MARSHALL DAY Acoustics

UNDERHILL ROAD AGGREGATE PROCESSING NOISE COMPLIANCE ASSESSMENT

Rp 001 R02 20201133 | 6 April 2021

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Project: **UNDERHILL ROAD AGGREGATE PROCESSING**

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1.0 INTRODUCTION

PJ Warren Earthmovers Ltd proposes to carry out aggregate processing and stockpiling at Underhill Road, Featherston. Marshall Day Acoustics has been engaged by Russell Hooper Consulting on behalf of PJ Warren Earthmoving to predict the potential noise generated by these activities. The noise predictions are to be compared against guideline noise limits. These guideline limits have been established using the noise standards of the Wairarapa Combined District Plan ("the District Plan").

Russell Hooper Consulting has informed us that PJ Warren Earthmovers has obtained written consent for this proposal from some neighbours within the immediate vicinity of the processing site. In accordance with the Resource Management Act 1991 ('RMA') section 95D (e), the consent authority must disregard any effect on a person who has given written approval to this application.

A noise compliance assessment is required for neighbouring properties which have not provided written approval.

This assessment is based on the following documents:

- Russell Hooper Consulting Ltd "*Site Plans*" dated January 2021;
- Russell Hooper Consulting Ltd sketch showing schematic work area layout, received 29 March 2021;
- Wairarapa Combined District Plan Part A-Environmental Zones, section 4.5.2.
- *"McCloskey R105 & Pegson Metrotrak Noise Levels[5]"*

Further information has been obtained by communication with Russell Hooper Consulting Ltd and PJ Warren Earthmovers Ltd.

A glossary of relevant acoustical technical terms is contained in Appendix A.

2.0 SITE DESCRIPTION AND NEIGHBOURING PROPERTIES

2.1 Processing Site and Assessment Locations

The proposed processing site is located approximately 3km northeast of the Featherston township. Locations of the closest dwellings for which consent has not been obtained have been identified by Russell Hooper Consulting. These are:

- 355 Underhill Road
- 43 Bucks Road
- 10 Algies Road
- 17 Algies Road
- 36 Algies Road

Note that although the stakeholders at 391 and 471 Underhill Road have provided consent for this proposal, we have included these dwellings within our assessment.

Properties located at greater distances from the subject site may also be exposed to noise from its operation, but noise levels would be less than for the properties considered in this assessment. This reduction is due to additional attenuation from increased distances, ground absorption, and screening due to intervening terrain.

Figure 1 shows the approximate location of the subject site (outlined in blue), the primary crushing location and assessment locations.

Figure 1: Approximate location of subject site (blue outline) and dwellings within this assessment (*Base image: LINZ)*

2.2 District Plan Zoning

The processing site and all receiver locations are zoned Rural (Primary Production) within the Wairarapa Combined District Plan. Figure 2 shows the subject site within the context of the District Plan zoning.

Figure 2: Subject site (approx. location outlined in blue) and surrounds zoning within the Wairarapa Combined District Plan. (*Base image: Wairarapa GIS)*

3.0 PROPOSED ACTIVITY

PJ Warren Earthmovers proposes to process soil and gravel excavated from the site for various purposes including as roading aggregate. Figure 1 shows the general proposed site layout.

The aggregate excavation and screening would take place incrementally across the site, with each area of extraction being a strip approximately 180 metres by 30 metres. As each work area strip is completed, another would be commenced.

We understand the primary tasks include excavation of top-soil, screening and stockpiling extracted material, and crushing and stockpiling of screened material. The screener would operate as near as possible to the location of excavation, and the screened aggregate material would then be transported to the on-site crushing area, marked as "*Primary crushing location*" as shown in Figure 1. Processed material will be carted from the site by truck and trailer units. During peak times, there may be up to 100 truck-and-trailer movements per day.

The hours of operation for crushing and screening would be 8:00am to 5:00pm Monday to Friday with trucks carting material off site from 7:00am to 5:00pm Monday to Friday.

4.0 ACOUSTIC PERFORMANCE STANDARDS

At this stage, the legislative status of the combined activities of extraction, screening and crushing aggregates on this site is not clear to us. In any event, there is a general obligation in terms of Section 16 of the RMA which, in summary, states that an activity shall adopt the best practicable option (BPO) to ensure that the emission of noise does not exceed a reasonable level.

In forming an opinion on what would constitute a "reasonable noise level" for an activity such as this, we consider the permitted activity noise criteria within the District Plan to provide appropriate guideline criteria.

