CHAPTER 9 NOISE

9.1 INTRODUCTION

Noise and Vibration Consultants Ltd was commissioned by Boliden Tara Mines DAC (BTM) to undertake the Noise Chapter of Environmental Impact Assessment Report (EIAR). The development refers to the proposed buttressing works to be undertaken on sections of the dam walls of the Randalstown Tailings Storage Facility (TSF). These works are proposed to be undertaken with a view to increasing the Factor of Safety (FoS) associated with the dam walls.

9.1.1 Statement of Authority

This chapter of the EIAR has been prepared by Mr. Brendan O'Reilly of Noise and Vibration Consultants Ltd. Brendan has a master's degree in noise and vibration from Liverpool University and has over 40 years' experience in noise and vibration control, many years' experience in preparation of noise impact statements and has been a member of a number of professional organisations including SFA, ISEE and IMQS, Brendan was a co-author and associate consultant in the EPA, 2003 'Environmental Quality Objectives, Noise in Quiet Areas'. Brendan has successfully dealt with all noise aspects of BTM's construction and operation of the various stages of TSF development between 1974 and 2012 including setting up continuous noise and vibration monitoring systems around the BTM mine site in 1974.

9.1.2 Aim of Report

The report assesses the noise aspects of the proposed development which are:

- Construction and Road Traffic
- Operation
- Decommissioning

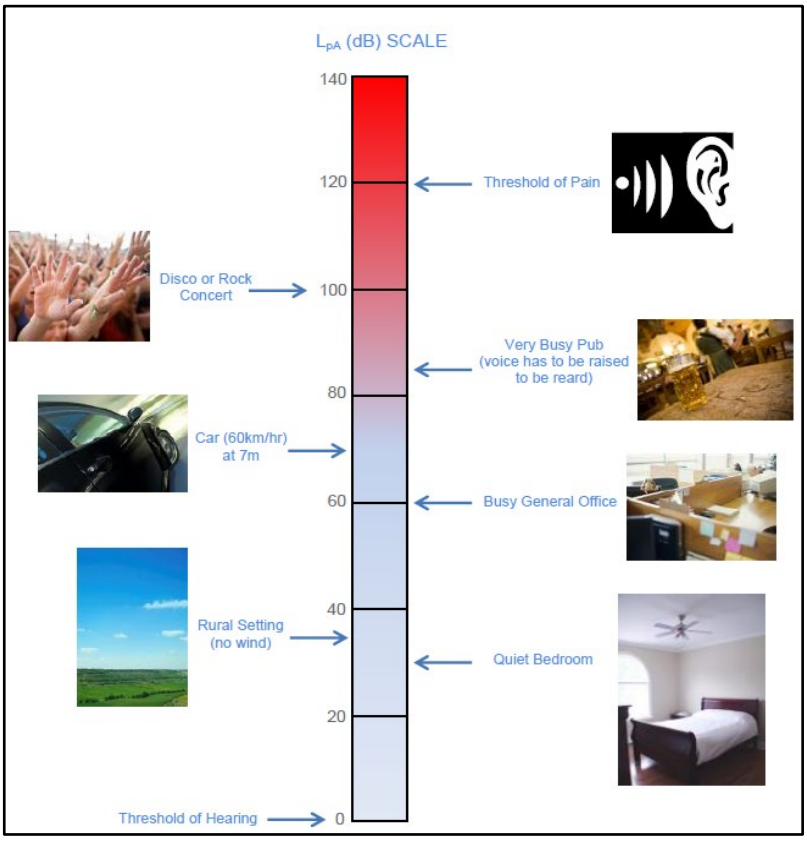
9.1.3 Acoustic Terminology

Sound is simply the pressure oscillations that reach our ears. These are characterised by their amplitude, measured in decibels (dB), and their frequency, measured in Hertz (Hz). Noise is unwanted or undesirable sound, it does not accumulate in the environment, is transitory, fluctuates, and is normally localised. Environmental noise is normally assessed in terms of A-weighted decibels, dB (A), when the 'A weighted' filter in the measuring device elicits a response which provides a good correlation with the human ear. The criteria for environmental noise

control are of annoyance or nuisance rather than damage. In general, a noise level is liable to provoke a complaint whenever its level exceeds by a certain margin, the pre-existing noise level or when it attains an absolute level. A change in noise level of 3 dB (A) is 'barely perceptible', while an increase in noise level of 10 dB (A) is perceived as a twofold increase in loudness. A noise level in excess of 85 dB (A) gives a significant risk of hearing damage. Construction and industrial noise sources are normally assessed and expressed using equivalent continuous levels, LAeq[1] often referred to as 'ambient sound.' LA90 is the A-weighted sound level, which is equalled or exceeded for 90% of the sample period and is defined as the background noise level. LA10 is the A-weighted sound level, which is equalled or exceeded for 10% of the sample period and is defined as the background noise level. Table 9.1 lists indicative noise levels in dB(A) for various noise sources.

