Appendix EE

REPORT

Tonkin+Taylor

Construction Noise Management Plan

Runway resurfacing

Prepared for
Wellington International Airport Ltd
Prepared by
Tonkin & Taylor Ltd
Date
August 2020
Job Number
1014797

Exceptional thinking together
www.tonkintaylor.co.nz

Document Control

Title: Construction Noise Management Plan Acoustic Assessment					
Date	**Version**	**Description**	**Prepared by:**	**Reviewed by:**	**Authorised by:**
July 2020	1	Draft assessment for client review	Lindsay Leitch	Darran Humpheson	
August 2020	2	Draft incorporating client comments	Lindsay Leitch	Darran Humpheson	
August 2020	3	Final	Lindsay Leitch	Darran Humpheson	Penny Kneebone

Distribution:

Wellington International Airport Ltd	1 PDF copy
Tonkin & Taylor Ltd (FILE)	1 PDF copy

Table of contents

1 Introduction

This Construction Noise Management Plan (CNMP) has been prepared by Tonkin & Taylor Limited (T+T) for Wellington International Airport Ltd (WIAL). The CNMP will be used to manage noise from re-surfacing works along the main runway. It details the key contacts, noise limits, predicted levels of noise, identification of the nearest noise sensitive receivers, mitigation measures, and communication and complaints procedures.

The project is to resurface the runway between the thresholds of the runway (approximately 1800 m). Works are anticipated to commence in mid-September 2020 and be completed by the end of January 2021. Fulton Hogan has been engaged as the contractor for these works.

1.1 Project overview

Re-surfacing of the main runway at WIAL will take place over approximately four months between September 2020 and January 2021. Any works on the runway must take place during the airport's night-time curfew, when the runway is not in use by aircraft (00:00 to 06:00 for domestic operations and 01:00 to 06:00 for international arrivals). This night-time availability period has been brought forward by approximately 2 hours due to the lack of international flights as a result of Covid-19, as well as fewer domestic flights, and therefore a longer window is available for the works, i.e. approximately 22:00 to 06:00.

Equipment required for the re-surfacing works is inherently noisy, and activities such as milling, paving and grooving will be clearly audible for many residents in the local vicinity. Mitigation measures included in this CNMP will help to reduce noise levels, and good communication strategies will help to manage the expectations of the local community.

Due to the type of plant and distance to the nearest residential dwelling, vibration from the works are expected to be negligible when experienced off site. Vibration has therefore not been considered within this management plan.

There are substantial benefits to undertaking the work at the current time: by taking advantage of the limited number of late evening / night-time flights, a significantly longer working period can be utilised. This means the overall duration of the works is correspondingly shorter than would normally be the case, which allows a shorter construction duration.

Nevertheless, noise levels will need to be managed during each night-time shift to ensure that noise effects on neighbouring residents are as low as reasonably practicable. Best practicable options (BPO) are presented in this CNMP which will be implemented, as well as items which will be included in training / inductions of site personnel.

1.2 Contact details

Table 1.1: Contact details

Role	Name	Organisation	Phone	Email
WIAL complaint manager	Jo Lester	WIAL	027 307 6041	jo.lester@wellingtonairport.co.nz
WIAL project manager	Nick Petkov	WIAL	027 294 3513	nick.petkov@wellingtonairport.co.nz
Contractor: Project Manager	Ash Hough	Fulton Hogan Ltd	027 605 0351	ash.hough@fultonhogan.com
Acoustic consultant	Lindsay Leitch	T+T	021 266 7718	lleitch@tonkintaylor.co.nz
Council Compliance & Advice Manager	Matthew Borich	WCC	021 199 6256	matthew.borich@wcc.govt.nz

WIAL will be the central focus for communication for this project and will coordinate communications (including complaints) between the community, WCC and the contractor (Fulton Hogan). The contractor will manage the day-to-day effects of noise from construction activities, with input from the acoustic consultant, WIAL and the construction team on site.

2 Project description

The re-surfacing works will replace the central 40 m down the entire main runway at WIAL. This represents approximately 90% of the runway area. The area to be re-surfaced is shown in Figure 2.1.