Chapter 4.5.2 of the District plan states that noise arising from a permitted activity shall not exceed the following noise levels at or within the notional boundary of any residence within the rural zone, except for dwellings on the same site as the activity:

55dBA L_{10}	7.00am – 7.00pm
45dBA L_{10}	7.00pm – 7.00am
75dBA L_{max}	9.00pm – 7.00am

The District Plan requires that in this context, noise is measured in accordance with New Zealand Standard NZS 6801:1991 "*Measurement of Sound*" and assessed in accordance with New Zealand Standard NZS 6802:1991 "*Assessment of Environmental Sound*".

4.1 Notional Boundary

The notional boundary is defined in the Wairarapa Combined District Plan as a line 20 metres from the façade of any habitable dwelling used for residential purposes, or the legal boundary where this is closer to the dwelling.

4.2 Guideline Noise Limit

As noted, the operational hours for the truck movements, and operation of the screener and crusher, would be 7am to 5pm, Monday to Friday. Consequently, we have adopted a guideline noise limit of **55dBA L_{10}**.

5.0 SITE ACTIVITY NOISE

5.1 Plant Items Considered for this Assessment

The plant items proposed to be used on this site (as informed by Russell Hooper Consulting Ltd), and their corresponding sound power levels, are outlined in this section of this report.

The manufacturers operational noise data for the crushing plant and screening plant have been provided to us by PJ Warren Earthmovers. Noise data for other items of plant used in this assessment have been obtained from noise measurements of similar equipment, carried out by us.

The plant items and their corresponding sound power levels (L_{WA}) used in this assessment are as follows:

- McCloskey 105 Screen: L_W 116 dBA;
- Pegson Metrotrak 900 x 600 Crusher: L_W 114 dBA;
- Wheeled loader: L_W 107 dBA;
- Tracked excavator 20 – 30 tonne: L_W 107 dBA;
- Dump truck: L_W 107 dBA;

- Truck and trailer units accessing and departing from the site: L_W 104 dBA.

5.2 Best Practicable Option

5.2.1 Special Audible Characteristics

Where a sound has a distinctive character which may affect its acceptability within a community, then a reduction of 5 dB may be applied to the noise standard, in accordance with Sections 4.4 and 4.5 of NZS 6802: 1991. Such characteristics would include the sound being noticeably impulsive or tonal.

For an activity such as this, possible special audible characteristics (SAC) include noise from reversing beepers, track squeal from tracked equipment, or tailgates banging.

The following noise mitigation should be implemented to ensure that the risk of application of the SAC penalty is avoided, and ensure that BPO is taken to reduce operational noise emissions as far as practicable:

- Ensure that equipment is properly maintained;
- Mitigate track squeal from tracked equipment (may include tensioning and watering or lubricating the tracks regularly)
- The access route and any other vehicle paths that are developed on the site should be maintained and kept free of potholes etc. to minimise truck noise;
- Loading/unloading techniques to minimise the banging of tailgates;
- The processed material (particularly the first loads) should be carefully placed into the truck & trailer trays, rather than "dumped" from a height above the tray;
- Avoid tonal reversing or warning alarms (suitable alternatives may include flashing lights, broadband audible alarms or reversing cameras inside vehicles).

5.2.2 Noise Mitigation Bunding

P. J. Warren Earthmovers has stated that they will install localised noise mitigation bunding around each 180 metre x 30 metre "strip" as required to enable compliance with the guideline noise limit. We consider this bunding to be a component of taking BPO to avoid unreasonable noise, in accordance with Section 16 of the RMA.

To manage the site activity noise to remain within the guideline noise limit, the location and height of the bunding would be determined by the locations of the potentially affected dwellings. This is discussed further in Section 5.3 of this report.

5.3 Noise Modelling

We have calculated the noise emissions from site activities in accordance with ISO 9613-2: 1996 as implemented in SoundPLAN® environmental noise modelling software. ISO 9613-2 considers a range of frequency dependent attenuation factors, including propagation distance, atmospheric absorption, ground effect, reflections and acoustic screening.

Site activities as described in Section 3.0 have been considered using the plant described in Section 5.1. Truck and trailer movements extend from the site access road intersection with Underhill Road to the primary crushing location, returning on that same route.

From the noise data provided, we have identified the crusher and the screening plant as being the noisiest items that would be operated on this site. As noted in Section 3, the screener would operate as near as possible to the location of excavation, and the screened aggregate material would then be transported to the on-site crushing area, marked as "*Primary crushing location*" as shown in Figure 1.

Figure 3 shows a schematic layout of a typical 30m x 180m "strip" that would be located within the larger subject site. Figure 4 shows a schematic layout of the 30m x 180m "strip" with bunding as required.

