



MARSHALL DAY
Acoustics



MARTHA PLAN CHANGE PROJECT
ASSESSMENT OF NOISE EFFECTS

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Updated in Response to Further Information Request – July 2022

Project: **MARTHA PLAN CHANGE PROJECT**

Prepared for: **OceanaGold New Zealand Limited**
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Report No.: **Rp 002 20190222**

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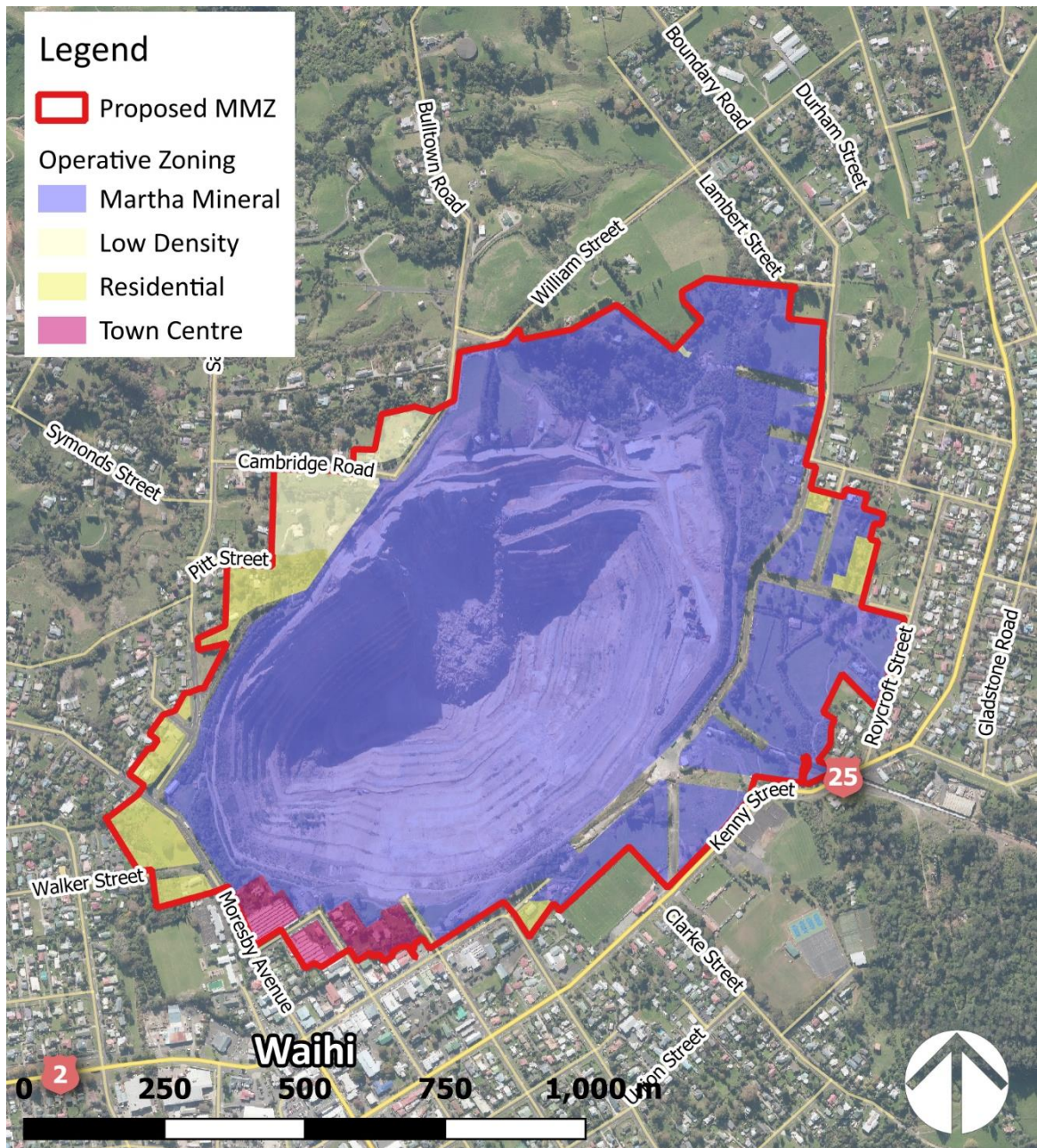
1.0 INTRODUCTION

Marshall Day Acoustics (MDA) has been engaged by OceanaGold New Zealand Limited (OGNZL) to provide an assessment of the potential noise emissions resulting from the proposed rezoning of a series of properties around the township of Waihi, to Martha Mineral Zone (MMZ).

This report summarises the findings of our assessment and calculations. Rather than focussing on any specific activities that may occur in the MMZ in the future, we have considered the noise effects of typical mining activities on noise-sensitive receivers beyond the proposed extent of the MMZ and have also made recommendations to ensure activities that are permitted within the MMZ are subject to reasonable noise performance standards, and that where activities in the expanded MMZ require resource consent appropriate consideration is given to the assessment of noise effects.

A glossary of any acoustical terminology used in this report is provided in Appendix A. The proposed expanded MMZ area is shown in Figure 1 below, along with the underlying zoning of all land included in the plan change application.

Figure 1: Proposed Martha Mineral Zone area and existing zoning



2.0 PROPOSED PLAN CHANGE DESCRIPTION

OGNZL propose to rezone all land parcels that will be necessary to support the potential future expansion of the Martha Pit, including ancillary activities (such as noise bunds and surface facilities areas). Changing these areas to MMZ zoning will enable a future resource consent application to be made for the potential expansion of surface mining in the Martha Pit as a discretionary activity (whereas surface mining outside of the MMZ is currently a prohibited activity).

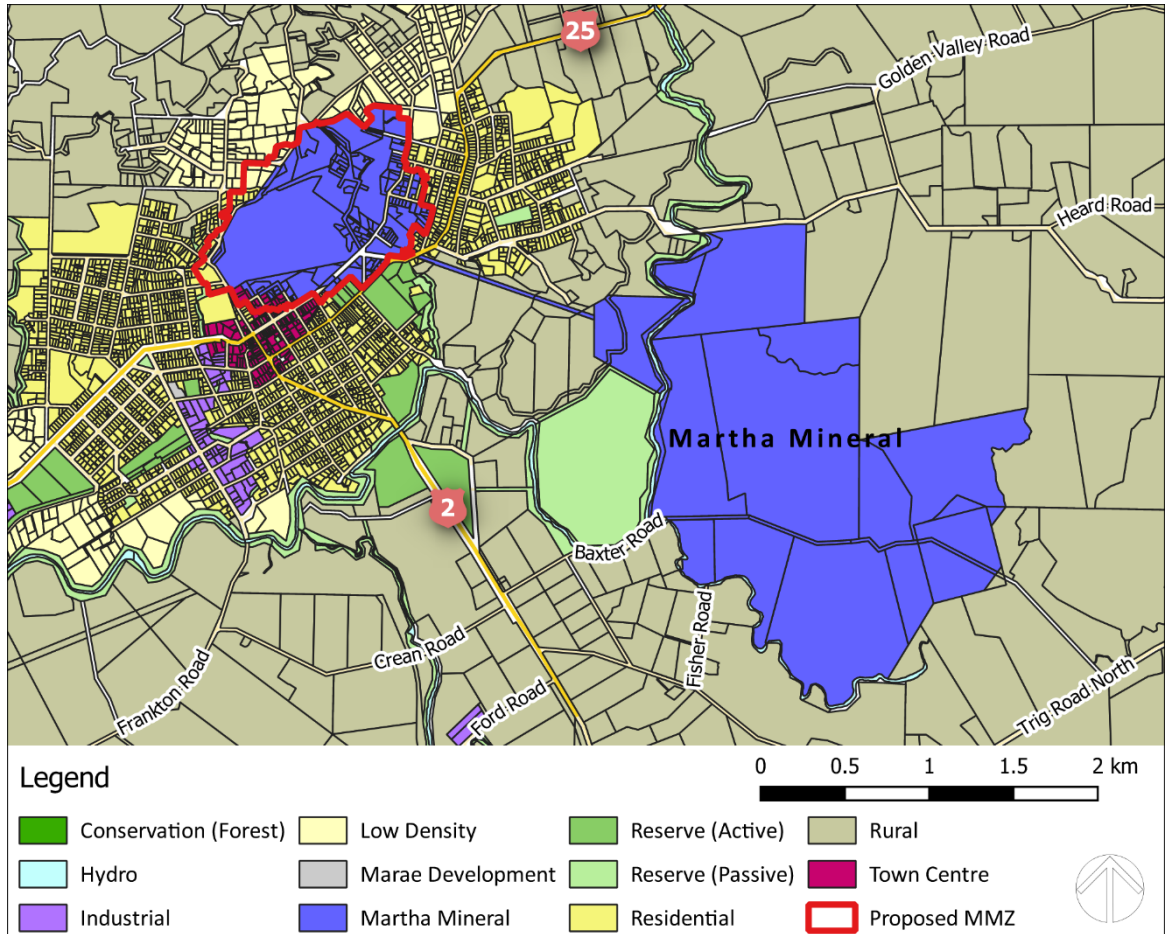
As shown above in Figure 1, it is proposed to expand the MMZ to the south, west and north-west of the current extent of the Martha Pit / MMZ. The proposed plan change would rezone properties that are currently zoned as Residential, Low Density Residential and Town Centre in the Hauraki District Plan (HDP).

We understand that the plan change application does not seek to define a specific future pit shape or envelope for the expansion of the Martha pit. Therefore, this report makes recommendations on the application of noise limits for permitted activities in the MMZ other than P1 and P2 (which are already subject to defined noise limits set in the former mining consent conditions).

We also consider the potential for noise impacts from activities that require resource consents on areas adjacent to the extents of the MMZ. In relation to these activities, this report considers what wording should be included in the MMZ provisions to ensure appropriate consideration is given to the effects of noise.

The MMZ continues to the east to include the processing area and Tailings Storage Facilities (TSF), as shown in Figure 2, meaning that any changes to the noise provisions also need to consider effects in these areas.

Figure 2: Planning zones in the Hauraki District Plan with proposed MMZ indicated



2.1 Sensitive Receivers Near the Proposed MMZ

All the land that will be subject to the proposed rezoning is under the ownership or control of OGNZL.

The altered areas of the proposed MMZ are adjacent to the following land zonings:

- Residential;
- Low Density Residential;
- Passive Reserve; and
- Town Centre.

The proposed rezoning will not change the existing types of receivers or activities within these areas. The expansion of the MMZ, primarily to the west and north, would mean that receivers currently at further distances from the zone would then become closer.

This means the potential for noise from permitted activities or activities seeking resource consent in the MMZ to impact them would increase as theoretically such activities (including mining activities) could potentially move closer to these receivers. This potential impact is investigated in this report.

In our view, the most sensitive areas, or those areas most likely to be affected by noise because of activities establishing in the new areas proposed to be rezoned as MMZ are:

1. Residential zoned areas west of Moresby Avenue and Savage Road.
2. Low Density Residential areas around Cambridge Road.
3. Waihi Central School (situated within the Residential Zone).
4. The area around Seddon Street and Moresby Avenue, which has both Town Centre Zone and Residential Zone portions.

These areas have been considered in detail in our assessment.

3.0 EXISTING NOISE PERFORMANCE STANDARDS

Existing mining activity in Waihi is subject to a variety of historic consents and permits. These are described below. We also provide an overview of the applicable HDP noise standards and other common guidance on environmental noise levels.

Surface mining in the residential, low density and town centre zones is a prohibited activity and is only allowed for in the MMZ. The MMZ is proposed to be extended around the Martha Pit to provide for the potential expansion of the pit crest.

3.1 Martha Mineral Zone

The MMZ encompasses various noise-related conditions from previous consent documents (at least in part). A summary of the key documents in terms of noise is as follows:

- Mining was originally permitted under the Mining Act 1971, with Mining Licence 32-2388 granted in 1987 (latest variation in 2017).
- Following implementation of the Resource Management Act 1991 (**RMA**), the first-generation HDP:
 - o Adopted the existing licence area as the Martha Mineral Zone; and
 - o Created the 'Extended Martha Mineral Area' (**EMMA**) overlay for future expansion.
- Consent was granted for the EMMA project in 1999 (LUC No. 97/98-105, latest variation in 2019).
- 'Project Martha' was granted consent in 2018 for further open pit works (LUC No. 202.2018.00000857.001).

No specific noise limits are provided in the MMZ section of the HDP for permitted activities, nor are any limits relevant to the MMZ given in the general noise rules at Section 8.3.1.3. Instead, Rule 5.17.4.1 P1 and P2 provide for any activity conducted in accordance with the relevant terms and conditions of, and within the area covered by, the Mining Licence and EMMA consent, as a permitted activity. While these documents have both now expired, their conditions are adopted by the HDP.

We note that activities covered by Rule 5.17.4.1 P1 and P2 are also exempt from compliance with Rule 8.3.2, which relates to ground vibration. There is no such exemption from the noise limits in Rule 8.3.1 – although we anticipate this is because Rule 8.3.1 does not include any noise limits for activities in the MMZ.

The Project Martha consent is still valid and its conditions still apply, as summarised in Section 3.1.3 below.

Because many of the historic consents have been subject to later variations, we note that there has been a progressive change from use of the L_{10} assessment parameter to the use of L_{eq} . Use of the L_{eq} parameter means that the noise limits are already aligned with current best practice.

3.1.1 Mining Licence Conditions

The licence, granted in 1987, covers activities in the Martha Pit, the processing plant and TSF 1 and 2, and was last updated in 2017 ahead of its expiration.

The Mining Licence contains similar provisions on construction noise, assessment methods, management plans and operating hours.

In relation to operational noise, Condition 21(a) states that:

"All activities provided for by the Mining Licence taking place on any site within the Mining Licence area shall not exceed the following limits when measured at or within the boundary of any residentially zoned site or the notional boundary of any occupied dwelling in the Rural Zone and measured over the periods specified below:

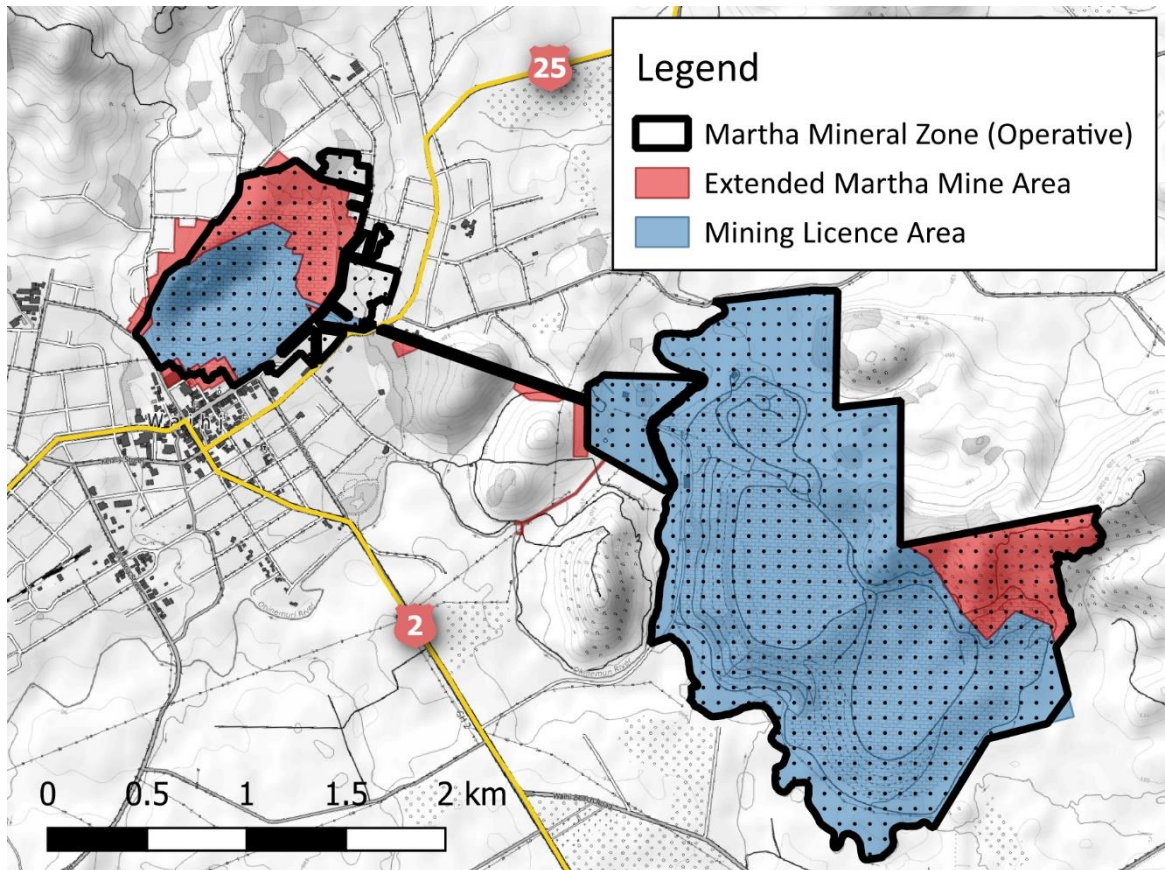
Monday-Friday	0700 - 2100	55 dB L_{Aeq}
Saturday	0700 - 1200	55 dB L_{Aeq}
All other times	2100 - 0700 (the following day)	40 dB L_{Aeq} 70 dB L_{AFmax}

All noise shall be measured within or close to the boundary of any residentially zoned site or the notional boundary of any occupied rural dwelling site not owned by the licence holder or related Company or not subject to an agreement with the licence holder or related Company.