Sound Power Level (L_{WA} dB) is a measure of the acoustic energy emitted from a source of noise, expressed in decibels. Sound power level refers to the source and sound pressure level is measured by a sound level meter at a distance from a source. **Table 9.1** lists indicative noise levels in dB(A) for various noise sources

Table 9.1: L_{PA} (dB) scale and indicative noise levels



[1] L_{Aeq} is defined as being the A-weighted equivalent continuous steady sound level that has the same sound energy as the real fluctuating sound during the sample period and effectively represents a type of average value.

9.2 CHARACTERISTICS OF PROPOSED DEVELOPMENT

It is proposed to construct a reinforcement buttress to the extant embankment walls of the TSF. The development works will consist of the construction of a rockfill and earthen reinforcement buttress to sections of the extant embankment walls of the TSF. The proposed buttress to be constructed on the downstream slope at the crest of the Stage 1, 2 and 3 starter embankments will provide additional support to the embankment walls and increase the overall stability of the extant upstream raises for Stage 4 and Stage 5. Figure 9.1 shows a cross section of the existing facility embankment with proposed buttress. The proposed development will not increase the footprint nor the overall height of the extant structure (refer to **Chapter 3** for a more detailed description of construction).

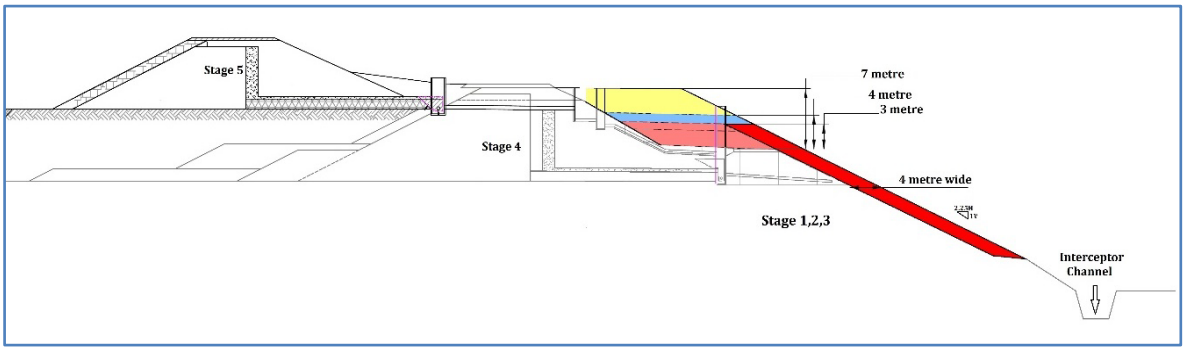


Figure 9.1 Cross section of facility embankment with proposed buttress

9.2.1 Construction Phase

The proposed buttress will be developed in two phases:

- Phase 1 works involves widening the embankment of Stage 4
- Phase 2 works involves widening the embankment of Stages 1, 2 and 3.

Road construction traffic to the site will be generated by importation of materials. The approximate quantity of construction material[2] required on site will be in the order of:

- 265,700m^3 Rockfill – this will be sourced from mine waste rock or third-party quarries;
- 295,650m^3 Soil – this will be imported from third party construction sites where it is surplus to requirements (subject to under Article 27 By-Product approval by EPA).

[2] All construction material will be sourced and imported in accordance with the Company's IEL.

There are 3 construction options proposed for the Buttress Development ranging from 1.5-year duration (Option A) to 3-year duration (Option C). Option B is 2-year duration.

Option A is assessed as construction over a 1.5-year period results in higher intensive activity thereby resulting in more elevated noise levels. If Option A is within the guideline limits than the other options will also be within those same limits.

9.2.2 Operational Phase

When the Buttress is put in place, to include seeding of embankment walls, there will be no further noise sources associated with the development.

9.3 ASSESSMENT METHODOLOGY

This noise assessment contains the following sections:

- Legislation and guidance review.
- Baseline Description - a description of the receiving environment based on the results of surveys, desk information, available maps and consultations.
- Assessment of Potential Effects - identifying the ways in which noise receptors could be affected by the Development, including prediction of noise levels for construction and operational phases.
- Mitigation Measures, Residual Effects and Do Nothing – a description of measures recommended to off-set potential negative effects and a summary of the significance of the effects of the Development after mitigation measures have been implemented.
- Cumulative Effects – identifying the potential for effects of the Development in combination with those from other local noise sources.
- Summary of Significant Effects.
- Conclusion.

9.3.1 Relevant Legislation and Guidance

The noise assessment is carried out in accordance with the guidance contained in the following documents:

- EPA Guidance Note for Noise: Licence Applications, surveys and Assessment in Relation to Scheduled Activities (NG4, Jan 2016)
- Boliden Tara Mines Industrial Emissions Licence (IEL) P0 516-04
- ISO 1996-1-2016 Acoustics-Description and Measurement of Environmental Noise – Part 1: Basic Quantities and Procedures (ISO 1996)
- National Roads Authority (NRA) Guidelines for Treatment of Noise and Vibration in National Road Schemes, 2004
- BS 5228-1:2009+A1:2014, Code of Practice for Noise and Vibration Control on Open Sites (BS 5228)
- Guidelines on the information to be contained in the Environmental Impact Assessment Reports (EIAR), EPA May 2022

9.4 RECEIVING ENVIRONMENT

9.4.1 Identification of Potential Receptors

Based on the construction of the reinforcement buttress, potential noise-sensitive receptors were identified from maps. aerial mapping, Eircode searches and site visits. Receptors within 1km of the proposed buttress are given in **Figure 9.2**.

