

# MA8 Noise Impact Assessment



**Our Ref:** 249312

7<sup>th</sup> August 2023

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**Report Number:** 23\_06\_249312\_CD\_01\_rev1

Dear Mr Wiggan,

## **Environmental Noise Survey at Lincoln Storm, Weston-Super-Mare**

Please find enclosed the report relating to the environmental noise monitoring carried out at Lincoln Storm, Worle Quarry on 28<sup>th</sup> of June 2023.

An account for this work will be forwarded to you under separate cover. The work was undertaken according to our General Conditions of Contract.

This is a revised report and replaces the previous copy.

If we can be of any further assistance to you in this matter, please do not hesitate to contact me.

Yours sincerely

On behalf of **SOCOTEC UK Ltd**

**Chris Duffill** BSc (Hons) AMIOA AFOH

**Acoustic Consultant and Occupational Hygiene Technologist**

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# Lincoln Storm

**Environmental Noise Survey**

**Weston-Super-Mare**

**June 2023**

Carried out for:

Mr Ray Wiggan  
Lincoln Storm  
Worle Quarry  
Lower Kewstoke Road  
Weston-Super-Mare,  
BS22 9LF

**Issue date:** 7<sup>th</sup> August 2023





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## EXECUTIVE SUMMARY

This report presents the findings of an environmental noise survey carried out for at Lincoln Storm, at their Weston-Super-Mare site. The measurements were performed on 28<sup>th</sup> of June 2023. The site visit was carried out by Chris Duffill BSc (Hons) AMIOA AFOH Acoustic Consultant and Occupational Hygiene Technologist of SOCOTEC UK Limited Environment and Safety Division. The site was represented by Ray Wiggan of Lincoln Storm.

The survey was required to investigate if noise arising from the Lincoln Storm site is likely to have an adverse impact on the closest noise sensitive receptors (NSRs) as assessed under BS4142:2014.

As the site was not in production, Specific Noise measurements were taken of the processes running as part of preventative maintenance at representative output levels including the SRT plant, Generators, Gravity Separator and mobile plant. These were used to input into a CadnaA model to calculate sound levels due to site activity at the NSRs. The highest potential noise levels based on site activity were used in building the model to present a worst-case scenario.

Table 1 – Summary of measurements

Daytime measurements	The Observatory	79 Hillcott	Rock Cottage
	dB	dB	
Background sound level $L_{A90}$	37	32	33
<b>CadnaA Calculated level from Site Activity at NSRs - <math>L_{Aeq}</math></b>	<b>31</b>	<b>32</b>	<b>31</b>
Excess of calculated level at NSR over background sound level	<b>-6</b>	<b>0</b>	<b>-2</b>

The calculated levels as assessed under BS4142:2014 were below or in one case equal to the measured background levels at each of the NSRs.

At the two closest NSRs, 79 Hillcott and Rock Cottage, there was steady road traffic noise from Kewstoke Road which was the dominant factor in the noise climate.

Measurements were taken whilst the plant was operating and with associated vehicle movements, however, it should be noted that when the plant begins to operate steadily noise levels may vary which would have an impact on the noise levels at the boundary.

The following recommendations are made to ensure that noise emissions are kept to a minimum:

- Install acoustic enclosures around the Generators to reduce the transmission of noise
- Ensure that Roller Shutter doors are kept shut on all buildings; the West facing Roller Shutter door on the SRT plant was reportedly always open for frequent access - install an automatic response roller door system to maintain containment of noise Acoustic screens or enclosures could also be considered for the Mill in the SRT plant
- Acquire quieter Fork Lift Trucks running on Electric or LPG
- Ensure a management plan for vehicle noise on site is in place that limits the time spent on site and the time vehicles are stationary with engines running.

## 1 INTRODUCTION

- 1.1 This report presents the findings of an environmental noise survey carried out for Lincoln Storm, at their Weston-Super-Mare site. The measurements were performed on the 28<sup>th</sup> of June 2023 (daytime). The site visit was carried out by Chris Duffill BSc (Hons) AMIOA AFOH Acoustic Consultant and Occupational Hygiene Technologist of SOCOTEC UK Limited Environment and Safety Division. The site was represented by Ray Wiggan of Lincoln Storm.

