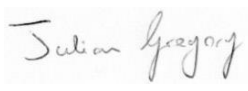
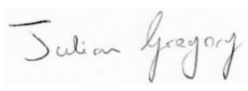




CROWNHILL TOPSOIL WASTE MANAGEMENT FACILITY NOISE AND VIBRATION MANAGEMENT PLAN

Unit 1009, Caerwent Army Training Estate,
Caerwent

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1. Site Details

Name of the applicant	Crownhill Topsoil
Activity address	Unit 1009 Caerwent Army Training Estate
National Grid Reference	ST 46457 92070

This Noise and Vibration Management Plan has been prepared for Crownhill Topsoil and Aggregates operations at Unit 1009 of the Caerwent Army Training Base.

Crownhill Topsoil and Aggregates' Waste Recovery Facility is proposed to be located at Unit 1009 of the Caerwent Army Training Estate.

The Army Training Estate is operated by the Ministry of Defence / Defence Infrastructure Organisation and managed by Landmarc. It is predominantly used for the training of MOD personnel and the storage of MOD assets. Sections of the site are now let to companies for use as commercial / industrial facilities.

Crownhill proposes to operate an Inert Waste Recovery facility at Unit 1009 which will include:

- The processing of inert soils and construction and demolition waste into topsoil and recycled aggregates;
- The sale of quarried aggregates and other building / construction products.

The company currently operate an aggregate wholesale / retail business from the facility, which requires the delivery, storage and re-loading of aggregates from Unit 1009.

2. Identification and evaluation of impacts

For an impact to occur, there needs to be a source, a receptor and a pathway for the source to reach the receptor. For noise the pathway is air and for vibration the pathway is the ground and the materials within it.

2.1 Activities likely to generate noise and vibration

For the purpose of assessing noise and vibration emissions from the site, the following activities (sources) will be considered:

- Operation of a crusher – inert construction and demolition wastes will be loaded into the crusher using a 14t excavator or loading shovel. Crushed materials will be segregated into stockpiles of varying materials gradings, which will be managed by a 14t excavator.
- Operation of a screen – as above except screening as opposed to crushing.
- Excavation and loading – Materials will be stockpiled on site by type and grading. A loading shovel or excavator will be used to load materials into road wagons for transport to customers.
- Vehicle movements around the site – This applies primarily to receptors near highways within and adjacent to the site. The key receptor for these emissions will be properties near the site entrance.

Crownhill currently use the following equipment at Unit 1009 as part of their aggregate supply business:

- Mercedes Actros HGV 44t Tractor Unit – 2015
- 3No Mercedes Arocs 8x4 Tipper Trucks – 2018 – 2019
- Mercedes Arocs 8x4 20t Tipper fitted with a grab – 2019
- Mercedes Arocs 8x4 20t fitted with s hook loader – 2019
- Iveco 8x4 20t fitted with s grab – 2015
- 2No Transit 130 Tipper
- Doosan DL200 Loading Shovel – 2019
- JCB 411 Loading Shovel – 2010
- Merlo 42.7 Telehandler – 2018
- Doosan DX140 Excavator – 2019
- JCB 814 Power Slide Excavator – 1988

For the operation of the Inert Waste Recovery facility, Crownhill proposed to employ the following at the site:

- Terex Finlay 863 Screener – 2019
- Terex J960 Crusher – 2020

2.2 Potential Receptors:

The closest residential receptors to Unit 1009 are Great Llanmelin Farm, which is 670m west of the site and residential properties in Llanvair Road, which are approximately 1km from Unit 1009 but are approximately 70m from the site entrance from the A48 Trunk Road, at the MoD checkpoint. This is the point at which vehicles using the Unit 1009 facility, access and egress the Army Training Centre

There are many buildings within the MoD base, around Unit 1009. Some of these were used by troops on exercises for overnight shelter but following a review in 2019, they were assessed as being unsafe and have been sealed. Two new troop shelters have been constructed within the Army Training Base to accommodate troops on overnight

manoeuvres. These are located approximately 1.5km SE of Unit 1009 and are only used during the night and early morning. Due to the distance from Unit 1009 and the nature of their use, these will not be considered further within this assessment.

During Army operations at the base, troops may pass close to Unit 1009. These operations include gun fire using blank rounds, often with helicopter air support and this is the predominant noise source during these operations. Troop movements within the base, during exercises, are unpredictable and short term, we have therefore not considered these as receptors.

As the nearest residential receptors to Unit 1009 are over 600m away, we consider that the key receptors for noise and vibration from the operation of an Inert Waste Management Facility will therefore be animals and birds within Llanmelin Woods and members of the public within Llanmelin Woods Camp Hill Fort Scheduled Monument. This is approximately 340m NW at its nearest point (the section most visited by members of the public is approximately 400m NW). No noise sensitive premises (NSPs) have been identified within 500m of Unit 1009. We have however considered impacts on the residential properties at Great Llanmelin Farm and for residents in Llanvair Road, due to vehicle movements in and out of the Army Training Estate.

Noise impacts on workers at the site have been assessed via task based Risk Assessment and have been addressed through the Crownhill Health and Safety system, in line with the Control of Noise at Work Regulations, 2005. These will not be considered further within this plan.

2.3 Relevant Standards and Documentation

This noise and vibration assessment has been carried out in accordance with the two primary standards for noise and vibration assessments for construction and open sites:

- British Standard BS 7445-1:2003 - Description and measurement of environmental noise; and
- British Standard BS5228-1:2009+A1:2014 - Code of practice for noise and vibration control on construction and open sites.
- British Standard BS5228-2:2009 - Code of practice for noise and vibration control on construction and open sites.
- British Standard BS4142:2014 + A1: 2019 – Methods for rating and assessing industrial and commercial sound.
- ISO 9613-2:1996 – Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation.

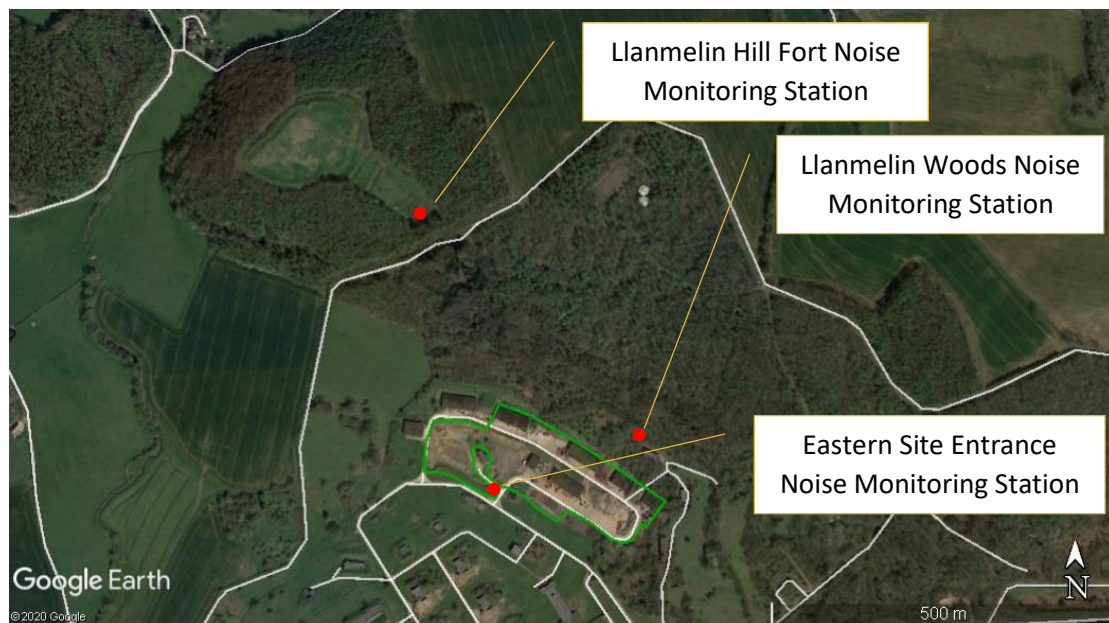
2.4 Background Noise Measurements at Identified Receptors:

To enable comparison of predicted noise levels, background noise monitoring has been undertaken at identified receptors on two occasions. This has been undertaken as 4no 15min LA_{eq} / LA_{90} measurements at each identified receptor on two separate occasions (Note: this assessment was undertaken during May 2020, during the COVID 19 Lockdown Period. Reduced human activity due to the lockdown measures may result in reduced environmental noise levels. This assessment should be repeated, and this plan updated following the relaxation of lockdown measures)

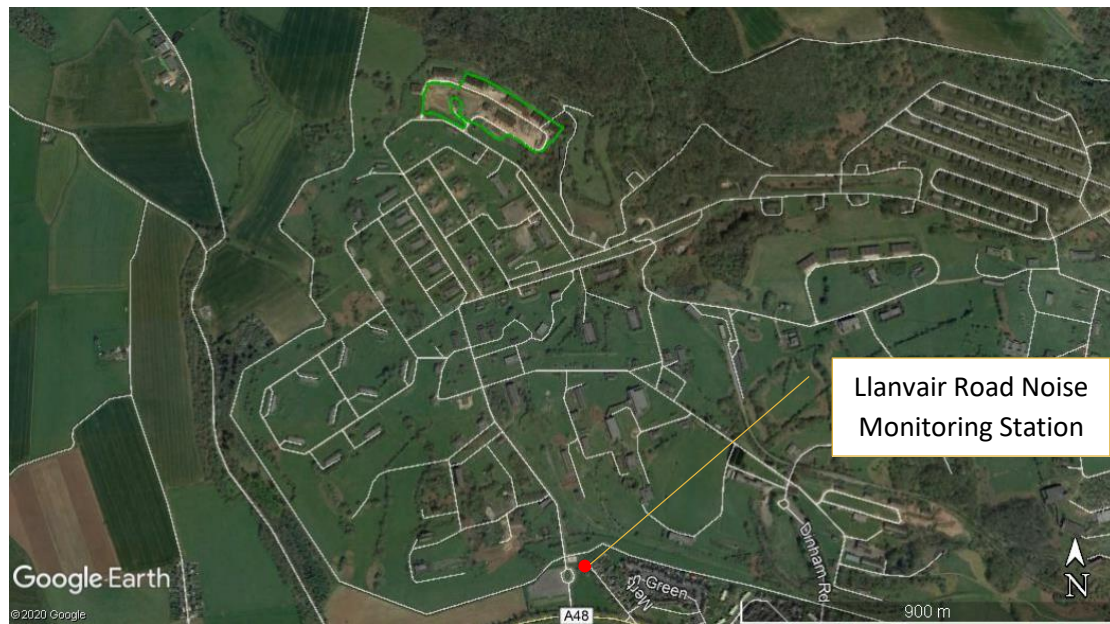
Attended noise measurements were taken at the following locations:

- Adjacent to the eastern entrance to Unit 1009 – Grid Ref: ST 46362 92062 (this location was used to gain an understanding of the current noise environment at Unit 1009. Data from this monitoring is reported but has not been used within this assessment)
- At the eastern side of Llanmelin Hill Fort – Grid Ref: ST 46363 92461
- In the edge of Llanmelin Woods north of Unit 1009 – Grid Ref: ST 46574 92145 (this is within the Army Training Estate boundary and hence members of the public will not be present)
- Outside No13 Llanvair Road – Grid Ref: ST 46668 90974

Baseline noise monitoring was not undertaken at Great Llanmelin Farm due to the presence of barking dogs, which were encountered on both occasions. Agricultural and road noise were the predominant noise sources at this location.



NOISE MONITORING LOCATIONS



NOISE MONITORING LOCATIONS

The sound level meter was set to record noise levels over 4 no 15 minute periods during the operational period for the aggregates business currently operating at Unit 1009. These were then aggregated into a 1hr LA_{eq} and LA_{90} . This method is used so that if an anomaly impacts one of the 15 minute time intervals, it does not abort an hours monitoring. No night time measurements were taken as within the terms of the MoD Lease, the site cannot operate during the night.

For each noise measurement, the noise climate, wind speed and direction, and the noise levels were recorded and noted. The meter automatically stored the LA_{eq} , LA_{min} , LA_{max} and percentile values. Measurements were made with a fast (0.125s) time constant.

Night-time measurements were not taken as the proposed inert waste management facility will not operate during the night.

Equipment Used:

Noise Meter: Svantek 977 Sound Level Meter. To BS EN 60804 - Type I Serial No 36496;

Microphone: Svantek SV12L, Serial No 59937;

Pre-amp: Svantek SV12L, Serial No 10182;

Acoustic Calibrator: SV 30A Type 1

Noise Levels were measured in accordance with BS 7445: 1991 – Description and Measurement of Environmental Noise.

Calibration

The meter was calibrated at the start and end of each monitoring period with no drift. Readings can therefore be considered valid.

Weather – 04/05/20:

Temperature: 23oC

Wind Speed/Direction: 4mph/SE

Precipitation: None

Cloud Cover: 0 Oktas

Other Notable Atmospheric Conditions: Measurement undertaken during COVID 19 Lockdown period.

Weather – 20/05/20:

Temperature: 16oC

Wind Speed/Direction: Still

Precipitation: None

Cloud Cover: 2 Oktas

Other Notable Atmospheric Conditions: Measurement undertaken during COVID 19 Lockdown period.

Activities ongoing within Unit 1009 – 04/05/20 and 20/05/20 – Loading of aggregates into lorries and vans, using wheeled loading shovel and telehandler. Vehicle movement around the site.