Three baseline noise survey locations were selected based on the proposed construction development layout and are considered representative of the local noise environment.

Figure 9.2: Showing layout of TSF (OS Map) and receptors within 1km

9.4.2 Baseline Noise Survey

Baseline noise measurements were derived from the noise survey carried out from 23rd to 29th November 2021 at locations given in **Table 9.2**.

Table 9.2: Baseline Noise Survey Locations

House Locations	ITM	Description
1	684572,772896	Microphone at 1.2-1.5m above ground level located north of development site
13	684374,770800	Microphone at 1.2-1.5m above ground level located south-east of development site
29	685923, 770775	Microphone at 1.2-1.5m above ground level located south-west of development site

9.4.2.1 Instrumentation Used

The following instrumentation was used in the baseline survey measurements:

- Three Larson Davis Precision Integrating Sound Level Analyser/Data logger with 1/2" Condenser Microphones.
- All microphones were fitted with double skin windscreens based on that specified in W/31/00386/REP 'Noise Measurements in Windy Conditions[3]'.
- Calibration Type: Larson Davis Precision Acoustic Calibrator.

All acoustic instrumentation was calibrated before and after the survey and the drift of calibration was less than 0.4dB well within accepted guidelines. A copy of the calibration certificates of the acoustic instruments are included in **Appendix 9-A**.

Table 9.3 gives the ambient and background noise levels obtained analysed for day, evening and night-times according to NG4 and Tara' IEL PO516-04 at three baseline measurement locations representing the environs surrounding the proposed development. **Figure 9.3** shows monitoring locations which are represented by receptors 1, 13 and 29.

[3] W/31/00386/REP 'Noise Measurements in Windy Conditions'.

Figure 9.3 Showing layout of TSF (OS Map) and monitoring locations.

Table 9.3: Summary of ambient and background noise levels from 23rd to 29 November 2021

Receptor Location 1	Leq dBA	L10 dBA	LA90 dBA
Day time	43	46	36
Evening	39	41	31
Night-time	36	38	30

Receptor Location 13	Leq dBA	L10 dBA	LA90 dBA
Day time	45	48	38
Evening	38	41	30
Night-time	35	38	30

Receptor Location 29	Leq dBA	L10 dBA	LA90 dBA
Day time	44	47	36
Evening	39	41	30
Night-time	35	37	29

The primary access route to the facility is from the north from the L74141 road via the R163 Kilberry road (Kells to Slane Road). Land surrounding the facility is predominantly used for agriculture. Population density is low with ribbon development of one-off dwellings along the local road network. The main noise sources in the existing environment are road traffic and agricultural activity.

9.5 IDENTIFICATION OF POTENTIAL IMPACTS

There will be no additional noise associated with the operation of the TSF when the buttress construction is completed. The buttress will not alter the operation of the facility. No additional noise sources will be added. Currently operational noise associated with the TSF is limited to the operation of electrical pumps which are inaudible at the boundary of the facility. Routine staff trips to and from the site are made for a range of activity ranging from maintenance of pumps to visual checks and compliance monitoring. The potential noise impacts from construction will be:

- Construction of Buttress and,
- Road traffic movements associated with delivery of materials.

9.5.1 Construction of Buttress

9.5.1.1 Noise Limits

The construction noise limits are given in **Table 9.5**, while the operational noise limits are given under BTM's EPA Industrial Emission License (IEL) P0 516-04. It is important to note that the construction of the buttress will not generate any additional operational noise.

The licence does not specify noise limits for construction activity however, **Table 9.4** gives the IEL noise limits for operational noise.

Table 9.4 gives the IEL noise limits for operational noise.

Day-time, LA_{rT}, dB (30 minute)	Evening time, LA_{rT}, dB (30 minute)	Night-time, LA_{rT}, dB (30 minute)
55	50	45

Note: There should be no clearly audible tonal component in the noise emission from the activity at any sensitive receptor.

9.5.1.2 Construction Noise

The NRA guidelines for construction noise which are considered acceptable for construction activity are given in **Table 9.5**.

Table 9.5: Noise levels that are acceptable based on the NRA Guidelines

Day / Times	Guideline Limits
Monday to Friday 07:00 – 19:00hrs 19:00 – 22:00hrs	 70dB LAeq, (1h) and LAmax 80dB 60dB LAeq, (1h) and LAmax 65dB
Saturday 08:00 – 16:30hrs	 65dB LAeq, (1h) and LAmax75dB
Sunday and Bank Holidays 08:00 – 16:00hrs	 60dB LAeq, (1h) and LAmax 65dB

Note: Maximum permissible noise levels at the façade of dwellings during construction.

