 and 12.

7 Construction hours

Construction hours are generally:

- Monday to Friday 6.30 am to 8 pm
- Saturday 7.30 am to 6 pm.

Night works would generally occur between the hours of 8 pm to 6.30 am. Night works will only be scheduled for construction activities which would impact on normal day-time traffic operations such as the placement of bridge beams across Raumati, Kapiti, Otaihanga and Te Moana Roads and tie-in and surfacing works at the existing SH1. The Alliance will notify the parties identified in Section 11.1 below of these works at least five days prior to commencement.

8 Noise performance standards

The noise levels in Tables 8.1 and 8.2 below are applicable at 1 metre from the façade of buildings in the appropriate category (table 1 for residences, table 2 for businesses).

Table 8.1: Project construction noise criteria: residential receivers

Time of week	Time period	Construction noise criteria (long-term duration) dB $L_{Aeq(T)}$*	
		$L_{Aeq(T)}$	L_{AFmax}
Weekdays	0630-0730	55	75
	0730-1800	70	85
	1800-2000	65	80
	2000-0630	45	75
Saturdays	0630-0730	45	75
	0730-1800	70	85
	1800-2000	45	75
	2000-0630	45	75
Sundays and public holidays	0630-0730	45	75
	0730-1800	55	85
	1800-2000	45	75
	2000-0630	45	75

Table 8.2: Project construction noise criteria: commercial and industrial receivers

Time period	Construction noise criteria (long-term duration) dB $L_{Aeq(T)}$*
0730 – 1800	70
1800 – 0730	75

* T means an assessment duration between 10 minutes and 60 minutes.

9 Vibration performance standards

9.1 Vibration Category A

The Category A vibration performance standards identify the levels at which vibration tends to create an 'annoyance' effect for humans which may then result in a response such as a complaint to the Project. At these levels, the vibration will not result in damage to buildings or fixtures, although residents may perceive this as possible.

The standard addresses human response for the following premises and times:

Dwellings	daytime and night-time
Occupied workplaces (excl. industrial)	daytime

(Criteria for unoccupied buildings and offices at night-time are given in relation to building damage, not annoyance.)

If measured or predicted vibration levels exceed the Category A criteria then a suitably qualified expert shall be engaged to assess and provide practical options for managing construction vibration at the affected location in an effort to reduce the level of annoyance being experienced. If the Category A criteria cannot be practicably achieved, the Category B criteria shall be applied.

9.2 Vibration Category B

Category B is designed to protect buildings against damage, but retains a higher degree of protection for dwellings at night-time to manage annoyance.

9.3 Vibration levels higher than Category B

In the event that measured or predicted vibration levels exceed Category B criteria, then construction activity shall only proceed if a suitably qualified expert undertakes continuous monitoring of:

- vibration levels; and
- effects on buildings at risk of exceeding the Category B criteria.

Where the Category B criteria cannot practicably be met, the process of Section 14.2 below shall be followed.

9.4 Vibration Criteria

The Project criteria for construction vibration are given in Table 9.1 below:

Table 9.1: Project construction vibration criteria

Receiver	Details	Category A	Category B
Occupied dwellings	Daytime 0630h - 2000h	1 mm/s PPV	5 mm/s PPV
	Night-time 2000h - 0630h	0.3 mm/s PPV	1 mm/s PPV
Other occupied buildings*	At all times	2 mm/s PPV	5 mm/s PPV
All other buildings	At all times	5 mm/s PPV	50% of Line 2 values in Table B.2 of BS 5228-2:2009

* 'Other occupied buildings' include daytime workplaces such as offices, community centres etc. but not industrial buildings. Schools, hospitals, rest homes etc. would fall under the occupied dwellings category.

10 Monitoring

10.1 Requirements

10.1.1 Noise

Construction noise levels shall be monitored and assessed in accordance with the requirements of NZS 6803:1999 "*Acoustics - Construction Noise*". Methods are set out in detail in NZS 6801:2008 *"Acoustics – Construction Noise".* In summary, noise levels shall be measured:

- With a sound level meter of at least class 2, but preferably class 1;
- At 1 metre from the most exposed façade of a receiving building and at 1.5m above ground;
- Where this is not possible, measurement at a representative position at a similar distance to construction;
- For a duration of 15 minutes (the Standard allows for monitoring durations between 10 and 60 minutes).

10.1.2 Vibration

Construction vibration levels shall be monitored and assessed in accordance the requirements of German Standard DIN 4150-3:1999 "*Structural vibration – Part 3: Effects of vibration on structures*".

Where practicable, monitoring shall be undertaken without any building occupants present to avoid data contamination of occupant movement in the building.

In summary, vibration levels shall be measured as follows:

- Monitoring equipment shall include a vibration meter with two tri-axial transducers (accelerometers or geophones). It must be capable of measuring peak particle velocities (PPV, in mm/s) in all three axes of each transducer simultaneously as a time-trace histogram. The histogram interval period shall be no more than 1 minute.
- One transducer shall be placed on the ground adjacent to the facade which faces the construction activity, and weighed down with a sandbag. The other transducer shall be fixed to the building foundation in a manner suitable for that foundation type. For example:
  - A dwelling with a timber floor shall have the transducer clamped to the end-span of a sub-floor member on the side of the building which faces the construction activity
  - A dwelling with poured concrete foundations shall have the transducer placed on a concrete footing which faces the construction activity, weighed down with a sandbag
  - Note that sandbags must be minimum 12 kg in weight, and be of sufficient size to cover the entire transducer and lay on the surface surrounding the transducer
- Measurement duration shall be between 10 and 60 minutes.
- In analysing the monitoring results, the house transducer data shall be compared against the ground transducer data to identify any significant peaks in the house data which may have been due to occupant-induced vibration. Such peaks shall be highlighted in the monitoring report and removed from the compliance assessment dataset.

10.1.3 General requirements

Monitoring shall be undertaken:

- During relevant stages of work, i.e. excluding break times but including variations in activities over the measurement period;
- At the onset of high noise and/or vibration generating activities, e.g. during piling in close proximity to dwellings or when equipment operates within its risk contour in relation to vibration;
- As and when required during critical phases of construction, i.e. when possible exceedance of the Project criteria is predicted, e.g. night works;
- In response to reasonable complaints about noise, vibration or re-radiated noise (due to vibration) being received. Generally, a reasonable complaint involves a complaint from a member of the public in relation to a noise/vibration issue that can be correlated to construction works on the project;
- By a suitably qualified and experienced acoustic/vibration specialist, or a member of the site Environmental Team who has been trained by the project acoustic/vibration specialist.

A Noise or Vibration Monitoring Form (attached at Appendix F) is to be completed for each survey.

10.1.4 Monitoring locations

Monitoring locations shall be representative of the construction noise/vibration received by the most affected houses and shall include, but not be limited to:

- **Zone 1**: Dwellings located in Leinster Avenue, Main Road (SH1) and Raumati Road, Rata Road, Milne Drive and Kāpiti Road;
- **Zone 2**: Dwellings located in Mazengarb Road and east of the Expressway between Kāpiti Road and Mazengarb Road, Cheltenham Drive and Oxford Court, dwellings located near the Otaihanga Road bridge and Kauri, Puriri Roads; and
- **Zone 3**: Dwellings located in Te Moana Road, dwellings adjacent to Ngarara Road bridge, at the End Farm Road and in the vicinity of Peka Peka Road.

Specific monitoring locations are set out in the schedules in Appendices C and D. These schedules will be completed progressively as construction work establishes along the alignment.

10.2 If a measurement shows non-compliance

In the event that a noise measurement shows non-compliance with the Project criteria, the following procedures shall be implemented:

- A site specific construction noise management plan shall be produced in accordance with Section 14.1.
- The Alliance Environmental Manager will work with the Alliance Construction Manager to confirm that the proposed construction methodology has not changed from what was used in the predictive noise modelling and that all identified mitigation measures have been implemented.
- In the event that identified mitigation measures have not been implemented, these measures are to be implemented immediately.
- Once implemented, noise monitoring will be undertaken again, to confirm compliance with the Project criteria.
- If compliance is still not met, the Environmental Manager and Construction Manager will work together to resolve the issue through the use of additional mitigation measures, changes in plant and equipment being used or changes in construction methodology, Expert advice from the Project Acoustic Specialist will be sought as required.

In the event that a vibration measurement shows non-compliance with the Project criteria, the following procedures shall be implemented:

- A site specific construction vibration management plan shall be produced in accordance with Section 14.2.

- For exceedances of Category A vibration levels, the Environmental Manager will work with the Construction Manager to identify ways in which the vibration criteria can be achieved through using different plant or a changed construction methodology.
- If Category A cannot be achieved, the Environmental Manager will meet with those affected and discuss the annoyance factor caused by vibration and alleviate any concerns that damage may be occurring to their property.
- Construction work will continue provided that the Category B levels can be met.
- In the event that Category B levels cannot be achieved, works will stop in the vicinity of the affected receivers until appropriate additional vibration mitigation measures can be implemented. The project Vibration Specialist will work closely with the Environmental and Construction Managers to resolve the issue in a practical manner. Affected parties will be kept informed of developments. Measures to be implemented may include additional monitoring and a building condition survey to compare with the pre-construction baseline survey. Monitoring will be undertaken to confirm the effectiveness of mitigation measures and compliance with the Category B levels.
- The Alliance Environmental Manager shall liaise with affected receivers throughout this process.

10.3 Reporting

Noise monitoring records, vibration monitoring results and building condition surveys will be retained by the Environmental Manager. Monitoring records shall be kept at the site office for the duration of the project construction, and made available upon request.

11 General management procedures and mitigation measures

The following sections outline noise and vibration management and mitigation measures that shall be implemented throughout construction of the Project.

Zone and section specific mitigation measures are provided in Section 12 of this CNVMP and shall be implemented in addition to the general measures outlined below, where required.

Any appropriate management and mitigation measure shall be implemented and installed in the relevant location prior to the construction works commencing that have been identified to cause an exceedance of the criteria set out in Sections 8 and 9 above.

11.1 Notification and consultation

Notification of directly and indirectly affected parties shall be undertaken as set out in the Stakeholder and Communications Management Plan (SCMP). In summary, the SCMP provides a framework to:

- Inform the community of construction progress;
- Engage with the community in order to foster good relationships and to provide opportunities for learning about the Project;
- Provide early information on key Project milestones; and
- Respond to queries and complaints.

Specifically relating to noise and vibration issues, notification of and consultation with affected parties shall be carried out at least five days prior to commencement of work within any construction area as follows:

Night-time works

- Occupiers of properties within **200 metres** of the construction area: Written notification and a Project description shall be provided to raise awareness of the Project, its expected activities and duration in the vicinity. Practical measures residents can take to minimise noise such as closing windows at night shall be included.

All other works

- Occupiers of properties within **100 metres** of the construction area: General written notification and a Project description shall be provided to raise awareness of the Project, its expected activities and duration in the vicinity.
- Occupiers of properties within **50 metres** of the construction area: Individual written notification shall be provided and opportunity made available for discussions on a case-by-case basis, if requested by the occupants/owners.
- Occupiers of properties within **20 metres** of the construction area shall be directly engaged with via individual discussions and, if necessary, alternatives and/or mitigation options will be explored that are acceptable to both parties. Ongoing consultation shall be carried out throughout the duration of construction.

When discussing concerns over vibration, it is important to convey that vibration can be felt at levels far below those that pose any risk of building damage, even superficial damage such as plaster cracking.

Further details on identifying closest receivers in each Sector are contained in the schedules in Appendix D and Appendix E. Schedules shall be updated as and when appropriate, e.g. if additional locations are identified that are potentially affected by construction noise and/or vibration.

11.2 Training of personnel

All personnel on site shall be made aware of the importance of operating in the least disruptive manner. All personnel working on the Project, including Contractor employees and subcontractors, shall be familiar with, and be responsible for, implementing this CNVMP.

11.3 Selection of low noise and vibration plant

Low noise and vibration plant shall be selected and used wherever practicable. Where plant is identified as being particularly noisy and/or vibration inducing, action shall be taken to reduce emissions. This may involve the fitting of mitigation devices, such as silencers, enclosures or isolation pads. Plant shall be maintained to ensure that noise and vibration emissions remain as low as practicable.

11.4 Building condition surveys

Prior to the commencement of Project construction operations, a detailed pre-construction building condition survey of identified at-risk buildings, services and structures shall be conducted by a suitably qualified engineer. In addition, each building shall be classified according to the Project vibration criteria (refer Table 8-1) to identify the relevant vibration limit for that receiver.

Potentially at-risk buildings are tabulated in Appendix E.

The survey shall include, but not be limited to, the following:

- Existing condition of buildings, services or structures, including existing levels of any aesthetic damage or structural damage;
- Record (including photographs) of the major features of the buildings, services and structures including location, type, construction, age and present condition, including defects;
- Foundation type of the building, service or structure;
- Preparation of a report recording the findings of the survey. A copy of each report shall be forwarded to the Alliance Environmental Manager within one week of the assessment;
- Resurvey of buildings, services and structure, which are the subject of complaints, or if the vibration criteria have been exceeded and there is potential for damage to have occurred;
- Within six months of completion of the Project, a detailed post-construction condition survey of the same buildings, services and structures shall be conducted and a report prepared identifying any changes in the condition and making an assessment as to whether these changes are likely to be as a result of the construction works.