2.4.1 Results

Table 1: Eastern Site Entrance – Baseline Measurements:

Eastern Site Entrance – 04/05/2020:							
Start	Period#	A Leq	A Max	A Min	LAF (SPL)	A Peak	LA90
12:48:52	0	44.1	62.9	33.6	37.3	82.3	37.1
13:03:52	1	54.3	80.6	33.8	42.8	96.2	37.5
13:18:52	2	54.7	78.5	34.7	54.0	90.7	38.0
13:33:52	3	54.6	78.3	36.0	46.3	91.0	41.0
LA _{eq} 1hr =		53.4					37.9

Eastern Site Entrance – 20/05/2020:							
Start	Period#	A Leq	A Max	A Min	LAF (SPL)	A Peak	LA90
07:47:12	0	51.3	77.6	34.8	44.4	91.5	37.4
08:03:12	1	47.3	74.8	33.9	41.1	89.9	37.2
08:18:12	2	51.6	77.5	34.1	52.9	91.4	37.6
08:33:12	3	56.2	81.4	35.5	50.2	97.7	41.3
LA _{eq} 1hr =		52.7					37.8

Eastern Site Entrance Average Baseline LA_{eq} – 53.1dB, LA₉₀ – 37.8dB

Table 2: Llanmelin Woods – Baseline Measurements:

Llanmelin Woods – 04/05/2020:							
Start	Period#	A Leq	A Max	A Min	LAF (SPL)	A Peak	LA90
14:06:04	0	53.8	74.9	33.4	41.3	87.2	38.8
14:21:04	1	55.3	76.2	31.6	40.8	91.5	39.2
14:36:04	2	51.5	73.6	30.8	52.4	88.7	38.5
14:51:04	3	53.4	78.1	31.9	46.6	86.4	39.1
LA _{eq} 1hr =		53.7					38.9

Llanmelin Woods – 20/05/2020:							
Start	Period#	A Leq	A Max	A Min	LAF (SPL)	A Peak	LA90
11:23:11	0	49.8	76.8	36.3	43.7	88.5	38.6
11:38:11	1	54.3	80.3	32.4	48.4	90.4	38.9
11:53:11	2	53.5	74.7	30.8	47.1	89.7	39.2
12:08:11	3	52.3	72.7	32.4	46.8	90.1	39.7
LA _{eq} 1hr =		52.8					39.1

Llanvair Woods Hill Fort Average Baseline LA_{eq} – 53.3dB, LA₉₀ – 39.0dB

Table 3: Llanmelin Woods Hill Fort – Baseline Measurements

Llanmelin Woods Hill Fort – 04/05/2020:							
Start	Period#	A Leq	A Max	A Min	LAF (SPL)	A Peak	LA90
15:19:46	0	38.4	57.5	30.8	33.8	72.4	33.2
15:34:46	1	39.8	51.9	29.6	36.5	63.5	33.1
15:49:46	2	40.1	58.4	29.9	34.7	71.9	33.2
16:04:46	3	42.2	58.6	30.1	35.5	73.3	33.4
LA _{eq} 1hr =		40.4					33.2

Llanmelin Woods Hill Fort – 20/05/2020:							
Start	Period#	A Leq	A Max	A Min	LAF (SPL)	A Peak	LA90
09:26:34	0	39.3	56.8	31.1	34.3	71.2	32.9
09:41:34	1	40.3	58.9	29.8	37.2	64.9	33.2
09:56:34	2	41.6	57.4	30.0	35.7	72.3	33.1
10:11:34	3	39.7	56.8	35.7	33.3	71.6	33.1
LA _{eq} 1hr =		40.3					33.1

Llanvair Woods Hill Fort Average Baseline LA_{eq} – 40.4dB, LA₉₀ – 33.1dB

Table4: Llanvair Road – Baseline Measurements

Llanvair Road – 04/05/2020:							
Start	Period#	A Leq	A Max	A Min	LAF (SPL)	A Peak	LA90
16:28:07	0	54	69.8	62.1	34.3	79.3	39.6
16:43:07	1	56.3	74.7	59.3	37.2	82.2	41.0
16:58:07	2	55.4	71.2	56.8	35.7	78.6	39.9
17:13:07	3	56.7	68.7	61.4	33.3	77.6	41.3
LA _{eq} 1hr =		55.7					40.5

Llanvair Road – 20/05/2020:							
Start	Period#	A Leq	A Max	A Min	LAF (SPL)	A Peak	LA90
12:39:03	0	56.1	66.7	56.1	32.1	74.7	41.4
12:54:03	1	54.8	71.3	59.4	35.4	78.3	39.8
13:09:03	2	55.3	69.6	52.2	38.1	77.7	40.3
13:24:03	3	55.9	64.8	63.4	36.0	76.1	39.9
LA _{eq} 1hr =		55.6					40.4

Llanvair Road Average Baseline LA_{eq} – 55.6dB, LA₉₀ – 40.4dB

Notable noise sources were the opening of the steel flap on the loading skip on the telehandler and the opening of tail gates on wagons.

3. Assessment of Noise on Identified Receptors:

Proposed operations at Unit 1009 will be broadly similar to construction activities. BS 5228: 2009 provides methods for predicting and assessing construction noise and vibration based on details of construction activities. Noise predictions are based upon source measured levels for each relevant item of plant and the application of corrections for:

- Distance between the source and receptor location
- The percentage operating time of the plant
- Any attenuation between source and receptor – methodology described within ISO 9613-2 used for this (calculated using Cadna/A noise prediction software)

The source levels used for this assessment are taken from the Defra – Update of Noise Database for Prediction of Noise on Construction and Open Sites (updating Annex C of BS 5228).

Due to the distance of the site from residential receptors, impacts are considered unlikely. Key noise impacts are therefore likely to be on adjacent ecological receptors and users of the Llanmelin Hill Fort Scheduled Monument. However impacts on ecological and residential receptors and on other users of the MoD base, will be considered.

3.1 Potential Noise Sources

Noise sources have been determined as set out in the Defra – Update of Noise Database for Prediction of Noise on Construction and Open Sites – 2005, except for the *Screen Stockpiles for which figures have been used from Defra Update of Construction Plant Noise Database Phase 3: Noise measurement data for construction plant used on quarries – 2006.

The following noise sources have been considered within this report:

TABLE 5: PLANT INFORMATION USED FOR NOISE PREDICTIONS

Plant	Quantity	Defra Noise Database Ref:	Sound Pressure Level 10m from source, dB	% on Time
Wheeled Loader	1	Table 6 - 34	76	50
14T Excavator	1	Table 2 - 25	69	50
Tracked Crusher – crushing concrete -	1	Table 1 - 15	84	90
Lorry 39t	4	Table 6 - 19	76	40
Wheeled loader – loading hopper	1	Table 6 - 32	75	60

Plant	Quantity	Defra Noise Database Ref:	Sound Pressure Level 10m from source, dB	% on Time
Wheeled loader – loading lorry	1	Table 6 - 33	82	40
Screen stockpiler	1	*Table 1(b) - 15	81	90

We have used combinations of this plant to undertake noise predictions of four activities:

- Crushing of inert waste – for this activity we have assessed a wheeled loader loading the crusher, the crusher itself and a 14t excavator managing the stockpiles.
- Screening of inert waste – for this activity we have assessed a wheeled crusher loading the crusher, the screener itself and a 14t excavator managing the stockpiles.
- Loading multiple lorries – for this we have assessed a wheeled loader loading 39t lorries.
- HGV vehicles entering and exiting the base.