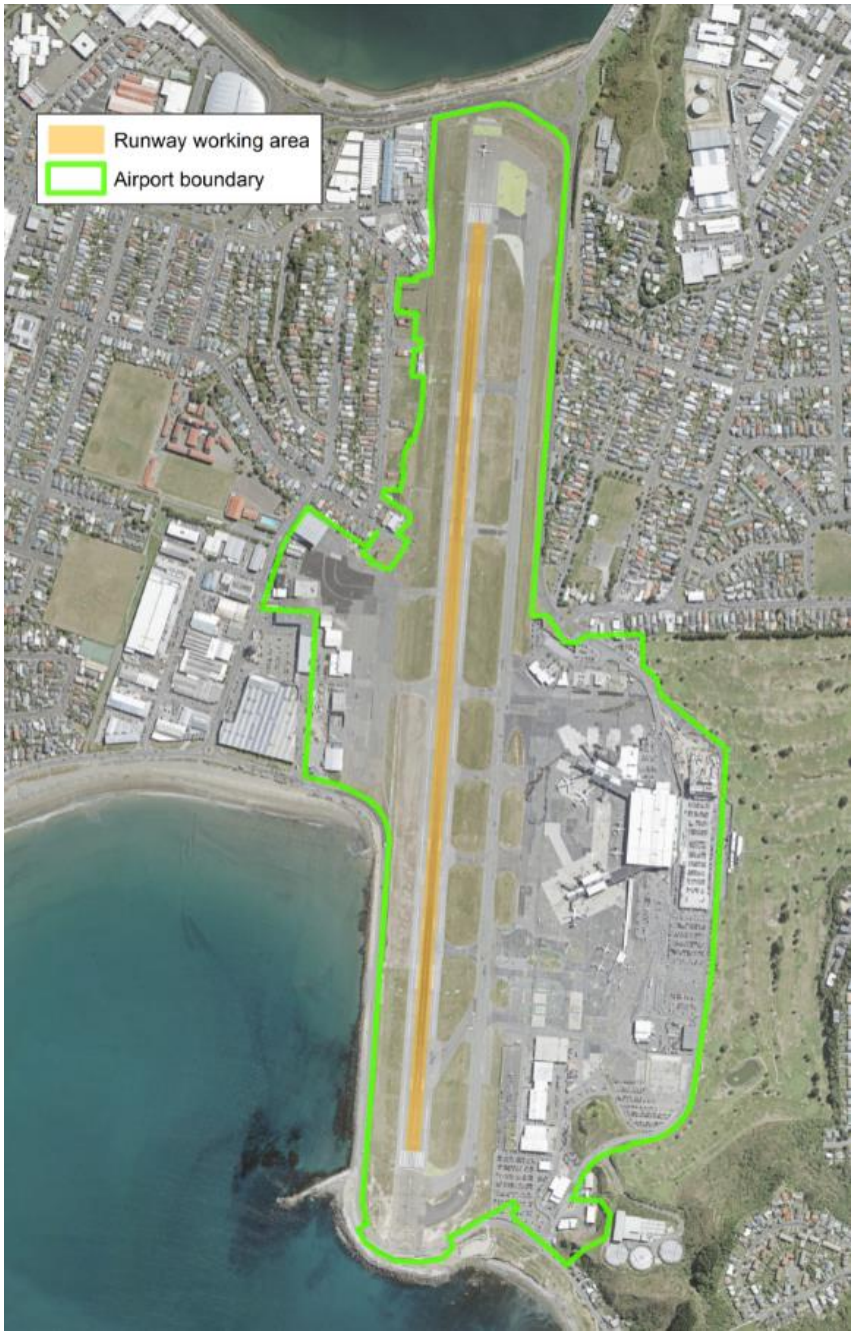


Figure 2.1: Extent of area to be re-surfaced (runway working area). Sourced from the LINZ Data Service and licensed for reuse under the CC BY 4.0 licence.

Two main activities will take place for the re-surfacing: milling and paving to replace the runway surface, and subsequent grooving to improve the surface run-off and traction. Grooving will take place once the new surface has been in place for around six weeks, so that it has stabilised and grooves will retain their shape.

Works are expected to start at the southern end of the runway and progress to the north. It is expected that approximately 50 m will be milled and paved over the course of one night shift. A shift will typically start with around half an hour of milling runs before the paving runs can start. These two activities will then run concurrently for most of the shift before the milling is complete and the final paving runs can be completed.

The nominal start time for works will be 10 pm, although works will start after the last domestic flight which will vary around this time. Works will be finalised by around 4.30 am, leaving time for tidying up, site handover and inspection, ensuring a safe return to aircraft operations.

After the surface has had a chance to settle for approximately six weeks, the central 39 m of the runway will be grooved. The grooving machine will run transversely across the runway in the same direction as the milling and paving (south to north). It is possible that grooving might occur at the same time as paving and milling, but there would be a significant distance between the two operations and noise levels are not expected to be cumulative.

The staging area for the project will be located at the southern end of the eastern apron. There will be no asphalt plant on site; asphalt will be brought onto site via around 80 truck movements per shift from Belmont, Lower Hutt. Truck movements within the site have been considered in this assessment, with an estimated maximum of 18 return truck movements within the site per hour (information / estimates supplied by Fulton Hogan). Millings (the material removed from the runway ahead of paving each night) will be stored at the staging area each night, and carted away during the day, in order to reduce transport-related noise from loading during the night.

In the event that re-surfacing cannot take place on a night shift but asphalt has already been produced (i.e. a late notice cancellation of works), areas have been identified near the terminal where the asphalt can be used to repair / replace old surface. This is not likely to happen on a regular basis (it did not need to happen at all during the last overlay) and will be covered by the airport's general Noise Management Plan if it does eventuate.

The whole re-surfacing is expected to take approximately four months from September 2020.

3 Criteria

3.1 Framework documents

3.1.1 WIAL NMP

WIAL has an airport-wide Noise Management Plan (NMP) to assist stakeholders in complying with the relevant objectives and rules in the District Plan (DP). It also contains guidance around consultation and complaint handling. The document is geared towards managing noise from normal activities at WIAL, with an outline guidance on managing noise from airside maintenance.