11.5 Reversing alarms

All equipment operating on any of the Project construction sites during night-time shall be fitted with alternatives to tonal reversing alarms. Such alternatives may include, but not be limited to, visual signals or broadband auditory devices.

11.6 Night-time operation

In close proximity to residences, high-noise and/or vibration activities shall be scheduled for the daytime where practicable, and avoided during the night-time.

In close proximity to schools and commercial buildings, high-noise and/or vibration activities shall be scheduled during the evening and night-time period where this is practicable.

For contractors yards located adjacent to noise sensitive receivers, noisy vehicles shall enter and leave the site only during daytime hours, where practicable. Where this is not practicable, truck routes shall be chosen so as to minimise disruption to sensitive receiver positions.

11.7 Hierarchy of mitigation options

In the event that potential non-compliance with the construction Project criteria is predicted, or in the event of measurement showing non-compliance with the these criteria, site specific management plan will be prepared in accordance with the process set out in Section 14.

Appropriate mitigation options will be considered and implemented following the hierarchy set out below. Each question shall be considered in sequence before moving onto the next one.

1. Have equipment and methodologies been chosen that reduce the overall noise from the activity? Can quieter alternative equipment or methodologies be practicably implemented?
2. Is it imperative that night-time works be undertaken, or can works be re-scheduled to daytime?
3. Can temporary construction noise or vibration barriers be erected or installed within the designation, which provide effective shielding of the equipment/activity?
4. Can the works be sequenced to avoid sensitive times for neighbouring residents/businesses, e.g. can works be scheduled for school holidays?
5. Have potentially affected persons been contacted and implications discussed/feedback taken into consideration in the planning of this activity?
6. When appropriate, have residents been offered temporary relocation to suitable alterative accommodation, and have they accepted the offer?

7. Is the activity of long duration and likely to impact on the same group of residents for an extended time? Is there a justified case for affected houses to be upgraded to provide a suitable internal noise environment during this activity, e.g. by installing alternative ventilation/improved glazing? (Advice from a suitably qualified acoustic engineer required)

11.8 Noise barriers and enclosures

In areas where the Project noise criteria may be exceeded, noise barriers shall be used where they provide effective mitigation (i.e. break acoustic line-of-sight and are close to either the source (preferable) or the receiver).

The design of any barriers and enclosures shall be reviewed and verified by a suitably qualified acoustic specialist prior to implementation.

All barriers and/or enclosures shall be installed prior to construction works commencing within 100 metres of identified locations requiring mitigation.

Permanent (traffic) noise barriers shall be:

- Implemented where practicable
- Installed early during construction where appropriate
- Constructed in their final form, but may utilise temporary materials such as plywood (this can then be replaced with permanent materials prior to opening of the project)

Temporary noise barriers shall be:

- Utilised for those areas where no permanent noise barriers are required or where these cannot be practicably implemented early during construction
- Constructed of suitable material, typically plywood. Alternative barrier construction may include, but not limited to, fibre cement, shipping containers or mass-loaded vinyl.
- Constructed so that they contain no gaps
- Of sufficient height to interrupt line-of-sight between the receiver and the source

Enclosures shall be used on generators (muff boxes) and pumps:

- When a noise barrier is not sufficient to achieve compliance with the Project noise criteria; and
- Where most appropriate, e.g. stationary plant such as generators or pumps.

11.9 Vibration barriers and isolators

Vibration barriers can provide limited attenuation for ground-borne vibration. Accordingly, the practicability of implementing vibration barriers shall be assessed on a case-by-case basis by a suitably qualified and experienced specialist.

Vibration barrier options include, but are not limited to; open trenches, backfilled trenches, concrete-filled trenches, sheet pile walls, concrete pile walls and grout curtains.

The required depth of the barrier is based on the frequency characteristics of the vibration source.

Vibration isolators (such as suitably specified rubber pads) can provide limited attenuation for items of fixed plant, including stationary excavators (refer Section 11.3).

11.10 Vibration from excavator use

The soft ground conditions (particularly peat) in the vicinity of the Expressway mean that the weight-shift associated with vigorous excavator operation can generate significant vibrations. Excavators must be operated smoothly, avoiding the following movements:

- Banging of the ground with the bucket or any other attachment. Any compaction should be carried out by a compactor;
- Sudden changes of direction or quick rotations of the chassis, particularly when on an incline;
- Load-spreading platforms would also mitigate vibration effects of weight-shifting

11.11 Vibration effects on infrastructure assets

Any infrastructure assets such as roads, underground pipework etc. near areas of high-vibration activity shall be identified prior to commencing construction and included as a Schedule in Appendix E.

It is noted that German Standard DIN 4150-3:1999 (which the Project Criteria are based on, in part) contains vibration criteria for buried pipework in Table 2 of the Standard. The most stringent criterion in the table is 50 mm/s PPV (for masonry and plastic pipes) which indicates that, compared with dwellings, pipework is not particularly vulnerable to vibration damage.

Notwithstanding this, risk assessments of relevant infrastructure assets should be undertaken, and managed through SSCVMPs (refer Section 14.2) as appropriate.

11.12 Temporary resident relocation

Where all practicable noise and vibration management and mitigation measures have been implemented, but compliance with the Project criteria is still not achievable, relocation of affected receivers may need to be considered.

Relocation shall be considered in exceptional cases only, and expert advice from a suitably qualified and experienced acoustics specialist shall be sought.

12 Zone-specific management and mitigation measures

12.1 Noise

Site specific management and mitigation measures will be required for a number of locations in addition to the general measures noted in Section 11 above and are set out in Appendix D.

In addition, a set of construction risk diagrams (aerial maps with 'cloud markings' to indicate areas which are at risk of exceeding the Project noise criteria) has been developed, refer Appendix D of the CEMP.

12.2 Vibration

The primary management measure for vibration is to identify and develop awareness of vibration risk, i.e. which construction sources impose a risk of exceeding the Project criteria, and which structures are susceptible to damage. In addition to dwellings, this may include garages and swimming pools.

The tables in Appendix E specify, for each Project sector, key vibration sources, their 'risk contours' inside which the Project vibration criteria may be exceeded, and the addresses of at-risk buildings. In addition, a set of construction risk diagrams (aerial maps with 'cloud markings' to indicate these areas) has been developed, refer Appendix D of the CEMP.

The risk contours are based on theoretical models, and will be updated in conjunction with the Project vibration specialist as site-specific measurement data becomes available.

Risk is categorised as High or Medium and each risk level requires specific actions to be undertaken when working in those areas, as follows:

- High Risk:
  - Receivers located within the risk contour of any vibration source
  - Individual discussion with building owners and on-going consultation
  - Building condition survey prior to construction
  - Site-specific vibration measurements to assess damage risk
- Med Risk:
  - Receivers that are not inside, but are close to the risk contour (approximate risk contour + 20%)
  - Notification of building owners and opportunity for discussion if requested

– Site-specific vibration measurements to assess damage risk if requested

13 Procedures for handling noise and vibration complaints

Complaints procedures are detailed in the CEMP, along with targeted time frames for resolving complaints. All complaints will be recorded, investigated and closed out, with records maintained at the Project office. These will be available for inspection during normal office hours by affected parties and the relevant local authority.

Due to the emotive nature of noise and vibration, every effort will be made by the Alliance to address and close out the complaint as soon as practicable, but at most within 10 working days. The Environmental Manager will be responsible for keeping complainants informed of the associated investigation and subsequent outcomes. For on-going complaints, the Alliance Environmental Manager shall request additional measurements by a suitably qualified and experienced acoustic specialist targeting the specific noise or vibration source. The investigation of an on-going noise or vibration complaint may include the following:

- Identification of noise or vibration inducing activities at the time of complaint, and measurement and assessment of noise or vibration levels from these activities;
- Determination of the best practicable mitigation options in conjunction with the Construction Manager;
- Implementation of the management or mitigation measure in a timely manner;
- Measurement of noise or vibration levels following implementation of mitigation action(s);
- Communication with complainant;
- Reporting of findings and actions to the Alliance Project Manager.

In accordance with condition DC.14, the following shall be recorded, and a record of the response and remedial actions undertaken maintained:

- the name and address (as far as practicable) of the complainant;
- identification of the nature of the complaint;
- location, date and time of the complaint and of the alleged event;
- weather conditions at the time of the complaint (as far as practicable);
- the outcome of the investigation into the complaint;
- measures taken to respond to the complaint; and
- any other activities in the area, unrelated to the Project that may have contributed to the complaint, such as non-Project construction, fires or traffic accidents.

14 Site specific construction management plans (SSCMPs)

14.1 Site specific construction noise management plan (SSCNMP)

Where noise levels are predicted to exceed the noise criteria in Section 8, a SSCNMP will be submitted to KCDC for certification at least 5 working days prior to the relevant construction activity commencing. The occupiers of those premises predicted to receive the noise exceedance shall be consulted during the preparation of the SSCNMP.

An example SSCNMP is attached at Appendix G.

The SSCNMP shall contain the following information:

- The activity and location of proposed works;
- The timing and duration of the activity;
- The equipment to be used;
- Predicted noise levels;
- Identified dwellings at which compliance cannot be achieved with conventional mitigation measures;
- How affected persons have been consulted; and
- Alternative management and mitigation measures proposed.

14.2 Site specific construction vibration management plan (SSCVMP)

Where any construction activities measured or predicted to exceed the Category B Project criteria of Section 9.2, a SSCVMP shall be developed and submitted to KCDC at least 5 working days prior to the relevant construction activity commencing. The occupiers of those premises predicted to receive the vibration exceedance shall be consulted during the preparation of the SSCVMP.

An example SSCVMP can be found in Appendix G. A SSCVMP shall contain the following information:

- The activity and location of proposed works;
- The timing and duration of the activity;
- The equipment to be used;
- Predicted vibration levels;
- Identified dwellings at which compliance cannot be achieved with conventional mitigation measures;
- How affected persons have been consulted; and
- Alternative management and mitigation measures proposed.

14.3 General requirements

Notwithstanding the requirement to submit a SSCNMP or SSCVMP, mitigation measures will continue to be implemented as per the CNVMP and reviewed/monitored to confirm compliance and effectiveness of the plan. This includes the overall aim to achieve compliance with the relevant Project criteria.

For noise, the likelihood of exceedance shall be determined by utilising appropriate prediction tools, e.g. the calculation tools of NZTA, specifically the NZTA NZS 6803 Tool:

acoustics.nzta.govt.nz/monitoring-prediction-assessment/construction-maintenance-noise

For vibration, the likelihood of exceedance shall be determined by pre-construction measurements of relevant vibration inducing equipment to establish safe distances.

15 Construction noise and vibration management schedule

Management schedules for construction noise and vibration shall be prepared for each Zone.

The noise schedules (Schedules in Appendix D) shall detail high-noise equipment and all sensitive receivers as follows:

- for daytime work: within 20, 50 and 100 metres, and
- for night-time work: within 200 metres. (refer Section 11.1)

The vibration schedules (Schedules in Appendix E) shall detail high-vibration equipment, their safe distances and all sensitive receivers within the high and medium risk categories (refer Section 12.2).

The schedules shall be prepared by the construction team prior to commencement of works in each section.

16 CNVMP review

This CNVMP, including environmental controls and procedures, shall be reviewed to ensure that it remains applicable to the activities being carried out.

The review will take into consideration:

- Significant changes to the construction methodology that affect the noise and/or vibration generation
- Changes in methodology or management in response to noise and/or vibration monitoring showing non-compliance

- Public complaints.

Reasons for making changes to the CNVMP will be documented. A copy of the original CNVMP document and subsequent versions will be kept for the Project records, and marked as obsolete. Each new/updated version of the CNVMP documentation will be issued with a version number and date to eliminate obsolete CNVMP documentation being used.

The CNVMP will be updated, with the necessary approval, throughout the course of the Project to reflect material changes associated with changes to construction techniques or the natural environment. Consultation with the Kāpiti Coast District Council will be required for any relevant revisions of a material nature for the CNVMP.

Appendix A

Glossary

Appendix A – Glossary

Noise

Ambient Noise	Ambient Noise is the all-encompassing noise associated with any given environment and is usually a composite of sounds from many sources near and far.
A-weighting	A frequency filter which is applied to a measurement of sound so as to more closely approximate the frequency bias of the human ear.
dB	Decibel – the basic measurement unit of sound. It is a logarithmic ratio of measured sound pressure level with respect to a reference level of 20 micropascals.
$L_{Aeq(T)}$	The A-weighted, time averaged sound level (on a logarithmic/energy basis) over the measurement period T (e.g. between 10 and 60 minutes).
L_{AFmax}	The maximum A-weighted sound level recorded during the measurement period. Measured with fast time weighting, i.e. a 125 millisecond time constant
L_{A10}	The A-weighted sound level which is equalled or exceeded for 10% of the measurement period.
L_{A90}	The A-weighted sound level which is equalled or exceed for 90% of the measurement period. L_{A90} is an indicator of the mean minimum noise level and is used in New Zealand as the descriptor for background noise
L_{A95}	The A-weighted sound level which is equalled or exceed for 95% of the measurement period.
L_{Zpeak}	The peak instantaneous pressure level recorded during the measurement period, with a flat (i.e. no) frequency weighting.
Noise	A sound that is unwanted by, or distracting to, the receiver.
NZS 6801:2008	New Zealand Standard NZS 6801:2008 *"Acoustics – Measurement of Sound"*
NZS 6802:2008	New Zealand Standard NZS 6802:2008 *"Acoustics – Environmental Noise".*
NZS 6803:1999	New Zealand Standard NZS 6803:1999 "*Acoustics – Construction Noise*".