9.5.2 Prediction of Construction Noise Levels

It is not possible to specify the precise noise levels of emissions from the construction plant and equipment until such time as a contractor is chosen and construction plant has been selected. Additional calculations are made for the trucking of material to the point of use on the Development site. **Table 9.6** indicates typical construction related noise levels for this type of Development. Predictions are made for the nearest receptors to the Development**.**

Table 9.6: Typical Plant and machinery noise levels[4]

Activity	L_{Aeq} at 10m
Bulldozer (D8 or equivalent)	83 dBA
Tracked Excavator (30 tonne)	80 dBA
Vibrating Roller (9 tonne)	75 dBA
Dozer	76 dBA

With all the plant in **Table 9.6** operating together in the same area, the noise level equivalent is assumed as (83+80+75+76) = 85.7 dBA at 10 m.

The difference in noise levels between two locations can be calculated as:

$$\mathbf{L}_{p2} - \mathbf{L}_{p1} = 10 \log (R_2 / R_1)^2 - (A_{atm} + A_{gr} + A_{br} + A_{mis})$$

$$= 20 \log (R_2 / R_1) - (A_{atm} + A_{gr} + A_{br} + A_{mis})$$

where:

L_{p1} = sound pressure level at location 1

L_{p2} = sound pressure level at location 2

R_1 = distance from source to location 1

R_2 = distance from source to location 2

and where:

A_{atm} = Attenuation due to air absorption

A_{gr} = Attenuation due to ground absorption

A_{br} = Attenuation provided by a barrier

A_{mis} = Attenuation provided by miscellaneous other effects

In the calculation attenuation by A_{atm}, A_{gr}, A_{br} and A_{mis} is conservatively assumed as 3dBA with no allowance made for the barrier effects of the dam wall.

[4] BS 5228-1:2009 Code of practice for noise and vibration control on construction and open sites. Noise (+A1:2014)

Trucking on Site

Trucking on site is assumed at 25 movements /hr. The general expression for predicting the 1 hr LAeq alongside a haul road used by single engine items of mobile plant is:

$L_{Aeq} = L_{WA} - 33 + 10\log_{10}Q - 10\log_{10}V - 10\log_{10}d$ where:

L_{WA} is the sound power level of the truck, in decibels (dB);
Q is 20, the number of vehicles movements per hour;
V is 25, the average vehicle speed, in kilometres per hour (km/h);
d is the distance of the nearest receptor taken as 264 m from the haul road, in metres (m).

LAeq = 105-33 + 10log 15 – 10log50 – 10log 264 = 47.0 LAeq 1hr (whole number)

The predicted noise levels from the development including trucking on site is given in **Table 9.7** and in **Appendix 9-B.** A range of noise levels are given with the maximum levels including trucking and site buttress development.

Table 9.7 gives the noise levels (to whole number) predicted at the nearest receptors from construction activity including trucking of material on site. At receptor locations more than 1km away, noise levels will be less than that predicted.

Table 9.7: Predicted Construction Noise Levels

House ID	ITM Easting	ITM Northing	Distance to Receptor	Geometric Spreading	Other Attenuation dBA	LAeq dB 1hr Range	Trucking On site	LAeq dB incl. truck 1hr Range
H1	684572	772896	866	39.0	3	33-44	43	33-47
H2	683590	770976	589	35.4	3	37-47	45	37-49
H3	683872	770764	501	34.0	3	38-49	45	38-51
H4	684082	770716	459	33.2	3	39-49	46	39-51
H5	684114	770708	457	33.2	3	39-50	46	39-51
H6	684150	770704	451	33.1	3	39-50	46	39-51
H7	684147	770639	515	34.2	3	38-48	45	38-50
H8	684178	770634	512	34.2	3	38-49	45	38-51
H9	684213	770610	525	34.4	3	38-48	45	38-50
H10	684218	770693	444	32.9	3	39-50	46	39-51
H11	684295	770677	439	32.8	3	39-50	46	39-51
H12	684729	772915	941	39.5	3	33-43	42	33-46