Risk for project noise is categorised in the WIAL NMP as follows:

- Low – predicted noise levels are not considered to be significant and are at least 3 dB lower than the relevant performance noise standard; and
- High – predicted noise levels without enhanced mitigation are likely to meet or exceed the performance noise standard and/or significant night-time works are planned.

The noise risk categorisation for this project is **high** due to extended night-time working and noise levels predicted to exceed the performance noise standard. This project-specific CNMP meets the requirements for a WIAL project with a high noise risk assessment.

3.1.2 Previous CNMPs

Previous CNMPs have been prepared and approved for previous re-surfacing / overlay works. These are as follows:

- Marshall Day Acoustics (MDA) report *Runway Overlay Construction Noise Assessment* ref 2008220A 001 R03 dated 6 August 2008;

- MDA CNMP for overlay works (Appendix D of the above report); and
- AECOM report *WIAL Taxiway Alpha Construction Noise Management Plan* ref 60521044 dated 8 September 2017.

These documents have been referenced in the preparation of this CNMP. In particular, noise levels used in the MDA assessment (as detailed in Appendix C of that report) have been used in the modelling to support this CNMP and the management and mitigation controls of the Taxiway Alpha works have been used to define BPO for this project.

3.2 Noise criteria

Rule 11.1.1.1.8 of the DP contains limits for any activity within the Airport area, other than aircraft operations, engine testing and the operation of APUs when measured at any residential site. The limits between 10 pm and 7 am are 45 dB $L_{Aeq(15min)}$ and 75 dB L_{AFmax}.

The definition of 'noise emission level' within the DP specifically excludes construction noise at the airport from being measured and assessed in accordance with New Zealand Standard NZS 6803:1999[1]. However, for reference, the limits from this standard are reproduced below.

The recommended construction noise limits of NZS 6803:1999 are detailed in Table 3.1. Time periods outside those proposed for this work are greyed out. These values are for works of typical duration, i.e. between 2 and 20 weeks duration. Noise is assessed over a typical 15 minute period which should be indicative of typical activity for the majority of the time.

Table 3.1: Construction noise limits for residential dwellings taken from NZS 6803

Time of week	Time period	Noise limit dB	
		L_{Aeq}	L_{Amax}
Weekdays	6:30 am – 7:30 am	60	75
	7:30 am – 6:00 pm	75	90
	6:00 pm – 8:00 pm	70	85
	8:00 pm – 6:30 am	45	75
Saturdays	6:30 am – 7:30 am	45	75
	7:30 am – 6:00 pm	75	90
	6:00 pm – 8:00 pm	45	75
	8:00 pm – 6:30 am	45	75

These limits apply to construction noise levels measured at 1 m from the façade of residential dwellings and are the same numerical limits at night-time as those contained in DP Rule 11.1.1.1.8.

Limits for commercial and industrial buildings are presented in Table 3.2.

Table 3.2: Construction noise limits for commercial and industrial buildings taken from NZS 6803

Time period	Typical duration of work dB L_{Aeq}
7:30 am – 6:00 pm	75
6:00 pm – 7:30 am	80

[1] New Zealand Standard 6803:1999 Acoustics - Construction Noise.

These construction limits have been used on recent runway projects, in particular the rehabilitation of Taxiway Alpha.

4 Noise sensitive receivers

There are a significant number of residential receivers in relatively close proximity to the airport runway. Along the northern half of the runway, there are residential properties approximately 160 m from the centre line of the runway to the east and west.