Vibration

BS 5228-2:2009	British Standard BS 5228-2:2009 "Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration". This is the standard adopted for this Project to assess human response to construction.
DIN 4150-3:1999	German Standard DIN 4150-3:1999 "Structural Vibration – Part 3: Effects of vibration on structures". This standard is generally adopted in NZ to assess building damage.
PPV	Peak Particle Velocity, measured in mm/s. This is the standard metric for assessing construction vibration levels.
Risk contour	The closest distance to a vibration source at which a measurement would be expected to comply with the risk assessment criteria

General

AEE	Assessment of Environmental Effects. A document relating to, and assessing the effects of a specific element of the Project e.g. Noise, Air Quality, Traffic, Vibration
CNVMP	Construction Noise and Vibration Management Plan. This document.
"Suitably qualified acoustics specialist"	A person who has sufficient qualifications and experience in the relevant field(s) of acoustics (noise and/or vibration) to undertake robust measurements and assessments, i.e. a Member of the Acoustical Society of New Zealand.
SSCNMP	Site Specific Construction Noise Management Plan
SSCVMP	Site Specific Construction Vibration Management Plan

Appendix B

Activity sound power levels

Appendix B – Activity sound power levels

An overall sound power "Group L_{Aw}" for each activity has been determined from the following data. This takes into account the overall operation time of each item of equipment within the group. The overall "Group L_{AW}" may be lower than the sound power level of the loudest item in the group where this item does not operate continuously. For instance in "span finishing and barrier installation" the Group L_{AW} is stated at 110 dB despite grinders and jack hammers contained in the group have sound power levels of around 120 dB L_{AW}. This is because these items of equipment would be used intermittently only.

The following activities are representative of activities throughout the entire project. In some areas, the plant that will likely be used differs from that contained in the following tables, but generally not significantly.

Table B-1: State highway reconstruction

Activity	Day/Night	Equipment (add. equipment may be used)	Avg. Sound Power Level per unit (dB)
Preload fill	Day	On-road trucks Compactors Hydraulic excavator (c. 20 Tonne) **Group Lw**	95-105 106 109-115 **113**
Road Construction and surfacing	Day	Graders (100kw) Rollers (vib.& non-vib.) On-road trucks Water carts Wirtgen KMA200 Stabiliser Bitumen sprayers Loaders Pavers Wirtgen Rotomill **Group Lw**	110 102-105 95-105 105-110 112 105 104 110 - 114 114 **110**

Table B-2: Road Realignment / widening

Activity	Day/Night	Equipment (add. equipment may be used)	Avg. Sound Power Level per unit (dB)
Road construction and surfacing	Day	Excavators	109-115
		Trucks	98-110
		Kerbing machine	114
		Concrete trucks	99-104
		Concrete pump	100-106
		Graders (100kw)	110
		Rollers (vib.& non-vib.)	102-105
		On-road trucks	95-105
		Water carts	105-110
		Wirtgen KMA200 Stabiliser	112
		Bitumen sprayers	105
		Loaders	104
		Pavers	110 - 114
		Wirtgen Rotomill	114
		Group Lw	**115**

Table B-3: Bridge Construction

Activity	Day/Night	Equipment (add. equipment may be used)	Avg. Sound Power Level per unit (dB)
Bore piling Stone columns	Day	Diesel Generators	110-120
		Petrol Generators	110-120
		Air Compressors (trailer mounted)	75-85
		General light vehicles	95-110
		Concrete breakers (hand held or attached to excavator)	122
			103
		Crawler crane (40t - 100t)	107-110
		Piling drill rig	111
		Vibro hammer	109-115
		Excavators (5-30t)	106
		Concrete trucks	102
		Concrete pump	100-106
		Delivery trucks (articulated)	109
		Earthmoving trucks	98-110
		Water trucks	107
		Sucker trucks	90

		Water blaster Welder and gas set Bentonite or Polymer system (complete with tanks and filtration systems) **Group Lw**	93-96 <100 **110**
Pile cap construction Column/cros shead construction Super-structure construction (pre-cast beams	Day Pre-cast beam placement during night-period	Diesel Generators Petrol Generators Air Compressors (trailer mounted) General light vehicles Concrete breakers (hand held) Crawler crane (40t - 100t) Excavators (5-30t) Concrete trucks Concrete pump Delivery trucks (articulated) Earthmoving trucks Sucker trucks Water trucks Water blaster Welder and gas set Mobile cranes (25t-300t) Grout pump Elevated work platforms (knuckle boom, straight boom, scissor lift, cherry pickers) Water pump with spears Submersible water pumps Telehandler Forklift Petrol powered concrete saws Core drills **Group Lw**	110-120 110-120 75-85 95-110 122 103 109-115 106 102 109 109 98-110 107 90 93-96 95-105 108 <95 97-109 90 99-105 95 107-113 113 **110**

Table B-4: Expressway Construction

Activity	Day/Night	Equipment (add. equipment may be used)	Avg. Sound Power Level per unit (dB)
Preload fill	Day	On-road trucks Compactors Excavators (20T) **Group Lw**	95-105 106 97-110 **113**
Earthworks	Day	On-road trucks Compactors Excavators (50T) Excavators (20T) MT31 Dumpers Twin Scrapers Single elevator Scrapers **Group Lw**	105 106 110-115 97-110 100-110 118-123 115-120 **118**
Road pavement construction	Day Potential night works at interchanges	Excavators Trucks Kerbing machine Concrete trucks Concrete pump Graders (100kw) Rollers (vib.& non-vib.) On-road trucks Water carts Wirtgen KMA200 Stabiliser Bitumen sprayers Loaders Pavers Wirtgen Rotomill **Group Lw**	109-115 98-110 114 99-104 100-106 110 102-105 95-105 105-110 112 105 104 110 - 114 114 **115**

Table B-5: Wetland Ponds

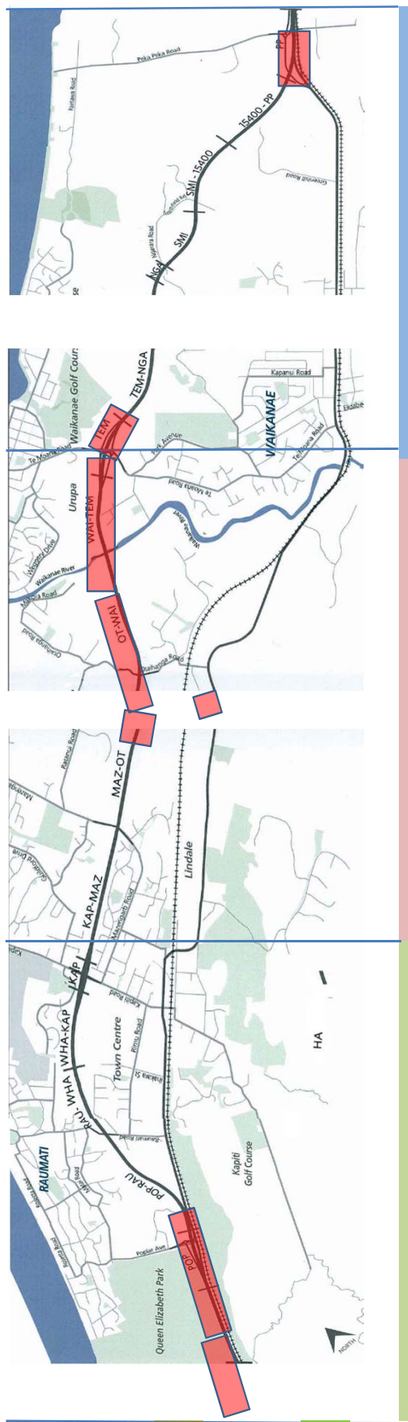
Activity	Day/Night	Equipment (add. equipment may be used)	Avg. Sound Power Level per unit (dB)
Excavation and finishing of stormwater wetland pond	Day	Hydraulic excavator On Road Trucks **Group Lw**	109-115 95-105 **110**

Appendix C

Construction staging programme

MacKays to Peka Peka
EXPRESSWAY ALLIANCE

STAGING PROGRAMME 2013



ZONE	SECTION	SUB-SECTION	Reference
NORTH		CH. 17400-18050	29
	Peka Peka Interchange	Peka Peka Road	28
	CH.16600-18050		
		Preload - CH.16600-17400	27
		Expressway Construction 16600-17400	26
	15400 to Peka Peka CH.15400-16600	15400 to Peka Peka (CH.15400-16600)	25
	Smithfield Road CH.13700-15400	Smithfield Road Expressway 13700-15400 Drainage works 14000-14600	24
	Ngarara Road CH.13500-13700	Ngarara Road CH.13500-13700	23
	Te Moana Road - Ngarara Road CH.12350-13500	Te Moana Road - Ngarara Road CH.12350-13500	22
	Te Moana Interchange CH.11500-12350		
		Interchange Construction	21
CENTRAL	Waikanae River - Te Moana Road	Vector Gas Enabling Works (CH.10750-12350)	20
	CH.10750-11500		
		Expressway Construction CH. 10750-11500	19
	Waikanae Bridge CH.10500-10750	Waikanae Bridge CH.10500-10750	18
	Otaihanga Road - Waikanae River CH.9250-10500	Otaihanga - Waikanae River CH.9250-10500	17
	*Otaihanga Roundabout**	*Otaihanga Roundabout*	*16*
	Otaihanga Project Office/Yard	Otaihanga Project Office/Yard	15
	Otaihanga Road Bridge CH.9150-9250	Otaihanga Bridge CH.9150-9250	14
	Mazengarb Road - Otaitanga Road CH.8000-9150	Mazengarb Road - Otaihanga Road CH.8000-9150	13
	Mazengarb Road Bridge CH.7900-8000	Mazengarb Road Bridge CH.7900-8001	12
	Kapiti Road - Mazengarb Road CH.6500-7900	Kapiti - Mazengarb Road (to include specific mitigation for residential areas to the east & west)	11
	Kapiti Road Interchange CH.6200-6500	Kapiti Road Interchange CH.6200-6500	10
SOUTH	Wharemauku Stream - Kapiti Road CH.5500-6200	Wharemauku Stream - Kapiti Road CH.5500-6200 (to include specific mitigation for Milne Drive through to Quadrant Heights)	9
	Wharemauku Stream Bridge CH.5350-5500	Wharemauku Stream Bridge CH.5350-5500	8
	Raumati Road - Wharemauku Stream CH.4550-5350	Raumati Road - Wharemauku Stream CH.4550-5350 (to include specific mitigation for Conifer Court)	7
	Raumati Road Bridge CH. 4400-4550	Raumati Road Bridge CH. 4400-4550	6
	Poplar Avenue - Raumati Road CH. 3200-4400	Poplar Avenue - Raumati Road CH. 3200-4400 (including new Leinster Avenue & specific mitigation)	5
	Poplar Avenue Interchange CH.1900-3200	Preload & Ground Improvements, CH. 1900-3200	4
		Poplar Avenue Realignment	3
		Poplar Avenue Bridge	2
	*Raumati Straight**	*Raumati Straight*	1

* no certification required due to separate consents

SITE SPECIFIC MANAGEMENT PLAN KEY
Construction Erosion and Sediment Control Plan (SSCESCP)
Traffic Management Plan (SSTMP)
Construction Vibration Management Plan (SSCVMP)
Construction Noise Management Plan (SSCNMP)
Landscape Management Plan (SSLMP)
Urban Design Plan (SSUDP)
Planting Management Plan (SSPMP)
Hard Landscape Management Plan (SSHLMP)
Ecological Management Plan (SSEMP)
Cultural Heritage Management Plan (SSCHMP)

Group 1 Management Plans submitted for certification

Group 2 & 3 Management Plans submitted for certifcation

APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
			SSCNMP, SSCESCP, SSTMP, Vegetation Clearance Plan	Stormwater Peer Review & Certification	Preload 1660 - 17400			
						SSCESCP SSTMP, SSLMP, SSCNMP	15400 to Peka Peka	
								SSCESCP, SSCNMP SSEMP, SSUDP,SSLMP SSTMP,
		SSCNMP, SSCESCP, SSTMP, Vegetation Clearance Plan	Remove buildings; Site clearance	Stormwater Peer Review & Certification	Vector Gas enabling works - earthworks/drainage			
								SSCESCP, SSCNMP SSEMP, SSLMP, SSUDP SSTMP, Maintenance Plan
					SSCESCP SSLMP, SSCNMP, SSCVMP Stormwater Peer Review & Certification	Otaitanga - Waikanae River		
			Otaihanga Roundabout					
		SSCESCP SSTMP	Otaitanga Project Office/Yard					
					SSCESCP SSCNMP, SSCVMP Stormwater Peer Review & Certification	Mazengarb Road - Otaihanga Road		
					SSCESCP SSCNMP, SSCVMP SSLMP Stormwater Peer Review & Certification	Leinster Avenue Realignment		
			SSCNMP, SSCESCP, SSTMP, Vegetation Clearance Plan	Stormwater Peer Review & Certification	Preload & Ground Improvements, CH. 1900-3200			
								SSCESCP, SSTMP
								SSCNMP, SSEMP, SSLMP
			Raumati Straight					

OVERARCHING MANAGEMENT PLAN LODGEMENT DATES
*Noise Monitoring Plan (NMP) - Submitted