## 2 SCOPE AND EXCLUSIONS

- 2.1 The survey was required to investigate if noise arising from the Lincoln Storm site at Worle Quarry is likely to have an adverse or significant adverse impact at the closest noise sensitive receptors (NSRs) as assessed under BS4142:2014.
- 2.2 It was understood that Lincoln Storm are required to demonstrate that Environmental noise will not cause disruption to nearby residents as a condition of their license to operate. Noise criteria in respect of the NSRs were requested but it is understood that no specific requirements have been set by the local authority.
- 2.3 Attended noise monitoring was carried out at a property adjacent to the Golf Course to the West (The Observatory) and two properties to the East, each located on two adjacent small lanes off Kewstoke Road (Rock Cottage and 79 Hillcott). The map in Appendix C shows the monitoring locations.
- 2.4 A log of relevant noise events from site and other local activity at the NSRs was kept during monitoring.
- 2.5 The monitoring locations were determined with assistance from Ray Wiggan of Lincoln Storm and were judged to be the closest NSRs to the site. It was understood that a complaint about noise had been received from a property located to the East.

## 3 PROCESS AND OBSERVATIONS

- 3.1 The Lincoln Storm site recycles lithium ion batteries, extracting the reusable metal.
- 3.2 The site was located in a Quarry with steep rock faces surrounding the plant building on three side, with the entrance from the open North end.
- 3.3 Production was understood to have been halted at the facility pending Environment Agency approvals. The plant machinery was run at typical loads and power levels however, so noise measurements could be taken.
- 3.4 The site had three main production areas. The material extraction process was managed in a building known as the SRT Plant, which was housed to the South of the site in a large factory

unit. There were three generators located outside this plant building against the wall, on the East side. There were two roller shutter doors (RSDs); one to the South and another to the East.

- 3.5 The generators were not all in operation. It was stated that a condition of operating was that generators were limited to a maximum output of 500 kVA. This was supplied by a single Akxa AD410. The Akxa AD1015 was not running.
- 3.6 The SRT plant reportedly will have several processes running including de-lamination and separation, leading to product recovery and resale. The Mill located at the South side inside the SRT plant was noted to be the noisiest process. It was close to the RSD. This was running at 750 rpm, though is capable of 1000 rpm. However, it was explained that the rate of 750 rpm is optimum and achieves the best results, therefore, running at 75% of max load.
- 3.7 Another factory unit on the West of the site, smaller in size, housed the two gravity separators. This was located directly against the cliff face with the RSD to the East.
- 3.8 Other noise sources on site were the diesel operated fork lift truck. Other vehicle movements were limited as the site was not operational, but one delivery van accessed the site on two occasions. It would be reasonable to assume that there will be frequent vehicle movements to deliver and collect product once operational, pausing at the weighbridge before loading and unloading. This will add to the noise impact.
- 3.9 There was a drier plant to the north side of the site, but this was not operational. It would normally be run by a 630 kVA generator.
- 3.10 It was understood that the site would be operational between 7:00 and 19:00 with no night-time hours of operation. However, it was mentioned that some weekends would be used but that the noisy tasks would be restricted. No assessment can be made of impact during weekend hours, as this would require a separate assessment of background noise at the NSRs under weekend conditions, which is likely at a reduced level compared to weekday daytime. Furthermore, a weekend assessment was not part of the original scope of works.

## **4 BACKGROUND INFORMATION**

4.1 Noise is generally considered as unwanted sound - it may be too loud, intrusive or simply occur at the wrong time. It can cause annoyance, interfere with work efficiency, induce stress, disturb concentration and adversely affect communication. Furthermore, noise is an underestimated threat that can cause a number of short- and long-term health problems, such as sleep disturbance, cardiovascular effects, poorer work and school performance, hearing impairment, etc.