These calculations present a worst case scenario as the noise levels used are for older plant, whereas Crownhill uses predominantly Euro 5 or 6 modern plant which have lower noise outputs. Predicted levels do not however take account of distinctive noises such as loud bangs due to metal parts operating and loads being dropped. These will be considered as part of the BS4142:2014 + A1: 2019, assessment.

3.2 Receptors

The following receptors were utilised for this calculation as it was felt that they represented the most vulnerable receptors.

TABLE 6: RECEPTORS CONSIDERED AS PART OF ASSESSMENT

Location Number	Description	Distance from Source (m)	Grid Reference
1	Llanmelin Woods	100	ST 46573 92196
2	Llanmelin Woods Camp Hill Fort Scheduled Monument	340	ST 46272 92461
3	Great Llanmelin Farm – to the west of the site.	670	ST 45590 92291
4	Residential properties on Llanvair Road	1,000	ST 46662 90978

The following information was used for each receptor:

- Plant noise output at 10 (LWA);
- Plant quantity;

- Percentage “on time”;
- Distance from the plant to the receptor;
- Ground topography and screening effects.

For Great Llanmelin Farm and Llanvair Road it was assumed that the ground was soft as it is predominantly grass and scrub land between these receptors. Barrier attenuation was included for Llanmelin Woods and Llanmellin Hill Fort, due to the presence of the buildings / stockpiles along the northern boundary of Unit 1009 and steeply rising ground to the north and west. Stockpiles were considered as double barriers due to their width. Approximately 50% of the northern boundary of the site is screened by buildings which are 4m high and 20m wide. For the purpose of barrier effect it was assumed that the extent of the northern boundary was stockpile.

For Great Llanmelin Farm and Llanvair Road, no barrier attenuation was used, although there are multiple buildings between the source and the receptors. Many of the buildings within the base are surrounding by earth blast mounds, which would provide significant screening for noise emissions.

The site is undulating and rises towards Llanmelin Woods, which would provide significant attenuation. When predicting noise received at a receptor, no barrier attenuation allowance should be made for vegetation, even trees, as it is extremely difficult to predict the attenuation effect due to the number of variables i.e. type and density of vegetation and vegetation does not comply with the definition of a barrier within ISO 9613-2:1996. In reality however, dense vegetation can provide significant screening.

3.3 Results of Noise Assessments

Full calculations and results can be seen at Appendix 1.

TABLE 7: CRUSHING OPERATIONS – PREDICTED NOISE LEVELS AT RECEPTORS

Receptor	Predicted Façade Level (dB LAeq 15mins)
1 – Llanmelin Woods	47.9
2 - Llanmelin Woods Camp Hill Fort	42.4
3 - Great Llanmelin Farm	35.0
4 - Residential properties on Llanvair Road	30.6

TABLE 8: SCREENING OPERATIONS – PREDICTED NOISE LEVELS AT RECEPTORS

Receptor	Predicted Façade Level (dB LAeq 15mins)
1 – Llanmelin Woods	47.7
2 - Llanmelin Woods Camp Hill Fort	40.6
3 - Great Llanmelin Farm	33.2
4 - Residential properties on Llanvair Road	28.8

TABLE 9: LORRY LOADING – PREDICTED NOISE LEVELS AT RECEPTORS

Receptor	Predicted Façade Level (dB LAeq 15mins)
1 – Llanmelin Woods	48.6
2 - Llanmelin Woods Camp Hill Fort	41.5
3 - Great Llanmelin Farm	34.1
4 - Residential properties on Llanvair Road	29.7

Vehicle Movements at Site Entrance – Predicted Noise Levels at Receptors

The following are the results for commercial vehicle movements entering and exiting the Army Training Estate from the A48. We have assumed that there will be four vehicles per hour associated with Crownhills activities, each with a duration of less than 1 minute.

TABLE 10: PREDICTED NOISE LEVELS AT SITE ENTRANCE

Receptor	Predicted Façade Level (dB LAeq 15mins)
Llanvair Road	43.8

3.4 Noise Impact Assessment

Due to the mobile nature of the equipment to be used within operations at Unit 1009 and the size of the site, we have used two methodologies to assess the potential impact of noise which could be generated by the operation of an Inert Waste Management facility at Unit 1009, on residential properties. We have used the ABC method as described in BS5228-1: 2009 as activities at the site are akin to those undertaken at a construction site and the methodology described within BS4142:2014 + A1:2019 as the operations at the site would be classed as a fixed installation.

No assessment has been undertaken of night-time, evenings or weekends as the facility will not operate during these periods.

As ambient noise levels (rounded to the nearest 5dB) are less than Category A values (65dB) as specified in BS5228, all locations will be considered as Category A.

3.4.1 Comparison of Predicted Noise Levels against Background:

TABLE 11: COMPARISON OF BASELINE AGAINST ACTIVITY RELATED NOISE OUTPUTS:

Receptor	Baseline Noise Level dB(A) LAeq 1hr	Baseline Noise Level dB(A) LA90 1hr	Predicted dB(A) LAeq 10hr – Crushing Operations	Predicted dB(A) LAeq 10hr – Screening Operations	Predicted dB(A) LAeq 10hr – Loading Operations
Llanmelin Woods	53.3	39.0	47.9	47.7	48.6
Llanmelin Woods Camp Hill Fort	40.4	33.1	42.4	40.6	41.5
Great Llanmelin Farm	N/A	N/A	35.0	33.2	34.1
Residential properties on Llanvair Road	55.6	40.4	30.6	28.8	29.7

Predicted dB(A) LAeq 10hr for the movement of aggregate and soil delivery vehicles as they enter and exit the site is 43.8dB(A).

Category A threshold values are 65dB. None of the predicted value for any of the proposed operations exceed this.

3.4.2 BS5228 Assessment

Using the 5dB(A) Change assessment described within BS 5228-1:2009, from the above table it can be seen that predicted noise levels from the operation of an inert waste management facility at Unit 1009 will exceed baseline LA_{eq} levels within Llanmelin Woods Hill Fort but not by more than 5dB(A), this is therefore not classed as significant.

This is however an assessment predominantly for residential receptors and other sensitive receptors. BS 5228-1:2009 does state 'For public open space, impact might be deemed to be significant if the total noise (pre-construction ambient plus construction noise) exceeds the pre-construction ambient noise (LA_{eq}, Period) by 5 dB or more for a period of one month or

more. However, the extent of the area impacted relative to the total available area also needs to be taken into account.' In respect of this, we believe that impacts on users of the hill fort will not be significant. There is parking for 2No cars at the Hillfort site and during the two monitoring visits no other visitors were noted. It is likely that this site is little visited by members of the public. Consideration should also be given to the overall noise level of the predicted noise. It is unlikely that this would have detriment on the enjoyment of the Hill Fort Site.

3.4.3 BS4142 Assessment

This assessment is used to assess the potential impacts from fixed installations. Plant operating within Unit 1009 will be transient but the methodologies set out within BS4142 are applicable to the operation of the facility.