Group 1 - 03/05/13
Construction Air Quality Management Plan (CAQMP)
Construction Noise & Vibration Management Plan (CNVMP)
Construction Traffic Management Plan (CTMP)
Erosion & Sediment Control Plan (ESCP)
Hazardous Substances Management Plan (HSMP)
Contaminated Soils Management Plan (CSMP(HH))

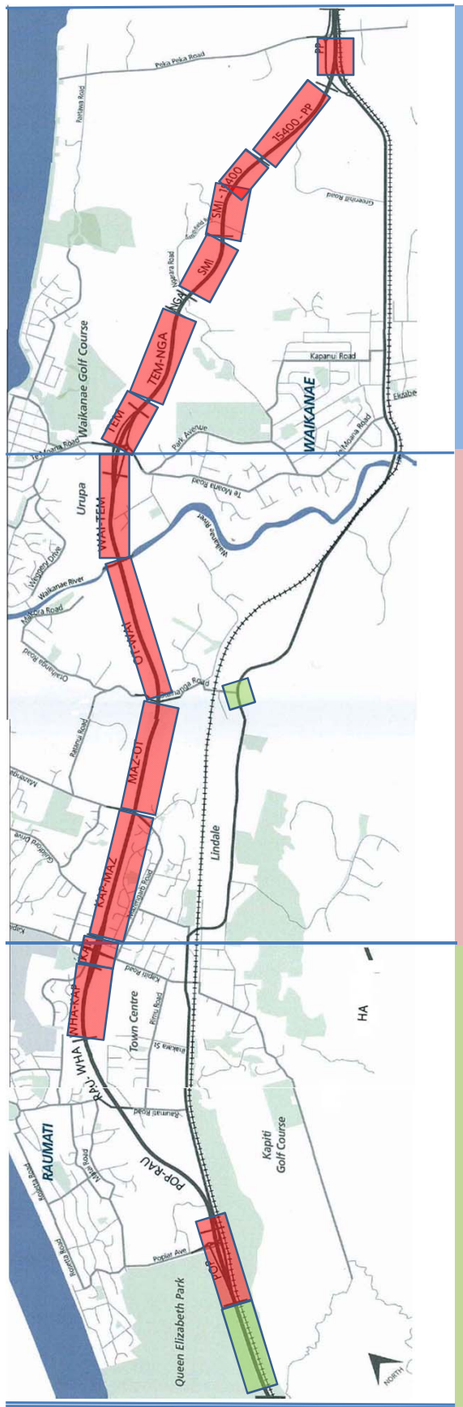
Group 2 - 10/5/13
Settlement Effects Management Plan (SEMP)
Groundwater Level Management Plan (GMP)
Ecological Management Plan (EMP)
Landscape Management Plan (LMP)
Contaminated Soils & Groundwater Management Plan (CSGMP)

Group 3 - June 2013
Network Integration Plan (NIP)
Stakeholder & Communications Management Plan (SCMP)
Accidental Discovery Protocol (ADP)
Network Utilities Management Plan (NUMP)
Resource Efficiency and Waste Management Plan (REWMP)

Under construction
Settlement
No construction
Complete

MacKays to Peka Peka
EXPRESSWAY ALLIANCE

STAGING PROGRAMME 2014



ZONE	SECTION	SUB SECTION	Reference	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
NORTH	Peka Peka Interchange CH.16600-18050	CH. 17400-18050	29												
		Peka Peka Road	28												
		Preload - CH.16600-17400	27	Preload continues											
		Expressway Construction 1660-17400	26												
	15400 to Peka Peka CH.15400-16600	15400 to Peka Peka (CH.15400-16600)	25	15400 to Peka Peka continues											
	Smithfield Road CH.13700-15400	Smithfield Road Expressway 13700-15400 Drainage works 14000-14600	24	Drainage works 14000-14600			Expressway 13700-15400			Smithfield Road, including Bridge					
	Ngarara Road CH.13500-13700	Ngarara Road CH.13500-13700	23												
	Te Moana Road - Ngarara Road CH.12350-13500	Te Moana Road - Ngarara Road CH.12350-13500	22						SSCESCP SSLMP, SSCNMP, SSTMP	Te Moana Road - Ngarara Road					
	Te Moana Interchange CH.11500-12350	Vector Gas Enabling Works B	20B	Gas Main Diversion - Vector											
		Interchange Construction	21									SSCESCP SSCNMP, SSCNVMP, SSTMP, SSUDP, SSLMP	Interchange Construction		
CENTRAL	Waikanae River - Te Moana Road CH.10750-11500	Vector Gas Enabling Works A	20A	Gas Main Diversion - Vector											
		Expressway Construction CH. 10750-11500	19						SSCESCP, SSTM SSCNMP, SSEMP, SSLMP	Expressway Construction					
	Waikanae Bridge CH.10500-10750	Waikanae Bridge CH.10500-10750	18	Waikanae River Bridge											
	Otaihanga Road - Waikanae River CH.9250-10500	Otaihanga - Waikanae River CH.9250-10500	17	Otaitanga - Waikanae River											
	*Otaihanga Roundabout**	*Otaihanga Roundabout*	*16*			SSPMP	Planting								
	Otaihanga Project Office/Yard	Otaihanga Project Office/Yard	15												
	Otaihanga Road Bridge CH.9150-9250	Otaihanga Bridge CH.9150-9250	14			SSCESCP SSTMP, SSUDP, SSCNMP	Otaihanga Road Bridge								
	Mazengarb Road - Otaitanga Road CH.8000-9150	Mazengarb Road - Otaihanga Road CH.8000-9150	13	Mazengarb Road - Otaitanga Road											
	Mazengarb Road Bridge CH.7900-8000	Mazengarb Road Bridge CH.7900-8001	12									SSCESCP SSTMP, SSCNMP, SSCVMP, SSLMP, SSUDP	Mazengarb Road Bridge		
	Kapiti Road - Mazengarb Road CH.6500-7900	Kapiti - Mazengarb Road (to include specific mitigation for residential areas to the east & west)	11									SSCESCP SSTMP, SSLMP, SSCVMP, SSCNMP	Kapiti Road - Mazengarb Road		
SOUTH	Kapiti Road Interchange CH.6200-6500	Kapiti Road Interchange CH.6200-6500	10						SSCESCP SSTMP, SSCNMP, SSCVMP, SSLMP, SSUDP	Kapiti Road Interchange					
	Wharemauku Stream - Kapiti Road CH.5500-6200	Wharemauku Stream - Kapiti Road CH.5500-6200 (to include specific mitigation for Milne Drive through to Quadrant Heights)	9									SSCESCP, SSCNMP SSUDP, SSLMP SSTMP	Wharemauku Stream - Kapiti Road		
	Wharemauku Stream Bridge CH.5350-5500	Wharemauku Stream Bridge CH.5350-5500	8												
	Raumati Road - Wharemauku Stream CH.4550-5350	Raumati Road - Wharemauku Stream CH.4550-5350 (to include specific mitigation for Conifer Court)	7												
	Raumati Road Bridge CH. 4400-4550	Raumati Road Bridge CH. 4400-4550	6												
	Poplar Avenue - Raumati Road CH. 3200-4400	Poplar Avenue - Raumati Road CH. 3200-4400 (including new Leinster Avenue & specific mitigation)	5												
	Poplar Avenue Interchange CH.1900-3200	Preload & Ground Improvements, CH. 1900-3200	4	Preload Continues											
		Poplar Avenue Realignment	3	Poplar Ave Realignment					SSPMP	Planting					
		Poplar Avenue Bridge	2												
	*Raumati Straight**	*Raumati Straight*	1												

SITE SPECIFIC MANAGEMENT PLAN KEY

- Construction Erosion and Sediment Control Plan (SSCESCP)
- Traffic Management Plan (SSTMP)
- Construction Vibration Management Plan (SSCVMP)
- Construction Noise Management Plan (SSCNMP)
- Landscape Management Plan (SSLMP)
- Urban Design Plan (SSUDP)
- Planting Management Plan (SSPMP)
- Hard Landscape Management Plan (SSHLMP)
- Ecological Management Plan (SSEMP)
- Cultural Heritage Management Plan (SSCHMP)

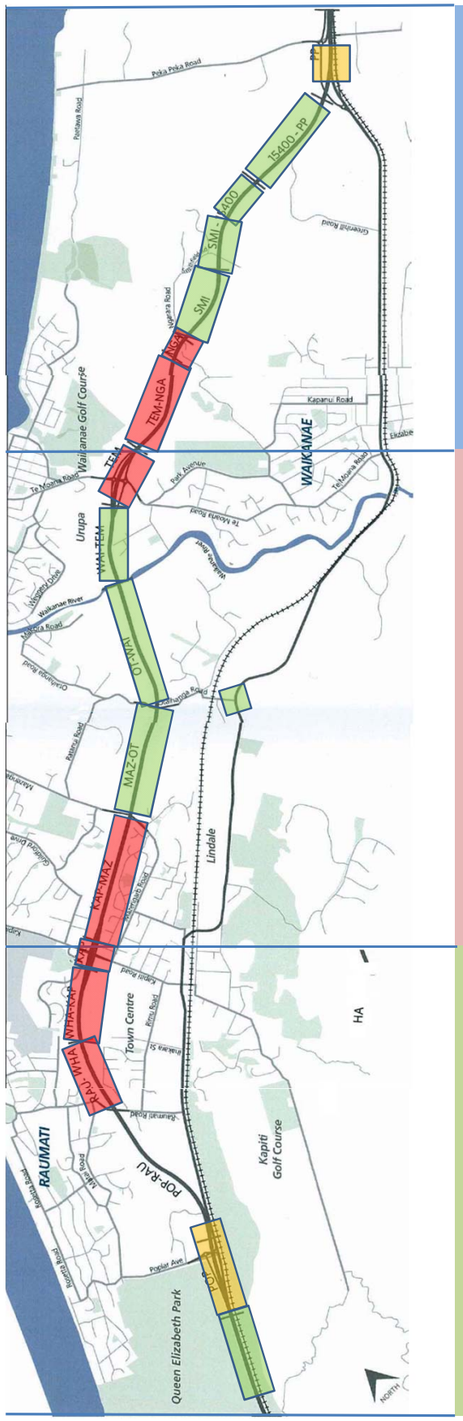
Under construction
Settlement
No construction
Complete