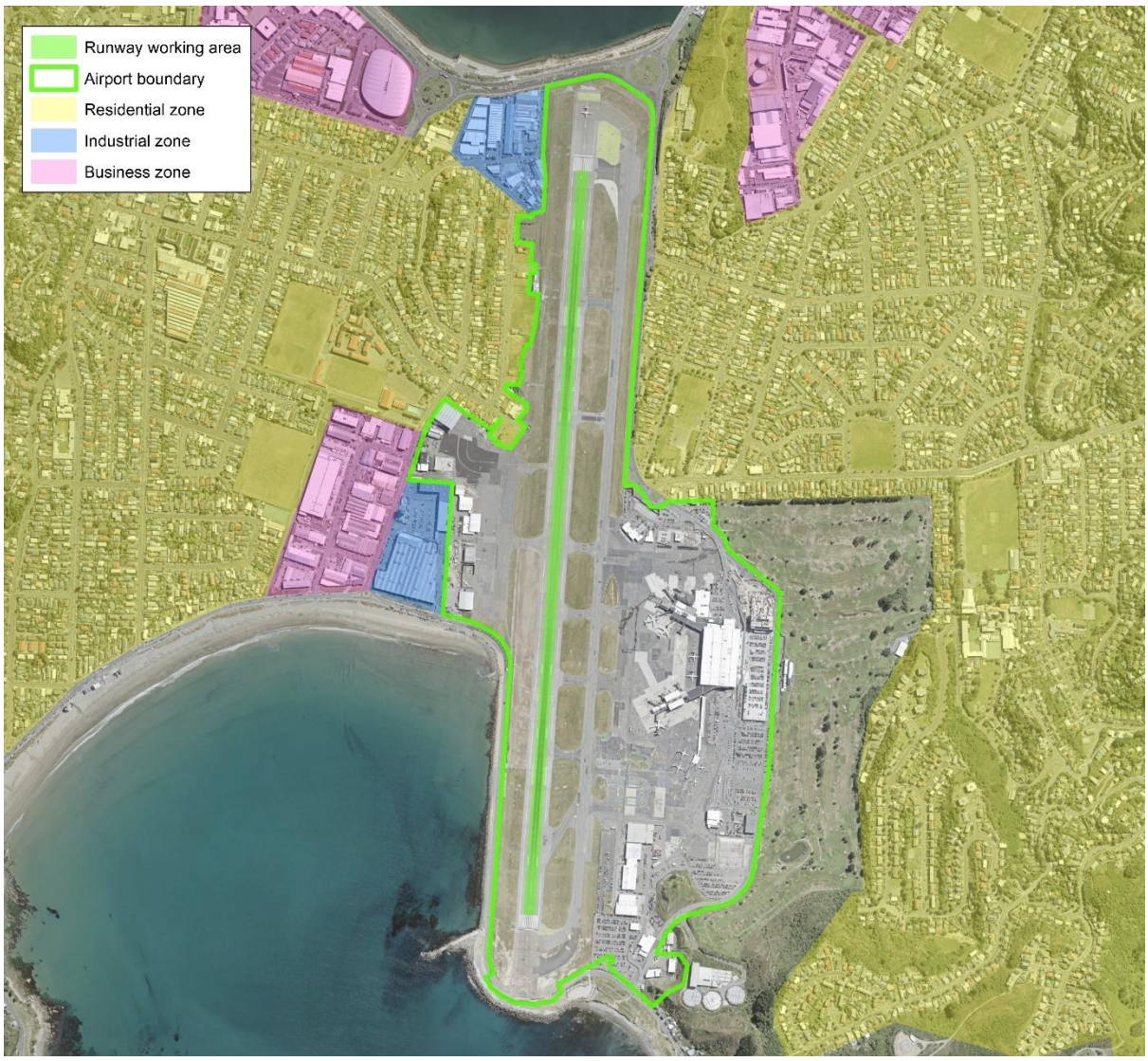


Figure 4.1: Location of noise sensitive receivers.

5 Noise levels

5.1 Tasks and equipment

A list of equipment to be used for the re-surfacing works is shown in Appendix A, together with the assumed sound power levels.

The tasks performed during a typical night shift for milling and paving are as follows.

Table 5.1: Tasks and equipment during a typical night shift

Task	Equipment	Number	Duration
Task 1: Milling	Rotomill Mustang skid steer Saw cutter Kango hammer and compressors Light stands Trucks removing millings from mill to southern apron Loader at stockpile site Utes Service trucks Transporter trucks	1 1 2 2 8 4 1 4 2 2	0.75 hours 10.15 - 11 pm
Task 2: Milling & paving	Rotomill Emulsion sprayer Paver Trucks removing millings from mill to southern apron Trucks carting asphalt from Belmont to paver Roller Kango hammer and compressors Suction sweeper Mustang skid steer Light stands Loader at stockpile site	1 1 1 4 16 4 1 2 1 8 1	4.75 hours 11 pm - 3.45 am
Task 3: Paving & rolling	Paver Trucks feeding paver Roller Suction sweeper Mustang skid steer Light stands Loader at stockpile site Transporter trucks	1 16 4 2 1 8 1 2	1.75 hours 3.45 - 5.30am

Task 2 has been modelled as the worst-case scenario for milling and paving. Eighteen return truck movements are anticipated in the worst-case hour of activity. Saw cutting and use of the Kango hammer have not been included as these will not be used continuously. Up to an hour of saw cutting is anticipated earlier in the evening (typically before 11 pm), with intermittent use later in the shift (around five minutes of use as required). Of the remaining equipment, we have made reasonably pessimistic assumptions around on-time, but have assumed that most of the equipment will be operational at the same time.

Grooving will take place separately using two grooving machines. No other equipment is required during grooving apart from a sweeper as part of the clear-up at the end of each shift. Over the course of a typical night shift, grooving would be expected to take place between approximately 10.15 pm and 5 am.

5.2 Maximum levels

There is an L_{Amax} limit of 75 dB at noise sensitive receivers. Noise from the equipment above will be continuous in nature rather than impulsive, and L_{Amax} levels are not expected to be significantly higher than the L_{Aeq} values. Isolated events such as loading trucks should be managed as per Section 6.3.

5.3 Tonality and special audible characteristics

Much of the Fulton Hogan equipment to be used for the re-surfacing is relatively new, and tonality issues are not anticipated. Tonality from machinery typically stems from older equipment that is no longer running in alignment.

Tonal reversing alarms can be clearly distinguishable and are often a cause for complaint. Broadband reversing alarms will be fitted to all plant under the contractor's control that will be operational on site (see Section 6.3).