Rating Penalty Principle

Section 9 of BS4142:2014+A1:2019 describes how the rating sound level should be derived from the specific sound level, by determining a rating penalty.

BS4142:2014+A1:2019 states:

"Certain acoustic features can increase the significance of impact over that expected from a basic comparison between the specific sound level and the background sound level. Where such features are present at the assessment location, add a character correction to the specific sound level to obtain the rating level. This can be approached in three ways:

- a) subjective method;*
- b) objective method for tonality;*
- c) reference method."*

Given that the Proposed Development is not operational, the subjective method has been adopted to derive the rating sound level from the specific sound level. This is discussed in Section 9.2 of BS4142:2014+A1:2019, which states:

"Where appropriate, establish a rating penalty for sound based on a subjective assessment of its characteristics. This would also be appropriate where a new source cannot be measured because it is only proposed at that time, but the characteristics of similar sources can subjectively be assessed. Correct the specific sound level if a tone, impulse or other characteristics occurs, or is expected to be present, for new or modified sound sources."

BS4142:2014+A1:2019 defines four characteristics that should be considered when deriving a rating penalty, namely; tonality; impulsivity; intermittency; and other sound characteristics, which are defined as:

Tonality

A rating penalty of +2 dB is applicable for a tone which is "just perceptible", +4 dB where a tone is "clearly perceptible", and +6 dB where a tone is "highly perceptible".

Key impacts are likely to be on wildlife within Llanmelin Woods. Little information exists on the impacts of noise on wildlife. It is likely that wildlife within Llanmelin Woods is habituated to some level of noise from operations at Unit 1009 and from the operation of the wider Army Training Estate, including loud bangs due to explosions and the site being frequently overflown by low level aircraft and helicopters. Predicted noise levels are below 60dB(A) with the exception of crushing operations which are marginally above this. Crushing operations will be undertaken infrequently and only for a few days at a time. It is difficult to make a definitive assessment on potential impacts on wildlife but due to the relatively low levels predicted and that no works will be undertaken during hours of darkness it is unlikely that impacts will be significant.

Rating Penalty Assessment:

Noise emitted from operations at Unit 1009 has the potential to be impulsive and intermittent, however noise which is impulsive or intermittent are likely to be lower level and hence no penalties have been assigned.

Uncertainty in Calculations

BS4142:2014 requires that the level of uncertainty in the measured data and associated calculations is considered in the assessment. The Standard recommends that steps should be taken to reduce the level of uncertainty.

Measurement Uncertainty:

BS4142:2014+A1:2019 states that measurement uncertainty depends on a number of factors, including the following, which are applicable in this instance:

- b) the complexity and level of variability of the residual acoustic environment;
- d) the location(s) selected for taking the measurements;
- g) the measurement time intervals;
- h) the range of times when the measurements have been taken;
- i) the range of suitable weather conditions during which measurements have been taken;
- k) the level of rounding of each measurement recorded; and
- l) the instrumentation used."

Each of the measurement uncertainty factors outlined above have been considered and discussed below.

TABLE 13: ASSESSMENT OF MEASUREMENT UNCERTAINTY FACTORS

Measurement Uncertainty Factor Reference	Level of Uncertainty	Discussion
b)	0 dB	Residual acoustic environment is relatively constant, hence no correction for a complex residual acoustic environment.
d)	0 dB	Measuring at a location representative of the closest affected receptors to the site has enabled the determination of robust background sound levels.
g)	0 dB	Measurement time intervals were set in accordance with BS4142:2014+A1:2019, hence no further correction needs to be made.
h)	0 dB	Measurements were undertaken over the specified time period.
i)	0 dB	Measurements were attended and were undertaken during suitable weather conditions.
k)	0 dB	Measured values were rounded to 0.1 dB, therefore rounding would not have had a significant impact on the overall typical background sound levels.
l)	0 dB	The acoustic measurement equipment accorded with Type 1 specification of British Standard 61672, and were deployed with appropriate wind shields.

Relative Change in Ambient Noise Level

In circumstances where a noise environment may be altered by addition or removal of a noise source, considered to be largely anonymous or within the prevailing acoustic character of an area, for example, changes to traffic quantum or patterns, it is normal to consider the relative change in ambient noise level. The assessment, therefore, focuses primarily on this phenomenon.

The impact scale adopted in this assessment is shown in Table 1, below, which relates to established human responses to noise.

TABLE 14: IMPACT SCALE FOR COMPARISON OF FUTURE NOISE AGAINST EXISTING NOISE

Noise Level Change dB(A)	Subjective Response	Significance
0	No change	No impact
0.1 – 2.9	Barely perceptible	Minor impact
3.0 – 5.9	Noticeable	Moderate impact
6.0 – 9.9	Up to a doubling or halving of loudness	Substantial impact
10.0 or more	More than a doubling or halving of loudness	Major impact

The criteria above reflect the key benchmarks that relate to human perception of sound. A change of 3 dB(A) is generally considered to be the smallest change in environmental noise that is perceptible to the human ear. A 10 dB(A) change in noise represents a doubling or halving of the noise level. The difference between the minimum perceptible change and the

doubling or halving of the noise level is split to provide greater definition to the assessment of changes in noise level.

It is considered that the criteria specified in the above table provide a good indication as to the likely significance of changes in noise levels in this case and have been used to assess the impact of noise from the proposed inclusion of inert waste recovery at Unit 1009.

TABLE 15: DIFFERENCE BETWEEN BASELINE AND PREDICTED ACTIVITY RELATED NOISE OUTPUTS:

Receptor	Baseline Noise Level dB(A) LA90 1hr	Difference – Baseline / Predicted – Crushing Operations. dB(A)	Difference – Baseline / Predicted – Screening Operations. dB(A)	Difference – Baseline / Predicted – Loading Operations. dB(A)
Llanmelin Woods	39.0	8.9	8.7	9.6
Llanmelin Woods Camp Hill Fort	33.1	9.3	7.5	8.4
Great Llanmelin Farm	N/A	N/A	N/A	N/A
Residential properties on Llanvair Road	40.4	-9.8	-11.6	-10.7

Predicted dB(A) LAeq 10hr for the movement of aggregate and soil delivery vehicles as they enter and exit the site is 43.8dB(A). This gives a baseline / predicted difference of 3.4dB(A)

From the above table it can be seen that noise levels emitted from inert waste recovery operations at Unit 1009 are likely to have a Substantial Impact on residential properties within Llanmelin Woods and at Llanmellin Wood Hill Fort. There are no identified residential properties at either of these locations. The calculations illustrate that proposed operations at Unit 1009 are unlikely to impact residential receptors in Greater Llanmelin Farm or Llanvair Road. It is likely that HGVs entering and leaving the Army Training Estate will add to the overall noise environment around the site entrance but these will be limited to the operational times of the base i.e. 07:00 – 17:30 and hence will avoid sensitive periods.

There is little available data on the impact of noise on wildlife, it is likely that wildlife which uses the woods near to Unit 1009 is habituated to noise.