House ID	ITM Easting	ITM Northing	Distance to Receptor	Geometric Spreading	Other Attenuation dBA	LAeq dB 1hr Range	Trucking On site	LAeq dB incl. truck 1hr Range
H13	684374	770800	299	29.5	3	42-53	47	42-54
H14	684320	770572	534	34.6	3	37-48	45	37-50
H15	684449	770495	536	34.6	3	37-48	45	37-50
H16	684479	770474	538	34.6	3	37-48	45	37-50
H17	684606	770389	554	34.9	3	37-48	45	37-50
H18	684630	770363	571	35.1	3	37-48	44	37-50
H19	684665	770324	599	35.6	3	36-47	44	36-49
H20	684717	770372	543	34.7	3	37-48	44	37-50
H21	684800	770318	590	35.4	3	37-47	44	37-49
H22	684751	770284	626	35.9	3	36-47	44	36-49
H23	684824	770180	727	37.2	3	35-45	43	35-45
H24	684937	770149	758	37.6	3	34-45	43	34-47
H25	684957	770132	776	37.8	3	34-45	43	34-47
H26	684969	770119	788	37.9	3	34-47	43	34-49
H27	685877	770528	343	30.7	3	41-52	45	41-53
H28	685918	770546	358	31.1	3	41-52	45	41-53
H29	685923	770775	262	28.4	3	44-54	48	44-55
H30	685963	770661	330	30.4	3	42-52	45	42-53
H31	685990	770665	353	31.0	3	41-52	45	41-53
H32	686072	770681	426	32.6	3	39-50	46	39-52
H33	686079	770710	427	32.6	3	39-50	46	39-52
H34	686152	770657	510	34.1	3	38-49	44	38-50
H35	686195	770688	544	34.7	3	37-48	44	37-50
H36	686147	770606	521	34.3	3	38-48	44	38-50
H37	686174	770611	545	34.7	3	37-48	44	37-50
H38	686203	770614	571	35.1	3	37-48	44	37-50
H39	686427	770753	767	37.7	3	34-45	43	34-47
H40	685871	773086	919	39.3	3	33-43	42	33-46
H41	685827	773075	895	39.0	3	33-44	42	33-46
H42	685696	773049	838	38.5	3	34-44	43	34-47
H43	683878	770377	842	38.5	3	33-44	43	33-47
H44	685004	770084	820	38.3	3	34-44	43	34-47
H45	685237	769953	886	39.0	3	33-44	43	33-47
H46	685282	769866	959	39.6	3	32-43	42	32-46
H47	685323	769821	991	39.9	3	32-43	42	32-46
H48	685731	769835	958	39.6	3	32-43	42	32-46

House ID	ITM Easting	ITM Northing	Distance to Receptor	Geometric Spreading	Other Attenuation dBA	LAeq dB 1hr Range	Trucking On site	LAeq dB incl. truck 1hr Range
H49	686586	770422	998	40.0	3	32-43	42	32-46
H50	686556	770427	968	39.7	3	32-43	42	32-46
H51	686466	770575	835	38.4	3	34-44	43	34-47
H52	686481	770691	827	38.4	3	34-44	43	34-47
H53	686186	772911	933	39.4	3	33-43	42	33-46
H54	683124	771730	964	39.7	3	32-43	42	32-46
H55	683190	771673	893	39.0	3	33-44	43	33-47

9.5.2.1 Assessment of Construction Noise

It is expected that the maximum predicted noise levels will not occur for longer than 4 to 5 weeks equivalent at any location. The maximum predicted construction noise levels are well within the NRA guidelines for all activity. The noise levels from this short-term activity are not considered significant.

All workers associated with the development will be subject to the Health and Safety Authority Regulation[5] which states that for noise exposure noise levels likely to exceed 80 dBA (expressed as Lep,d 8 hour dBA) that there is the potential of risk of damage to hearing. All workers on site will be given guidance on how to comply with this 'First Action Level.'

9.5.3 Cumulative Assessment

There are no operational or permitted industrial noise sources within 1km of the proposed development so there are no cumulative impacts to consider in construction of the Development. The electric submersible pumps on the TSF site and housed pumps are inaudible on the boundary of the site.

9.6 ROAD TRAFFIC NOISE

Road traffic noise is generated by construction traffic to the site by importation of materials. The Traffic Impact Assessment Report[6] is described in Chapter 5 Material Assets where 3 scenarios are assessed based on duration of importation of material with a number of assumptions made. For the purposes of the noise impact assessment Option A is taken as a

[5] SI No. 371/2006 - Safety, Health and Welfare at Work (Control of Noise at Work) Regulations 2006
[6] PMCE, 2022. Traffic and Transport Assessment

worst-case scenario as it provides the more intensive trucking in a shorter time period. Option A traffic flow is given in **Table 9.8** which provides a summary of the HGV predicted trips to the site. The predictions are based on a number of assumptions namely, material will be transported to the site in loads of 26.5 tonnes (similar to existing loads), construction will be limited to 5 days /week and over a 10-hour day period. Traffic flow will also include a total of six construction workers who will also travel to/from the site daily. It is assumed that these workers will arrive at the site during the morning peak hour and depart during the evening peak hour, with these time periods including the maximum volume of traffic on the surrounding road network. Based on maximum flow of traffic the staff trips are added.

The more significant impact on traffic flow will be on the local road (L74141), however the trucking on this route will extend over a length of less than 0.3 km and passes only one house which is owned by the developer.