In the event that a property is sold and ceases to be subject to an agreement between the licence holder (or related Company) and the purchaser, or in the event that there is no longer an agreement between the licence holder (or related Company) and the landowner, the location for the measurement of noise shall revert to being on or close to the boundary of that residentially zoned site or the notional boundary of the occupied rural site."

The 'Mining Licence area' defined in the consent is shown in Figure 3 below, along with the other key boundaries of interest.

Figure 3: Reproduction of Mining Licence 'Attachment A'



3.1.2 EMMA Consent Conditions

The conditions are mostly aligned with the Mining License conditions referred to above. This consent established a Noise Control Boundary (NCB) for noise from the Martha Pit, as shown in Figure 4 below. It was first established in 1999 and the conditions were most recently revised in 2019.

The full conditions are reproduced in Appendix B. In brief, they stipulate the working hours, construction and operational noise limits and noise monitoring/assessment requirements.

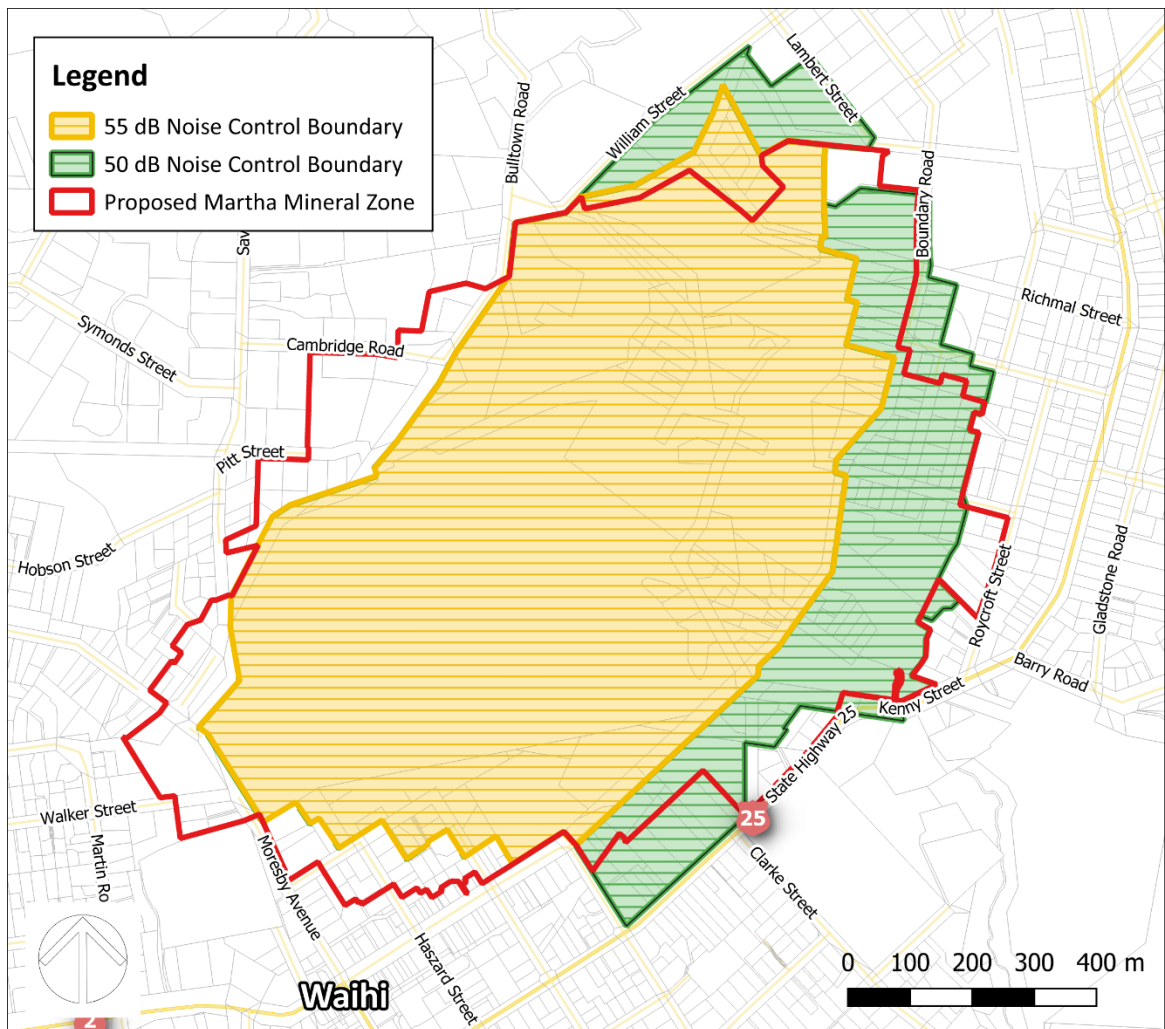
Operational Noise Limits

Noise from activities within the extended pit and surface facilities area (as authorised by the EMMA consent) must achieve the respective NCB limits (Figure 4) of 50 and 55 dB L_{Aeq} during the defined operating periods of 0700 to 2100 hrs Monday to Fridays and 0700 to 1200 hrs on Saturdays. At all other times, the limit is 40 dB L_{Aeq} . These limits do not apply to land owned by OGNZL or where they have an agreement with the landowner.

Noise from activities within the conveyor corridor and waste disposal area must achieve 55 dB L_{Aeq} during operating periods, assessed at the boundary of any residential site (or rural notional boundary) not owned or under agreement with OGNZL. Again, a 40 dB L_{Aeq} noise limit applies outside of operating periods.

For OGNZL operations outside of these areas, the consent specifically states that the usual HDP noise limits apply, which are discussed later in this report.

Figure 4: Existing NCB lines and proposed MMZ extension area



Construction Noise

A specific noise limit is provided for Waihi Central School, where a level of 55 dB L_{Aeq} shall not be exceeded at any point within the school boundary during school hours.

Otherwise, noise limits are provided that are commensurate with the NZS 6803:1999 construction noise limits for regular duration works, as discussed in Section 3.2.2. The rule differs from NZS 6803:1999 in that the noise limit at all other times, including Sundays and Public Holidays, is

40 dB L_{Aeq} and the limits apply at residential boundaries or rural notional boundaries. (NZS 6803:1999 applies the limits at the façades of sensitive buildings, rather than at boundaries.)

Other Matters

The conditions require that noise monitoring be undertaken on a weekly basis during construction and at least biannually for normal operations.

OGNZL are also required to prepare and maintain a Noise Management Plan (NMP) that details the methods used to comply with the noise limits. We understand that the most recent approved version of this was issued in 2019¹. This document brings together all the conditions and obligations from the various consents and permits.

3.1.3 Project Martha Conditions

This consent established the Martha Underground Mine and the Phase 4 Cutback (MP4). Again, it provides conditions that are generally aligned with those above for aspects such as:

- Operating hours;
- Construction noise (either at the school or elsewhere);
- Separate operational noise limits for Martha Pit activities and for other activities such as the Favona portal; and
- Development of a Noise Management Plan.

However, Condition 22, which provides operational noise limits for noise ‘around the Martha Pit’ imposes a 50 dB L_{Aeq} criterion on mining activities. We consider this to have been reasonable and appropriate as a noise rule at the time of the consent.

The relevant limits are summarised below in Table 1, with Condition 25 specifying that the limits apply ‘at any occupied dwelling’ (it is not clear whether this means at the boundary or façade). The conditions pertaining to noise are reproduced in full for reference in Appendix C.

Table 1: Summary of Project Martha operational noise limits

Condition No.	Applies to...	Period	Noise Limit	
			dB L_{Aeq}	dB L_{AFmax}
Condition 22	Mining and mining related activities around the Martha Pit	Weekdays	50	-
		Saturday	50	-
		All other times*	40	70
Condition 23	Use of the cement aggregate fill plant, Favona portal and polishing pond stockpiles and the pit lake filling pipeline corridor	Weekdays	55	-
		Saturday	55	-
		All other times*	40	-

The construction noise conditions for Waihi Central School are slightly more prescriptive in this version of conditions in that the hours of application are more clearly defined as 0830 to 1500 hrs, Monday to Friday. In addition, a maximum noise limit of 75 dB L_{AFmax} is given, which was not specified in the EMMA consent or Mining Licence.

¹ OGNZL Document Ref: WAI-200-PLN-014, available from OGNZL website.

3.1.4 Summary of Historic Consents

The information above is summarised in Table 2 below. All of the time periods are aligned across the consents so that the following operating hours apply:

- Monday to Friday, 0700 to 2100 hrs;
- Saturdays, 0700 to 1200 hrs; and
- Night-time period, where a maximum noise limit applies, 2100 to 0700 hrs the following day.

Table 2: Summary of previously consented noise limits

Consent	Activities	Noise Limit Application	Time Period	Noise Limit, dB		
				L _{Aeq}	L _{Amax}	
Mining Licence	Within the Licence area	At or within residential site, or the notional boundary of any occupied rural dwelling	Monday - Friday	55	-	
			Saturday	55	-	
			All other times	40	-	
			Night	-	70	
EMMA	Within the 55 dB NCB	Any point outside the NCB	Monday - Friday	55	-	
			Saturday	55	-	
	Within the 50 dB NCB	Any point outside the NCB	Monday - Friday	50	-	
			Saturday	50	-	
	All activities	Any point outside the NCB	All other times	40	-	
			Night	-	70	
	Conveyor corridor and waste disposal area	At or within residential site or the notional boundary of any occupied rural dwelling, unless owned by, or under agreement with, OGNZL	Monday - Friday	55	-	
			Saturdays	55	-	
Project Martha	[22] Mining and mining related activities around the Martha Pit	[25] All operational noise shall be measured at any occupied dwelling not owned by the consent holder or related company or not subject to an agreement with the consent holder or related company	Monday - Friday	50	-	
			Saturday	50	-	
			All other times	40	-	
			Night	-	70	
	[23] Use of the cement aggregate fill plant, Favona portal and polishing pond stockpiles and the pit lake filling pipeline corridor			Monday - Friday	55	-
				Saturday	55	-
				All other times	40	-

3.2 Hauraki District Plan

In addition to the MMZ provisions, the HDP contains noise rules that apply to all activities in the District. Any parts of OGNZL's operations that do not occur within the MMZ will be subject to these, unless otherwise covered by resource consent.

3.2.1 General Noise Limits (Section 8.3)

Zone Specific Noise Standards

The HDP provides district-wide rules for the assessment of noise in Section 8.3.1. The noise standards outlined in Rule 8.3.1.3 apply to noise received at different sites both within the same zone (part A) and between zones (part B).

We note that Part B of the Rule for noise between zones does not provide any noise limits that are relevant to this plan change, because it does not list noise from within the MMZ.

The noise standards for zones adjacent to the MMZ are summarised in Table 3, with the HDP zoning² previously shown in Figure 2. Although noise from the MMZ is not covered by this section of the HDP, the general noise limits that apply to other activities provide an indication of the anticipated amenity levels in each area.

Table 3: Summary of District Plan noise standards from Rule 8.3.1.3(1)

Site Zoning/Use		Time Period	Noise Level	
Noise Generator	Noise Receiver		dB LAeq (15 min)	dB LAfmax
Part A (within zones)				
Residential/ Low Density	Boundary of any other residential site	Day	50	-
		Night	40	65
Rural	Notional boundary of any rural zoned dwelling	Day	50	-
		Night	40	65
Town Centre	Within any other TC	Day	55	-
		Night	40	65
Passive Reserve	Passive Reserve	All times	55	-
Active Reserve	Active Reserve		No Restrictions	
Part B (between zones)				
<i>No rules apply to this project</i>		-	-	-

Assessment Matters

The HDP requires (in Rule 8.3.1.3) that noise is measured in accordance with New Zealand Standard NZS 6801:2008 “Acoustics – Measurement of environmental sound” and assessed in accordance with New Zealand Standard NZS 6802:2008 “Acoustics - Environmental Noise”. These are the most recent iterations of these Standards and are consistent with the National Planning Standards.

The HDP also refers to any operator’s overarching duty to ensure ongoing compliance with the provisions of the RMA and the Health Act 1996.

² Zone extents obtained from the Waikato LASS Data Portal ‘Zone’ dataset by HDC.

Exemptions

Some specific noise sources are exempt from compliance with the noise standards, as specified Rule 8.3.1.3 (1)(d). For the avoidance of doubt, we do not consider that any of these are relevant to this plan change application.

3.2.2 Construction Noise and NZS 6803:1999

Rule 8.3.1.3 (3) provides limits for construction noise and requires management, measurement and assessment in accordance with New Zealand Standard NZS 6803:1999 “Acoustics - Construction Noise”.

Of relevance to this project, the rule applies the ‘Table 2’ limits from NZS 6803:1999 to noise received in the Rural, Residential and Low-Density Residential zones. These limits are reproduced in Table 4.

Table 4: Recommended upper limits for construction noise received in residential zones and dwellings in rural areas (Table 2 of NZS 6803)

Time of week	Time period	Typical duration		Short-term duration		Long-term duration	
		dB LAeq	dB LAmax	dB LAeq	dB LAmax	dB LAeq	dB LAmax
Weekdays	0630-0730	60	75	65	75	55	75
	0730-1800	75	90	80	95	70	85
	1800-2000	70	85	75	90	65	80
	2000-0630	45	75	45	75	45	75
Saturdays	0630-0730	45	75	45	75	45	75
	0730-1800	75	90	80	95	70	85
	1800-2000	45	75	45	75	45	75
	2000-0630	45	75	45	75	45	75
Sundays and public holidays	0630-0730	45	75	45	75	45	75
	0730-1800	55	85	55	85	55	85
	1800-2000	45	75	45	75	45	75
	2000-0630	45	75	45	75	45	75

The Standard defines the duration of works as follows:

- “Short-term” means construction work at any one location for up to 14 calendar days;
- “Typical duration” means construction work at any one location for more than 14 calendar days but less than 20 weeks; and
- “Long-term” means construction work at any one location with a duration exceeding 20 weeks.

For noise received within the Town Centre Zones, the Standard’s ‘Table 3’ noise limits apply, as shown in Table 5.

Table 5: Recommended upper limits for construction noise received in industrial or commercial areas for all days of the year (Table 3 of NZS 6803)

Time period	Typical duration	Noise Limit, dB L _{Aeq}	
		Short-term duration	Long-term duration
0730-1800	75	80	70
1800-0730	80	85	75

For completeness, we note that the Standard provides the following footnotes to the above (paraphrased in brief):

- Clause 7.2.5 The night-time limits in Table 4 apply to activities carried out in industrial or commercial areas where it is necessary to prevent sleep interference (e.g. residential activities, hospitals, hotels) The limits may also be used to protect other specific noise sensitive activities at certain hours of the day.
- Clause 7.2.6 Where there is a relatively high background sound level (L₉₀) due to noise from sources other than construction work, limits should be based on a determination of the existing level of noise in the area (a “background plus” approach).
- Clause 7.2.7 Where noise cannot be measured outside a building, the upper limits for noise measured inside the building shall be the levels stated minus 20 dBA.

3.3 General Noise Guidance

3.3.1 NZS 6801 and 6802

The HDP refers to, and requires assessment in accordance with, NZS 6801:2008 and NZS 6802:2008. These Standards represent current industry best practice.

NZS 6802:2008 is commonly used in New Zealand to inform assessments of environmental effects. The Standard provides the following guidance on desirable upper limits of sound exposure at or within the boundary of any residential land use:

- Daytime – 55 dB L_{Aeq (15 min)}
- Evening – 50 dB L_{Aeq (15 min)}
- Night-time – 45 dB L_{Aeq (15 min)} and 75 dB L_{AFmax}

The noise levels provided in the Standard are intended to provide territorial authorities with appropriate guidance for the development of local noise criteria. (It notes that the inclusion of an evening period and its hours of application are a matter for the relevant local authority.)