The bitumen sprayer has an in-built safety feature which beeps a horn twice prior to the start of spraying. It is not possible to over-ride this feature.

5.4 Noise contours plots

Noise contour plots have been produced for the following scenarios and are presented in Appendix B. These contour plots show the 45 dB LAeq contour for the worst-case scenario for the surrounding area. The calculation assumes that the noise sources are concentrated in the worst location (i.e. producing the highest noise level) at each location. These high levels will usually be when equipment is operating in the closest location to a property. For much of the time, noise levels will be less than this when equipment is operating further away.

- Milling / paving (no mitigation);
- Milling / paving with mitigation: noise barrier situated at the side of the site;
- Grooving (no mitigation); and
- Grooving with mitigation: noise barrier behind grooving machine.

The highest levels predicted are for unmitigated grooving. Mitigation of the grooving machine is predicted to have a significant benefit, reducing levels by around 8 dB due to partial screening. The reduction in the size of the worst-case 45 dB L_{Aeq} contour can be seen between Figure 3 and Figure 4 in Appendix C. During grooving with mitigation, the residential streets which are predicted to exceed 45 dB L_{Aeq} at some point during the works are Bridge Street and Tirangi Road to the west of the runway, and Calabar Road, the block between SH1 and Miro Street, the southern part of Kauri Street, the western end of Broadway, and the northernmost houses along Moa Point Road. Works may be audible outside this contour at times.

The predicted contour for mitigated milling and paving is larger than that for mitigated grooving, and there is less of a reduction in the size of the contour due to multiple items of equipment operating that are not mitigated. In addition to the properties listed above, areas also predicted to fall within the 45 dB LAeq contour are the southern part of Lonsdale Crescent and Coutts Street to the west of the runway, Wexford Road and further along Kauri Street and Broadway to the east, Bunker Way and Raukawa Street in Strathmore Park, and the remainder of the houses on Moa Point Road.

6 Noise management and mitigation

6.1 Hierarchy of mitigation

A hierarchy of mitigation measures is appropriate to implement depending on the potential noise impact of activities.

General measures include

- Staff training and awareness;
- Good practice on site;
- Stakeholder / community engagement;
- General equipment measures; and
- Sequencing / timing of works.

Mitigation measures include:

- Appropriate selection of equipment;
- Use of acoustic screens or barriers; and
- Use of low noise equipment.

6.2 Mitigation

Mobile screening will be used for the milling machine and the grooving machine. This can be achieved by attaching a barrier to a luggage trolley or tractor which then trails the noisy equipment. The equipment should be screened in the direction of the nearest residential properties. If there are properties on both sides of the work site (for example to the east and west of the northern end of the runway) then barriers either side may be required.

Use of the Kango hammer and saw cutting should be screened if practicable. This can be achieved either through a similar method of mobile screening, or a smaller portable screen or enclosure.

6.3 Noise management

In addition to the above mitigation, the Site Manager will talk to site staff about potential issues in relation to noise and how they can help reduce it. This could be carried out at the same time as the site inductions or through specific staff training. To ensure noise limits are achieved, all site staff will be made aware of and follow the below good practice.

1. Trucks should enter site without engine brakes and leave site with smooth acceleration and low engine revs;
2. When arriving at work, drive slowly on site and keep engine revs to a minimum. Keep stereos off and do not slam vehicle doors;
3. Equipment and vehicles should not be left running when not in use;
4. Limit vehicle horns to emergency purposes only;
5. Where possible, avoid reversing beepers on trucks, opting for flashing lights, broadband alarms or rear sensors where practicable;
6. All equipment is to be well maintained - simple maintenance can reduce noise levels by as much as 50 per cent. For example, preventing tracked vehicles from ‘squealing’ will help to minimise disturbance;
7. No shouting on site. Either walk over and talk to somebody or use a radio/phone;
8. Be careful with tools and equipment. Place them down and do not drop them;

9 Do not slam tailgates of vehicles;

10 Do not drag materials on the ground. Place them down when you arrive at the work area;

11 When loading and unloading trucks try not to drop material from a height. Load softer material at the bottom;

12 If you see anything/anyone making unnecessary noise then stop it/them. If the source cannot be stopped then report it to the Site Manager;

13 It is essential that good relationships are maintained with local residents. Any queries from members of the public should be responded to politely and referred to the WIAL Complaints Manager. Staff shall assist the public to make contact with this person. Staff shall not enter into a debate or argue with members of the public; and

14 No potentially noisy work is to be conducted until all staff involved in the task understands the required noise controls for that task.

7 Noise monitoring

Noise monitoring will be undertaken during the project programme and will be conducted by appropriately trained staff in accordance with NZS 6801:2008 and NZS 6803:1999.

Monitoring will be conducted at locations representative of the closest residential receivers as follows:

- At the start of milling / paving works;
- At least monthly as milling / paving works progress along the runway;
- At the start of grooving works;
- At least monthly as grooving works progress along the runway; and
- If required, in response to construction noise related complaints.