Table 9.8: Summary of Predicted Trips

Parameters	Option A
Total Tonnage of Material to be delivered to site	1,234944
Duration Years	1.5
Tonnes per year	823,296
Tonnes per week (48 weeks per year)	17,152
Tonnes per day (5 days per week)	3,430
Number of HGVs per day (10 hours per day)	129
Number of HGVs per hour (10 hours per day)	13 (12.9)
Staff	6
Total access movements	135
Total movements per day (10 hour per day)	270
Number of movements per hour	27

9.6.1 Increase in Road Traffic Noise

Increases in noise levels can be calculated when the percentage increase in traffic flow is known (Ref. HMSO Calculation of Road Traffic Noise, 1988). There is a logarithmic relationship between noise levels and traffic volume and the higher the existing traffic volume the greater the traffic increase required to produce a perceptible noise change. A twofold increase in road traffic flow can produces a 3dB(A) change in noise level along a route. The numbers of vehicle

movements associated with the proposed development have been calculated[7] and are summarised in **Table 9.8**. Construction traffic as a percentage of combined traffic is presented in **Table 9.9**

Table 9.9: Construction Traffic

Road section	Construction Traffic as % of Combined Traffic
L74141	33.52 %
R163	11.79 %
R162	2.09 %

9.6.2 Assessment of Road Traffic Noise

The most significant impact will be on the L74141 from the T-junction with the R163 and the entrance to the TSF site. The maximum increase in noise levels on the L74141 (over the baseline) is 53.59 % which equates to an increase in noise levels of 2 dBA towards the site entrance. As HGV's give higher noise levels than light vehicles then the increase can be given as 100% resulting in a noise level increase of 3dBA. Trucks entering and leaving the site towards the short distance to the R163 junction will be travelling very slowly generating low noise emissions.

At the peak traffic flow periods (PM and AM) the noise levels will increase along the L74141 by less than 3dBA. A noise level increase between 2-3dBA is considered '*barely perceptible'* resulting in a **negligible** impact. Furthermore, the only receptor that HGV's will be passing along the L74141 is owned by the developer. A noise level increase of between 1 and 5dB is considered marginal.

The effects of noise from onsite construction activities are therefore considered not significant.

9.7 OPERATIONAL NOISE

There is no operational noise associated with the proposed development.

[7] Traffic data presented in Chapter 5

9.8 DO NOTHING SCENARIO

If the proposed development were not to proceed, sections of the TSF embankment would not be further strengthened, construction would not proceed, thereby generating no construction noise.

9.9 MITIGATION MEASURES

A construction environmental management plan (CEMP) will be prepared by the appointed contractor in conjunction with the BTM environmental management team. Noise control measures will be incorporated into the CEMP. Cognisance will be taken to the guidance provided in BS 5228-1:2009 Code of practice for noise and vibration control on construction and open sites. Recommendations are made regarding the supervision, planning, preparation and execution of works, emphasising the need to consider noise at every stage of the activity.

Other control measures are:

- Construction workers will have induction training course to include environmental controls as set out in the CEMP.
- Substitution of plant or activities by less noisy ones
- Control on working hours as outlined in **Table 9.5**.
- All construction traffic to be used on site should have effective well-maintained silencers.
- Where possible the use of plant or equipment by less noisy ones and all workers will be requested to avoid unnecessary revving of machinery and instructed to throttle down or turn off plant when not in use.
- Good maintenance of equipment.

Site plant will have tonal reversing horns substituted by white noise systems according to Health and Safety Standards to avoid continuous tonality on the development site.

9.10 RESIDUAL IMPACTS

It is anticipated that there will be no adverse impact of noise in the environs of the application site provided best practice is applied during construction and there will be no operational impacts.

9.11 CUMULATIVE IMPACTS

The operation of the electric submersible pumping system at the TSF and the housed pumps do not contribute to the noise levels at any receptor (due to distance and housing of pumps), so there are no cumulative noise effects.

9.12 DECOMMISSIONING

The buttress will be left in place so there is no decommissioning of the development, therefore there will be noise emissions.

9.13 MONITORING

The predicted noise levels are well within the guidelines for construction noise and monitoring is not considered necessary.

9.14 SUMMARY OF EFFECTS

Table 9.10 gives a summary of effects, using the guidelines given by the EPA.

Table 9.10: Summary of Effects

Activity	Quality	Significance	Duration
Construction: Noise	Negative	Not Significant	Short-term
Road Traffic Noise	Negative	Not Significant	Short-term

9.15 CONCLUSION

This chapter has assessed the significance of the potential effects of the Development during construction, operation and decommissioning. There are no operational, decommissioning, or cumulative effects.

Option A provides construction being carried out over the shorter period of time which means works are more intensive giving rise to the higher noise levels of the 3 options. The assessment is made on Option A which demonstrate that the site construction works are well within the NRA guideline limits while the increase in noise levels due to road traffic will be barely perceptible.

Noise during construction of the Development will be managed to comply with best practice, legislation and guidelines current at that time so that effects are not significant.