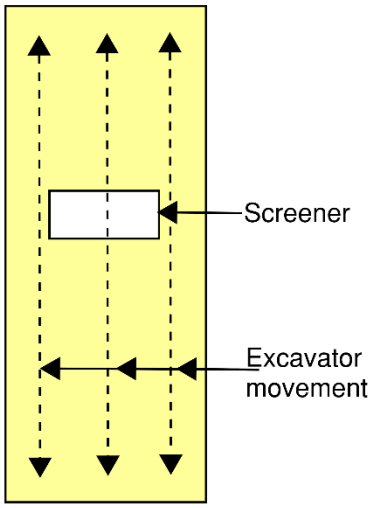

Figure 3: 30m x 180m working area within the subject site.

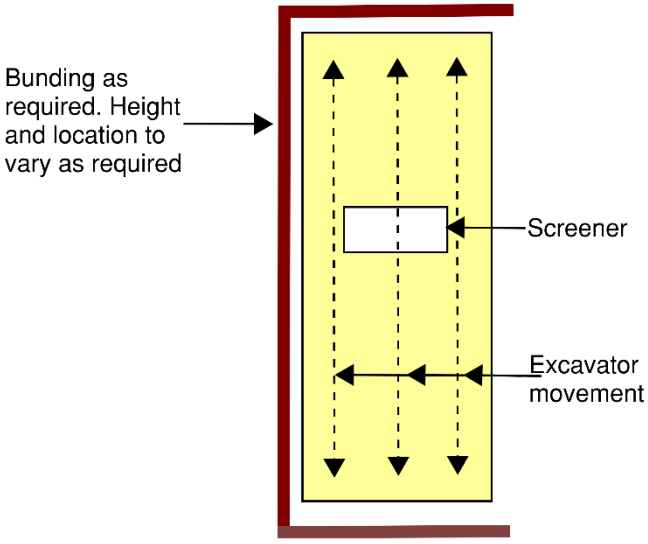

Figure 4: 30m x 180m working area with bunding (location to be determined as required)

Within this assessment, we have considered three operational scenarios. Each of these considers all site operations (excavation, screening, crushing, truck movements) to occur simultaneously. These scenarios are as follows:

- Bunding 3 metres high;
- Bunding 2 metres high;
- No bunding.

5.4 Compliance with Guideline Noise Limits

Figure 5 shows an outline of the extent of the available excavation and screening area for each scenario discussed below. In all scenarios, no works should occur within the blue shaded areas of Figure 5.

5.4.1 Bunding location

To be effective in mitigating noise, any bunding should be positioned as close as possible to the activity and interrupt the line of sight between the noise source and the receiver. Note that as the reduced level (RL) of each work strip area is lowered, the effective height of any bunding increases. As a consequence, the bunding would become a more effective noise barrier as the RL is lowered.

Where there is any doubt by the site operator on suitable bunding locations, then clarification should be sought from us.

5.4.2 Bunding 3 metres in height

In order to remain within the 55 dBA L_{10} guideline noise limit, excavations and screening should not take place any closer than 200 metres from any dwelling.

5.4.3 Bunding 2 metres in height

In order to remain within the 55 dBA L_{10} guideline noise limit, excavations and screening should not take place any closer than 250 metres from any dwelling.

5.4.4 No bunding

In order to remain within the 55 dBA L_{10} guideline noise limit, excavations and screening should not take place any closer than 300 metres from any dwelling.