Clause C8.6.2 of the Standard provides further discussion on these guidelines:

‘The recommended daytime limit of 55 dB L_{Aeq (15 min)} is consistent with the guideline values for community noise in specific environments published by the World Health Organization. The World Health Organization identifies that during the daytime, few people are seriously annoyed by activities with levels below 55 dB L_{Aeq}. The night-time limit recommended should not exceed 45 dB L_{Aeq (15 min)} outside dwellings so that people can sleep with windows open for ventilation and achieve the desirable indoor 30 to 35 dB L_{Aeq (15 min)} level as a design level to protect against sleep disturbance.’

3.3.2 Resource Management Act 1991

Regardless of any noise performance standards provided in local legislation or specific land-use consents, the RMA imposes overarching obligations on all generators of noise.

Section 16 of the RMA concerns one's duty to avoid unreasonable noise and states that:

'Every occupier of land (including any premises and any coastal marine area), and every person carrying out an activity in, on, or under a water body or the coastal marine area, shall adopt the best practicable option to ensure that the emission of noise from that land or water does not exceed a reasonable level.'

Section 17 of the RMA also states that every person has a duty to avoid, remedy, or mitigate any adverse effect on the environment arising from an activity carried on by or on behalf of the person.

3.3.3 International Guidance

The key international guidance is that provided by the World Health Organization's (WHO) Guidelines for Community Noise³. This guidance is commonly used within New Zealand as a basis for assessing environmental noise exposure. For community or environmental noise, the critical health effects (those effects which occur at the lowest exposure levels) are:

- Sleep disturbance;
- Annoyance (slight, moderate, high); and
- Speech interference/communication disturbance.

The Guideline Values for these three critical health effects for community or environmental noise are presented in Table 6. These guidelines, based on extensive international research, are the exposure levels that represent the onset of the effect for the general population. That is, at these noise levels, critical health effects only begin to appear in a small number of vulnerable or sensitive groups.

Table 6: WHO Guideline Values for the critical health effects of community or environmental noise

Specific Environment	Critical health effect(s)	dB LAeq	Time base (hours)	dB LAmax
Outdoor living area	Serious annoyance, daytime & evening	55	16	-
	Moderate annoyance, daytime & evening	50	16	-
Dwellings, indoors Inside bedrooms	Speech Intelligibility and moderate annoyance, daytime & evening	35	16	-
	Sleep disturbance, night-time	30	8	45
Outside bedrooms	Sleep disturbance, window open (outdoor values) night-time	45	8	60

³ Berglund, B. et al, *Guidelines for Community Noise*. World Health Organisation (1999).

4.0 EXISTING NOISE ENVIRONMENT

4.1 Historic Noise Measurement Data

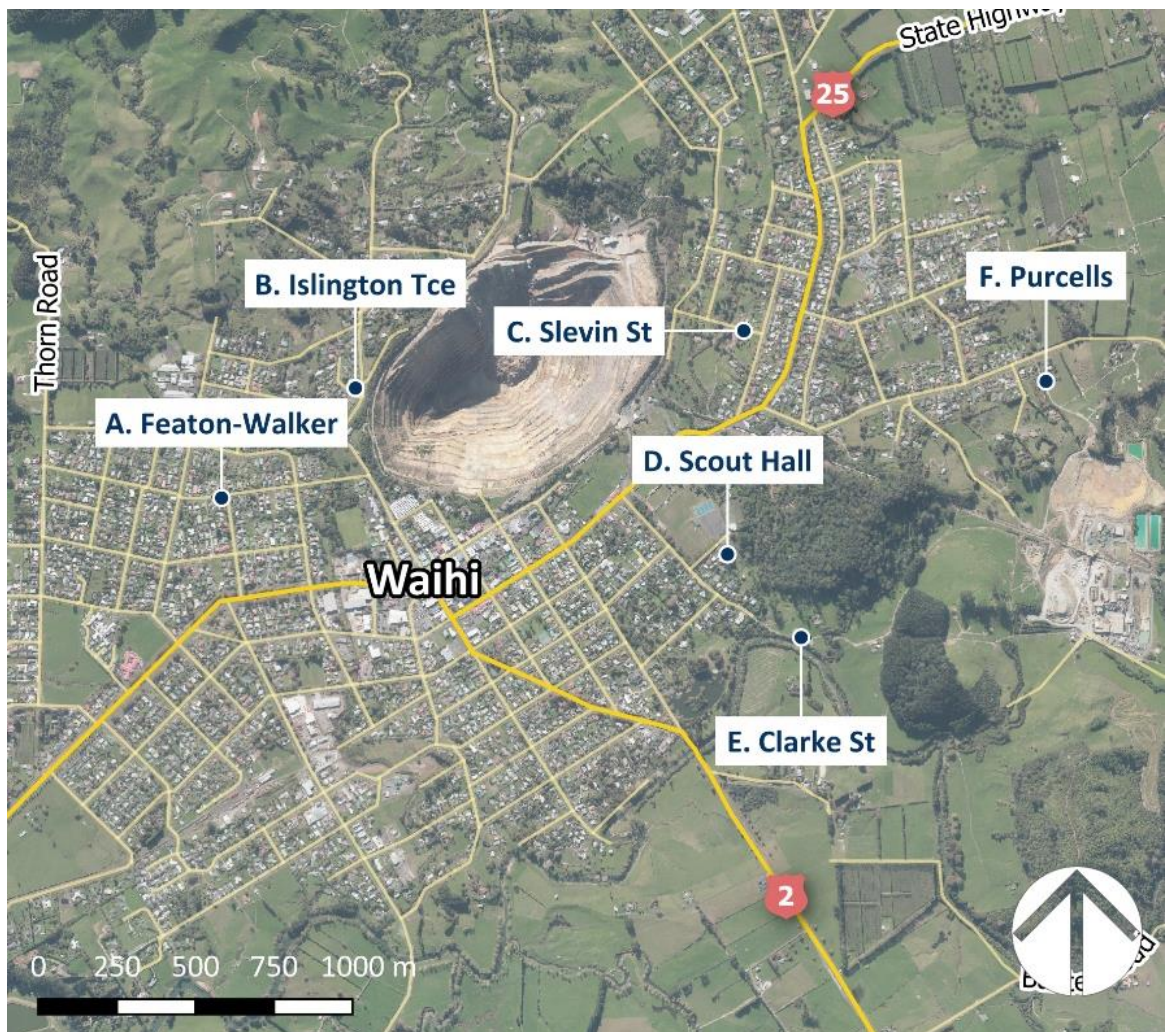
We have been provided with historic noise measurements that have occurred at Waihi from the OGNZL archives. These measurements have been undertaken generally for two reasons:

- Complaint response monitoring; and
- Compliance monitoring.

The results of the compliance monitoring are compiled and issued in a quarterly compliance report to the HDC. The compliance obligations within the HDP are also summarised in the Noise Management Plan.

Compliance monitoring mainly occurs at two positions, ‘Scout Hall’ and ‘Purcells’, as shown in Figure 5 below. Compliance measurements cover the Martha Pit and the process plant. Additional locations have also been monitored intermittently, and more frequently in recent years. Measurements have been undertaken both day and night at these locations for compliance purposes.

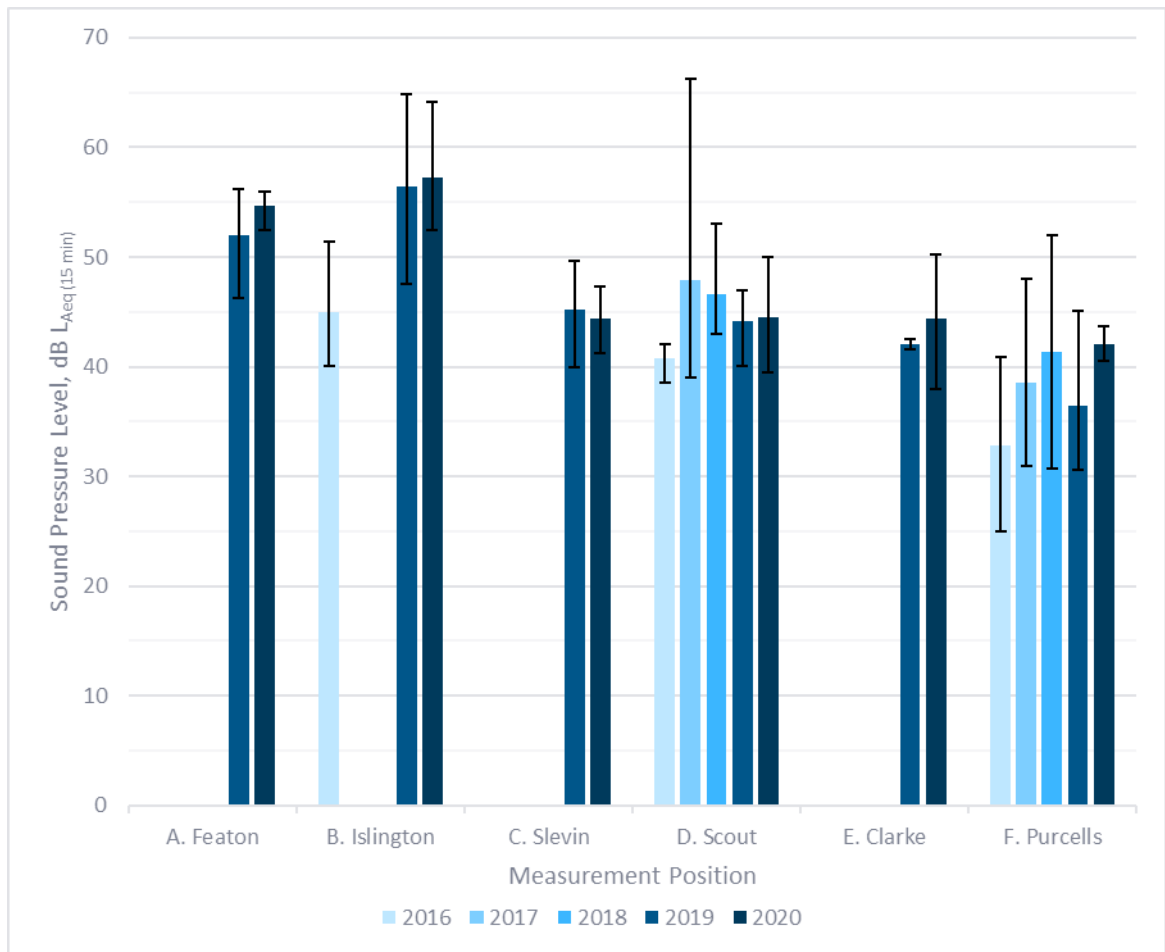
Figure 5: Regular noise monitoring positions used by OGNZL



We understand that noise measurements have still been undertaken in the vicinity of the Martha Pit despite it not being operational since 2015. These measurements therefore provide a useful comparison between times with and without the pit operating.

The last five years’ results are collated in Figure 6 overleaf.

Figure 6: Chart showing mean noise levels over last five years (error bars show range)



Generally, our analysis indicates that the noise levels are only slightly influenced by whether the Martha Pit is operating or not, with other anthropogenic noise sources clearly audible and contributing to the overall noise environment.

Noise levels are typically between 45 and 55 dB L_{Aeq} , which is typical of a small regional town environment during the daytime. Noise levels at Purcells (Position F) have mainly been obtained during the night.

In terms of resultant noise effects, this means that there is an appreciable contribution from other noise sources to the noise environment, so the impact of mining noise is somewhat reduced.

In our opinion, this also means it is problematic to always determine whether the mining operations are compliant with the controls or not.

In our experience of similar situations, there are times when complaints have been received and there has been a conclusion drawn that noise levels are non-compliant, even though noise levels from mining activities alone comply with relevant limits. This is because the measured noise levels include contributions from other noise sources, and then exceed the compliance limit.

4.2 2020 Noise Monitoring Survey (MDA)

We undertook a comprehensive programme of noise surveys across the Waihi area to obtain background data for this assessment and establish existing noise levels.

Six remote noise monitoring units were installed at the locations shown in Figure 7. The positions were chosen to represent the different noise-receiving environments experienced across the Waihi township. These positions were:

MP1. 26 Islington Terrace. Representative of the closest dwellings to the edge of the Martha Pit.

MP2. 14 Roycroft Street. Represents dwellings close to the stockpile area and processing plant.

MP3. 126 Clarke Street. Closest dwellings to south-eastern pit face works and processing plant.

MP4. 28 Russell Street. Representative of general dwellings in the township, further from the mine.

MP5. 34 Heath Road. Closest dwellings to the Gladstone Pit and processing plant areas.

MP6. 131 Trig Road Nth. Representative dwellings closest to the TSF areas.

The noise monitors were installed on Thursday 30 July 2020 and generally ran through until either Friday 14 August (MP2 and MP5) or Thursday 20 August (MP3, MP4 and MP6). Unfortunately, data from the unit at MP1 was lost after Sunday 2 August due to theft of the unit.

The units were configured to continuously record noise levels throughout the day and night for the duration of the monitoring.

We have analysed meteorological records for the survey period in order to exclude periods of adverse weather from our analysis. Further information on this, and on the measurement instrumentation used, is provided in Appendix D.

The recorded data at each location is summarised overleaf in Table 7, while Figure 8 provides the average hourly noise level at each position across the day.

Full time histories of the recorded data are provided for reference in Appendix E.

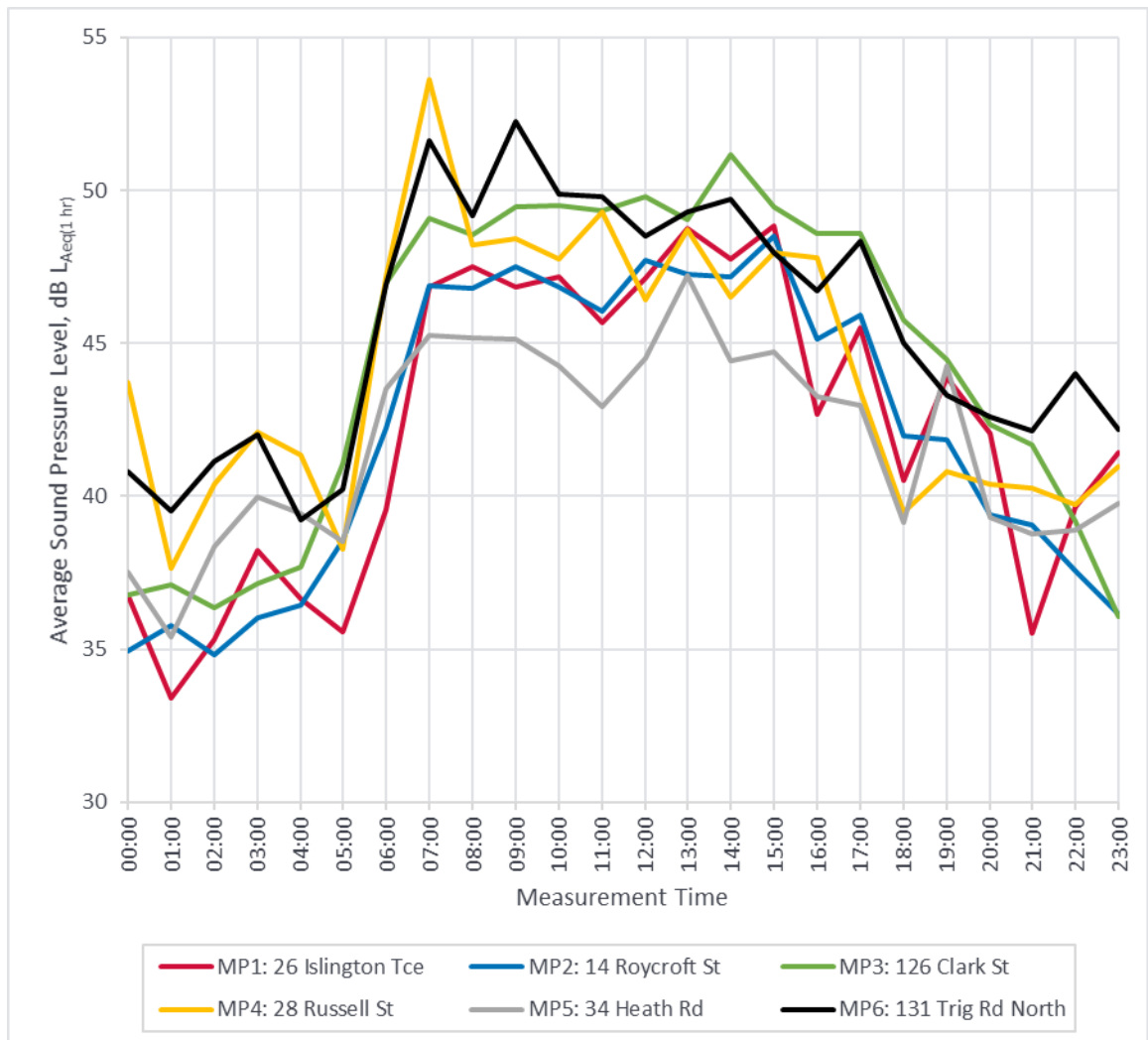
Figure 7: MDA ambient noise level monitoring sites



Table 7: Summary of ambient noise monitoring results

Site	Address	Time Period	Measured Noise Level, dB			
			L _{Aeq}	L _{A10}	L _{A90}	L _{Amax}
MP1	26 Islington Terrace	Day (0700 - 2200 hrs)	46	49	41	83
		Night (2200 - 0700 hrs)	39	43	36	69
MP2	14 Roycroft Street	Day (0700 - 2200 hrs)	47	47	39	77
		Night (2200 - 0700 hrs)	39	39	32	67
MP3	126 Clarke Street	Day (0700 - 2200 hrs)	49	50	44	92
		Night (2200 - 0700 hrs)	39	39	30	84
MP4	28 Russell Street	Day (0700 - 2200 hrs)	43	47	36	75
		Night (2200 - 0700 hrs)	42	45	33	76
MP5	34 Heath Road	Day (0700 - 2200 hrs)	46	45	39	78
		Night (2200 - 0700 hrs)	40	42	35	68
MP6	131 Trig Road North	Day (0700 - 2200 hrs)	50	50	39	81
		Night (2200 - 0700 hrs)	43	44	37	74

Figure 8: Graph showing the average measured noise level at each hour of the day



4.3 Summary

Based on the measured noise levels from Section 4.2, we conclude that in Waihi township, noise levels are typical of a small rural town with a State Highway passing through. The most significant contribution to daytime noise levels is local road traffic, and it is observed background noise levels reduce markedly during the night, by approximately 5 to 15 dB.