9.16 REFERENCE

- The National Roads Authority (NRA), Guidelines for the Treatment of Noise and Vibration in National Roads Schemes (2004)
- PMCE, 2022. Traffic and Transport Assessment. Proposed Construction of a Rockfill Reinforcement Buttress to the Extant Embankment Walls of the Tailings Storage Facility, Co. Meath
- BS 5228-1:2009 Code of practice for noise and vibration control on construction and open sites. Noise (+A1:2014)
- ISO 1996/1Acoustics – Description and Measurement of environmental noise- Part 1: Basic quantities and procedures
- ISO 1996-2: Acoustics – Description and Measurement of environmental noise Part 2: Acquisition of data pertinent to land use
- ISO 1996-3: Acoustics- Description and Measurement of environmental noise Part 3: Application to noise limits
- Calculation of Road Traffic Noise, Department of Welsh Office, 1988 HMSO
- Noise Control on Construction and Open Sites - Part 1. Code of Practice for Basic Information and Procedures for Noise Control
- Guidelines on the information to be contained in the Environmental Impact Assessment Reports (EIAR), EPA May 2022
- SI No. 371/2006 - Safety, Health and Welfare at Work (Control of Noise at Work) Regulations 2006

Appendix 9-A: Copy of Calibration Certificates

MTS Calibration Ltd,
The Grange Business Centre,
Belasis Avenue,
Billingham TS23 1LG,
England
Telephone: 01642 876 410

CERTIFICATE OF CALIBRATION

Approved Signatory:

Tony Sherris

Issued by: MTS Calibration Ltd

Date of Issue: 02 February 2021 **Certificate Number:** 35442

Sound Level Meter

Sound Level Meter Periodic Tests to EN 61672-3: 2013 Class 1

Client: Environmental Measurements
Unit 12, Tallaght Business Centre
Whitestown Business Park
Co.Dublin 24, Ireland

Instrument Make: Larson Davis
Instrument Model: LxT1L
Serial Number: 0005660

Associated Equipment	Make	Model	Serial number
Preamplifier	Larson Davis	PRMLxT1L	055806
Microphone	PCB	377B02	316352
Calibrator	Brüel & Kjær	4231	3014620
Calibrator supplied by	MTS for this calibration		

Test results summary, detailed results are shown on subsequent pages.

Periodic tests were performed in accordance with procedures from IEC 61672-3:2013 Class 1

Tests performed	Section	Results of test	Page	Comments
Calibration Certificate	22		1	
Additional information			2	
Indication with Calibrator Supplied	10	No Limit	3	
Self-Generated Noise	11	No Limit	3	
Frequency and Time-weightings at 1kHz	14	Complies	3	
Long term stability	15	Complies	3	
High stability	21	Complies	3	
Acoustic Tests	12	Complies	4	
Frequency Weighting A	13	Complies	5	
Frequency Weighting C	13	Complies	6	
Frequency Weighting Z	13	Complies	7	
Level Linearity	16	Complies	8	
Level Linearity Range Control	17		n/a	SLM only has one range
Tone-burst Response	18	Complies	9	
Peak C sound level	19	Complies	10	
Overload indication	20	Complies	11	

The instrument was within the above specification as received - no modifications were made

The sound level meter submitted for testing has successfully completed the periodic tests of IEC 61672-3: 2013 for the environmental conditions under which the tests were performed. As evidence was publicly available, from an independent testing organisation responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2: 2013, to demonstrate that the model of sound level meter fully conformed to the Class 1 specifications in IEC 61672-1: 2013, the sound level meter submitted for testing conforms to the Class 1 specifications of IEC 61672-1: 2013

Additional tests performed	Reference	
Microphone full frequency response	35444	See additional certificate
Filter calibration, third octave or octave	35442F	See additional certificate

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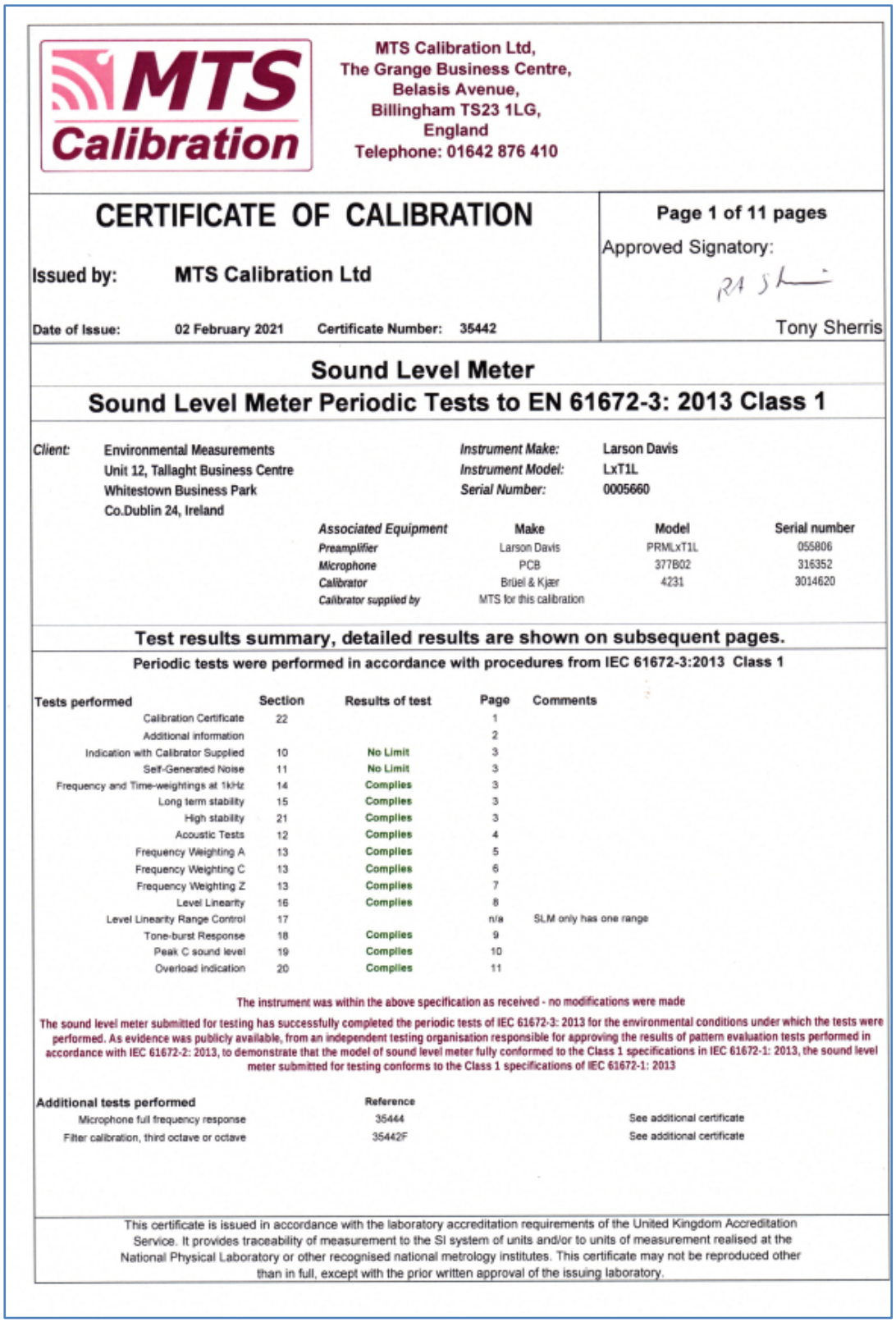