* no certification required due to separate consents

Staging Programme Version 2 April 2013

MacKays to Peka Peka
EXPRESSWAY ALLIANCE

STAGING PROGRAMME 2015



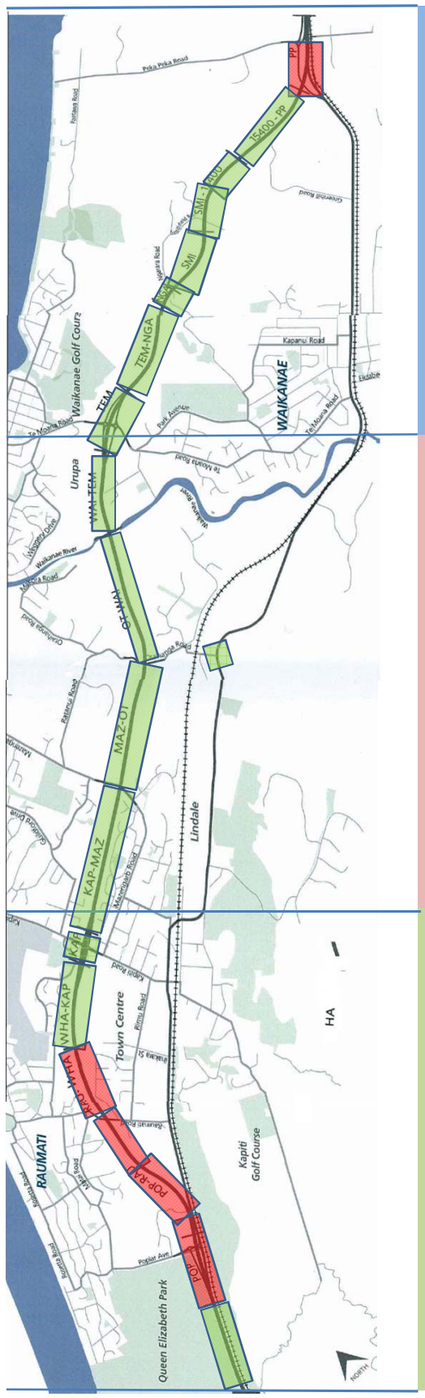
ZONE	SECTION	SUB-SECTION	Reference	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
NORTH	Peka Peka Interchange CH.16600-18050	CH. 17400-18050	29												
		Peka Peka Road	28												
		Preload - CH.16600-17400	27												
		Expressway Construction 1660-17400	26												
	15400 to Peka Peka CH.15400-16600	15400 to Peka Peka (CH.15400-16600)	25				SSPMP	Planting							
	Smithfield Road CH.13700-15400	Smithfield Road Expressway 13700-15400 Drainage works 14000-14600	24	Smithfield Road, including Bridge			SSPMP SSPMP	Planting Planting							
	Ngarara Road CH.13500-13700	Ngarara Road CH.13500-13700	23									SSCESCP SSEMP, SSLMP, SSUDP, SSCNMP	Ngarara Road, including Bridge		
	Te Moana Road - Ngarara Road CH.12350-13500	Te Moana Road - Ngarara Road CH.12350-13500	22	Te Moana Road - Ngarara Road											
	Te Moana Interchange CH.11500-12350	Vector Gas Enabling Works B	20B												
		Interchange Construction	21	Interchange Construction											
CENTRAL	Waikanae River - Te Moana Road CH.10750-11500	Vector Gas Enabling Works A	20A												
		Expressway Construction CH. 10750-11500	19	Expressway Construction					SSPMP	Planting					
	Waikanae Bridge CH.10500-10750	Waikanae Bridge CH.10500-10750	18												
	Otaihanga Road - Waikanae River CH.9250-10500	Otaihanga - Waikanae River CH.9250-10500	17												
	*Otaihanga Roundabout**	*Otaihanga Roundabout*	*16*												
	Otaihanga Project Office/Yard	Otaihanga Project Office/Yard	15												
	Otaihanga Road Bridge CH.9150-9250	Otaihanga Bridge CH.9150-9250	14												
	Mazengarb Road - Otaitanga Road CH.8000-9150	Mazengarb Road - Otaihanga Road CH.8000-9150	13			SSPMP	Planting								
	Mazengarb Road Bridge CH.7900-8000	Mazengarb Road Bridge CH.7900-8001	12	Mazengarb Road & Bridge							SSPMP	Planting			
	Kapiti Road - Mazengarb Road CH.6500-7900	Kapiti - Mazengarb Road (to include specific mitigation for residential areas to the east & west)	11	Kapiti Road - Mazengarb Road							SSPMP	Planting			
	Kapiti Road Interchange CH.6200-6500	Kapiti Road Interchange CH.6200-6500	10	Kapiti Road Interchange					SSPMP	Planting					
SOUTH	Wharemauku Stream - Kapiti Road CH.5500-6200	Wharemauku Stream - Kapiti Road CH.5500-6200 (to include specific mitigation for Milne Drive through to Quadrant Heights)	9	Wharemauku Stream - Kapiti Road				SSPMP	Planting						
	Wharemauku Stream Bridge CH.5350-5500	Wharemauku Stream Bridge CH.5350-5500	8					SSCESCP SSLMP, SSUDP, SSCNMP, SSEMP	Wharemauku Stream Bridge						
	Raumati Road - Wharemauku Stream CH.4550-5350	Raumati Road - Wharemauku Stream CH.4550-5350 (to include specific mitigation for Conifer Court)	7								SSCESCP SSCNMP, SSLMP, SSEMP, SSUDP	Raumati Road - Wharemauku Stream			
	Raumati Road Bridge CH. 4400-4550	Raumati Road Bridge CH. 4400-4550	6												
	Poplar Avenue - Raumati Road CH. 3200-4400	Poplar Avenue - Raumati Road CH. 3200-4400 (including new Leinster Avenue & specific mitigation)	5												
	Poplar Avenue Interchange CH.1900-3200	Preload & Ground Improvements, CH. 1900-3200	4	Preload Continues					SSPMP	Planting					
		Poplar Avenue Realignment	3												
		Poplar Avenue Bridge	2												
	*Raumati Straight**	*Raumati Straight*	1												

SITE SPECIFIC MANAGEMENT PLAN KEY
Construction Erosion and Sediment Control Plan (SSCESCP)
Traffic Management Plan (SSTMP)
Construction Vibration Management Plan (SSCVMP)
Construction Noise Management Plan (SSCNMP)
Landscape Management Plan (SSLMP)
Urban Design Plan (SSUDP)
Planting Management Plan (SSPMP)
Hard Landscape Management Plan (SSHLMP)
Ecological Management Plan (SSEMP)
Cultural Heritage Management Plan (SSCHMP)

* no certification required due to separate consents

MacKays to Peka Peka
EXPRESSWAY ALLIANCE

STAGING PROGRAMME 2016



ZONE	SECTION	SUB-SECTION	Reference	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
NORTH		CH. 17400-18050	29												
	Peka Peka Interchange CH.16600-18050	Peka Peka Road	28		SSCESCP SSCNMP, SSCVMP, SSLMP, SSUDP, SSEMP	Peka Peka Road, including Bridge									
		Preload - CH.16600-17400	27												
		Expressway Construction 1660-17400	26									SSCESCP SSCNMP, SSLMP	Expressway Construction 16600-17400		
	15400 to Peka Peka CH.15400-16600	15400 to Peka Peka (CH.15400-16600)	25												
	Smithfield Road CH.13700-15400	Smithfield Road Expressway 13700-15400 Drainage works 14000-14600	24												
	Ngarara Road CH.13500-13700	Ngarara Road CH.13500-13700	23				SSPMP	Planting							
	Te Moana Road - Ngarara Road CH.12350-13500	Te Moana Road - Ngarara Road CH.12350-13500	22				SSPMP	Planting							
	Te Moana Interchange CH.11500-12350	Vector Gas Enabling Works B	20B												
		Interchange Construction	21				SSPMP	Planting							
CENTRAL	Waikanae River - Te Moana Road CH.10750-11500	Vector Gas Enabling Works A	20A												
		Expressway Construction CH. 10750-11500	19												
	Waikanae Bridge CH.10500-10750	Waikanae Bridge CH.10500-10750	18				SSPMP	Planting							
	Otaihanga Road - Waikanae River CH.9250-10500	Otaihanga - Waikanae River CH.9250-10500	17				SSPMP	Planting							
	*Otaihanga Roundabout**	*Otaihanga Roundabout*	*16*												
	Otaihanga Project Office/Yard	Otaihanga Project Office/Yard	15												
	Otaihanga Road Bridge CH.9150-9250	Otaihanga Bridge CH.9150-9250	14				SSPMP	Planting							
	Mazengarb Road - Otaitanga Road CH.8000-9150	Mazengarb Road - Otaihanga Road CH.8000-9150	13				SSPMP	Planting							
	Mazengarb Road Bridge CH.7900-8000	Mazengarb Road Bridge CH.7900-8001	12				SSPMP	Planting							
	Kapiti Road - Mazengarb Road CH.6500-7900	Kapiti - Mazengarb Road (to include specific mitigation for residential areas to the east & west)	11				SSPMP	Planting							
	Kapiti Road Interchange CH.6200-6500	Kapiti Road Interchange CH.6200-6500	10				SSPMP	Planting							
SOUTH	Wharemauku Stream - Kapiti Road CH.5500-6200	Wharemauku Stream - Kapiti Road CH.5500-6200 (to include specific mitigation for Milne Drive through to Quadrant Heights)	9				SSPMP	Planting							
	Wharemauku Stream Bridge CH.5350-5500	Wharemauku Stream Bridge CH.5350-5500	8	Wharemauku Stream Bridge						SSPMP	Planting				
	Raumati Road - Wharemauku Stream CH.4550-5350	Raumati Road - Wharemauku Stream CH.4550-5350 (to include specific mitigation for Conifer Court)	7	Raumati Road - Wharemauku Stream			SSPMP	Planting							
	Raumati Road Bridge CH. 4400-4550	Raumati Road Bridge CH. 4400-4550	6	Raumati Road Bridge											
	Poplar Avenue - Raumati Road CH. 3200-4400	Poplar Avenue - Raumati Road CH. 3200-4400 (including new Leinster Avenue & specific mitigation)	5	Poplar Avenue - Raumati Road											
	Poplar Avenue Interchange CH.1900-3200	Preload & Ground Improvements, CH. 1900-3200	4												
		Poplar Avenue Realignment	3		SSCESCP, SSTMP, SSLMP, SSEMP SSCNMP	Poplar Avenue Bridge									
		Poplar Avenue Bridge	2												
	*Raumati Straight**	*Raumati Straight*	1												

* no certification required due to separate consents

SITE SPECIFIC MANAGEMENT PLAN KEY

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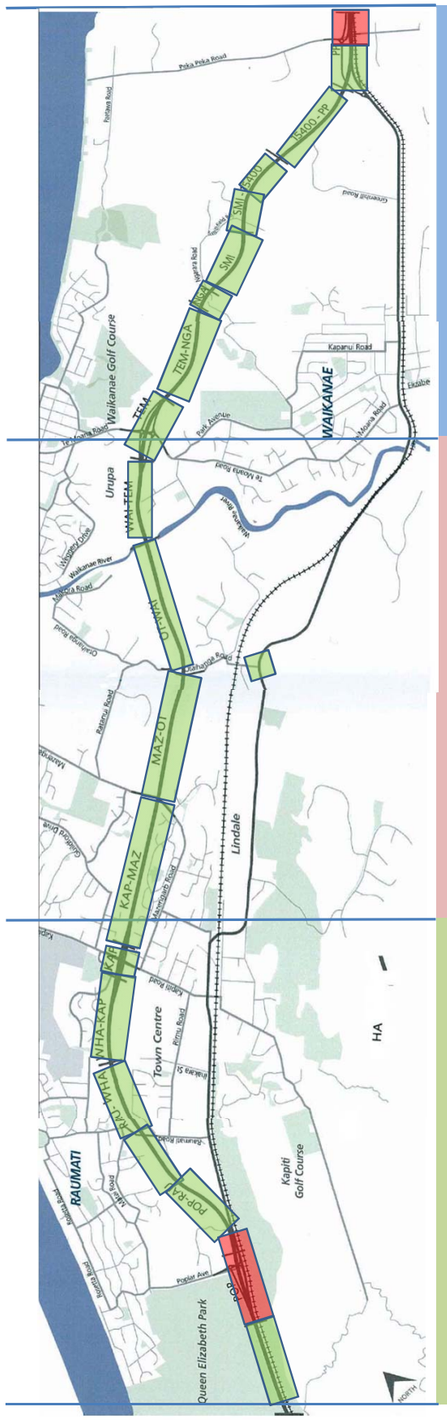
- Construction Vibration Management Plan (SSCVMP)
- Construction Noise Management Plan (SSCNMP)
- Landscape Management Plan (SSLMP)
- Urban Design Plan (SSUDP)
- Planting Management Plan (SSPMP)
- Hard Landscape Management Plan (SSHLMP)
- Ecological Management Plan (SSEMP)
- Cultural Heritage Management Plan (SSCHMP)

MacKays to Peka Peka
EXPRESSWAY ALLIANCE

STAGING PROGRAMME 2017



ZONE	SECTION	SUB-SECTION	Reference	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
NORTH	Peka Peka Interchange CH.16600-18050	CH. 17400-18050	29	17400-18050		SSPMP	Planting								
		Peka Peka Road	28	SSHLMP											
		Preload - CH.16600-17400	27												
		Expressway Construction 1660-17400	26												
	15400 to Peka Peka CH.15400-16600	15400 to Peka Peka (CH.15400-16600)	25												
	Smithfield Road CH.13700-15400	Smithfield Road Expressway 13700-15400 Drainage works 14000-14600	24	SSHLMP											
	Ngarara Road CH.13500-13700	Ngarara Road CH.13500-13700	23												
	Te Moana Road - Ngarara Road CH.12350-13500	Te Moana Road - Ngarara Road CH.12350-13500	22	SSHLMP											
	Te Moana Interchange CH.11500-12350	Vector Gas Enabling Works B	20B												
		Interchange Construction	21	SSHLMP											
CENTRAL	Waikanae River - Te Moana Road CH.10750-11500	Vector Gas Enabling Works A	20A												
		Expressway Construction CH. 10750-11500	19												
	Waikanae Bridge CH.10500-10750	Waikanae Bridge CH.10500-10750	18	SSHLMP											
	Otaihanga Road - Waikanae River CH.9250-10500	Otaihanga - Waikanae River CH.9250-10500	17												
	*Otaihanga Roundabout**	*Otaihanga Roundabout*	*16*												
	Otaihanga Project Office/Yard	Otaihanga Project Office/Yard	15												
	Otaihanga Road Bridge CH.9150-9250	Otaihanga Bridge CH.9150-9250	14	SSHLMP											
	Mazengarb Road - Otaitanga Road CH.8000-9150	Mazengarb Road - Otaihanga Road CH.8000-9150	13												
	Mazengarb Road Bridge CH.7900-8000	Mazengarb Road Bridge CH.7900-8001	12	SSHLMP											
	Kapiti Road - Mazengarb Road CH.6500-7900	Kapiti - Mazengarb Road (to include specific mitigation for residential areas to the east & west)	11	SSHLMP											
	Kapiti Road Interchange CH.6200-6500	Kapiti Road Interchange CH.6200-6500	10	SSHLMP											
SOUTH	Wharemauku Stream - Kapiti Road CH.5500-6200	Wharemauku Stream - Kapiti Road CH.5500-6200 (to include specific mitigation for Milne Drive through to Quadrant Heights)	9												
	Wharemauku Stream Bridge CH.5350-5500	Wharemauku Stream Bridge CH.5350-5500	8	SSHLMP											
	Raumati Road - Wharemauku Stream CH.4550-5350	Raumati Road - Wharemauku Stream CH.4550-5350 (to include specific mitigation for Conifer Court)	7	SSHLMP											
	Raumati Road Bridge CH. 4400-4550	Raumati Road Bridge CH. 4400-4550	6	SSHLMP	SSPMP	Planting									
	Poplar Avenue - Raumati Road CH. 3200-4400	Poplar Avenue - Raumati Road CH. 3200-4400 (including new Leinster Avenue & specific mitigation)	5		SSPMP	Planting									
	Poplar Avenue Interchange CH.1900-3200	Preload & Ground Improvements, CH. 1900-3200	4												
		Poplar Avenue Realignment	3	SSHLMP											
		Poplar Avenue Bridge	2	Poplar Av Bridge		SSPMP	Planting								
	*Raumati Straight**	*Raumati Straight*	1												