Daytime ambient noise levels are 43-50 dB L_{Aeq} , depending on the proximity to local roads and the town centre. Overall, noise levels are considered typical of a small rural town environment.

5.0 RECOMMENDED NOISE PERFORMANCE STANDARDS

5.1 Operational Noise

As we discuss in Section 2.1, there are currently several noise limits that apply to mining activities. The limits are dependent on whether they are associated with the Martha Pit in the town, and therefore primarily impacting residential activity, or for mining operations occurring to the east of State Highway 25.

It is also recognised that permitted activities or restricted discretionary activities in the MMZ (beyond Rule 5.17.4.1 P1 and P2) are not currently subject to the noise limits specified in Rule 8.3.1 of the HDP. As such, we recommend that noise limits for the MMZ be included in Section 8 of the HDP to ensure consistency with other zones in the Plan (although Rules P1 and P2 would continue to be subject to the noise limits in the former mining licence and resource consent conditions respectively).

We therefore recommend that the operational noise performance standards (for activities not covered by P1 and P2), as shown in Table 8 below, should apply across all parts of the MMZ. If these were adopted during any consenting process, then these standards would ensure the amenity values of Waihi and the wider community are protected.

With some exceptions we discuss below, we note that the timeframes and numerical noise limits are consistent with the noise limits of 8.3.1 of the HDP (shown in Section 3.2.1, Table 3 above) for Industrial zone noise emissions received in adjacent zones.

Regarding the HDP noise limits, we note that the daytime and night-time limits for the residential and rural zone are typical of what applies in many other districts in New Zealand, and we consider are also more stringent than the upper limits of acceptability outlined in NZS 6802 (refer Section 3.3.1).

The night-time maximum noise level (65 L_{AFmax}) is however more stringent than many other districts and we do not consider this as an appropriate balance between protection of residents' amenity and allowance for reasonable activity to occur in the District. We consider a noise limit of 70 dB L_{AFmax} is a more balanced approach.

As well as this, the daytime and night noise limits that apply within the Town Centre zone are also restrictive for such a zone with primarily commercial activity occurring within and would likely cause anticipated activities within that zone compliance issues. We do not consider this zone contains significant noise sensitive activity so the protection this rule provides is limited in effect. As well as this, it would be reasonable for such receivers in the zone to expect a different noise environment to that likely too be experienced in a purely suburban residential area. Therefore, we consider that less stringent noise limits for town centre receivers may be more appropriate. Further, for the Town Centre zone we consider a night-time maximum noise limit of 75 dB L_{AFmax} is also more appropriate for the same reason.

In practice, a maximum noise level of 65 dB L_{AFmax} would be exceeded on many occasions by typical town centre activities, such as nearby night-time vehicle movements, people conversing or car doors being shut. Trucks using the State highway through the zone at night would also be significantly above this noise level. This is further discussed in section 5.1.3

Table 8: Recommended noise limits for noise generated within MMZ

Receiving Zone	Assessment Point (at or within)	Time Period	Noise Limit	
			dB LAeq (15 min)	dB LAfmax
Residential/ Low Density AND Rural	Site boundary	0700 - 2200 hrs, Monday to Saturday	50	-
		Sundays and Public Holidays	45	-
	Notional boundary*	2200 - 0700 hrs, all days	40	70
Town Centre/Passive Reserve/Active Reserve	Site boundary	0700 - 2200 hrs on all days	55	-
		2100 - 0700 hrs, on all nights	45	75

* The notional boundary is a line 20m from the façade of a dwelling, or the property boundary where this is closer.

In addition to these noise limits, we consider that new residential or noise sensitive activity should remain non-complying in the MMZ.

5.1.1 Mining activity would be subject to multiple noise standards

It is noted that the proposed noise performance standards in Table 8 would mean that the permitted activities in the MMZ are subject to different noise standards. However, the activities covered by P1 and P2 are effectively akin to a resource consent and it is not unusual for there to be differing noise standards between permitted activities and activities subject to resource consents within the same zone.

In this instance, our view is that the only activity with the potential to cause uncertainty regarding its status under the permitted activity rules is prospecting and exploration (P5), which may be mistaken as being a part of the activities captured by P1 and P2. This is unlikely to be problematic in practice, given the good communication between OGNZL and HDC with respect to the drilling programme undertaken in Waihi.

5.1.2 Comparison with other noise controls

For some parts of the adjacent rural zoned areas, the recommended noise criteria are more stringent than the underlying zoning noise limits. This limits the community noise exposure to new permitted activities under the MMZ and is therefore a beneficial outcome of this plan change. It is also partially because these activities would be new operations, as opposed to operations associated with existing mines.

We also note the proposed criteria are broadly in line with many noise controls in District Plans around the country, and that these are also set at levels below the upper limit of acceptability.

5.1.3 Town Centre limits reflect elevated activity levels in this precinct

As discussed above, higher noise limits are proposed at the site boundary of the Town Centre and reserve zones than in residential and rural areas. This reflects the Town Centre zones nature as not being inherently a residential area. Any existing or future residential activities that establish in this zone would anticipate a higher noise environment than in a suburban area, for example.

Aside from mining activity, elevated noise levels will be generated as a result of road traffic, commercial activities, hospitality venues, etc.

As such, it is appropriate that the noise limits allow for a noise environment that is above and beyond that provided for in residential zones. It is common for business, commercial or town centre zoned areas to have higher noise limits for this reason.

For areas adjacent to the Martha pit, the proposed 'site boundary' noise limit would apply first and foremost at the zone boundary interface, making it effectively a 'zone boundary' noise limit. This means that all properties beyond the first row of buildings or structures will receive lower levels than those closer to the pit.

5.2 Construction Noise

Construction noise is generally higher than ongoing operational noise from a site. This is acknowledged in the noise criteria set in NZS 6803:1999 and in Section 8 of the HDP, which is higher than general zone noise limits for ongoing operations.

While the criteria permit higher noise levels to be generated, adverse effects may still be experienced by neighbours. The construction noise limits in the HDP represent a balance between the need for construction to occur and neighbouring activities to continue without major disruption.

The construction noise limits of the HDP applicable to noise received in the Rural, Residential, Low Density Residential, Reserve (Passive) and Reserve (Active) were set out previously in Table 4.

As a general guideline, with windows closed, building facades reduce noise levels by at least 20 dB, and in most instances by 25 dB or more. Therefore, effects on activities inside buildings can be summarised by the guidance in Table 9 below.

Table 9: Potential effects resulting from construction noise

External Noise Level, dB LAeq	Potential Daytime Effects Outdoors	Internal Noise Level, dB LAeq	Potential Daytime Effects Indoors
Up to 65	Conversation becomes strained, particularly over longer distances.	Up to 45	Noise levels would be noticeable but unlikely to interfere with residential or office daily activities.
65 to 70	People would not want to spend any length of time outside, except when unavoidable through workplace requirements.	45 to 50	Concentration would start to be affected. TV and telephone conversations would begin to be affected.
70 to 75	Businesses that involve substantial outdoor use (for example garden centres) would experience considerable disruption.	50 to 55	Phone conversations would become difficult. Personal conversations would need slightly raised voices. Office work can generally continue, but 55 dB is considered by the experts to be a tipping point for offices. For residential activity, TV and radio sound levels would need to be raised.
75 to 80	Some people may choose hearing protection for long periods of exposure. Conversation would be difficult, even with raised voices.	55 to 60	Continuing office work would be extremely difficult and become unproductive. In a residential context, people would actively seek respite.
80 to 90	Hearing protection would be required for prolonged exposure (8 hours at 85 dB) to prevent hearing loss.	60 to 70	Untenable for both office and residential environments. Unlikely to be tolerated for any extent of time.

Taking account of the above, it is recommended that Rule 8.3.1.3 (3) should apply to permitted activities in the MMZ (excluding construction activities undertaken as part of Rules P1 and P2). For any discretionary activity, whilst these would form the basis of assessment, there may be some

desire to apply more stringent, or less stringent controls, particularly based on time periods during the day (or night) that controls may apply.

The resultant noise impacts as a result of compliance with these performance standards would mean that noise impacts on amenity, whilst at times would be high, would not be unduly onerous for the time it occurs.

6.0 CALCULATED NOISE LEVELS

At this stage, there are no confirmed development plans for the Martha Pit (or related activities). Any future pit expansion would be authorised through a separate resource consenting process – which we understand would be a discretionary activity.

Despite this, to provide a basis for this assessment we have calculated noise levels from some scenarios that are representative of typical mining activities, based on generic operational scenarios provided by OGNZL. These broadly indicate the noise levels that will be produced from any future potential works and demonstrate where the proposed noise limits will be achieved and situations in which further mitigation or management may be required to ensure compliance with the proposed noise standards.

Opencast mining in the Martha Pit is likely to be already familiar to most residents, although it currently is not being worked. Remediation of the north wall collapse will be a prerequisite to any future works and before the pit extent can be expanded into adjacent areas.

When mining resumes, typical mining methods will continue to be employed. Some noise sources associated with typical mining methods within the Martha Pit include:

- Dump trucks;
- Loaders and excavators at the working face and along the haul routes;
- Drilling rigs;
- Explosive blasting;
- Processing (crushing) plant;
- The conveyor system; and
- Underground ventilation plant;

Much of the equipment above is mobile machinery and can access various areas of the pit that are elevated, which means that they can at times be more exposed to the surrounding community.

Noise levels have been calculated based on the plant and equipment listed above for the following phases of an indicative development of the Martha Pit:

1. Early years – northern wall remediation and activities close to the pit rim (worst case noise emissions).
2. Middle years – mining progressing into the pit and most remediation activities complete.
3. Final years – majority of mining activity only occurs at bottom of pit (lowest noise emissions).

6.1 Calculation Methodology

Computer noise modelling was undertaken using the SoundPLAN suite of noise modelling software (version 8.2). This software implements calculation procedures described in International Standard ISO 9613-2:1996 “Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation”, with adaptations as appropriate from ISO/TR 17534-3:2015 “Acoustics – Software for the calculation of sound outdoors – Part 3: Recommendations for quality assured implementation of ISO 9613-2 in software according to ISO 17534-1”.

This method accounts for a range of factors affecting the sound propagation including:

- The magnitude of the noise source in terms of sound power;
- The distance between source and receiver;
- The presence of obstacles such as screens or barriers in the propagation path;

- The presence of reflecting surfaces;
- The hardness of the ground between the source and receiver;
- Attenuation due to atmospheric absorption; and
- Meteorological effects such as wind gradient, temperature gradient and humidity.

The effect of meteorological conditions is simplified in ISO 9613 by calculating the average downwind sound pressure level. The Standard adopts the conservative approach of assuming “supportive” propagation conditions, assuming that wind is always blowing from the noise sources to the receiver locations (i.e. in all directions simultaneously).

6.2 Results

The results of this modelling are presented overleaf in Section 6.3.

The modelling indicates that in the early years of potential operation of an expanded pit within the MMZ, there are some locations where uncontrolled noise levels would likely exceed the recommended limits to a small extent. This is partly due to the relative terrain heights between where machinery is operating and the nearby houses. At these times, heavy machinery would not be located very deep in the pit relative to the pit rim, so noise is more easily able to propagate out of the pit to the nearest sensitive receivers, causing higher noise levels to be received.

The locations shown on the plots where noise levels are above the recommended noise limits are typically where heavy machinery would be operating near these residents. Equipment may not always be operating this close to these sensitive receivers, meaning, there will be periods of compliance and non-compliance based on movement of this equipment as needed.

These results have been predicted after a considerable amount of investigation has occurred into what types of machinery can be used, for how long, and with additional screening/bunding being implemented.

This means we have already investigated, in conjunction with OGNZL, smaller and quieter operating plant. We have therefore optimised these assumptions in our model.

The consequence is that, to ensure compliance with the recommended noise limits, additional management would need to be implemented. This may involve further restrictions on the type and size of plant, limits on the hours of operation or other management measures. Given any future pit expansion will be applied for through a conventional discretionary activity resource consenting process, mitigation measures to ensure compliance can be determined at the time resource consent is applied for.

Once mining operations are lower in the pit (i.e. from ‘middle years’ onwards), noise levels are compliant with the recommended noise limits at all locations.