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Appendix 9-B: Predicted maximum noise levels from the development including buttress development and trucking on site.

Receptor	Distance to Nearest Receptor	Geometric Spreading	Other 3 dBA	On Site Plant Range min	On Site Plant Range max	Trucking to Nearest whole number	Maximum Leq 1hr including trucking
1	866	38.7	41.7	33	44	43	47
2	589	35.4	38.4	37	47	45	49
3	501	34.0	37.0	38	49	45	51
4	459	33.2	36.2	39	49	46	51
5	457	33.2	36.2	39	50	46	51
6	451	33.1	36.1	39	50	46	51
7	515	34.2	37.2	38	48	45	50
8	512	34.2	37.2	38	49	45	51
9	525	34.4	37.4	38	48	45	50
10	444	32.9	35.9	39	50	46	51
11	439	32.8	35.8	39	50	46	51
12	941	39.5	42.5	33	43	30	43
13	299	29.5	32.5	42	53	47	54
14	534	34.6	37.6	37	48	45	50
15	536	34.6	37.6	37	48	45	50
16	538	34.6	37.6	37	48	45	50
17	554	34.9	37.9	37	48	45	50
18	571	35.1	38.1	37	48	44	50
19	599	35.6	38.6	36	47	44	49
20	543	34.7	37.7	37	48	44	50
21	590	35.4	38.4	37	47	44	49
22	626	35.9	38.9	36	47	44	49
23	727	37.2	40.2	35	45	43	47
24	758	37.6	40.6	34	45	43	47
25	776	37.8	40.8	34	45	43	47
26	788	37.9	40.9	34	45	43	47
27	343	30.7	33.7	41	52	45	53
28	358	31.1	34.1	41	52	45	53
29	262	28.4	31.4	44	54	48	55
30	330	30.4	33.4	42	52	45	53
31	353	31.0	34.0	41	52	45	53
32	426	32.6	35.6	39	50	46	52
33	427	32.6	35.6	39	50	46	52
34	510	34.1	37.1	38	49	44	50
35	544	34.7	37.7	37	48	44	50
36	521	34.3	37.3	38	48	44	50

Receptor	Distance to Nearest Receptor	Geometric Spreading	Other 3 dBA	On Site Plant Range min	On Site Plant Range max	Trucking to Nearest whole number	Maximum Leq 1hr including trucking
37	545	34.7	37.7	37	48	44	50
38	571	35.1	38.1	37	48	44	50
39	767	37.7	40.7	34	45	43	47
40	919	39.3	42.3	33	43	42	46
41	895	39.0	42.0	33	44	42	47
42	838	38.5	41.5	34	44	43	47
43	842	38.5	41.5	33	44	43	47
44	820	38.3	41.3	34	44	43	47
45	886	39.0	42.0	33	44	43	47
46	959	39.6	42.6	32	43	42	46
47	991	39.9	42.9	32	43	42	46
48	958	39.6	42.6	32	43	42	46
49	998	40.0	43.0	32	43	42	46
50	968	39.7	42.7	32	43	42	46
51	835	38.4	41.4	34	44	43	47
52	827	38.4	41.4	34	44	43	47
53	933	39.4	42.4	33	43	42	46