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* no certification required due to separate consents

AREA	SSEMP	SSESCP	SSCNMP	SSCVMP	SSLMP	SSUDP	SSPMP	SSHLMP	SSTMP
Peka Peka Interchange	✓	✓	✓	✓	✓	✓	✓	✓	✓
15400 - Pekapeka		✓			✓				✓
Smithfield Road - 15400		✓			✓				✓
Smithfield Road	✓	✓			✓	✓			✓
Ngarara Road	✓	✓			✓	✓			✓
Te Moana - Ngarara		✓			✓				✓
Te Moana Road Interchange		✓	✓		✓	✓	✓	✓	✓
Puriri & Kauri including El Rancho				✓	✓		✓	✓	
Waikanae River - Te Moana	✓	✓			✓				✓
Waikanae River Bridge	✓	✓			✓	✓	✓	✓	✓
Otaitanga - Waikanae River		✓			✓				✓
Mazengarb - Otaitanga	✓	✓			✓	✓			✓
Western side of Kapiti & Mazengarb including Cheltenham & Lincoln Court					✓		✓	✓	
Eastern side of Kapiti & Mazengarb incl Greenwood, Elder, Cypress, Spackman, Makarini, Palmer, St James, Chilton				✓	✓	✓	✓	✓	
Mazengarb Road Bridge		✓	✓		✓	✓	✓		✓
Kapiti - Mazengarb		✓	✓		✓				✓
Kapiti Road Interchange		✓	✓		✓	✓	✓	✓	✓
Milne Drive through to Quadrant Heights				✓	✓		✓	✓	
Wharemauku - Kapiti	✓		✓		✓				✓
Wharemauku Stream	✓	✓			✓	✓	✓	✓	✓
Raumati - Wharemauku		✓	✓		✓				✓
Conifer Court		✓		✓	✓		✓	✓	
Raumati	✓	✓	✓		✓	✓			✓
Raumati - Poplar		✓	✓		✓				✓
Leinster Ave				✓	✓	✓	✓	✓	
Poplar Intersection		✓			✓	✓	✓	✓	✓
Raumati Straight		✓			✓				✓
CWB						✓	✓		
Waikanae Oxidation Ponds	✓								

Appendix D

Noise management schedules

Appendix D – Noise management schedules

– Construction likely to exceed the Project noise criteria

South Zone: Raumati – Kapiti Interchange

Activity	Noisiest equipment	Est. total duration[1]	Most affected buildings	Exceeds daytime criterion 70 dB L_{Aeq}	Exceeds night-time criterion 45 dB L_{Aeq}	Potential mitigation option	Potential exceedance with mitigation	
							Day	Night
Poplar Ave realignment – earthworks and sealing	Graders Excavators Trucks	~4 months	1, 3, 5A and 5B, 7 Leinster Avenue	Yes	n/a	■ Temporary construction noise barriers ■ Choice of low noise equipment ■ Operation at north end of site during least sensitive times ■ Good communication and case-by-case mitigation	No	n/a
Earthworks on Poplar Ave to Raumati Road	Graders Excavators Trucks	~ 9 months	101, 103, 105, 106B, 107, 108, 109, 112, 115 Leinster Avenue 4, 6, 8, 9, 10, 11, 12 Conifer Court 72, 75, 76, 77, 78, 79, 86, 88, 90, 110, 116, 118 Raumati Road 218 A, 218B, 236 Matai Road 22,23,25 (both), 27 Fincham Road 200, 256, 260 SH1 42, 44 Gavin Road	Yes	n/a	■ Installation of traffic noise barriers shall be programmed for construction early in the construction period, if practicable. ■ Temporary construction noise barriers ■ Operation in proximity to dwellings during least sensitive times ■ Good communication and	Yes	n/a

[1] It is important to note that the duration of construction activity affecting specific dwellings will be much shorter than the total estimated time period for the activity

Activity	Noisiest equipment	Est. total duration[1]	Most affected buildings	Exceeds daytime criterion 70 dB L_{Aeq}	Exceeds night-time criterion 45 dB L_{Aeq}	Potential mitigation option	Potential exceedance with mitigation	
							Day	Night
						case-by-case mitigation		
Raumati Bridge Construction	Vibro-compaction Vibro hammer Bridge beam placement (concrete breakers, trucks)	~10 months Beam placement 4 nights	**Day** 218B Matai Road 82, 86, 88, 90, 116 Raumati Road 4, 6, 8, 10, 12, 14 Rata Road **Night** Dwellings north of Fincham and east of Matai Road Dwellings west of Rimu Road and east of Rata Road (south of Moss Lane properties) Dwellings immediately west of Conifer Court (north of 10 Conifer Court) NOTE: within this zone some dwellings may receive levels below 45 dB $L_{Aeq\ (T)}$ depending on screening provided by topography	Yes	Yes	■ Piling to occur at least sensitive times ■ Resident relocation during night works ■ Temporary noise barriers ■ Good communication and case-by-case mitigation ■ Schedule noisy activities for the daytime period	Yes (Vibro hammer / vibro piling only)	Yes
Earthworks between Raumati Rd and Wharemakau Stream	Graders Excavators Trucks Scrapers	~7 months	72, 75, 76, 77, 78, 79, 82, 86 Raumati Road 236 Matai Road 46, 48, 65 Rata Road	Yes	n/a	■ Installation of traffic noise barriers shall be programmed for construction early in the construction period, if practicable. ■ Temporary construction noise barriers ■ Operation in proximity to dwellings during least sensitive times ■ Good communication and case-by-case mitigation	Yes	n/a
Earthworks	Graders	~6 months	25, 27, 29, 31, 33, 37, 39, 41, 43, 45, 47,	Yes	n/a	■ As above	Yes	n/a

Activity	Noisiest equipment	Est. total duration[1]	Most affected buildings	Exceeds daytime criterion 70 dB L_{Aeq}	Exceeds night-time criterion 45 dB L_{Aeq}	Potential mitigation option	Potential exceedance with mitigation	
							Day	Night
between Wharemakau Stream and Kāpiti Road	Excavators Trucks Scrapers		49, 57 Quadrant Heights 11, 15, 17 Datum Way 7, 11, 15, 16, 20, 21, 23, 24, 28, 27 Observation Way 23, 27, 31, 44, 48, 51, 52, 55, 56, 59 Milne Drive					
Earthworks and sealing Kāpiti Road Widening	Graders Excavators Trucks	~6 months	**Day** 9 , 11, 19A to 19E, 23, 27, 31 Milne Drive (commercial) 3, 4, 5, 11 Kodex Place (commercial) 74, 80, 82, 84, 86, 88, 90, 92, 94, 102, 112, 118, 122 Kāpiti Road **Night** Depending on the activities occurring at night, noise emissions will vary. However, a conservative assessment suggests that all dwellings within 250 metres of the widening operations will potentially be exposed to levels above 45 dB $L_{Aeq\ (T)}$. This includes: ■ all dwellings north of Arawhata Rd, West of Elder Grove accessway ■ 2, 6,10,14 Bearing West Court ■ 44, 48 Milne Drive ■ 74 Kāpiti Road Noise levels at commercial buildings are unlikely to exceed 80 dB $L_{Aeq\ (T)}$	Yes	Yes	■ Conduct noisy activities during daytime periods where practicable ■ Temporary construction noise barriers ■ Resident relocation during night works ■ Good communication and case-by-case mitigation	Yes	Yes

Central Zone: Kapiti Interchange – Te Moana Road

Activity	Noisiest equipment	Est. total duration[2]	Closest dwelling(s)	Exceeds daytime criterion 70 dB L_{Aeq}	Exceeds night-time criterion 45 dB L_{Aeq}	Potential mitigation option	Potential exceedance with mitigation	
							Day	Night
Kāpiti Road bridge Construction	Vibro-compaction Vibro hammer	~10 months Beam placement over 12 nights	**Day** 90, 92/94, 96, 98, 102, 104 Kāpiti Road 4, 5,11 Kodex Place 19 A – 19E, 23, 27, 31 Milne Drive **Night** All dwellings within 250 metres of the beam placement. This includes: ■ all dwellings in the area between Kāpiti Road, Greenwood Place and Arawhata Road ■ All dwellings between 1 to 16 Makarini Drive ■ 4 , 6, 8, 10, 15, 17, 19, 21, 23, 25 Arawhata Road ■ 2, 6,10,14 Bearing West Court ■ All dwellings on Greenwood Place ■ 44, 48 Milne Drive ■ 74, 76 Kāpiti Road Noise levels at commercial buildings are unlikely to exceed 80 dB $L_{Aeq\ (T)}$	Yes	Yes	■ Piling to occur at least sensitive times ■ Resident relocation during night works ■ Temporary noise barriers ■ Good communication and case-by-case mitigation ■ Schedule noisy activities for the daytime period	Yes (Vibro hammer and vibro-compaction only)	Yes

[2] It is important to note that the duration of construction activity affecting specific dwellings will generally be much shorter than the total estimated time period for the activity

Activity	Noisiest equipment	Est. total duration[2]	Closest dwelling(s)	Exceeds daytime criterion 70 dB L_{Aeq}	Exceeds night-time criterion 45 dB L_{Aeq}	Potential mitigation option	Potential exceedance with mitigation	
							Day	Night
Earthworks between KāpitiRoad and Mazengarb Road	Graders Excavators Trucks Scrapers	~3 months	12, 13, 14, 16, 15A , 15B, 16 , 17 Greenwood Place 3, 4, 5, 6, 7, 8 , 9 Elder Grove 14, 15A, 15B, 16, 17A, 17 B, 18, 20A, 20B, 22, 24, 26, 28A, 28B Cypress Grove 11, 15, 17, 19 ,21, 23, 25, 27, 29, 31, 33, 35, 37A, 37B, 39 Spackman Crescent 59A, 59B, 61, 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93, 95, 97B, 99A, 99B, 103, 105, 107 Makarini Street 2, 4, 6, 7, 10, 12, 14, 15, 16, 17, 18 Palmer Court 3, 5, 7, 9, 11, 15, 20A, 20B, 22, 24 St James Court 12, 14, 16, 18, 20, 22, 35, 37, 39, 41, 45 Chilton Drive 353 Mazengarb Road 1, 2, 3, 4 Lincoln Court 19, 20, 21, 22, 23, 25, 26, 28, 30, 32, 34, 42, 44, 46, 48 Cheltenham Drive 14 Arundel Drive 28 Malvern Way 2, 4, 6, 8, 10 Oxford Court	Yes	n/a	■ Installation of traffic noise barriers shall be programmed for construction early in the construction period, if practicable. ■ Temporary construction noise barriers ■ Operation in proximity to dwellings during least sensitive times ■ Good communication and case-by-case mitigation	Yes	n/a

Activity	Noisiest equipment	Est. total duration[2]	Closest dwelling(s)	Exceeds daytime criterion 70 dB L_{Aeq}	Exceeds night-time criterion 45 dB L_{Aeq}	Potential mitigation option	Potential exceedance with mitigation	
							Day	Night
Vertical realignment of Kāpiti Road	Piling Graders Trucks Excavators	~4 months	**Day** 323, 345, 353, 372, 374, 376, 378, 380 Mazengarb Road 2 Soldiers Way 20, 22 Chilton Drive **Night** All dwellings within 350 metres of works on Mazengarb Road. This generally includes: ■ Dwellings on St James Court, Chilton Drive, Fytfield Place, Oxford Court, Crown Mews, Crown Hill, Sovereign Way, Soldiers Way, Service Lane, Harvest court ■ Realm Drive between Sovereign Way and Mazengarb Road Mazengarb Road between Pukeko Street and Mazengarb Pharmacy	Yes	Yes	■ Conduct piling operations during daytime ■ Limit night-time operations where practicable ■ Choose quiet piling methods where practicable (i.e avoid Vibro hammer piling) ■ Temporary construction noise barriers	No	No
Piling and beam launching for Mazengarb Road	Vibroreplacement Piling Concrete breakers Large plant	~4 months	**Day** 20, 22, 18 Chilton Drive **Night** All dwellings within 250 metres of works on the bridge. This generally includes: ■ Mazengarb Road between Realm Drive and Makarini Street Dwellings on St James Court, Chilton Drive, Fytfield Place	Yes	Yes	■ Piling to occur at least sensitive times ■ Resident relocation during night works ■ Temporary noise barriers ■ Good communication and case-by-case mitigation ■ Schedule noisy activities for the daytime period	Yes (Vibro hammer /vibro-compaction only)	Yes