Attended monitoring should be undertaken during construction hours on a rotation basis for a period of at least one hour each at identified dwellings / locations.

The results of each noise survey will be available to WCC for their information on request.

8 Communications

8.1 Stakeholder engagement

A key aspect of this CNMP is stakeholder engagement. The site contact for the public for the duration of the works will be the WIAL Complaints Manager. There will be the following communication with the community regarding construction noise issues:

- At least one week prior to the works a newsletter or similar will be distributed to all residents within the appropriate predicted 45 dB LAeq contour. The newsletter will include the following information:
  - Reason for the re-surfacing works;
  - Reason for the construction methodology proposed;
  - Overall timeframe and timing of specific noisy activities;
  - Reason for night / weekend working;
  - Expected noise effects; and
  - Contact details (name and phone number) for the WIAL Complaints Manager.

The same information will also be published in an advertisement in a local newspaper and on the WIAL website.

- Further information will be provided regularly (at least every two months) to residents with an update on the location of the works, and timings around specific activities, for example when grooving will start. This may be provided by newsletters or potentially by email or via the WIAL website.

A record will be kept of which properties have been contacted.

8.2 Documentation

All electronic files relating to construction noise will be kept by the Project Team. This will include:

- The CNMP and any revisions;
- Consultation register with list of properties contacted and newsletters distributed;
- Complaints register; and
- Results of noise monitoring, including site survey sheets and summary of what activities were underway at the time.

8.3 Complaints

The following procedure shall be followed for all noise complaints:

- All noise complaints should be immediately directed to the WIAL Complaint Manager;
- As soon as the complaint is received it will be recorded on the project complaints register;
- An initial response to the complainant will be made and recorded;
- The Complaint Manager will consider whether further investigation or monitoring is required, i.e. whether a justifiable noise complaint has been received;
- The site manager will be notified as appropriate and any corrective actions taken;
- Complaints and investigations shall be recorded in the complaints register. The register shall include:
  - The name of the complainant;
  - The nature of the complaint;
  - The date and time of the complaint;
  - Whether the complaint was considered justifiable, i.e. a noise related complaint;
  - Results of any investigations; and
  - Any mitigation measures adopted.
- The complaints register shall be made available to WCC upon request.

9 Staff training

Training of site personnel regarding noise will be incorporated into the site induction. This will include:

- Overview of this CNMP;
- Team roles and responsibilities;
- Noise mitigation and management procedures – both specific mitigation for identified activities and good practice on site in general;

- The importance of reducing noise levels as low as reasonably practical when working near residential areas;
- Complaints management process; and
- Any specific training required e.g. for machine operators.

Any current noise issues, for example complaints received, can be addressed in site meetings and /or toolbox talks.

10 Applicability

This report has been prepared for the exclusive use of our client Wellington International Airport Ltd, with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose, or by any person other than our client, without our prior written agreement.

We understand and agree that our client will submit this report as part of an application for resource consent and that WDC as the consenting authority will use this report for the purpose of assessing that application.

Tonkin & Taylor Ltd

Report prepared by:	Authorised for Tonkin & Taylor Ltd by:
.....	.....
Lindsay Leitch	Penny Kneebone
Senior Acoustic Consultant	Project Director

Technical review: Darran Humpheson, Acoustics Specialist

LILE
p:\1014797\issueddocuments\wial resurfacing cnmp final.docx

Appendix A: Glossary of acoustic terms

Term	Definition
dB	A unit of measurement on a logarithmic scale which describes the magnitude of sound pressure with respect to a reference value (20 µPa).
$L_{Aeq(t)}$	The A-weighted time-average sound level over a period of time (t), measured in units of decibels (dB).
L_{Amax}	The maximum A-weighted sound pressure level over a period of time or of a particular noise event, measured in units of decibels (dB).
L_{Ae}	Sound exposure level. The A-weighted time-average sound level compressed into a unit period of time (one second), measured in units of decibels (dB).
L_w / SWL	Sound power level of a source, measured in decibels (dB).
Noise	Unwanted sound.
SAC	Special audible characteristics – a sound that has a noticeable quality.

Every 10 dB increase in sound level doubles the perceived noise level. A sound of 70 dB is twice as loud as a sound level of 60 dB and a sound level of 80 dB is four times louder than a sound level of 60 dB. An increase or decrease in sound level of 3 dB or more is perceptible. A change in sound level of less than 3 dB is not usually discernible.

As sound levels are measured on a logarithmic scale, the following chart provides examples of typical sources of noise.