4. Assessment of Vibration Impacts

The threshold of perception in residential environments is identified at an exposure level of 0.3mm/s peak particle velocity (PPV) in accordance with guidance in BS 5228: Part 2. Complaint is likely where vibration exceeds 1.0mm/s PPV at residential properties but this exposure can be tolerated if prior warning and explanation has been given to residents. Above 10mm/s PPV the vibration is likely to be intolerable for any more than a very brief exposure.

BS 6472: 2008 Part 1 (Guide to evaluation of human exposure to vibration in buildings. Vibration sources other than blasting) provides guidance on human response to vibration in buildings.

BS 6472 part 1 provides guidance on assessing human response to vibration in buildings over the frequency range 0.5Hz to 80Hz. It describes frequency weighting curves for whole body vibration and introduces criteria in terms of Vibration Dose Value (VDV). VDV is a cumulative measure of the perceptible vibration experienced over a specified time period.

The document suggests that the perception thresholds in terms of vertical weighted peak acceleration for seated or standing individuals are:

- 0.01 ms⁻² – 25% of the population
- 0.015 ms⁻² – 50% of the population
- 0.02 ms⁻² – 75% of the population

BS 6472 also advises that adverse comment about building vibrations may occur when building vibration levels are only slightly above the threshold of perception.

For the assessment of impulsive and intermittent vibration, such as occurs from construction activities, BS 6472 uses the VDV to define the relationship between disturbance and the magnitude and duration of exposure.

Activities at the site are unlikely to produce significant levels of ground-borne vibration and the underlying geology is rock overlain with alluvium, which does not readily transfer ground-borne vibration.

Due to the distances to residential receptors and the nature of the activities being undertaken i.e. no dynamic compaction activities, disturbance to residents is extremely unlikely.

No data is available on vibration levels which are likely to cause disturbance to wildlife.

Prediction of vibration likely to be generated by certain activities is not possible due to the huge range of variables involved i.e. ground conditions, surface on which the machinery is located, nature of loading of the machinery. For example an empty dumper will produce more ground borne vibration than a full one as it is more likely to bounce.

The best assessment of ground borne vibration from plant and activities is human perception. If it is believed that excessive vibration is being produced by the activities being undertaken, it is likely that an item of plant or machinery is not operating correctly.

5. Control of Noise and Vibration

5.1 Noise Controls:

The following controls will be put in place to mitigate the potential impacts of noise from the operation of Crownhill Topsoil and Aggregates:

- The normal working hours within the Site shall be Monday to Friday between 07:00 and 19:00 hours and Saturday between 07:00 and 13:00, with no working on Sundays and public holidays.
- The works will adhere to BS 5228: parts 1 and 2, as well as BS 7385: parts 1 and 2.
- All vehicles and mechanical plant used, will be Euro 5 or 6 and shall be fitted with effective exhaust silencers and shall be maintained in good and efficient working order to ensure effective noise reduction;
- Vehicles and plant will be serviced in line with manufacturers guidance;
- All compressors shall be 'sound reduced' models fitted with properly lined and sealed acoustic covers which shall be kept closed whenever the machines are in use,
- Machines in intermittent use shall be shut down in the intervening periods between work or throttled down to a minimum. Ensure equipment is turned off when not in use;
- All audible warning systems and alarms shall be designed, where reasonably practicable, to minimise noise;
- Plant known to exhibit acoustic directivity, i.e. emit noise strongly in one direction, shall be oriented so that the noise is directed away from noise sensitive receptors;
- Items such as pumps, generators and compressors will be positioned as far away from sensitive receptors as possible. If noise levels are still too high, screening and hoarding will be used to protect the area.
- Items such as pumps, generators and compressors will be positioned as far away from sensitive receptors as possible. If noise levels are still too high, screening and hoarding will be used to protect the area.
- Where possible carry out loading and unloading during working hours and away from noise sensitive areas.
- Crushing and screening plant will be positioned to utilise the sites natural profile and existing buildings as acoustic attenuation.
- Acoustic covers to engines shall be kept closed at all times during operation.
- Materials shall be lowered where possible and not dropped. The surfaces onto which the materials are being moved shall be covered by resilient material.

Substitution

- Where reasonably practicable, plant and/or methods of work causing significant levels of noise and vibration should be replaced by other less intrusive plant and/or methods of working.

6. Training:

All staff will be briefed into the contents of this plan during site inductions. Key issues they will be made aware of are:

- The receptors of noise and vibration and why they are sensitive to noise and vibration.
- Site operational hours;
- The requirement to locate noisy activities away from sensitive receptors and positioned so that stockpiles and buildings provide screening for noisy activities;
- That plant and machinery must be shut down when not in use;
- Indicators that plant is emitting excessive noise or vibration, indicating that it is not operating correctly or that operating practices should be amended.

Induction records will be maintained to demonstrate that this training has been provided.

Regular toolbox talks will be given on environmental topics including the minimisation of noise and vibration as described above. A minimum of 2 environmental subject related toolbox talks will be given per annum with Toolbox Talk record sheets signed by all attendees to confirm they have received and understood the training provided.

7. Monitoring

7.2 Operational Threshold Limits

From calculations undertaken, the following limits have been set for the site. The key receptors will be Llanmelin Wood and the Llanmelin Woods Hill Fort Scheduled Monument.

Noise Limits at Site Boundary:

Day	Noise Level (LAeq) at Site Boundary	Period of Measurement	Maximum Noise Level (LA _{Max})
Monday – Friday – 07:00 – 19:00	75 dB	15 mins	85 dB
Saturday – 07:00 – 13:00	75 dB	15 mins	85 dB
Sunday	No works		

Noise Limits at Llanmelin Woods:

Day	Noise Level (LA _{eq}) at Control Station	Period of Measurement	Maximum Noise Level (LA _{Max})
Monday – Friday: 07:00 – 19:00. Saturday: 07:00 – 13:00	65 dB	15 mins	75 dB
Sunday	No works		

Noise Limits at Llanmelin Woods Hill Fort:

Day	Noise Level (LA _{eq}) at Control Station	Period of Measurement	Maximum Noise Level (LA _{Max})
Monday – Friday: 07:00 – 19:00. Saturday: 07:00 – 13:00	55 dB	15 mins	65 dB
Sunday	No works		

7.3 Ad-hoc Noise Monitoring

Crownhill have purchased a Sound Level Meter (Casella CEL-240 Type II Sound Level Meter, compliant with IEC 61672) which they will use to undertake internal noise assessments. This is not a calibrated instrument but will allow for approximate assessments to be undertaken to determine instantaneous A weighted level of an activity.

This will be undertaken by the Site Manager twice per week during general operations and daily during crushing and screening operations. The results of this will be recorded.

If it is found that noise levels exceed 85dB(A) at 10m from the activity If it is assessed that noise limits may exceed the above limits, formal noise monitoring will be undertaken in accordance with BS 7445: 1991 – Description and Measurement of Environmental Noise.

7.4 Annual External Monitoring

Further external monitoring shall be carried out annually by an Acoustics Consultant using a minimum of a Type II noise meter complying with IEC 61672-1:2003, which will have been serviced and calibrated by the manufacturer within the last 12 months.