6.3 Noise Contour Plots

Figure 9: Noise contour plot for Stage 1 indicative pit development scenario (early years)

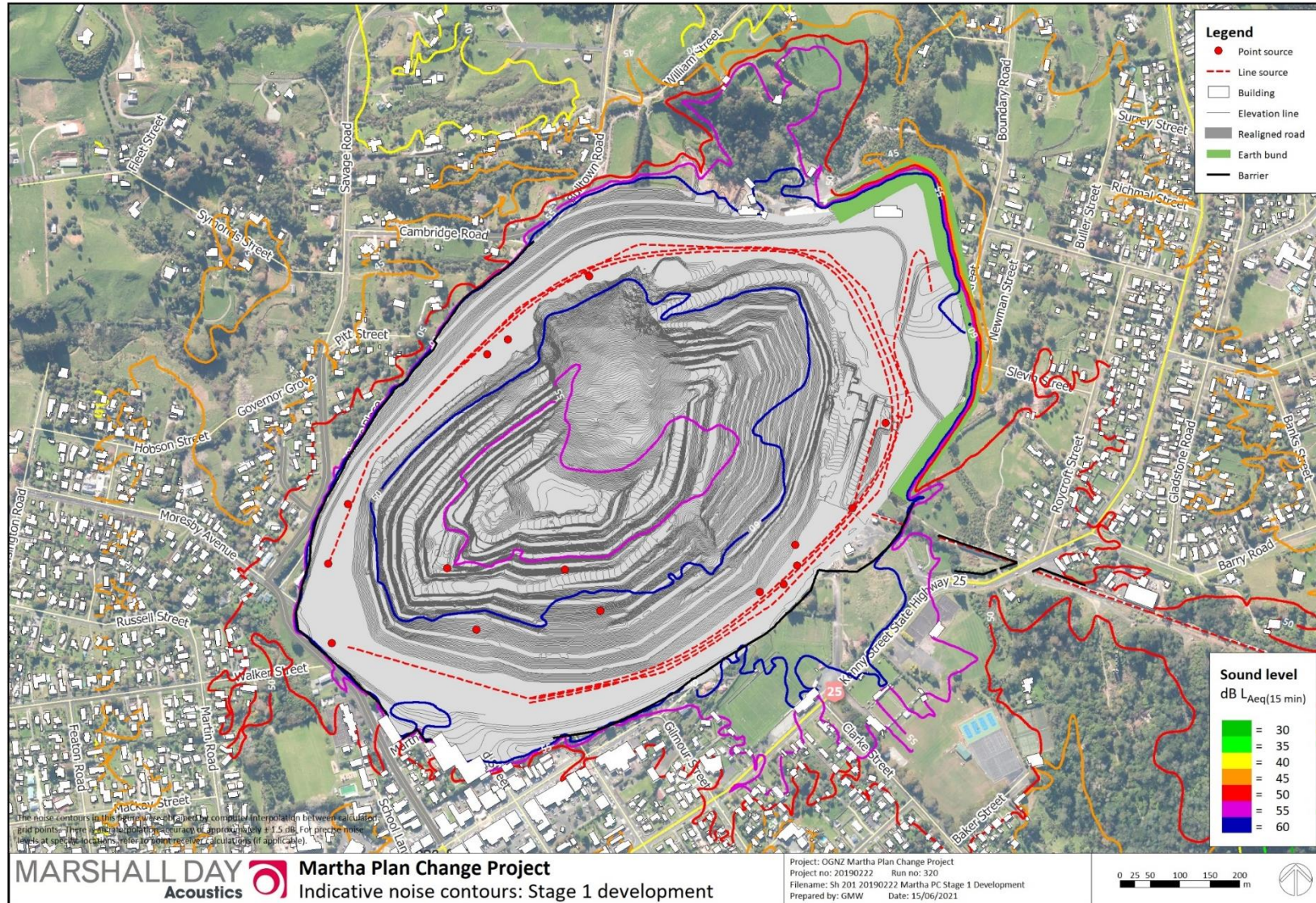


Figure 10: Noise contour plot for Stage 2 indicative pit development scenario (middle years)

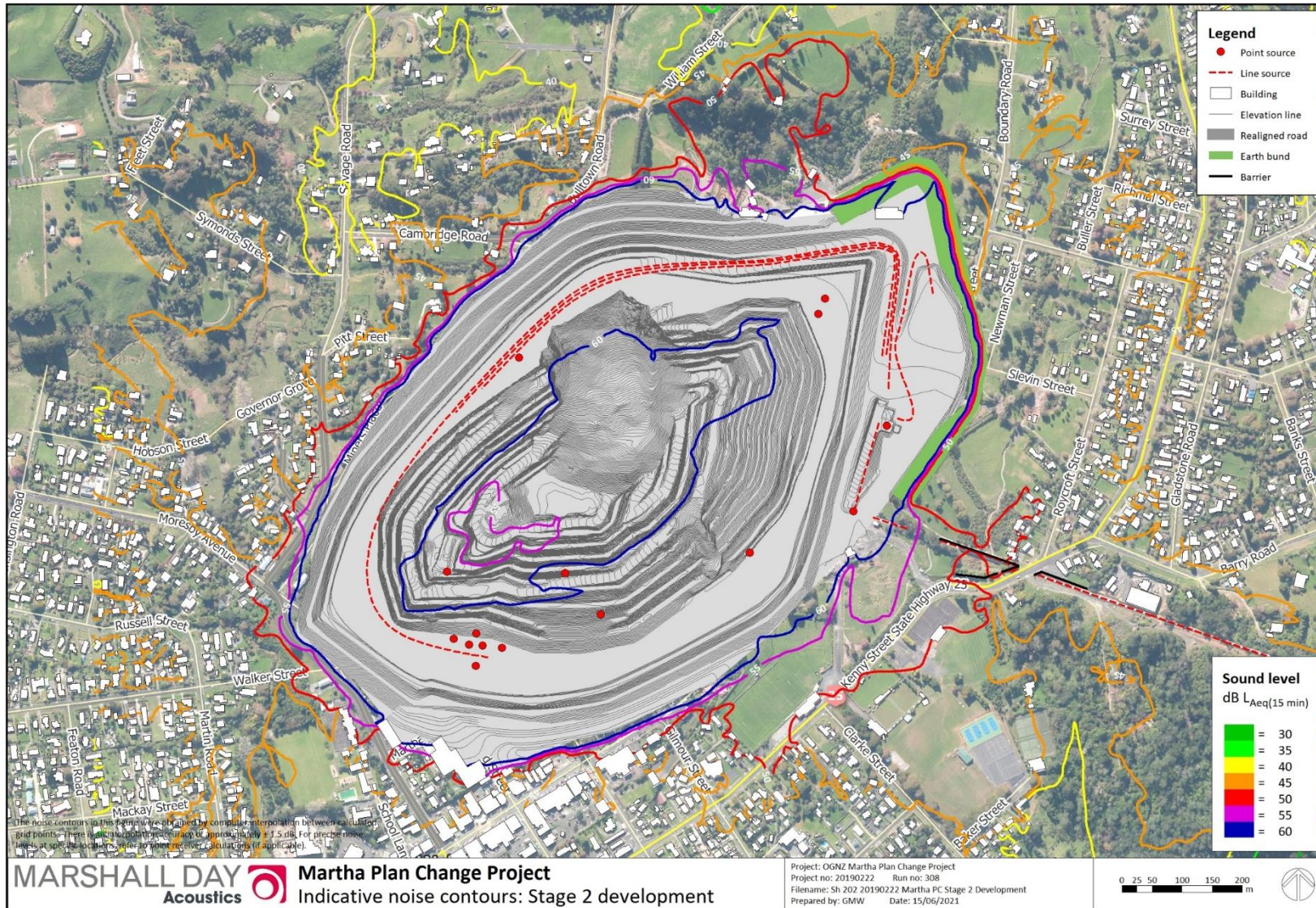
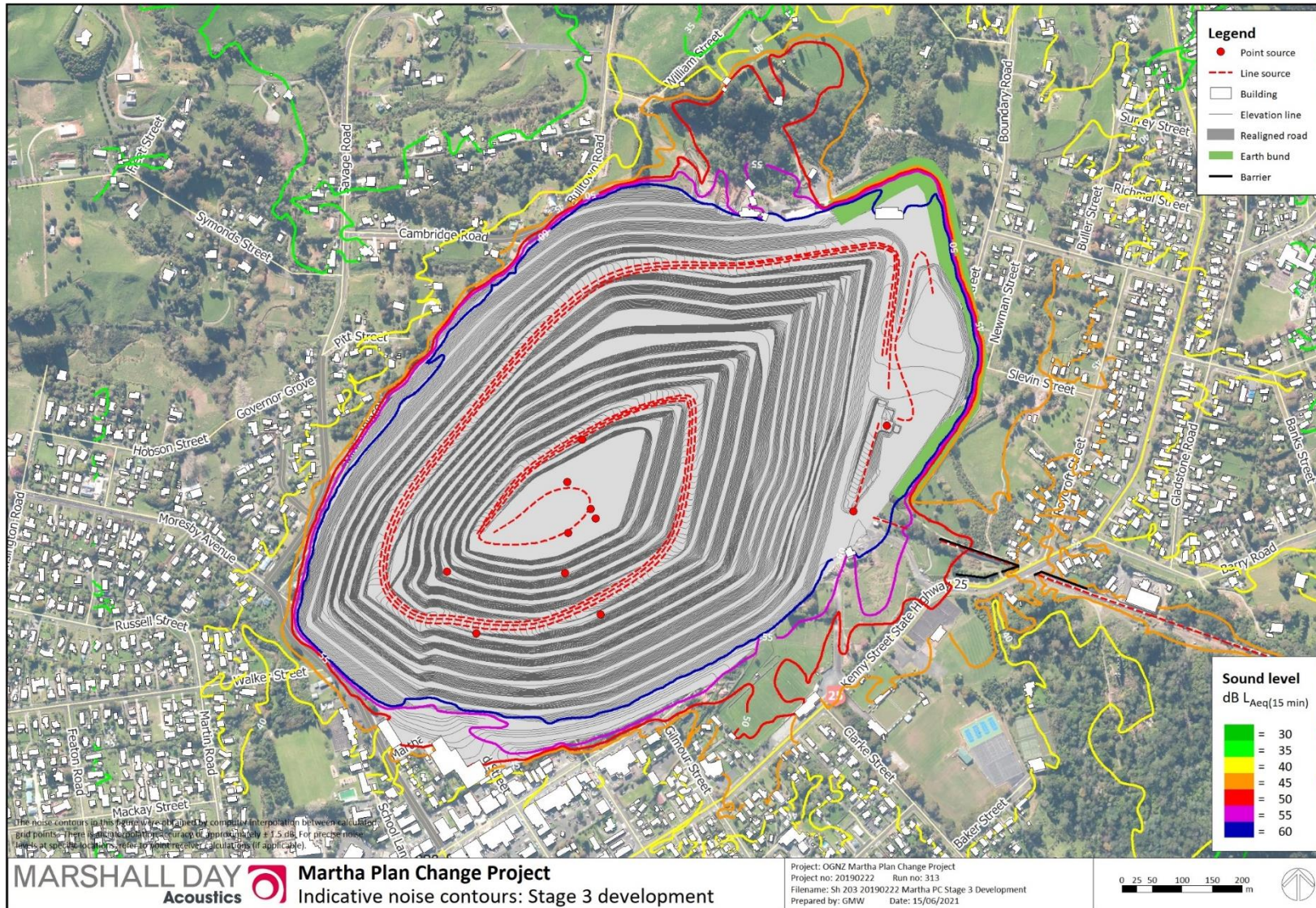


Figure 11: Noise contour plot for Stage 3 indicative pit development scenario (final years)



7.0 ASSESSMENT OF NOISE EFFECTS

In our opinion, the use of the recommended noise performance standards, as outlined in Table 8 (Section 5.0) of this report, should be applied across the MMZ for permitted (other than P1 and P2) or restricted discretionary activities, as these limits have been assessed to be protective of the amenity value of adjacent sensitive receivers. The appropriate noise limits for discretionary or non-complying activities in the MMZ can continue to be assessed on their merits as part of the resource consent process.

Additionally, it has been assessed that any future expansion of the Martha Pit within MMZ land parcels proposed to be rezoned could potentially be undertaken in accordance with the recommended noise limits in this report and is largely dependent on the location of machinery in relation to these sensitive environments. However, any future pit expansion would need to be authorised through a separate discretionary activity resource consenting process – as noted above. This resource consenting process would enable consideration of whether a future Martha Pit expansion will be undertaken in a manner that remains protective of amenity values (Policy (a)(iii) of the MMZ).

We anticipate that to ensure compliance with the criteria, and therefore to achieve acceptable noise levels, there may be the requirement to implement some degree of noise screening or use of restrictions on the amount of time certain equipment may operate as part of any potential future expansion of the Martha Pit. It could also be a combination of both of these mitigation measures.

We consider that these options are standard industry best practice and typically easily able to be implemented to control noise emissions. We therefore consider that management of noise emissions would be readily achievable.

In other words, the results of Section 5.0 show that, in general terms, the likely activity that could occur in the newly expanded MMZ could also comply (with mitigation where needed) with the recommended noise performance standards for permitted and restricted discretionary activities. In this regard, the expansion of the Martha Pit would not cause undue adverse noise effects in the surrounding community, assuming the recommendations of this report are implemented.

With respect to the expanded MMZ, there will be some locations, primarily to the west of the existing pit, where the rezoning may theoretically allow (subject to consent) mining to occur closer to noise sensitive activity. However, the noise limits that would apply do not allow a substantive change in noise levels in the community without also impacting other noise sensitive areas, and therefore the change in expected noise impacts is considered small.

Taking this into account and based on the calculated noise levels in Section 5.0, the existing noise environment in the vicinity and on the proposed lower general noise limits recommended to form the noise rules, we consider that if the noise limits were complied with then noise effects would be reasonable throughout the community.

APPENDIX A GLOSSARY OF TERMINOLOGY

Ambient	The ambient noise level is the noise level measured in the absence of the intrusive noise or the noise requiring control. Ambient noise levels are frequently measured to determine the situation prior to the addition of a new noise source.
A-weighting	The process by which noise levels are corrected to account for the non-linear frequency response of the human ear.
dB	<u>Decibel</u> The unit of sound level. Expressed as a logarithmic ratio of sound pressure P relative to a reference pressure of $P_r=20 \mu\text{Pa}$ i.e. $\text{dB} = 20 \times \log(P/P_r)$
$L_{A90}(t)$	The A-weighted noise level equalled or exceeded for 90% of the measurement period. This is commonly referred to as the background noise level. The suffix "t" represents the time period to which the noise level relates, e.g. (8 h) would represent a period of 8 hours, (15 min) would represent a period of 15 minutes and (2200-0700) would represent a measurement time between 10 pm and 7 am.
$L_{Aeq}(t)$	The equivalent continuous (time-averaged) A-weighted sound level. This is commonly referred to as the average noise level. The suffix "t" represents the time period to which the noise level relates, e.g. (8 h) would represent a period of 8 hours, (15 min) would represent a period of 15 minutes and (2200-0700) would represent a measurement time between 10 pm and 7 am.
L_{Amax}	The A-weighted maximum noise level. The highest noise level which occurs during the measurement period.
Noise	A sound that is unwanted by, or distracting to, the receiver.
NZS 6801:2008	New Zealand Standard NZS 6801:2008 <i>"Acoustics – Measurement of environmental sound"</i>
NZS 6802:2008	New Zealand Standard NZS 6802:2008 <i>"Acoustics – Environmental Noise"</i>
NZS 6803:1999	New Zealand Standard NZS 6803: 1999 <i>"Acoustics - Construction Noise"</i>
NZS 6806:2010	New Zealand Standard NZS 6806:2010 <i>"Acoustics - Road-traffic noise - New and altered roads"</i>
Special Audible Characteristics	Distinctive characteristics of a sound which are likely to subjectively cause adverse community response at lower levels than a sound without such characteristics. Examples are tonality (e.g. a hum or a whine) and impulsiveness (e.g. bangs or thumps).
SPL or L_p	<u>Sound Pressure Level</u> A logarithmic ratio of a sound pressure measured at distance, relative to the threshold of hearing ($20 \mu\text{Pa}$ RMS) and expressed in decibels.
SWL or L_w	<u>Sound Power Level</u> A logarithmic ratio of the acoustic power output of a source relative to 10^{-12} watts and expressed in decibels. Sound power level is calculated from measured sound pressure levels and represents the level of total sound power radiated by a sound source.

APPENDIX B EMMA CONSENT CONDITIONS

B1 Reproduction of Noise-Related Conditions

3.8 Noise

- (a) Construction (refer to the definition in Condition 3.3)

With the exception of Waihi Central School where the construction noise limit shall be 55 dB L_{Aeq} at any point at or within the boundary of the school during school hours, all construction activities provided for by this consent shall not exceed the following limits:

Monday - Friday	Saturdays	dB L_{Aeq}	dB L_{AFmax}
0630 – 0730		60	70
0730 – 1800	0730 – 1800	75	90
1800 – 2000		70	85

At all other times, including Sundays and Public Holidays, the noise level (L_{10}) shall not exceed 40 dB L_{Aeq} .

All noise shall be measured within or close to the boundary of any residentially zoned site or the notional boundary of any occupied rural dwelling site not owned by the consent holder or related Company or not subject to an agreement with the consent holder or related Company.

In the event that a property is sold and ceases to be subject to an agreement between the consent holder (or related Company) and the purchaser, or in the event that there is no longer an agreement between the consent holder (or related Company) and the landowner, the location for the measurement of noise shall revert to being on or close to the boundary of that residentially zoned site or the notional boundary of the occupied rural site.

Construction noise shall be managed, measured and assessed in accordance with New Zealand Standard NZS6803:1999 Acoustics – Construction Noise.