Decibel (dB)	Example
0	Hearing threshold
20	Still night-time
30	Library
40	Typical office room with no talking
50	Heat pump running in living room
60	Conversational speech
70	10 m from edge of busy urban road
80	10 m from large diesel truck
90	Lawn mower - petrol
100	Riding a motorcycle at 80 kph
110	Rock band at a concert
120	Emergency vehicle siren
140	Threshold of permanent hearing damage

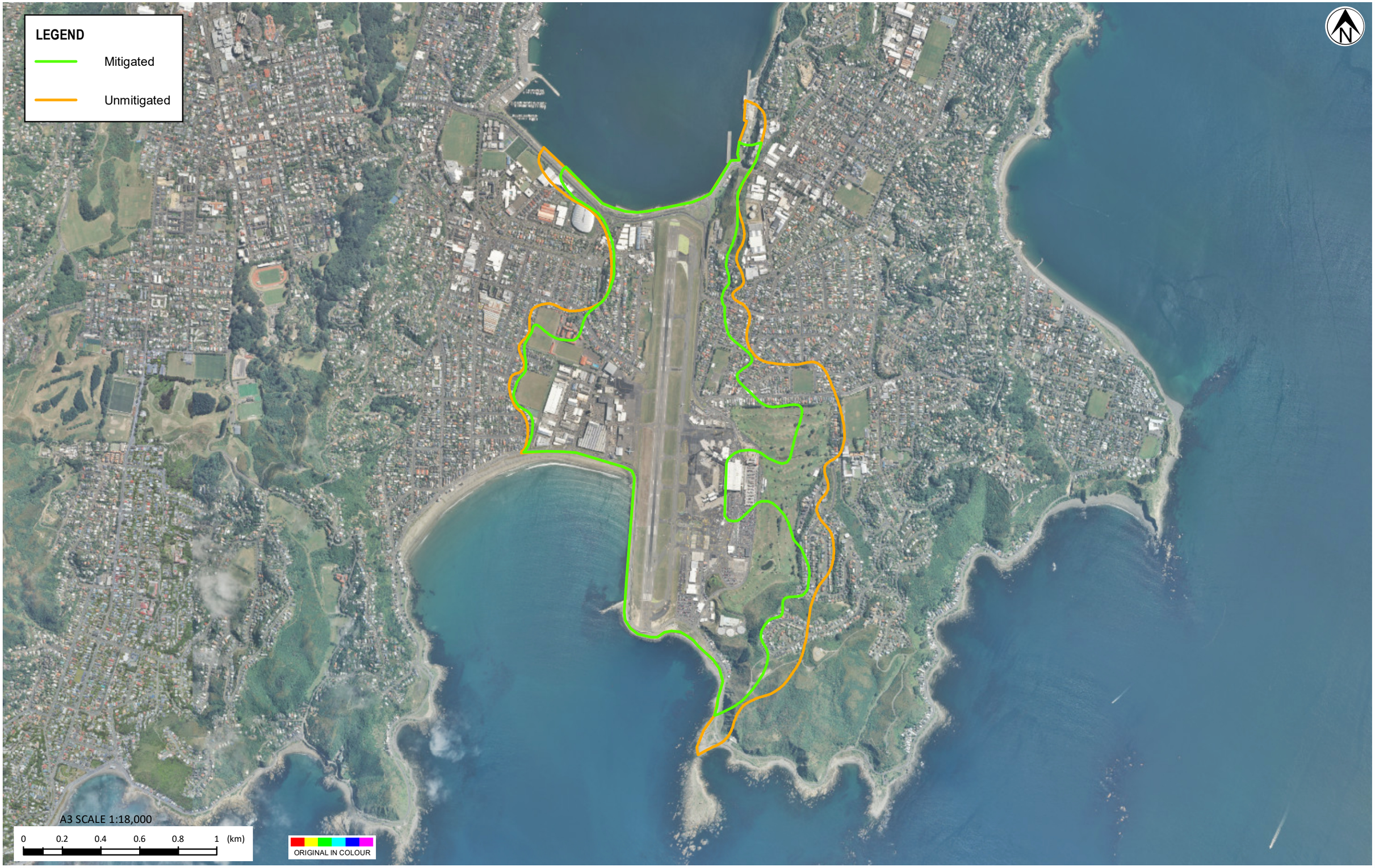
Appendix B: Equipment sound power levels

Table B.1: Sound power levels for equipment, taken from Appendix C of MDA report

Equipment	Sound Power Level dB
Loader	107
Kango hammer	120
Saw cutter	121
2.5m rotomill	111
1m rotomill	112
Suction sweeper	105
Emulsion sprayer	97
Case uniloader	106
Paver	104
Truck (mobile)	99
Truck (idling)	93
Pneumatic tyre roller	100
SW70 roller	107
Other roller	100
Lighting stands	92
Grooving machine	120
Tractor	106

Appendix C: Noise contour plots

C:\Users\cobe\Documents\WIAL\WIAL.mxd 2020-Aug-11 1:35:15 pm Drawn by



Tonkin+Taylor

Exceptional thinking together www.tonkintaylor.co.nz

NOTES:

Basemap: Sourced from the LINZ Data Service and licensed for re-use under the Creative Commons Attribution 4.0 New Zealand licence