Annual noise monitoring will be undertaken at the control stations at:

- Llanmelin Woods;

- Llanmelin Woods Hill Fort;
- Llanvair Road.

Results from this monitoring will be compared against threshold values outlined above.

7.5 Vibration Monitoring

Due to the negligible potential for impacts from vibration at the site, no limits have been set and no monitoring is proposed.

Appendix 1 – Noise Calculations

Crushing of Inert Waste				
Plant	Quantity	Sound Pressure Level 10m	% on Time	Duration weeks
Tracked Crusher	1	84	90	1
Wheeled Loader	1	76	70	1
14T Excavator	1	69	30	1

Receptor 1	Static Noise Sources	Level at 10m	Activity LWA	Distance to receptor	On Time	'On Time' Correction	Hard or Soft Ground	Distance / Barrier Correction	Is there a Barrier?	Source Height	Receiver Height	Barrier Height	Source to Barrier Distance	Barrier to Receptor Distance	Façade Correction	Cadna/A Output	LAeq,10hour
Llanmelin			dB(A)	m	%	dB(A)	(S or H)	dB(A)	(Y/N)	(m)	(m)	(m)	(m)	(m)	dB(A)	dB(A)	dB(A)
Wood	Tracked Crusher	84	112	100	70	-1.5	s	-63.3	Y	2.0	1.5	4.0	15.0	85.0	0	48.7	47.2
	Wheeled Loader	76	104	100	70	-1.5	s	-63.2	Y	2.0	1.5	4.0	15.0	85.0	0	40.8	39.3
	14T Excavator	69	97	100	50	-3.0	s	-64.7	Y	2.0	1.5	4.0	15.0	85.0	0	32.3	29.3
	TOTAL																47.9

Receptor 2	Static Noise Sources	Level at 10m	Activity LWA	Distance to receptor	On Time	'On Time' Correction	Hard or Soft Ground	Distance / Barrier Correction	Is there a Barrier?	Source Height	Receiver Height	Barrier Height	Source to Barrier Distance	Barrier to Receptor Distance	Façade Correction	Cadna/A Output	LAeq,10hour
Llanmelin			dB(A)	m	%	dB(A)	(S or H)	dB(A)	(Y/N)	(m)	(m)	(m)	(m)	(m)	dB(A)	dB(A)	dB(A)
Wood	Tracked Crusher	84	112	340	70	-1.5	s	-68.8	y	2.0	1.5	4.0	15.0	325.0	0	43.2	41.7
Hill Fort	Wheeled Loader	76	104	340	70	-1.5	s	-68.8	y	2.0	1.5	4.0	15.0	325.0	0	35.2	33.7
	14T Excavator	69	97	340	50	-3.0	s	-68.8	y	2.0	1.5	4.0	15.0	325.0	0	28.2	25.2
	TOTAL																42.4

Receptor 3	Static Noise Sources	Level at 10m	Activity LWA	Distance to receptor	On Time	'On Time' Correction	Hard or Soft Ground	Distance / Barrier Correction	Is there a Barrier?	Source Height	Receiver Height	Barrier Height	Source to Barrier Distance	Barrier to Receptor Distance	Façade Correction	Cadna/A Output	LAeq,10hour
Llanmelin			dB(A)	m	%	dB(A)	(S or H)	dB(A)	(Y/N)	(m)	(m)	(m)	(m)	(m)	dB(A)	dB(A)	dB(A)
Wood	Tracked Crusher	84	112	670	70	-1.5	s	-76.2	n	2.0	1.5	0.0	0.0	0.0	0	35.8	34.3
Hill Fort	Wheeled Loader	75	104	670	70	-1.5	s	-76.2	n	2.0	1.5	0.0	0.0	0.0	0	27.8	26.3
	14T Excavator	69	97	670	50	-3.0	s	-76.2	n	2.0	1.5	0.0	0.0	0.0	0	20.8	17.8
	TOTAL																35.0

Receptor 4	Static Noise Sources	Level at 10m	Activity LWA	Distance to receptor	On Time	'On Time' Correction	Hard or Soft Ground	Distance / Barrier Correction	Is there a Barrier?	Source Height	Receiver Height	Barrier Height	Source to Barrier Distance	Barrier to Receptor Distance	Façade Correction	Cadna/A Output	LAeq,10hour
Llanvair			dB(A)	m	%	dB(A)	(S or H)	dB(A)	(Y/N)	(m)	(m)	(m)	(m)	(m)	dB(A)	dB(A)	dB(A)
Road	Tracked Crusher	84	112	1000	70	-1.5	s	-80.6	n	2.0	1.5	0.0	0.0	0.0	0	31.4	29.9
	Wheeled Loader	76	104	1000	70	-1.5	s	-80.6	n	2.0	1.5	0.0	0.0	0.0	0	23.4	21.9
	14T Excavator	69	97	1000	50	-3.0	s	-80.6	n	2.0	1.5	0.0	0.0	0.0	0	16.4	13.4
	TOTAL																30.6

Results Summary	Predicted Façade Level	
1		47.9
2		42.4
3		35.0
4		30.6

Crushing of Inert Waste				
Plant	Quantity	Sound Pressure Level 10m from	% on Time	Duration weeks
Screen Stockpiles	1	81	90	1
Wheeled loader - loading hopper	1	75	70	1
13T Excavator	1	69	50	1

Receptor 1	Static Noise Sources	Level at 10m	Activity LWA	Distance to receptor	On Time	'On Time' Correction	Hard or Soft Ground	Distance / Barrier Correction	Is there a Barrier?	Source Height	Receiver Height	Barrier Height	Source to Barrier Distance	Barrier to Receiver Distance	Façade Correction	Cadna/A Output	Aeq,10hour (façade)
Llanmelin Wood			dB(A)	m	%	dB(A)	(S or H)	dB(A)	(Y/N)	(m)	(m)	(m)	(m)	(m)	dB(A)	dB(A)	dB(A)
	Screen Stockpiles	81	109	100	90	-0.5	s	-61.7	y	2.0	1.5	4.0	15.0	85.0	0	47.3	46.8
	Wheeled loader - loading hopper	75	103	100	70	-1.5	s	-61.7	y	2.0	1.5	4.0	15.0	85.0	0	41.3	39.8
	13T Excavator	69	97	100	50	-3.0	s	-61.7	y	2.0	1.5	4.0	15.0	85.0	0	35.3	32.3
	Total																47.7

Receptor 2	Static Noise Sources	Level at 10m	Activity LWA	Distance to receptor	On Time	'On Time' Correction	Hard or Soft Ground	Distance Correction	Is there a Barrier?	Source Height	Receiver Height	Barrier Height	Source to Barrier Distance	Barrier to Receiver Distance	Façade Correction	Cadna/A Output	Aeq,10hour (façade)
Llanmelin Wood			dB(A)	m	%	dB(A)	(S or H)	dB(A)	(Y/N)	(m)	(m)	(m)	(m)	(m)	dB(A)	dB(A)	dB(A)
	Screen Stockpiles	81	109	340	90	-0.5	s	-68.8	y	2.0	24.0	4.0	15.0	325.0	0	40.2	39.7
Hill Fort	Wheeled loader - loading hopper	75	103	340	70	-1.5	s	-68.8	y	2.0	24.0	4.0	15.0	325.0	0	34.2	32.7
	13T Excavator	69	97	340	50	-3.0	s	-68.8	y	2.0	24.0	4.0	15.0	325.0	0	28.2	25.2
	TOTAL																40.6