- (b) Operations

- i) Activities Within Area B

The noise level (L_{Aeq}) at any point outside the 55 dB and 50 dB control boundaries shown in Plan 2 (copy attached in Appendix E) arising from mining and related activities when measured within or close to the boundary of any residentially zoned site or the notional boundary of any occupied dwelling in the Rural Zone not owned by the Company or not subject to an agreement with the Company or related Company shall not exceed the limits specified below:

		55 dB Control Boundary	50 dB Control Boundary
Monday – Friday	0700-2100	55 dB	50 dB
Saturday	0700-1200	55 dB	50 dB
All other times		40 dB	40 dB

In the event that a property is sold and ceases to be subject to an agreement between the consent holder (or related Company) and the purchaser, or in the event that there is no

longer an agreement between the consent holder (or related Company) and the landowner, the location for the measurement of noise shall revert to being within or close to the boundary of that residentially zoned site or the notional boundary of the occupied rural site.

ii) Activities Within Areas C & D

The noise level (L_{Aeq}) measured within or close to the boundary of any Residential or Low Density Residential zoned site, or the notional boundary of any occupied rural dwelling site within the Rural zone not owned by the Company or not subject to an agreement with the Company or related Company shall not exceed the following limits:

Monday – Friday	0700-2100	55 dB
Saturday	0700-1200	55 dB
All other times		40 dB

In the event that a property is sold and ceases to be subject to an agreement between the consent holder (or related Company) and the purchaser, or in the event that there is no longer an agreement between the consent holder (or related Company) and the landowner, the location for the measurement of noise shall revert to being within or close to the boundary of that residentially zoned site or the notional boundary of the occupied rural site.

iii) Activities Within Areas E, F, H, I, & K

The provisions of Rule 8.3.1.3 of the Operative Hauraki District Plan 2014 shall apply.

In considering the action to be taken as a result of any breach of the noise limits, Council shall have regard to the following factors:

- 1) The total time duration for which the noise exceeded the limit
- 2) The time of the day at which the breach occurred
- 3) Whether the breach occurred as a result of factors beyond the control of the consent holder or contractor
- 4) The amount by which the noise limit was exceeded
- 5) The likelihood that the breach will recur
- 6) The actions taken to prevent recurrence of the breach
- 7) Action taken to mitigate the noise and whether the best practicable option for the circumstances was adopted

For the purposes of 4) above, a breach of the noise limit by 5dB or less shall be considered marginal. The Council will seek an explanation of the reasons for a marginal breach, and will seek that action be taken to avoid a recurrence if practical. The Council will not take enforcement action in respect of a marginal breach to achieve compliance where this would impose unreasonable restrictions on mine operations, such breach being one that will not impose anything more than minor adverse effects upon the residential areas in the vicinity of the mine. The Council may pursue enforcement action if the breach persists unduly in the circumstances or if the best practicable option is not being adopted.

- (e) Noise shall be measured in accordance with the provisions of New Zealand Standard NZS6801:2008 Acoustics – Measurement of Environmental Sound and assessed in accordance with the provisions of NZS 6802:2008 Acoustics – Environmental Noise.

3.9 Monitoring and Reporting on Noise Levels

- (a) The consent holder shall at weekly intervals during construction activities (as defined in Condition 3.3) and at intervals not exceeding six (6) months during operational activities, assess and record representative noise levels generated by mining operations.
- (b) Representative noise levels during construction and operation activities shall be measured and assessed in accordance with the methods specified in Condition 3.8.
- (c) The consent holder shall, unless otherwise directed to do so by the Council following consultation with the consent holder, provide a summary report to the Council at the end of each February, May, August and November on the representative noise levels.
- (d) The consent holder shall prepare a Noise Management Plan. This Management Plan shall be submitted to and approved by Hauraki District Council. The objective of this plan is to detail the methods to be used to comply with condition 3.8.

B2 Drawings Referenced in Noise Conditions

Figure 12: EMMA Consent Plan 1 “Areas A to F, H, I & K (Condition 2.2)”

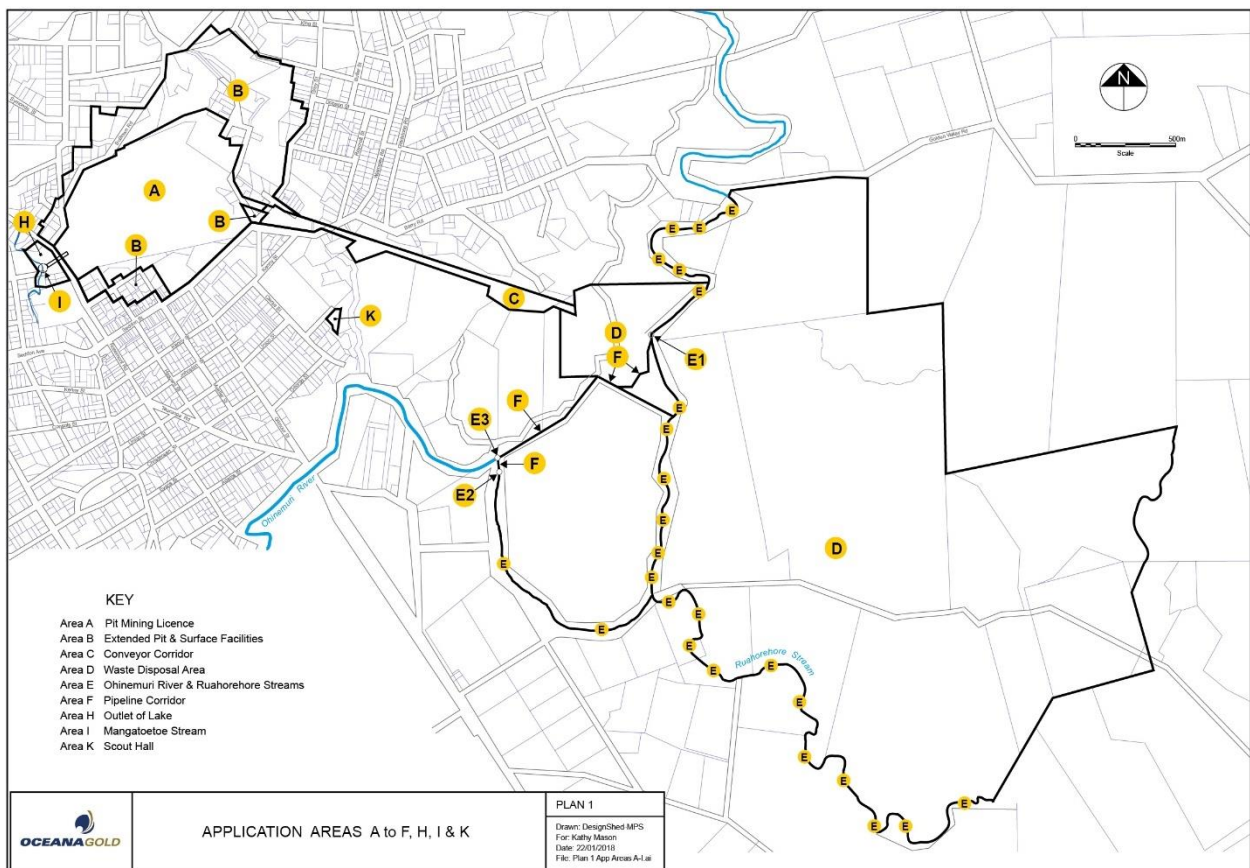
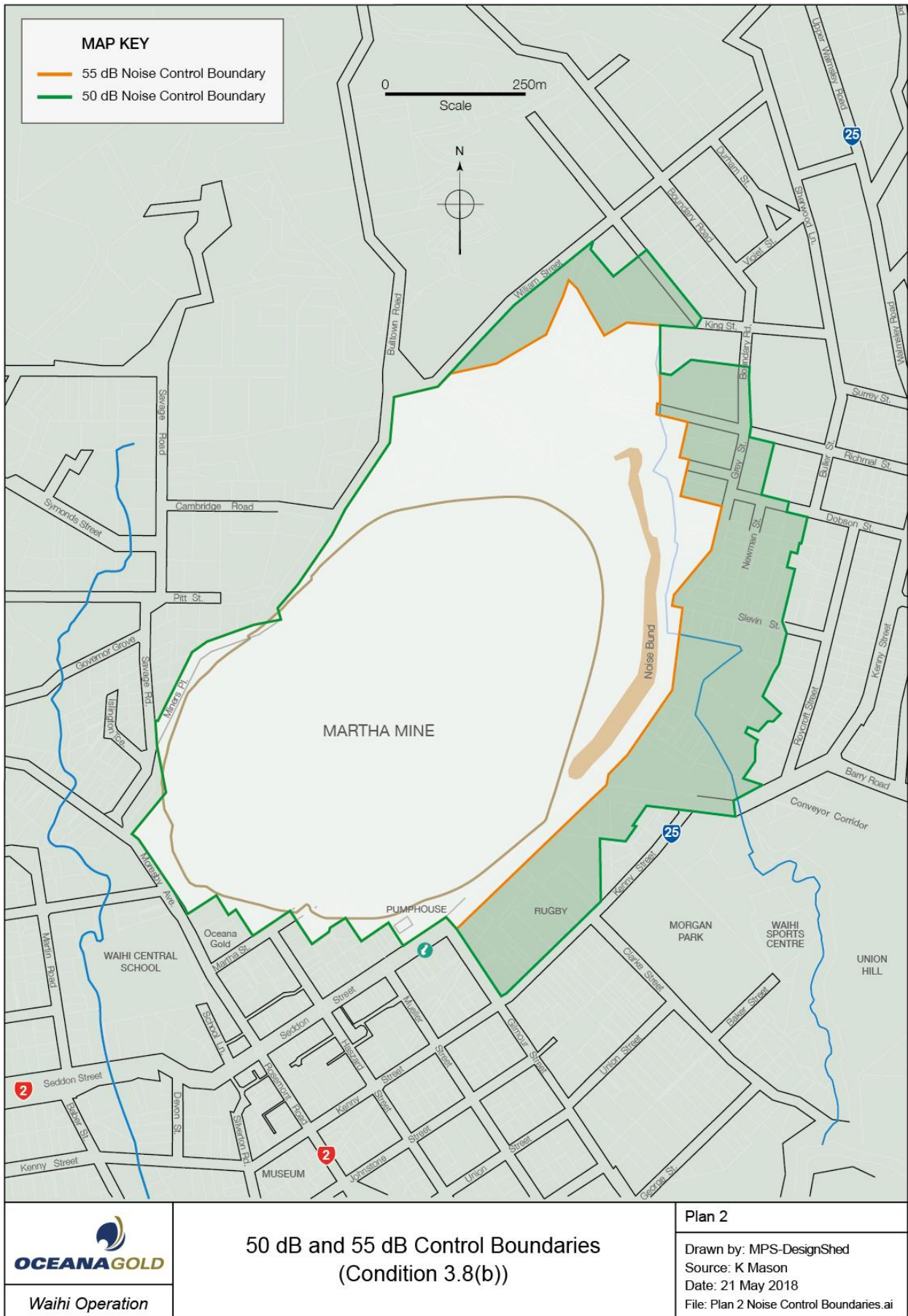


Figure 13: EMMA Consent Appendix E “Plan 2, 50 dB and 55 dB Control Boundaries (Condition 3.8(b)i)”



APPENDIX C PROJECT MARTHA CONSENT

CONSTRUCTION ACTIVITIES

- 14 The construction noise conditions in this consent apply to the following activities authorised as part of this consent:
- All works associated with the construction of the noise bund / fencing;
 - The construction of the cement aggregate fill plant;
 - The rehabilitation of the Martha Pit;
 - The construction of the intake structure, associated infrastructure and pipeline for the pit lake.
 - The construction of the outlet and discharge structure for the pit lake; and
 - The construction of the limestone addition plant for the pit lake.

NOISE

Construction Noise

- 15 All construction activities authorised by this consent shall not exceed the following noise limits within the boundary of Waihi Central School during the school term:

<i>Monday – Friday</i>	<i>L_{Aeq}</i>	<i>L_{AFmax}</i>
<i>0830 - 1500</i>	<i>55 dB</i>	<i>75 dB</i>

- 16 At all locations, including the Waihi Central School outside the times specified in Condition 15, all construction activities authorised by this consent shall not exceed the following noise limits:

<i>Monday – Friday</i>	<i>Saturdays</i>	<i>L_{Aeq}</i>	<i>L_{AFmax}</i>
<i>0630 - 0730</i>		<i>60 dB</i>	<i>75 dB</i>
<i>0730 - 1800</i>	<i>0730 – 1800</i>	<i>75 dB</i>	<i>90 dB</i>
<i>1800 - 2000</i>		<i>70 dB</i>	<i>85 dB</i>

- 17 At all other times, including Sundays and public holidays, the noise level from all construction activities authorised by this consent shall not exceed 40 dB L_{Aeq} .
- 18 Construction noise shall be managed, measured and assessed in accordance with New Zealand Standard *NZS6803:1999 Acoustics – Construction Noise*.
- 19 All construction noise shall be measured at any occupied dwelling* not owned by the consent holder or related company, or not subject to an agreement with the consent holder or related company.
- * ‘Occupied’ dwelling means any building or part of a building lawfully used for residential purposes.
- 20 The construction noise limits above shall not apply to any property or site that is:
- Owned by the consent holder or a related company; or
 - Owned by a third party which is subject to either a registered covenant or a written agreement (a copy of which is provided to the Council) whereby noise effects on the property caused by activities authorised under this consent are not to be taken into account for monitoring and compliance purposes.

- 21 The consent holder shall prepare a Noise Management Plan for certification by the Council. The objective of the Noise Management Plan is to provide detail on how compliance with Conditions 15 to 18 will be achieved for the duration the construction activities referred to in Condition 14.

As a minimum, the Noise Management Plan shall consider the requirements of Annex E of New Zealand Standard *NZS6803:1999 Acoustics – Construction Noise*, design limits, complaints procedures and noise monitoring. With respect to noise monitoring, the Noise Management Plan shall record that the company will assess and record representative noise levels on a weekly basis during construction activities and provide a summary report to the Council on a three-monthly basis.

The Noise Management Plan shall be submitted to the Council at least 20 working days prior to the first exercise of this consent. If certification is not provided within 20 working days of Council’s receipt of the Noise Management Plan activities authorised by this consent may commence. The Noise Management Plan may be reviewed and amended from time to time, subject to the certification of the Council but not in a manner inconsistent with these conditions.

Advice Note:

The Noise Management Plan may be prepared in conjunction with any Noise Management Plans prepared in accordance with the consent or permitted activity performance standards requirements applying to the consent holder’s other mines in the Waihi area.

Operational Noise

- 22 The noise level (L_{Aeq}) around the Martha Pit arising from mining and mining related activities shall not exceed the limits specified below:

Monday – Friday	0700 - 2100	50 dB
Saturday	0700 - 1200	50 dB
All other times		40 dB
Monday - Sunday	2100 - 0700	70 dB $L_{AF\ max}$

- 23 The noise level (L_{Aeq}) associated with the use of the cement aggregate fill plant, Favona portal and polishing pond stockpiles and the pit lake filling pipeline corridor shall not exceed the limits specified below:

Monday – Friday	0700 - 2100	55 dB
Saturday	0700 - 1200	55 dB
All other times		40 dB

- 24 Operational noise shall be measured in accordance with the provisions of New Zealand Standard *NZS6801:2008 Acoustics – Measurement of Environmental Sound* and assessed in accordance with the provisions of New Zealand Standard *NZS 6802:2008 Acoustics – Environmental Noise*.

- 25 All operational noise shall be measured at any occupied dwelling not owned by the consent holder or related company or not subject to an agreement with the consent holder or related company.

- 26 The operational noise limits shall not apply to any property or site that is:

- a. Owned by the consent holder or a related company; or
- b. Owned by a third party which is subject to either a registered covenant or a written agreement (a copy of which is provided to the Council) whereby noise effects on the property caused by activities authorised under this consent are not to be taken into account for monitoring and compliance purposes).

- 26A. The consent holder shall, unless otherwise directed to do so by Council following consultation with the consent holder, provide a summary report to the Council at the end of each three-month period from commencement of work to completion on the following:
- a. Results of the noise monitoring that is of direct relevance to the Martha Pit; and
 - b. All complaints received during the previous three-month period, action taken by the consent holder and the resolution (if any); and
 - c. Any other matters of concern raised with the consent holder.
- 27 The consent holder shall prepare a Noise Management Plan for certification by the Council. The objective of the Noise Management Plan is to provide detail on how compliance with Conditions 22 to 24 will be achieved for the duration the consent.

With respect to noise monitoring, the Noise Management Plan shall require that the company assess and record representative noise levels at intervals not exceeding six months during mining and related activities and provide a summary report following the completion of each monitoring event.

The Noise Management Plan shall be submitted to the Council at least 20 working days prior to the first exercise of this consent. If certification is not provided within 20 working days of Council's receipt of the Noise Management Plan activities authorised by this consent may commence. The Noise Management Plan may be reviewed and amended from time to time, subject to the certification of the Council but not in a manner inconsistent with these conditions.

Advice Note:

The Noise Management Plan may be prepared in conjunction with any Noise Management Plans prepared in accordance with the consent or permitted activity performance standards requirements applying to the consent holder's other mines in the Waihi area.

APPENDIX D NOISE SURVEY DETAILS

The key details of the noise monitoring programme are as follows:

Personnel: Lodewyk Jansen, Marshall Day Acoustics (deployment and retrieval).