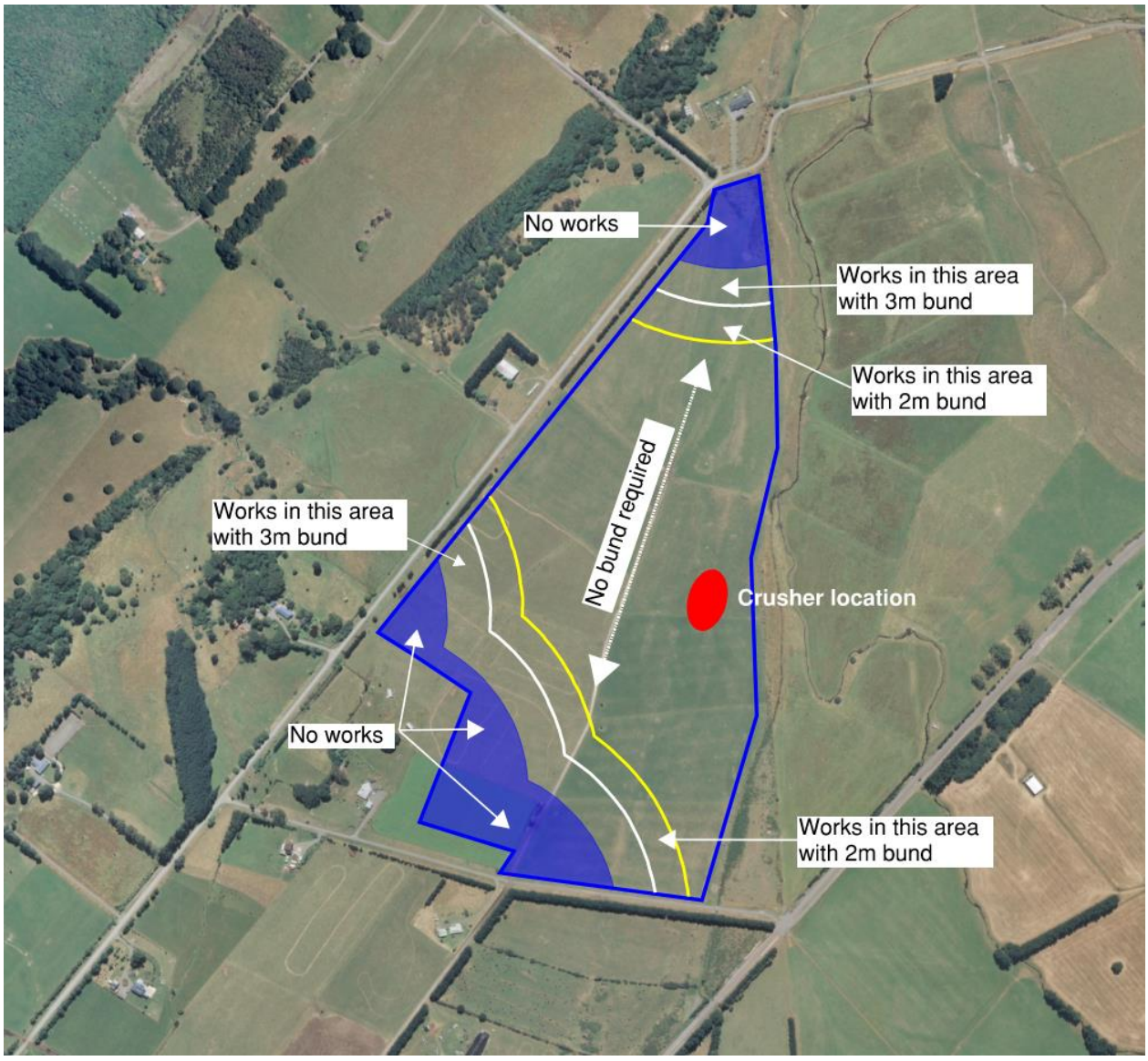

Figure 5: Extent of works (no works to occur in blue shaded areas) available. (*Base image: Wairarapa GIS)*

6.0 CONCLUSION

PJ Warren Earthmovers Ltd proposes to carry out aggregate processing and stockpiling at Underhill Road, Featherston.

We have assessed the noise resulting from all on-site activities, including from the screening and crushing operations. We conclude that the implementation of the general noise mitigation measures as discussed in Section 5.2.1 of this report, combined with the bunding as discussed in Section 5.2.2 of this report, would ensure that the BPO has been taken to ensure that the operational noise would not exceed a reasonable level.

With the implementation of these BPO measures, and with site activities taking place within the operational parameters set out in Section 5.4 of this report, we conclude that noise from the site would remain within the established 55 dBA L_{10} guideline noise limit.

APPENDIX A GLOSSARY OF TERMINOLOGY

Noise	A sound that is unwanted by, or distracting to, the receiver.
dB	Decibel (dB) is the unit of sound level. Expressed as a logarithmic ratio of sound pressure (P) relative to a reference pressure (Pr), where dB = 20 x log(P/Pr).
dBA	The unit of sound level which has its frequency characteristics modified by a filter (A-weighted) to more closely approximate the frequency bias of the human ear. A-weighting is used in airborne acoustics.
SPL or L_p	Sound Pressure Level: A logarithmic ratio of a sound pressure measured at distance, relative to the threshold of hearing (20 µPa RMS) and expressed in decibels.
SWL or L_w	Sound Power Level: 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.
L_{10}	The noise level equalled or exceeded for 10% of the measurement period. This is commonly referred to as the average maximum noise level.
NZS 6801:1991	New Zealand Standard NZS 6801:1991 "Measurement of Sound"
NZS 6802:1991	New Zealand Standard NZS 6802:1991 "Assessment of Environmental Sound"