REV	DESCRIPTION	GIS	CHK	DATE
0	First version	XXXX	YYYY	10/09/19

LOCATION PLAN

PROJECT No.	1014797	
DESIGNED	COBE	AUG.20
DRAWN		
CHECKED		
APPROVED		DATE

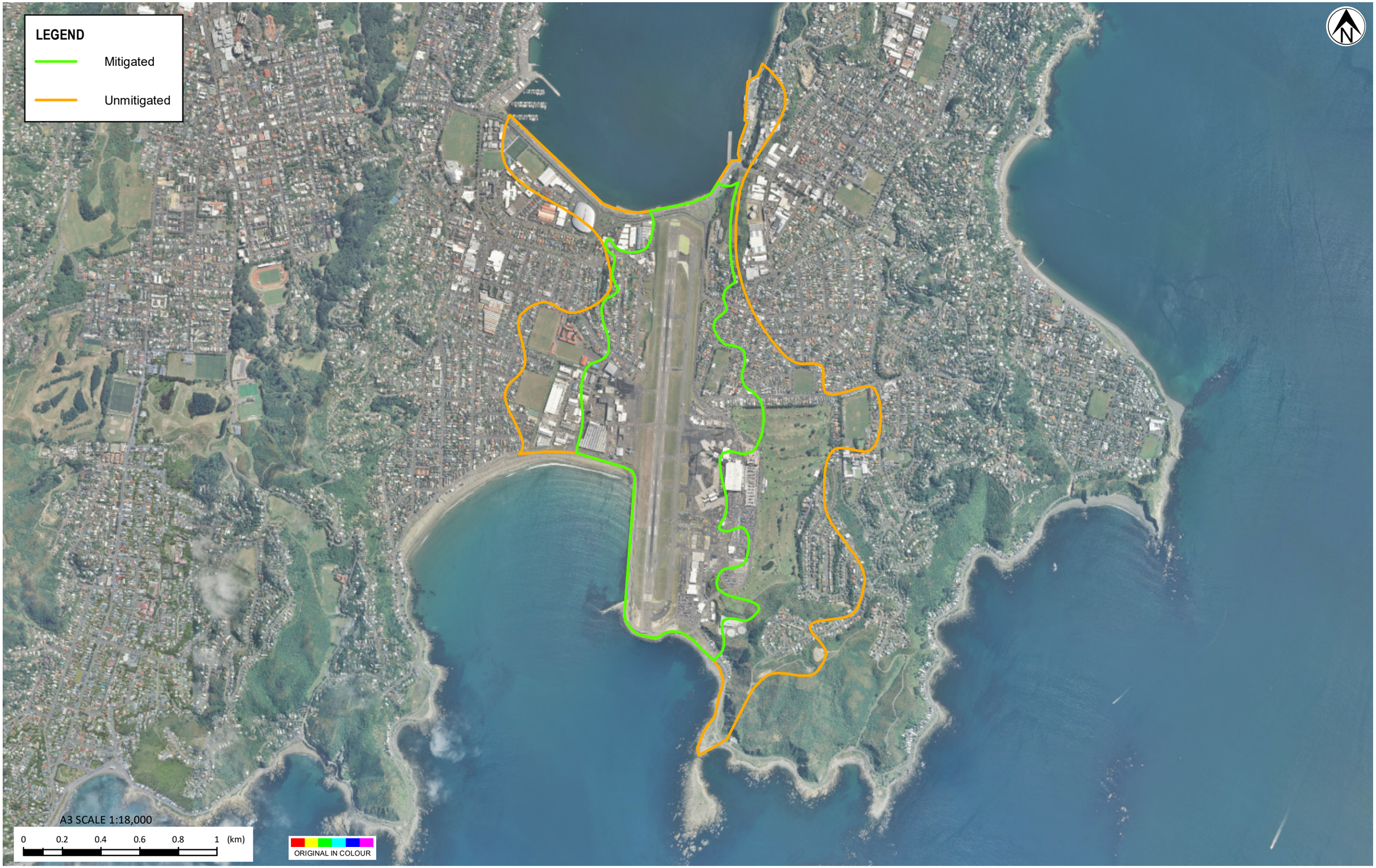
CLIENT **WELLINGTON INTERNATIONAL AIRPORT LIMITED**

PROJECT **WIAL RUNWAY OVERLAY WORKS**

TITLE EXTENT OF WORST-CASE 45 DB LAEQ CONTOUR FOR MILLING AND PAVING

SCALE (A3) 1:18,000 FIG No. FIGURE 1. REV 0

C:\Users\cobe\Documents\WIAL\WIAL.mxd 2020-Aug-11 1:35:15 pm Drawn by



Tonkin+Taylor

Exceptional thinking together www.tonkintaylor.co.nz

NOTES:

Basemap: Sourced from the LINZ Data Service and licensed for re-use under the Creative Commons Attribution 4.0 New Zealand licence

REV	DESCRIPTION	GIS	CHK	DATE
0	First version	XXXX	YYYY	10/09/19

LOCATION PLAN

PROJECT No.	1014797	
DESIGNED	COBE	AUG.20
DRAWN		
CHECKED		
APPROVED		DATE

CLIENT **WELLINGTON INTERNATIONAL AIRPORT LIMITED**

PROJECT **WIAL RUNWAY OVERLAY WORKS**

TITLE EXTENT OF WORST-CASE 45 DB LAEQ CONTOUR FOR GROOVING

SCALE (A3) 1:18,000 FIG No. FIGURE 2. REV 0

www.tonkintaylor.co.nz