### **4.2 Environmental Noise**

Noise induced hearing loss is not an issue at the exposure levels likely to be experienced by neighbours of noise emitting activities. It can be a potential hazard above noise levels of 80dB(A) and where exposure is over long periods of time. The nature of the response to noise can vary widely between individuals from no response at all to disturbance that can develop into annoyance or anger.

Some individuals may experience physical effects arising as a result of emotional stress, such as sleep disturbance or loss of appetite.

4.3 Unlike other environmental pollutants, the effects of noise are made up of two components - its energy (an objective component) and its tendency to annoy (a subjective component which differs according to the noise source). Thus, noise has a plethora of measurement units, supported to varying degrees by social survey data establishing their subjective annoyance factors. All this reflects the fact that, in general, noise affects people rather than the environment itself.

4.4 The Public Health Outcomes Framework (PHOF) published in January 2012 quoted that from noise mapping carried out in 2011 (and based on the 2011 census), the total number of people in England exposed to 65dB,  $L_{Aeq\ 16h}$  or more was 2.74 million (5.2% population) in daytime.

4.5 From noise mapping carried out in 2011 (and based on the 2011 census), the total number of people in England exposed to 55dB,  $L_{night}$  or more was 4.25 million (8.0 % population) at night-time.

4.6 These noise sources are regulated by numerous legal measures, with an even larger variety of technical controls available.

### **4.7 World Health Organisation environmental noise criteria**

Noise has emerged as a leading environmental nuisance in the World Health Organisation (WHO) European Region, and the public complains about excessive noise more and more often.

The WHO has recommended a number of environmental noise criteria based on community annoyance; speech intelligibility and sleep disturbance (See 'WHO Environmental health criteria 12, noise'). These criteria are:



- Sleep disturbance  $L_{Aeq}$  35dB(A) bedroom standard at night
- Indoor speech intelligibility: daytime  $L_{Aeq}$  45dB(A) in living rooms
- Outdoor community annoyance  $L_{Aeq}$  55dB(A).

Noise is a significant environmental pollutant, with complaints to local authorities on neighbour noise rising four-fold between 1984 and 1994, and similar notable rises about other noise sources such as construct and road noise.

Note: British courts have rejected these as the sole criteria of noise nuisance, preferring to take into account a wider range of subjective criteria.

4.8 Information on Legislation can be found in Appendix E.

## 5 MONITORING METHODS

5.1 See Appendix A – Methods for the test method and equipment used.

5.2 The sound level meter's microphones were equipped with windshields at all times and the following parameters were set on the sound level meters during the noise measurements:

Time weighting:	Fast
Frequency weighting:	A
Logging Intervals:	15 minutes
Parameters:	$L_{Aeq}$ $L_{AMax}$ $L_{A10}$ $L_{A90}$

5.3 The sound level meter was field calibrated with an electronic calibrator prior to the readings being taken and again on completion of the monitoring to report any calibration drift.

5.4 All readings taken were “free field”, i.e. at least 3.5m away from any façade or reflecting surface other than the ground. The microphone was located 1.5m above ground level.

5.5 SOCOTEC UK Limited personnel were present throughout the monitoring period, thereby ensuring that an accurate representation of the prevailing noise climate was recorded. The readings are only representative of the activities at the Lincoln Storm site and from the locality of the measurement locations on the day of the survey.

5.6 Efforts were made to ensure plant was running in a manner that was a true representation of normal operating conditions. Where a number of measurements have been taken, the highest have been used in calculations and discussions to represent the worst-case scenario.

5.7 All noise monitoring was carried out when the weather conditions satisfied the meteorological constraints as defined in BS 4142:2014+A1:2019, “Methods for rating and assessing industrial and commercial sound” i.e. mean wind speed less than 5 m/s and no significant rainfall. Wind speeds were measured using an anemometer.