Instrumentation: See Table 10 below. Example photographs are also provided below.

Calibration: Field calibration of the equipment was carried out before measurements, and the calibration checked after measurements. Observed change less than 0.1 dB.

Weather History: Recorded public data for “Five Oaks Kingsley Rd - IWAHI15” station overleaf in Figure 15.

Table 10: Survey details for each Measurement Position

	MP1	MP2	MP3	MP4	MP5	MP6	
Details	Address	26 Islington Tce	14 Roycroft St	126 Clarke St	28 Russell St	34 Heath Rd	131 Trig Rd Nth
	Coordinates	37° 23' 12 S 175° 50' 15 E	37° 23' 3 S 175° 51' 7 E	37° 23' 23 S 175° 50' 51 E	37° 23' 19 S 175° 50' 7 E	37° 23' 43 S 175° 51' 17 E	37° 24' 27 S 175° 53' 53 E
	Start	30/07/20 10:40	30/07/20 14:55	30/07/20 11:20	30/07/20 11:45	30/07/20 12:55	30/07/20 12:55
	Stop	02/08/20 23:50	14/08/20 12:35	20/08/20 10:15	20/08/20 09:45	14/08/20 12:50	20/08/20 08:50
Equipment	Model	01dB CUBE	01dB DUO	01dB DUO	B&K Type 2250	01dB CUBE	01dB CUBE
	Serial No.	11186	10863	10862	3025096	10702	10420
	Calibration	19/12/21	25/09/22	06/06/21	27/11/21	15/08/21	17/06/21

Figure 14: Example photographs of loggers installed at MP1 (right) and MP3 (left)



Figure 15: Weather history for August 2020 (which covers most survey days)

August 1, 2020 - August 31, 2020

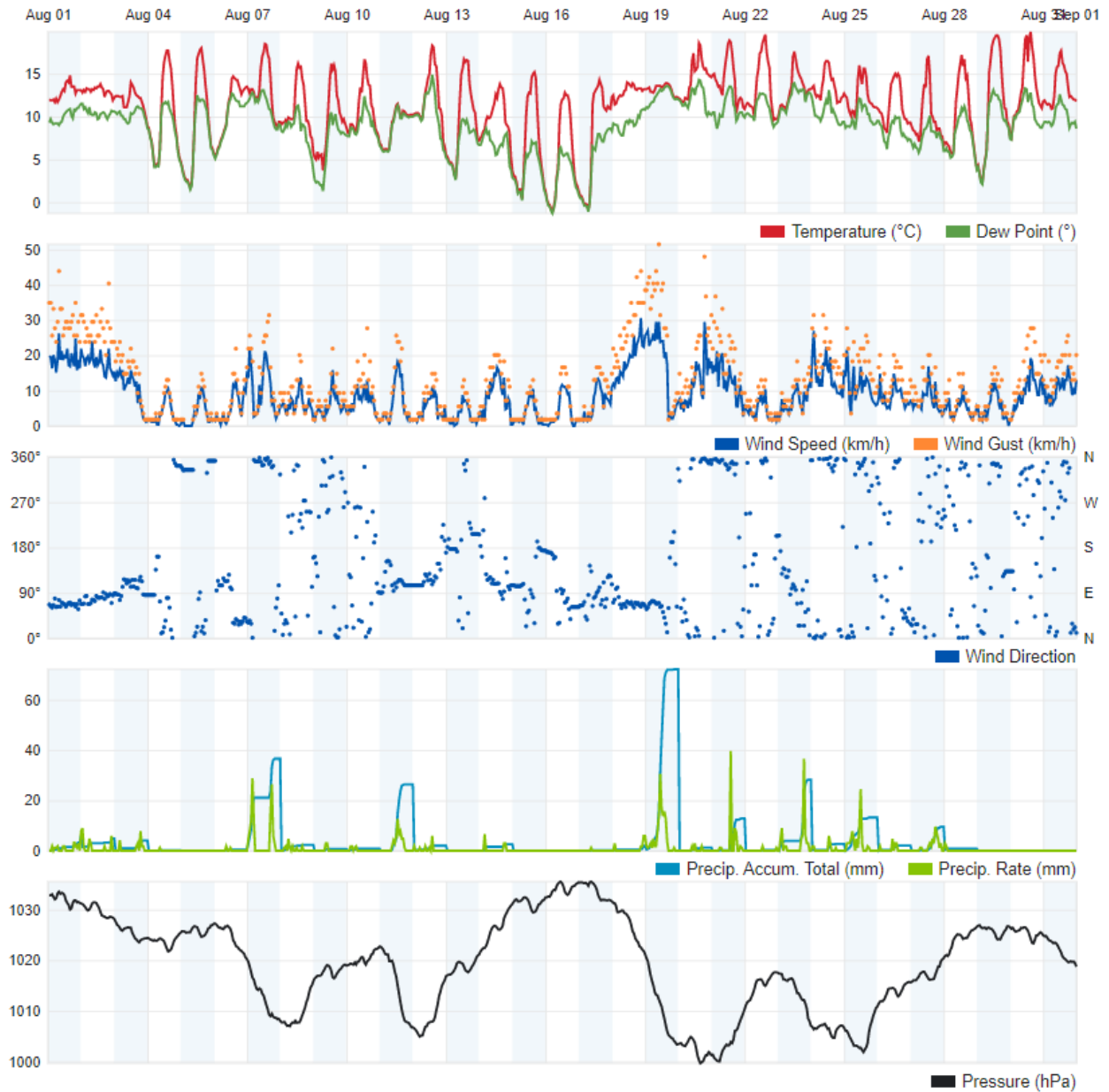


Figure obtained from: <https://www.wunderground.com/dashboard/pws/IWAIHI15/graph/2020-08-2/2020-08-2/monthly>

APPENDIX E MEASURED AMBIENT NOISE LEVELS

Figure E 1: Time history of measured noise levels at 2 Islington Terrace (MP1), w/c 30 July 2020

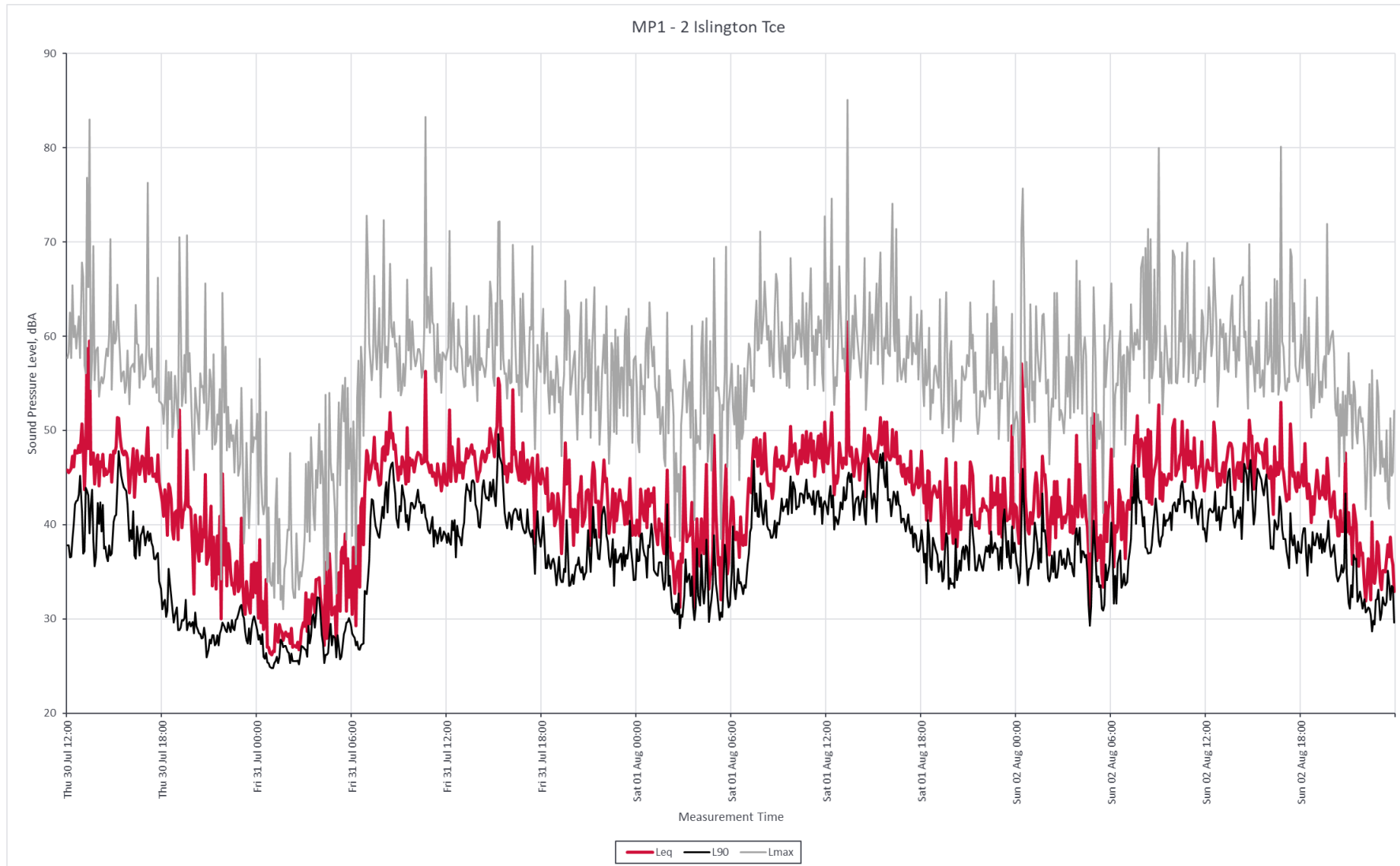


Figure E 2: Time history of measured noise levels at 14 Roycroft St (MP2), w/c 30 July 2020

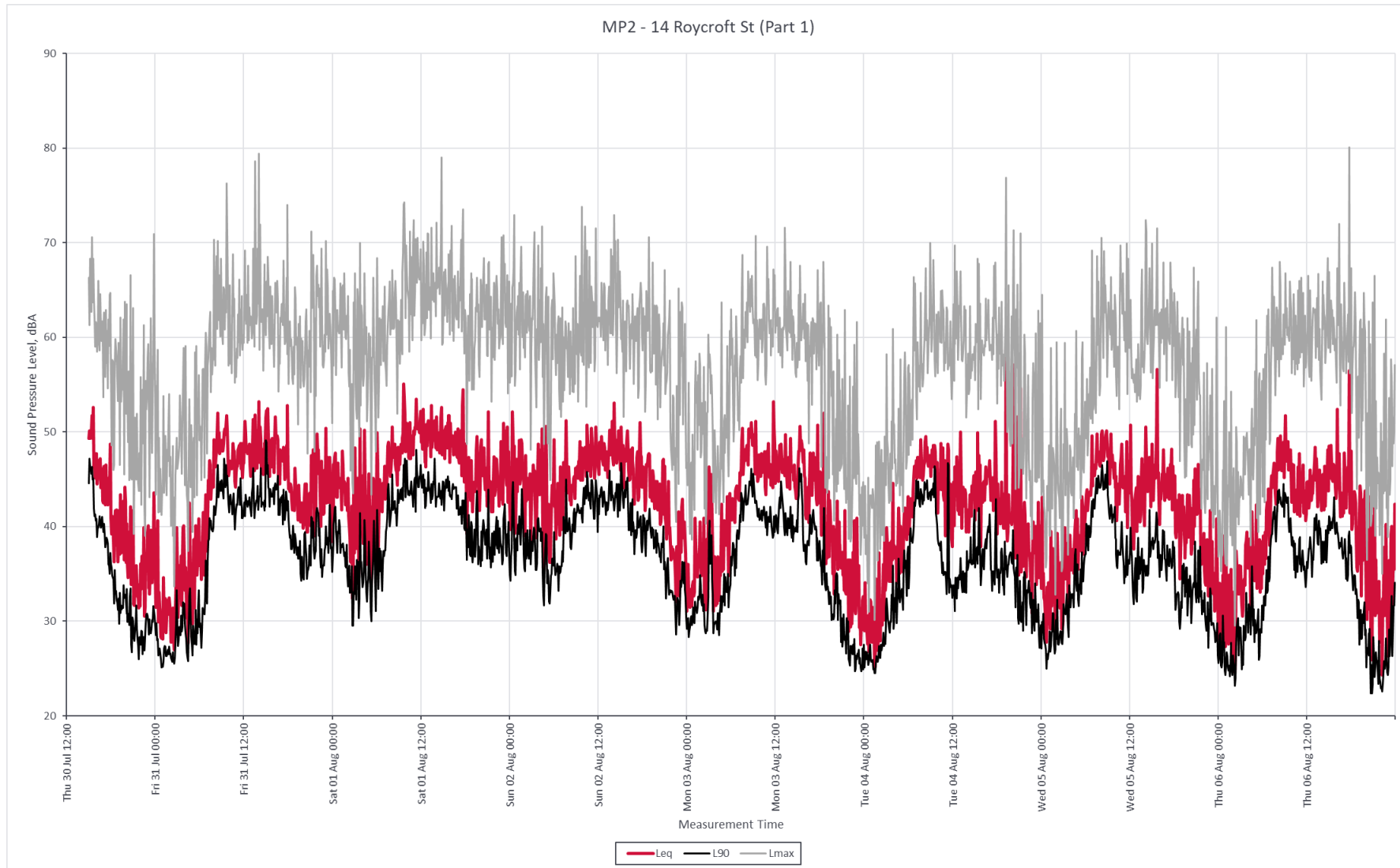


Figure E 3: Time history of measured noise levels at 14 Roycroft St (MP2), w/c 7 August 2020

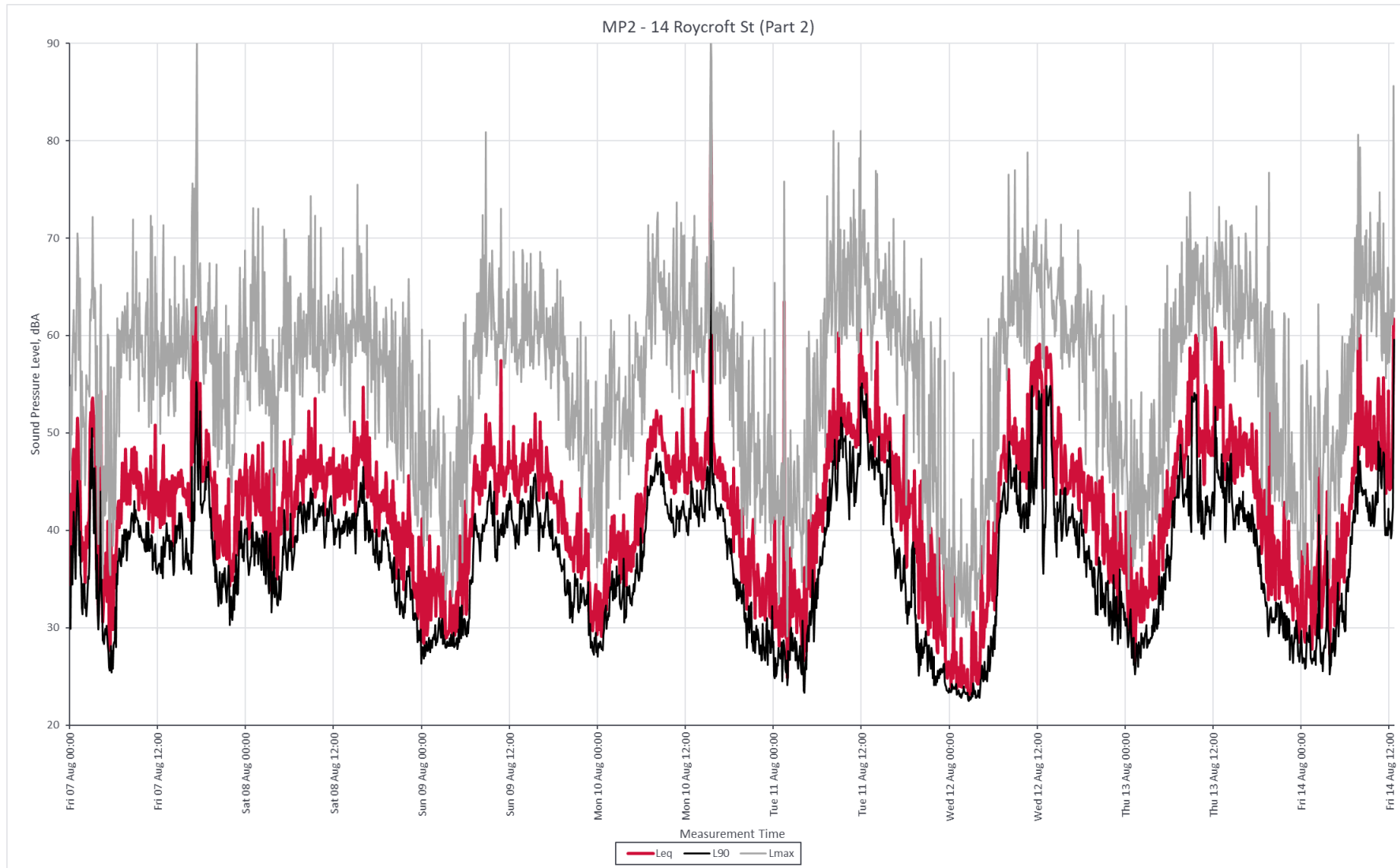


Figure E 4: Time history of measured noise levels at 126 Clarke St (MP3), w/c 30 July 2020