Activity	Noisiest equipment	Est. total duration[2]	Closest dwelling(s)	Exceeds daytime criterion 70 dB L_{Aeq}	Exceeds night-time criterion 45 dB L_{Aeq}	Potential mitigation option	Potential exceedance with mitigation	
							Day	Night
Earthworks on Mazengarb road	Graders Excavators Trucks Scrapers	~4 months	333, 339, 345 Mazengarb Road 60A, 60 Ratanui Road Paraparumu Waste Water Treatment Plant	Yes	n/a	■ Installation of traffic noise barriers shall be programmed for construction early in the construction period, if practicable. ■ Temporary construction noise barriers ■ Operation in proximity to dwellings during least sensitive times ■ Good communication and case-by-case mitigation	Yes	n/a
Excavation of stormwater wetland ponds	Excavators Off road trucks	~1 months	61 Killalea Road 2, 4, 6, 8,10 Oxford Court 44, 46, 48, 52 Cheltenham Drive	Yes	n/a	■ Good communication and case-by-case mitigation	No	n/a
Construction Yards	Equipment Mobilisation	~10 months ~24 months ~10 months	**Raumati Road (night)** 90, 116, 118 Raumati Road 4, 6 Rata Road **Ihakara Road (night)** None **Kāpiti Road (night)** 90, 92, 94 Kāpiti Road **Mazengarb Road (night)** 319, 323, 331, 345 Mazengarb Road	No	Yes	■ Noise control to generators ■ Avoid mobilising equipment en-masse during sensitive periods ■ Solid site hoarding	No	No
Bridge beam placement on Otaihanga Road	Cranes Hand tools	~2 months Beam placement over 4 nights	150 and 155 Otaihanga Road	No	Yes	■ Limit night-time construction where practicable ■ Good communication and case-by-case mitigation	No	Yes

Activity	Noisiest equipment	Est. total duration[2]	Closest dwelling(s)	Exceeds daytime criterion 70 dB L_{Aeq}	Exceeds night-time criterion 45 dB L_{Aeq}	Potential mitigation option	Potential exceedance with mitigation	
							Day	Night
Earthworks for new road link to Otaihanga Road	Excavators Trucks Graders	~4 months	Dwelling to south of 126 Otaihanga Road (no data available for allotment)	Yes	n/a	▪ Good communication and case-by-case mitigation	No	n/a
Earthworks between Otaihanga Road and Waikanae River	Excavators Trucks Graders Scrapers	~3 months	165 Otaihanga Road	Yes	n/a	▪ Good communication and case-by-case mitigation	No	n/a
Bridge construction for Waikanae River Bridge	Vibro-compaction Vibro Hammer	~12 months	East of El Rancho Christian Holiday Park	Yes	n/a	▪ Good communication and case-by-case mitigation	No	n/a
Earthworks between Waikanae River and Te Moana Road	Excavators Trucks Graders Scrapers	~6 months	65 Puriri Street	Yes	n/a	▪ Good communication and case-by-case mitigation ▪ Scheduling of work during off-peak season to avoid effects on El Rancho	No	n/a
Road sealing Te Moana Road Intersection	Excavators Trucks Graders	~4 months	Te Moana Road south of intersections	Yes	n/a	▪ Temporary noise barriers ▪ Good communication and case-by-case mitigation	No	n/a

North Zone: Te Moana Interchange – Peka Peka Interchange

Activity	Noisiest equipment	Est. total duration[3]	Most affected buildings	Exceeds daytime criterion 70 dB L_{Aeq}	Exceeds night-time criterion 45 dB L_{Aeq}	Potential mitigation option	Potential exceedance with mitigation	
							Day	Night
Bridge Construction at Te Moana Road	Vibro-compaction Vibro hammer Bridge beam placement	~8 months Beam placement over 12 nights	145 Te Moana Road	Yes	Yes	■ Piling to occur at least sensitive times ■ Resident relocation during night works ■ Temporary noise barriers ■ Good communication and case-by-case mitigation ■ Schedule noisy activities for the daytime period	Yes (Vibro hammer / vibro-compaction only)	Yes
Construction yard (Otaihanga Rd)	Concrete casting Truck deliveries Site mobilisation	Entire project duration 4 years	150 Otaihanga Road	No	Potentially	■ Locate plant and access roads away from nearby receivers ■ Operate during the daytime where practicable	No	No
Construction yard (Te Moana Road)	Concrete casting Truck deliveries Site mobilisation	~ 24 months	145 Te Moana Road	No	Yes	■ Noise control to generators ■ Avoid mobilising equipment en-masse during sensitive periods ■ Solid site hoarding	No	No

[3] It is important to note that the duration of construction activity affecting specific dwellings will generally be much shorter than the total estimated time period for the activity

Activity	Noisiest equipment	Est. total duration[3]	Most affected buildings	Exceeds daytime criterion 70 dB L_{Aeq}	Exceeds night-time criterion 45 dB L_{Aeq}	Potential mitigation option	Potential exceedance with mitigation	
							Day	Night
Earthworks for Smithfield Road Realignment	Excavators Trucks Graders	~ 6 months	283 Ngarara Road	Yes	n/a	▪ Good communication and case-by-case mitigation	No	n/a
Earthworks between Ngarara Road and Peka Peka	Excavators Trucks Graders Scrapers	~ 6 months	269 Ngarara Road	Yes	n/a	▪ Good communication and case-by-case mitigation	No	n/a
Earthworks and sealing for Peka Peka Interchange	Excavators Trucks Graders	~6 months	32 Peka Peka Road	Yes	Yes	▪ Resident relocation during night works ▪ Temporary noise barriers ▪ Good communication and case-by-case mitigation ▪ Schedule noisy activities for the daytime period where practicable	No	Yes

Appendix E

Vibration management schedules

Appendix E – Vibration management schedules

Schedules shall be amended as required, e.g. if additional buildings are found to require management or if different equipment is proposed to be used.

South Zone: Raumati – Kapiti Interchange

Source	Risk contour (m)	Risk level	At risk receivers
Piling: Vibro-hammer or cast-in-place methods only	19m	Med	90 Raumati Road
Vibratory rollers	16m	High	106, 107, 108, 112 Leinster Avenue 240 Main Road (front house) 10, 12 Conifer Court 110 Raumati Road
		Med	105 [+garage] Leinster Avenue 2 eastern-most dwellings of 260 Main Road subdivision (Shalom village) 218B Matai Road 90 Raumati Road
Excavators (digging and tracking) Wheeled loaders Motor scrapers Off-road trucks	8m	High	106, 107, 112 Leinster Avenue 240 Main Road (front house) 12 Conifer Court
		Med	105 [garage] 108 Leinster Avenue 10 Conifer Court 218B Matai Road 90, 110 Raumati Road
Vibratory rollers	16m	High	29, 39, 41 Quadrant Heights 21, 23, 24, 26 Observation Place 51, 55, 59 Milne Drive 84, 86, 88, 90, 92, 94 Kāpiti Road
Vibratory rollers	16m	Med	45, 47 Quadrant Heights 17 Datum Way 15, 27 Observation Place
Excavators (digging and tracking) Wheeled loaders Motor scrapers Off-road trucks	8m	High	29 Quadrant Heights 21, 23, 24, 26 Observation Place 51, 55, 59 Milne Drive 84, 86, 88, 90, 92, 94 Kāpiti Road

Source	Risk contour (m)	Risk level	At risk receivers
Excavators (digging and tracking) Wheeled loaders Motor scrapers Off-road trucks	8m	Med	39, 41 Quadrant Heights

Central Zone: Kapiti Interchange – Te Moana Road

Source	Risk contour (m)	Risk level	At risk receivers
Vibratory rollers	16m	High	13, 15, 15A, 17, 18 Greenwood Place 7, 8, 8A, 9, 9A Elder Grove 14B, 16B, 22, 24, 28B Cypress Grove 15, 33, 35, 37B Spackman Crescent 63A, 63B, 65–93 (odd numbers only), 97B, 99B, 105, 107 Makarini Street 6B, 8, 8B, 10, 14, 16, 18A, 18B, 24 Palmer Court 4, 6, 8, 10, 12 Oxford Court 9 [+pool], 11, 15, 24 St James Court 20, 22, 37B, 41 [pool], 45 Chilton Drive 345, 353 Mazengarb Road
		Med	5 Elder Grove garage 18 [garage], 20B [+garage], 26, 28A Cypress Grove 17, 21, 25 [+garage], 27 [+garage], 29, 31, 37A Spackman Crescent 95, 97A Makarini Street 2/24, 3/24, 26–34 & 42–50 (even numbers only) Cheltenham Drive 12 Palmer Court 37A Chilton Drive
Excavators (digging and tracking) Wheeled loaders Motor scrapers Off-road trucks	8m	High	13, 15, 15A, 17, 18 Greenwood Place 7, 8A, 9, 9A Elder Grove 14B, 16B, 28B Cypress Grove 35, 37B Spackman Crescent 63A, 63B, 77, 97B, 99B, 105, 107 Makarini Street 6B, 8B, 18A, 18B Palmer Court 4, 6, 8, 10, 12 Oxford Court 9 [+pool], 11, 15 St James Court 20, 22 Chilton Drive 60A Ratanui Road

Source	Risk contour (m)	Risk level	At risk receivers
		Med	8 Elder Grove 18 [garage], 20B [garage], 22, 24 Cypress Grove 15, 25 [garage], 27 [garage], 33 Spackman Crescent 65–75 & 79–93 (odd numbers only), 97B, 99B, 105, 107 Makarini Street 8, 10, 14, 16 Palmer Court 24 St James Court 37B, 41 [pool], 45 Chilton Drive
Vibratory rollers	16m	High	18 [+pool], 20, 23 Kauri Road
		Med	25A Kauri Road (El Rancho building)
Excavators (digging and tracking) Wheeled loaders Motor scrapers Off-road trucks	8m	High	18 [pool], 23 Kauri Road 145, 190B Te Moana Road
		Med	49, 61 Killalea Place 18 Kauri Road 31, 53 Puriri Road 145A, 164 (two houses) Te Moana Road

North Zone: Te Moana Interchange – Peka Peka Interchange

Source	Risk contour (m)	Risk level	At risk receivers
Vibratory rollers	16m	High	31 Peka Peka Road
		Med	20 Peka Peka Road
Excavators (digging and tracking) Wheeled loaders Motor scrapers Off-road trucks	8m	High	20, 31 Peka Peka Road
		Med	27 Te Kowhai Road

Appendix F

Construction noise and vibration monitoring record

NZ TRANSPORT AGENCY WAKA KOTAHI

MacKays to Peka Peka Expressway

CONSTRUCTION NOISE MONITORING SHEET

LOCATION:	Date:	Time:
	Other Site:	

SITE INFORMATION

Description of Works on Site / Machinery / Location:

Background Sound Description and Level:

Sound meter type:

Weather

Wind Speed	Wind Direction	Cloud Cover (%)	Other Observations

Measurements

Location	Distance from Activity	Time	L_{A10}	L_{A95}	L_{Amax}	L_{Aeq}	L_{Amin}	L_{A50}

Comments

Sampled By:_____ Signature _____

Appendix G

SSCNMP and SSCVMP templates

Site Specific Construction Noise Management Plan (SSCNMP)

NZ TRANSPORT AGENCY WAKA KOTAHI

1 MacKays to Peka Peka Expressway

SSCNMP No.		Revision No.	
Location			
Activity			
Start and End Date of Works			
Duration			
Proposed work hours			
Distance to closest receiver	*eg approximately 75metres – 55 Brown Street*		

Equipment to be used (tick accordingly)

- ❍ Excavators
- ❍ Six Wheelers
- ❍ Moxie
- ❍ Motor scrapers
- ❍ Other trucks
- ❍ Utes
- ❍ Jackhammers
- ❍ Cranes (50T, 100T, 220T)
- ❍ Concrete Saws
- ❍ Drill Rig
- ❍ Piling Rig

- ❍ Boom Lift
- ❍ Vibro compaction
- ❍ Vibro Hammer
- ❍ Grader
- ❍ Asphalting equipment
- ❍ Pumps
- ❍ Small tools
- ❍ Generators
- ❍ Compressors
- ❍ Reversing Alarms
- ❍ Other equipment: _____

Noise modelling results (attached)

Modelling results will indicate whether additional mitigation is required. Specific mitigation is to be undertaken as per table below.

Identified dwellings where compliance cannot be met with conventional mitigation measures

Address	Specific Mitigation

Specific noise mitigation solutions for plant/equipment (detail accordingly in consultation with Environmental Manager)

Generators/Compressors	Shielding to be used where practical to minimise noise.
Vehicles	Do not slam doors Keep speed and revs down Avoid sounding horn
Workers	Participate in night works induction Use phone and radio to communicate – do not shout and swear
Residents	Mail drop to be delivered to surrounding residents

General noise mitigation solutions for plant/equipment

Tick appropriate controls <u>once</u> implemented

- ❍ Equipment is modern and in good repair
- ❍ Equipment is fully serviced
- ❍ Reversing beepers have been muffled where appropriate (consider H&S implications)
- ❍ Wheel tracks (excavators and other tracked wheels have been greased)

Communications

Tick appropriate controls once implemented

- Have affected persons been consulted with?
  Date of consultation: _____
  Outcome of consultation:
  _____
  Has the methodology/mitigation been altered due to consultation?
  _____
  How have affected person views been incorporate?
  _____
- Has the stakeholder team been informed at least one week prior?
- Have you informed the stakeholder team of:
  - the period of night works (as applicable)
  - location of works
  - construction activities involved
  - list of plant/equipment
- Has the stakeholder team implemented the mail drop?
- Attach copy of mail drop
- Date of mail drop
- Method of mail drop _____

Worker behaviour

- Will a day/night works induction be undertaken?

Noise monitoring

- Has noise monitoring been booked with the environmental team?