Table 2 - Environmental conditions during the monitoring period

Date	Rain	Temperature °C	Wind	
			Direction	Speed m/s
28/06/2023	Sun/light cloud	19	W	4

- 5.8 The sound level meter was field calibrated to 94 dB before and after the monitoring period using a Cirrus CR:515 acoustic calibrator, serial no. 88031 calibrated 29/07/2022. The calibrator complies with IEC 60942:2003 Class 1 specification. The field calibration details are shown in Table 3.

Table 3 - Field calibration

Sound Level Meter	Serial Number	Date	Time	Calibration Level [dB]	End Calibration Drift [dB]
Cirrus CR171B	G300546	28/06/2023	8:58	94	0.12
		28/06/2023	14:27		

Certificates of calibration are available upon request.

## 6 RESULTS

### 6.1 BS4142:2014 Assessment

6.1.1 The measurements of the specific noise sources on site were used to build a CadnaA model to predict noise levels due to the site processes at the NSRs.

6.1.2 The background sound levels at the NSRs were measured without the plant running. At the nearest NSR (79 Hillcott) the plant was operated for a short time during a separate measurement, for the purposes of observing the impact of the plant on the noise climate at this NSR.

6.1.3 The noise criteria outcome is defined in BS 4142:2014 as follows:

*“NOTE 1 More than one assessment might be appropriate.*

- a) Typically, the greater this difference, the greater the magnitude of the impact.*
- b) A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.*
- c) A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.*
- d) The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact.*

*Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.*

*NOTE 2 Adverse impacts include, but are not limited to, annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact.”*

A summary of the results of the sound impact assessment carried out according to BS4142:2014 is shown in the table below. These results have been based on environmental noise monitoring carried out during the daytime of a weekday only (7:00 to 23:00).

Table 4 – Summary of Measurement results, Daytime

Daytime measurements	The Observatory	79 Hillcott	Rock Cottage
	dB	dB	dB
Background sound level $L_{A90}$	37	32	33
<b>CadnaA Calculated level from Site Activity at NSRs - <math>L_{Aeq}</math></b>	<b>31</b>	<b>32</b>	<b>31</b>
Excess of calculated level at NSR over background sound level	<b>-6</b>	<b>0</b>	<b>-2</b>

## **7 DISCUSSION**

### **7.1 Monitoring location 1, The Observatory**

The sound level meter was positioned adjacent to the boundary of the property. The Lincoln Storm plant was located below the cliffs to the East. The Observatory was on a track that lead off Worlebury Hill Road. A golf course and walking routes including bridleways surrounding the property. Traffic was minimal, but golfers and horse riders passed by frequently.

Noise from the M5, approximately 2.5 km away, to the East was faintly audible, together with other traffic noise from local roads including the busy A370 at about 2.5 km.

Other noise heard at times included birds and dogs.

The Lincoln Storm plant was not operating during monitoring at this location so the background level recorded represents an accurate reading of the local noise climate.

### **7.2 Monitoring location 2, 79 Hillcott**

The property was up a track leading off Kewstoke Road, and was the closest residence to all noise sources on site, approximately 80m away. The measurements were conducted close to the boundary of the property, slightly nearer the site than the property itself which was behind the wall.

Road traffic noise from Kewstoke Road at 60m distance was audible, with steady traffic travelling at moderate speeds in a residential area.

The house was located halfway up an incline that rose from Kewstoke Road, with the top of the incline 20m higher than the property. Beyond this was the cliff that bounded the site that was 25m high at this point.

The Lincoln Storm plant was not operating during monitoring at this location so the background level recorded represents an accurate reading of the local noise climate.

The plant was run for a short time during the visit to make a subjective assessment of the impact on the noise climate at the property boundary. The SRT plant was started up with the RSD to the South closed. This was noted to be faintly audible, but was not dominating the noise environment.

### **7.3 Monitoring location 3, Rock Cottage**

Rock Cottage was also on the incline that fell away from the quarry, about 50m North of 79 Hillcott but accessed from a different track leading off Kewstoke Road. The monitoring position was in front of the property which was lower down the incline and nearer the road as the rear of the property was not accessible.