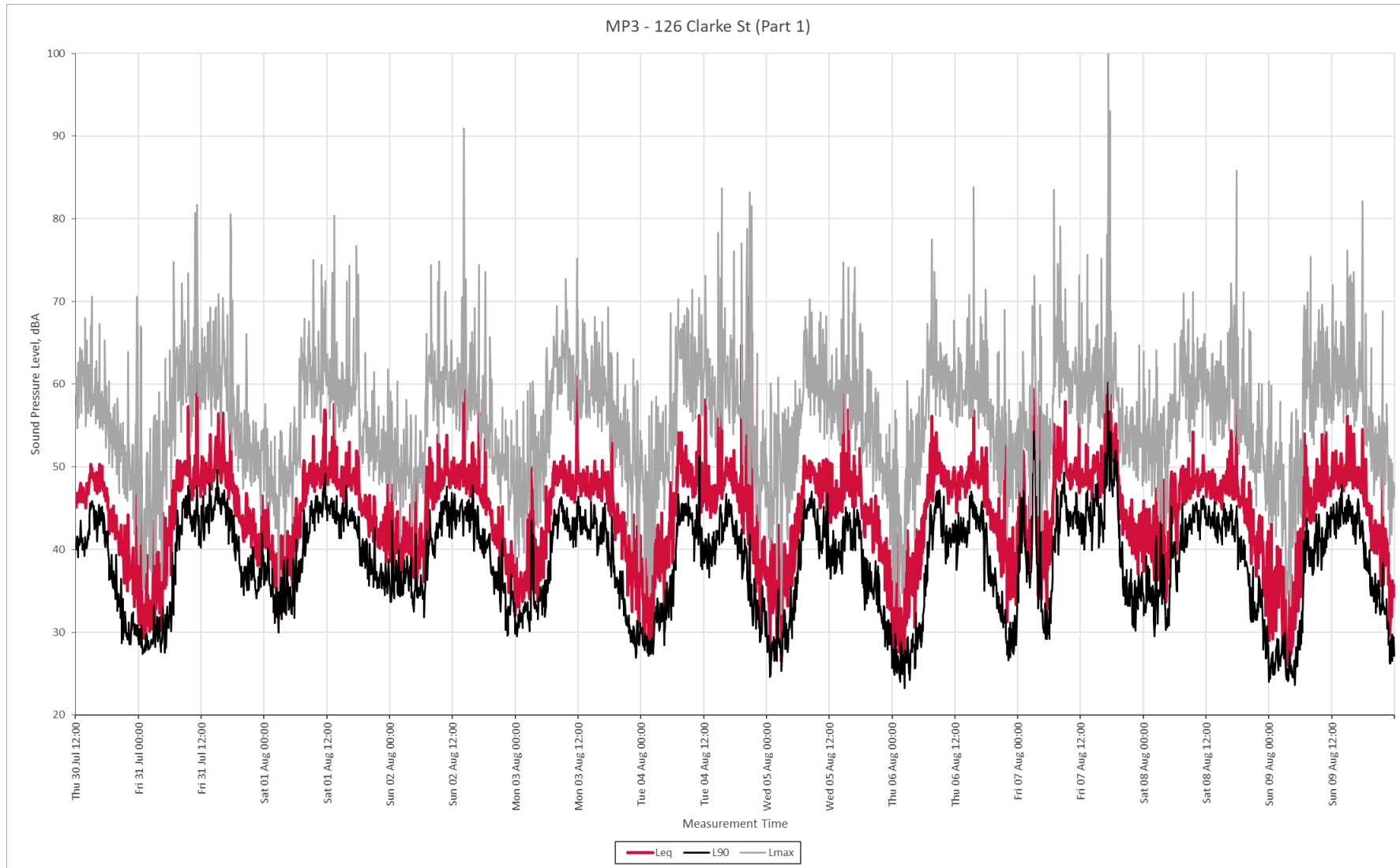


Figure E 5: Time history of measured noise levels at 126 Clarke St (MP3), w/c 7 August 2020

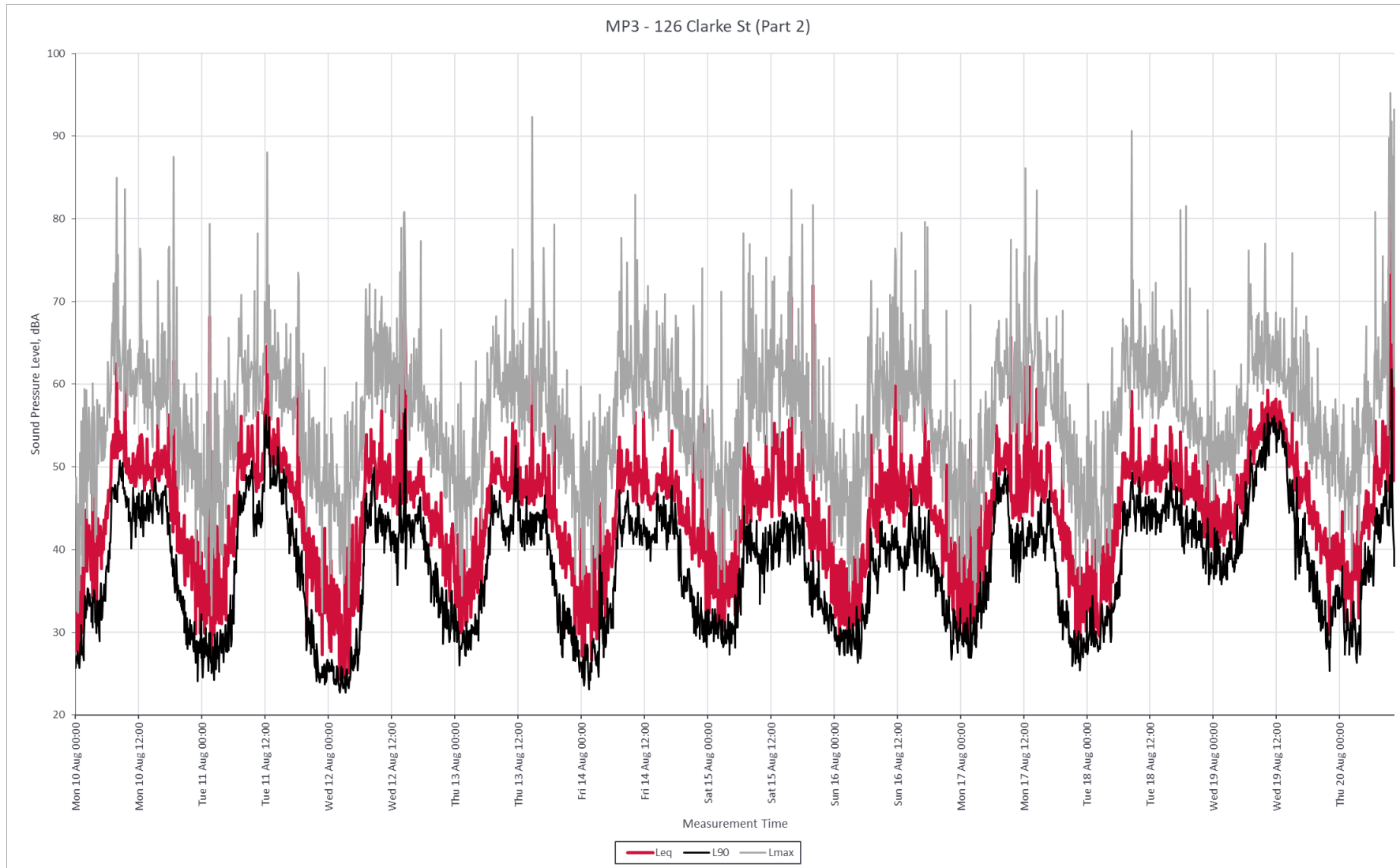


Figure E 6: Time history of measured noise levels at 28 Russell St (MP4), w/c 30 July 2020

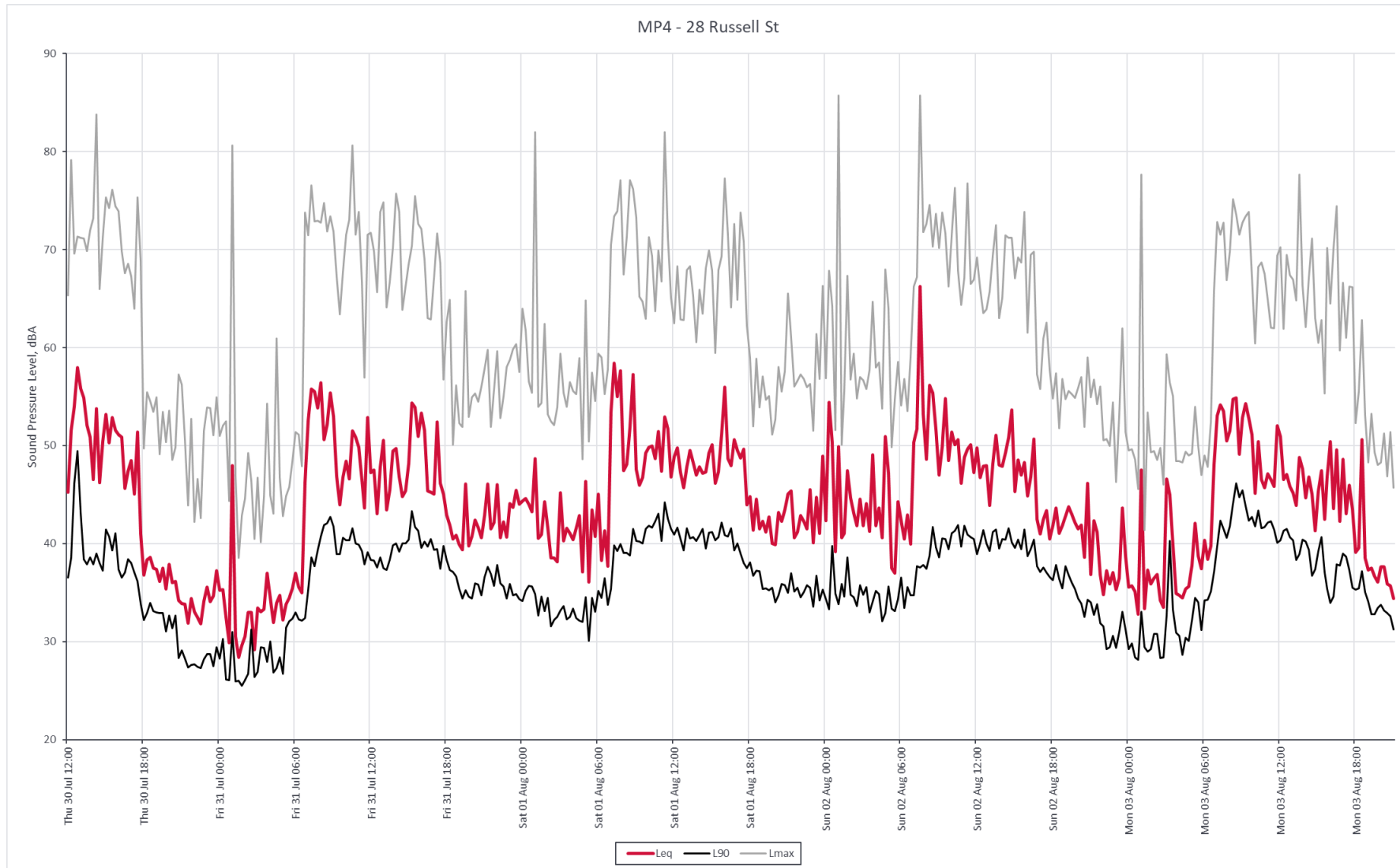


Figure E 7: Time history of measured noise levels at 34 Heath Rd (MP5), w/c 30 July 2020

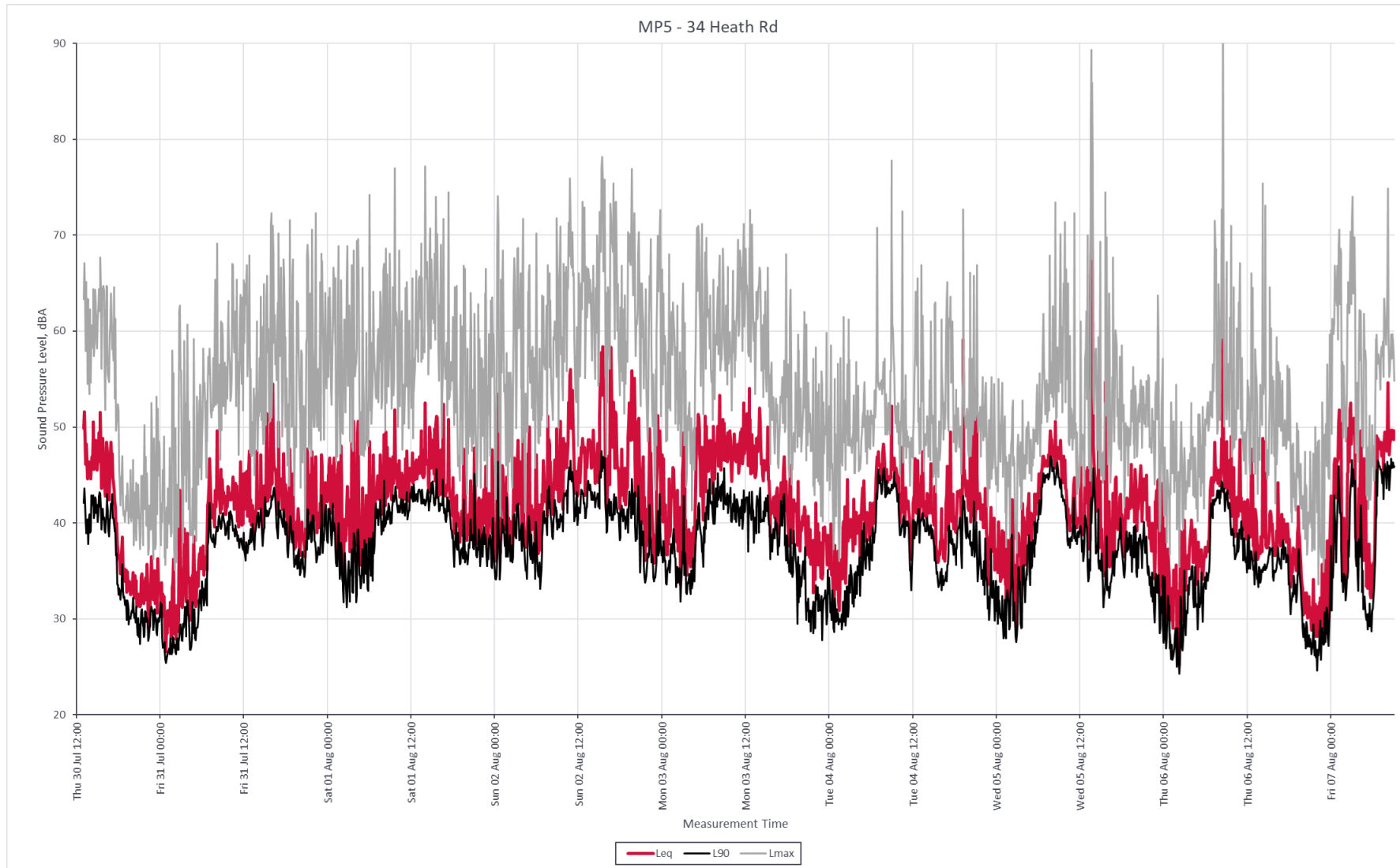


Figure E 8: Time history of measured noise levels at 131 Trig Rd North (MP6), w/c 30 July 2020