Complaints

- Have any complaints been received?
  Detail:

  _____

  _____

  _____

  _____

Review

- Review of noise monitoring, any complaints and activity progress after first day/night of works
- Implement improved procedures as required

Attachments:

Noise modelling results

Aerial photo showing distances and locations

Site Specific Construction Vibration Management Plan (SSCVMP)

NZ TRANSPORT AGENCY WAKA KOTAHI

1 MacKays to Peka Peka Expressway

SSCVMP No.		Revision No.	
Location			
Activity			
Start and End Date of Works			
Duration			
Proposed work hours			
Distance to closest receiver where Category B cannot be met	*eg approximately 75metres – 55 Brown Street*		

Category B Requirements

Receiver	Details	Category B
Occupied dwellings	Daytime 0630h – 2000h	5 mm/s PPV
	Night-time 2000h – 0630h	1 mm/s PPV
Other occupied buildings*	At all times	5 mm/s PPV
All other buildings	At all times	50% of Line 2 values in Table B.2 of BS 5228-2:2009

Equipment to be used (tick accordingly)

- ❍ Excavators
- ❍ Six Wheelers
- ❍ Moxie
- ❍ Motor scrapers
- ❍ Other trucks
- ❍ Jackhammers
- ❍ Drill Rig
- ❍ Piling Rig
- ❍ Vibro compaction
- ❍ Vibro Hammer
- ❍ Reversing Alarms
- ❍ Other equipment: _____

Predicted Vibration Results

Modelling results will indicate whether additional mitigation is required. Specific mitigation is to be undertaken as per table below.

Details of consultation undertaken with affected stakeholders

Address	Consultation Undertaken (include dates, type and timings)

Specific Mitigation Measures

Address	Specific Mitigation Measures Agreed Upon

Complaints

- Have any complaints been received?
  Detail:

  _____

  _____

  _____

Review

- Review of vibration monitoring, any complaints and activity progress after first day/night of works
- Implement improved procedures as required

Attachments:

Vibration modelling results

Aerial photo showing distances and locations

Appendix H

Independent reviewer comments

INDEPENDENT REVIEW OF Construction Noise & Vibration Management Plan (March 2013)
Independently Reviewed by: Jon Styles - Styles Group Acoustics & Vibration Consultants
Date of Independent Review: 19th April 2013

Signature of Independent Reviewer: 

Condition Reference	*Independent Reviewer's comment*	*Page/paragraph/section reference within Management*	*Management Plan Author's response*
DC.30 a)	The CNVMP is a comprehensive document that deals well with the requirements of the Designation Conditions, subject to the comments below. Interestingly, this condition requires the CNVMP to set out the methods, procedures and standards for mitigating the effects of vibration, but does not specifically require the CNVMP to set out the actual physical mitigation measures. In the absence of any specific Designation Condition requiring detailed mitigation measures, I consider that sections 11 and 12 of the CNVMP do a very good job of setting out the mitigation measures required of the constructor. This condition refers to the outcomes listed in DC.29(a). It is my view that the CNVMP will (subject to the comments below) enable the constructor to achieve the outcomes in DC.29(a). In my view, and subject to the comments below, the CNVMP meets the requirements of DC.30(a).	All	Agree
DC.30 b)	The first part of this condition has been satisfied by the provision of these comments. The second part of the condition can only be fulfilled once these comments are received by CNVMP author.	N/A	Agree
DC.30 c) I)	Section 6 of the CNVMP deals with this aspect, and refers to Appendices C and D to the CNVMP which provide a good description of the works, plant requirements and scheduled durations for the purpose of this condition. Although Appendix C is not provided with the CNVMP sent for review, staging programs are relatively standard and will provide a critical path / Gantt chart representation of the works program. Combined with the Noise Management Schedules in Appendix D, I consider that the requirements of this condition are met. The size of the project means that satisfying the condition on a micro-scale, (for example defining activities and durations relative to each dwelling) would be unwieldy and unreasonable. I consider that the level of detail provided in the current CNVMP is satisfactory for it's purpose.	ection 6 and Appendices C, D & I	Agree
DC.30 c) ii)	The hours of operational are defined in section 7 of the CNVMP, being generally during the day time, 6 days per week. This section also sets out an indicative list of activities that will require works to be undertaken at night. Night works are recognised as only being necessary where daytime traffic disruption is an issue, such as bridge works and tie-ins. This approach is very common for large projects and can certainly be supported in this case. The condition appears to anticipate detail on a reasonably micro scale by requiring the "*...days when construction activities causing noise or vibration would occur"*. It is not clear whether this is asking for the days of the week, or the specific days throughout the entire project. Clearly the latter is far too onerous and in any case would be subject to constant change (likely) on a daily basis. I consider that specifying the days of the week when works generating noise or vibration might occur including what activities / phases will require night works is sufficient to satisfy this condition.	Section 7	Agree
DC.30 c) iii)	Sections 8 and 9 of the CNVMP set out the relevant noise and vibration limits for the project in good detail and with good explanation. Table 8.1 sets out a set of vibration limits that are somewhat inconsistent with those contained in the conditions available at the time of this review. The *All other buildings* category in the CNVMP does not reference continuous vibration but retains the same numerical limits as DC.32. Although the condition is not repeated verbatim, (as would normally be expected) I do not take issue with this amendment, so the dropped reference to continuous vibration is redundant and can therefore be left out. The CNVMP condition introduces a new night time criterion for *Other occupied buildings* where Condition DC.32 is silent, (it only has a day time limit). The introduction of a night time vibration limit of 5mm/s for *Other occupied buildings* (compared to the day time limit of 2mm/s) is in my view nonsensical, as during night time the building would automatically be classified as *All other buildings* . Furthermore, the limits that have been introduced are the same for both Category A and Category B, which adds some confusion. Notwithstanding these comments, I acknowledge that there is some 'gap' in the conditions where there is no vibration limit for buildings that are occupied at night but are not considered dwellings. Examples could be night time retail, community centres with night time meetings, churches etc. It is my view that the best way for the CNVMP to deal with the gap is to reproduce the condition but change the time limitations in the detail column of the original DC.32 condition to read *At all times* . I do not consider that a night time workplace would be any less sensitive to vibration than the same workplace operating during the day time, and it is primarily for this reason that I suggest the alteration to the time limits. Otherwise, I consider the condition to be satisfied.	Sections 8 & 9	Agree, amended table 8-1 as suggested

DC.30 c) iv)	Appendices D and E set out the properties that may be affected by noise and vibration that may approach or exceed the relevant criteria. In my view the level of detail is good and certainly sufficient to satisfy the condition. The plans referred to in Appendix D of the CEMP have not been provided, but having seen similiar versions before, I consider that the provision of the information in graphical form will better facilitate the implementation of the CNVMP. For the purpose of this review however, I consider that this condition has been satisfied.	Appendices D & E	Agree
DC.30 c) v)	The monitoring requirements for noise and vibration are set out in section 10 of the CNVMP. I consider that overall, the requirements are set out well and the instrumentation and measurement methods are well defined. Notwithstanding, I have two comments to make. Firstly, I recommend that the vibration monitoring requirements for dwellings be prefaced with a preliminary requirement that it be undertaken without any occupants present if that is practicable, whilst acknowledging that even temporary occupant displacement is an adverse effect. The suggested regime of two sensors, (to detect the influence of occupants' movements in the building) should be considered a secondary measure. I suggest this because the veracity of the measurements undertaken with occupants moving about inside will be low compared to those undertaken in their absence, and for the latter the time required to post-process the measurements and obtain results with a high level of certainty is reduced. Secondly, the triggers for monitoring are relatively brief / non-specific. Given that the schedules in Appendices D & E are quite specific in terms of possible exceedances and dwellings, it may be sensible to link a monitoring trigger in section 10 to the commencement of works noted in the schedules that may approach or exceed the relevant limits.	Section 10 and Appendices D & E	Agree, amended Section 10.1.2 by adding sentence about non-occupied buildings, added wording to 10.1.3 referencing the risk contour as a trigger for vibration measurements
DC.30 c) vi)	Section 11.1 sets out the notification requirements for night works and other works based on proximity to the works, (and therefore the potential for disturbance). Section 11.2 deals with relocating affected residents where all other practicable mitigation measures have been exhausted. Section 13 deals with the procedures for handling noise complaints. Overall I consider together these sections of the CNVMP provide a good framework for notification and consultation. Specific detail and procedures are difficult to define in these circumstances as it is likely that each potential receiver will have different expectations, tolerances and desired remedies. It is therefore very common for the constructor to manage each affected person on a case-by-case basis, where the person always has the ability to defer the issue to the Council should they be dissatisfied with the constructors resolutions / mitigation suggestions. Overeall I consider that the notification and consultation provisions in the CNVMP are sufficient for this project.	Section 11	Agree
DC.30 d)	Not relevant		
DC.30 e)	Not relevant		

Appendix I

KCDC reviewer comments

KCDC REVIEW OF {INSERT TITLE OF MANAGEMENT PLAN}
Reviewed by: Malcolm Hunt
Date of Review: 17/04/13
Signature of Reviewer:

Condition Reference	*Condition Summary*	*KCDC Reviewer's comment*	*Page/paragraph/section reference within Management Plan*	*Management Plan Author's response*
DC.29A (ii) iii)	Requires monitoring at locations where possible exceedance of the noise and/or vibration limits may occur.	Thus, measured non-compliance with applicable noise or vibration limits may also trigger the need for site-specific plans in some additional locations, other than those identified within Appendices D and E. Therefore the words “or measured” should be inserted after the word “predicted” in the first sentence of Section 11.7 as this would better reflect the duties of NZTA set out under conditions DC.33 and DC.34 and accords with the evidence submitted to the Board of Inquiry by Ms Wilkening1 and reflects the necessary actions if monitoring of construction activities demonstrates non-compliance.	Section 11.7	Agree. Have amended the first sentence accordingly, allowing for predicted "potential non-compliance" and measured "actual non-compliance".
		As a related comment, it is noticed that the procedures set out in Section 10.2 of the draft Plan refer to actions to be taken if a measurement shows non-compliance. This section of the Plan should be amended to reflect the requirement to develop and implement SSCNMP’s or SSCVMP’s where monitoring indicates non-compliance.	Section 10.2	Agree. Have amended Section 10.2 to include reference to Sections 14.1 and 14.2 (SSCNMP and SSCVMP).
DC.30(c)(v)	Sets out a requirement for the plan to include “monitoring requirements”.	1. I consider section 10 of the Plan should set out the monitoring methods to be adopted when monitoring is undertaken. I therefore recommend reference to the noise measurement methods set out within NZS6801:2008 (although NZS6803:1999 refers to NZS6801:1999, this version has been superseded with the 2008 version which contains the appropriate guidance in my view. 2. I consider the monitoring of Leq noise levels should specifically refer to a 15 minute measurement period.	Section 10	Agree. Have amended Section 10.1.1 by adding reference to NZS6801:2008 and guidance to 15 minute survey period (however, have retained reference to NZS6803 duration of 10 to 60 minutes, which is also contained in DC.31)
DC .14	Responsibilities on the contractor (refer to a - d)	The procedures set out in Section 13 of the Plan for handling noise & vibration complaints should reflect requirements of DC 14 which impose a range of responsibilities on the contractor / NZTA for recording of complaints. It is recommended these record keeping duties are reflected within the wording of Section 13 of the CNVMP.	Section 13	Agree. Have amended Section 13 by including the relevant part of the wording of DC.14 and including the 10 day response period as the longest possible period (with the requirement to respond as soon as practicable).
DC.12	Stakeholder and Communications Management	In addition, often affected parties don’t know who to complain to. Therefore Section 13 of the CNVMP should identify the “Stakeholder and Communications Management Plan” (SCMP) required by condition DC12 as an important method for disseminating details of the organisation (including their address, telephone number, email address, etc.) for persons to lodge a construction noise or vibration complaint with. The SCMP requires the Requiring Authority to publish a plan to outline how the public and stakeholders will be communicated with throughout the construction period including regarding complaints. I therefore recommend Section 13 be amended to refer to the SCMP’s as a means of advising contact details of the contractor or NZTA in the event that a resident or affected party wishes to make a complaint. A useful additional measure would be for the address / contact details for the receipt of complaints to be included in any contract signage installed for the construction period.	Section 13	Agree in part. We consider that the SCMP is better referenced in Section 11.1 "Notification and Consultation". Have included a new first paragraph regarding wider notification of the Project in reference to the SCMP. Our reason is that the SCMP is not only relevant in relation to complaints, but also to other ongoing communication with directly and indirectly affected parties. It should therefore not only be linked to a specific facet of the project.
Summary The review of the Draft CNVMP has found the Plan to be mostly acceptable save for the following amendments that are considered necessary in our view, prior to certification by Council; Site Specific Management Plans – amend section 11.7 and 10.2 Monitoring – Section 10 to explicitly refer to NZS6801:2008 and a 15 minute measurement period Complaint handling – Section 13, amend to reflect duties under DC.14 also identifying the SCMP as a means of disseminating information on who an affected party may lodge a complaint with. I recommend these items be addressed and a revised Plan submitted to Council for certification.				

Appendix J

Consultation record

CONSULTATION FOR: ***{INSERT TITLE OF MANAGEMENT PLAN}***

Name of Management Plan Author:

Signature of M2PP Management Plan Author:

Signature of M2PP Compliance Manager:

Condition Reference No:	*Party/parties consulted*	*Consultation undertaken by*	*Date and location of consultation*	*Views of party/parties consulted*	*Have views been incorporated into the management plan?*	*Where and how views have been incorporated into the management plan?*	*If views have not been incorporated into the management plan, outline the reason/s why not*	*Has the condition been complied with?*