Road noise was the main source from Kewstoke Road at 50m down the track. As with 79 Hillcott, the incline rose about 20m to the cliff edge at the boundary of the Lincoln Storm site.

It is reasonable to assume that road traffic noise would be less at the rear of the property, being further from the road and with the building itself offering screening.

The CadnaA model prediction of noise levels were calculated for the rear of the property, closest to the site.

#### 7.4 Daytime monitoring results, The Observatory

The calculated noise level from site activities using the CadnaA model was 31 dB(A). This is 6 dB(A) below the measured background level,  $L_{A90}$  of 37 dB(A).

#### 7.7 Daytime monitoring results, 79 Hillcott

The calculated noise level from site activities using the CadnaA model was 32 dB(A). This is equal to the measured background level,  $L_{A90}$  of 32 dB(A).

#### 7.8 Daytime monitoring results, Rock Cottage

The calculated noise level from site activities using the CadnaA model was 31 dB(A). This is 2 dB(A) below the measured background level,  $L_{A90}$  of 33 dB(A).

#### 7.9 Significance of measurements at the locations and potential uncertainties

The potential uncertainties in this type of survey are mitigated as far as possible by following the SOCOTEC method and best practice, and are summarised below:

- Specific noise of activities on site were deemed to represent typical levels for running plant by the client. However, this did not represent normal production activities which could increase site noise, particularly in respect of movement of vehicles.
- Access to properties was restricted so getting background levels at the boundary was not possible.
- Duration of the monitoring was deemed to be representative of typical daytime activities at the NSRs, and was consistent throughout the monitoring periods on the day of the visit. It is not likely that this would alter greatly during typical day time weekdays.
- The distances and heights were calculated from a combination of sources including LIDAR mapped contours, OS and Open Street map data, and Google Earth.

The levels of noise produced by site activities has the potential to have the greatest influence on the measurements.

The other uncertainties are not deemed to be significant.

## 8 CONCLUSIONS AND RECOMMENDATIONS

Based on site observations and the results of the monitoring, it is reasonable to conclude that noise from plant and activities at the Lincoln Storm plant were not a significant factor for the environmental noise climate at the nearest noise sensitive receptors.

According to the BS4142 terminology, this means the likelihood of an adverse impact is low.

The noise from the site was detectable at 79 Hillcott as a constant low-level drone with the SRT plant running. However, the specific noise from site was soon masked by other sounds in the locations, including passing traffic which was at a similar level.

This does have the potential to increase with other activities including vehicle movement and other plant operating such as the Gravity Separators.

## 9 RECOMMENDATIONS

9.1 The following measures should be considered with regard to noise produced by site activities and plant, to ensure that noise levels emanating from site are kept to a minimum:

- Install acoustic enclosures around the Generators to reduce the transmission of noise
- Ensure that RSDs are kept shut during operational times on all buildings
- The West facing Roller Shutter door on the SRT plant was reportedly always open for frequent access; install an automatic response roller door system to maintain containment of noise for as long as possible
- Acoustic screening or enclosures should also be considered for the Mill inside the SRT plant
- Acquire quieter Fork Lift Trucks, for example running on Electric or LPG
- Ensure a management plan for vehicle noise on site is in place that limits the time spent on site and the time vehicles are stationary with engines running. Loading and unloading could be done in side a closed building, or engines stopped during these activities
- A proactive position on this would be to offer incentives to clients who use Euro Cat6 vehicles which produce lower noise and emissions
- If local concerns are an on-going issue, it will be necessary to repeat the monitoring with full site activity occurring as the noise levels do have the potential to be higher than the representative plant operations measured on the visit.

Other general good practice recommendations are listed below:

- Ensure that inspection plates and any acoustic panels on mobile and static plant are in place and fitted correctly
- Repair or replace any defective exhaust systems on mobile plant (i.e. missing clamps or locating pins) as soon as possible after any defects are discovered

- 
- Ensure that mobile plant and other site vehicles are driven and operated correctly, and that all site speed limits are properly observed
  - Ensure that mobile plant horns and reversing alarms are adjusted to a reasonable level. Tonal sounds such as beeps can be replaced with white noise which is less intrusive
  - Inspect the equipment used on site on a regular basis, including externally mounted equipment to ensure it is not damaged or requiring maintenance
  - Encourage employees to report any increase in plant noise they notice.