Receptor 3	Static Noise Sources	Level at 10m	Activity LWA	Distance to receptor	On Time	'On Time' Correction	Hard or Soft Ground	Distance Correction	Is there a Barrier?	Source Height	Receiver Height	Barrier Height	Source to Barrier Distance	Barrier to Receiver Distance	Façade Correction	Cadna/A Output	Aeq,10hour (façade)
Llanmelin Wood			dB(A)	m	%	dB(A)	(S or H)	dB(A)	(Y/N)	(m)	(m)	(m)	(m)	(m)	dB(A)	dB(A)	dB(A)
	Screen Stockpiles	81	109	670	90	-0.5	s	-76.2	n	2.0	-2.0	0.0	0.0	0.0	0	32.8	32.3
Hill Fort	Wheeled loader - loading hopper	75	103	670	70	-1.5	s	-76.2	n	2.0	-2.0	0.0	0.0	0.0	0	26.8	25.3
	13T Excavator	69	97	670	50	-3.0	s	-76.2	n	2.0	-2.0	0.0	0.0	0.0	0	20.8	17.8
	TOTAL																33.2

Receptor 4	Static Noise Sources	Level at 10m	Activity LWA	Distance to receptor	On Time	'On Time' Correction	Hard or Soft Ground	Distance Correction	Is there a Barrier?	Source Height	Receiver Height	Barrier Height	Source to Barrier Distance	Barrier to Receiver Distance	Façade Correction	Cadna/A Output	Aeq,10hour (façade)
Llanvair Road			dB(A)	m	%	dB(A)	(S or H)	dB(A)	(Y/N)	(m)	(m)	(m)	(m)	(m)	dB(A)	dB(A)	dB(A)
	Screen Stockpiles	81	109	1000	90	-0.5	s	-80.6	n	2.0	-2.0	0.0	0.0	0.0	0	28.4	27.9
	Wheeled loader - loading hopper	75	103	1000	70	-1.5	s	-80.6	n	2.0	-2.0	0.0	0.0	0.0	0	22.4	20.9
	13T Excavator	69	97	1000	50	-3.0	s	-80.6	n	2.0	-2.0	0.0	0.0	0.0	0	16.4	13.4
	TOTAL																28.8

Predicted	
Results Summary	Façade Level
1	47.7
2	40.6
3	33.2
4	28.8

Lorry Loading				
Plant	Quantity	Sound Pressure Level 10m from source, dB	% on Time	Duration weeks
Wheeled Loader	1	82	100	10
Lorry 32t	4	76	25	10

Receptor 1	Static Noise Sources	Level at 10m	Activity LWA	Distance to receptor	On Time	'On Time' Correction	Hard or Soft Ground	Distance / Barrier Correction	Is there a Barrier?	Source Height	Receiver Height	Barrier Height	Source to Barrier Distance	Barrier to Receiver Distance	Façade Correction	Cadna/A Output	Aeq,10hour (façade)
Llanmelin			dB(A)	m	%	dB(A)	(S or H)	dB(A)	(Y/N)	(m)	(m)	(m)	(m)	(m)	dB(A)	dB(A)	dB(A)
Wood	Wheeled Loader	82	110	100	100	0.0	s	-61.7	y	2.0	1.5	4.0	15.0	85.0	0	48.3	48.3
	Lorry 32t	76	104	100	25	-6.0	s	-61.7	y	2.0	1.5	4.0	15.0	85.0	0	42.3	36.3
	TOTAL																48.6

Receptor 2	Static Noise Sources	Level at 10m	Activity LWA	Distance to receptor	On Time	'On Time' Correction	Hard or Soft Ground	Distance / Barrier Correction	Is there a Barrier?	Source Height	Receiver Height	Barrier Height	Source to Barrier Distance	Barrier to Receiver Distance	Façade Correction	Cadna/A Output	Aeq,10hour (façade)
Llanmelin			dB(A)	m	%	dB(A)	(S or H)	dB(A)	(Y/N)	(m)	(m)	(m)	(m)	(m)	dB(A)	dB(A)	dB(A)
Wood	Wheeled Loader	82	110	340	100	0.0	s	-68.8	y	2.0	1.5	4.0	15.0	325.0	0	41.2	41.2
Hill Fort	Lorry 32t	76	104	340	25	-6.0	s	-68.8	y	2.0	1.5	4.0	15.0	325.0	0	35.2	29.2
	TOTAL																41.5

Receptor 3	Static Noise Sources	Level at 10m	Activity LWA	Distance to receptor	On Time	'On Time' Correction	Hard or Soft Ground	Distance / Barrier Correction	Is there a Barrier?	Source Height	Receiver Height	Barrier Height	Source to Barrier Distance	Barrier to Receiver Distance	Façade Correction	Cadna/A Output	Aeq,10hour (façade)
Llanmelin			dB(A)	m	%	dB(A)	(S or H)	dB(A)	(Y/N)	(m)	(m)	(m)	(m)	(m)	dB(A)	dB(A)	dB(A)
Wood	Wheeled Loader	82	110	670	100	0.0	s	-76.2	n	2.0	1.5	0.0	0.0	0.0	0	33.8	33.8
Hill Fort	Lorry 32t	76	104	670	25	-6.0	s	-76.2	n	2.0	1.5	0.0	0.0	0.0	0	27.8	21.8
	TOTAL																34.1

Receptor 4	Static Noise Sources	Level at 10m	Activity LWA	Distance to receptor	On Time	'On Time' Correction	Hard or Soft Ground	Distance / Barrier Correction	Is there a Barrier?	Source Height	Receiver Height	Barrier Height	Source to Barrier Distance	Barrier to Receiver Distance	Façade Correction	Cadna/A Output	Aeq,10hour (façade)
Llanvair			dB(A)	m	%	dB(A)	(S or H)	dB(A)	(Y/N)	(m)	(m)	(m)	(m)	(m)	dB(A)	dB(A)	dB(A)
Road	Wheeled Loader	82	110	1000	100	0.0	s	-80.6	n	2.0	1.5	0.0	0.0	0.0	0	29.4	29.4
	Lorry 32t	76	104	1000	25	-6.0	s	-80.6	n	2.0	1.5	0.0	0.0	0.0	0	23.4	17.4
	TOTAL																29.7

Results Summary	Predicted Façade Level	
1		48.6
2		41.5
3		34.1
4		29.7

Lorry Loading				
Plant	Quantity	Sound Pressure Level	% on Time	Duration weeks
Lorry 32t	1	76	10	1

[illegible]