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## 10 REFERENCES

1. ISO1996-1:2016 Acoustics -- Description, Measurement and Assessment of Environmental Noise -- Part 1: Basic Quantities and Assessment Procedures.
2. ISO1996-2:2017 Acoustics -- Description, Measurement and Assessment of Environmental Noise -- Part 2: Determination of Sound Pressure Levels.
3. British Standard: BS 7445. Description and Measurement of Environmental Noise (2003/2008).
  - Part 1. Guide to Quantities and Procedures.
  - Part 2. Guide to the Acquisition of Data Pertinent to Land Use.
  - Part 3. Guide to Application to Noise limits.
4. British Standard: BS 4142:2014+A1:2019. Methods for rating and assessing industrial and commercial sound.
5. Environment Agency; Horizontal Guidance Note IPPC H3, Part 2 – Noise Assessment and Control.
6. World Health Organisation: 2018: Environmental Noise Guidelines for the European Region.
7. British Standards Institution BS EN 61672-1:2013 Electroacoustics. Sound level meters. Specifications. London, BSI.
8. British Standards Institution BS EN IEC 60942:2018. Electroacoustics. Sound calibrators. London, BSI.

## APPENDIX A – METHODS

Process	<b>Environmental Noise Measurements</b>
Reference Documentation	British Standard BS 7445, ISO 1996-1:2016, ISO-1996-2:2017, BS EN 5228-1:2009+A1:2014, BS EN 61672-1:2013, BS EN IEC 60942:2018 SOCOTEC in house procedure – Noise Surveys - SCI/ENV/04-7
Monitoring equipment / Serial Number / Calibration status	Cirrus CR171B Precision Integrating Sound Level Meter, serial No. G300546, calibrated 1 <sup>st</sup> June 2023 fitted with windshield and calibration checked before and after survey, used with Cirrus CR515 calibrator, serial No. 88031 calibrated 29 <sup>th</sup> June 2022.
Analysis/Reporting Laboratory	SOCOTEC UK Ltd Cirencester
Accreditation Status	Not Accredited

## APPENDIX B – RESULTS

**Table B1 – Weather Conditions, Daytime 28/06/2023**

Date	Rain	Temperature °C	Wind	
			Direction	Speed m/s
28/06/2023	Sun/light cloud	19	W	4

**Table B2 – Background Sound Level Measurement Results at NSRs**

Start Time	Duration (h:m)	Location	L <sub>Aeq</sub> (dB)	L <sub>AFMax</sub> (dB)	L <sub>AFMin</sub> (dB)	L <sub>AF10</sub> (dB)	L <sub>AF90</sub> (dB)
11:12	01:00	The Observatory	48	79	35	45	<b>37</b>
12:25	01:00	79 Hillcott	42	66	29	43	<b>32</b>
13:46	00:30	Rock Cottage	51	68	29	52	<b>33</b>

**Table B3 – Specific Noise Measurements of Site Processes**

Process/Location	L <sub>Aeq</sub> (dB)	Distance r (m)	Directivity Q	Sound Power Level
Aksa Generator AD410 (410 kVA), no load, South	<b>79</b>	3	4	<b>93</b>
As above, West	76			
North	76			
Clark Diesel Fork lift truck, lifting & turn @2m	76			
As above run 2 @2m	<b>81</b>	2	2	<b>95</b>
SRT plant running, Open RSD to West	<b>79</b>	3	2	<b>96</b>
SRT plant, weighbridge, North	61			
SRT plant, East, towards rear near extraction motor	69			
SRT plant Open RSD, South	<b>81</b>	3	2	<b>98</b>
Gravity Separator, Fan on Max	<b>80</b>	3	4	<b>94</b>

Values highlighted in blue taken as highest readings obtained and used for the predictions

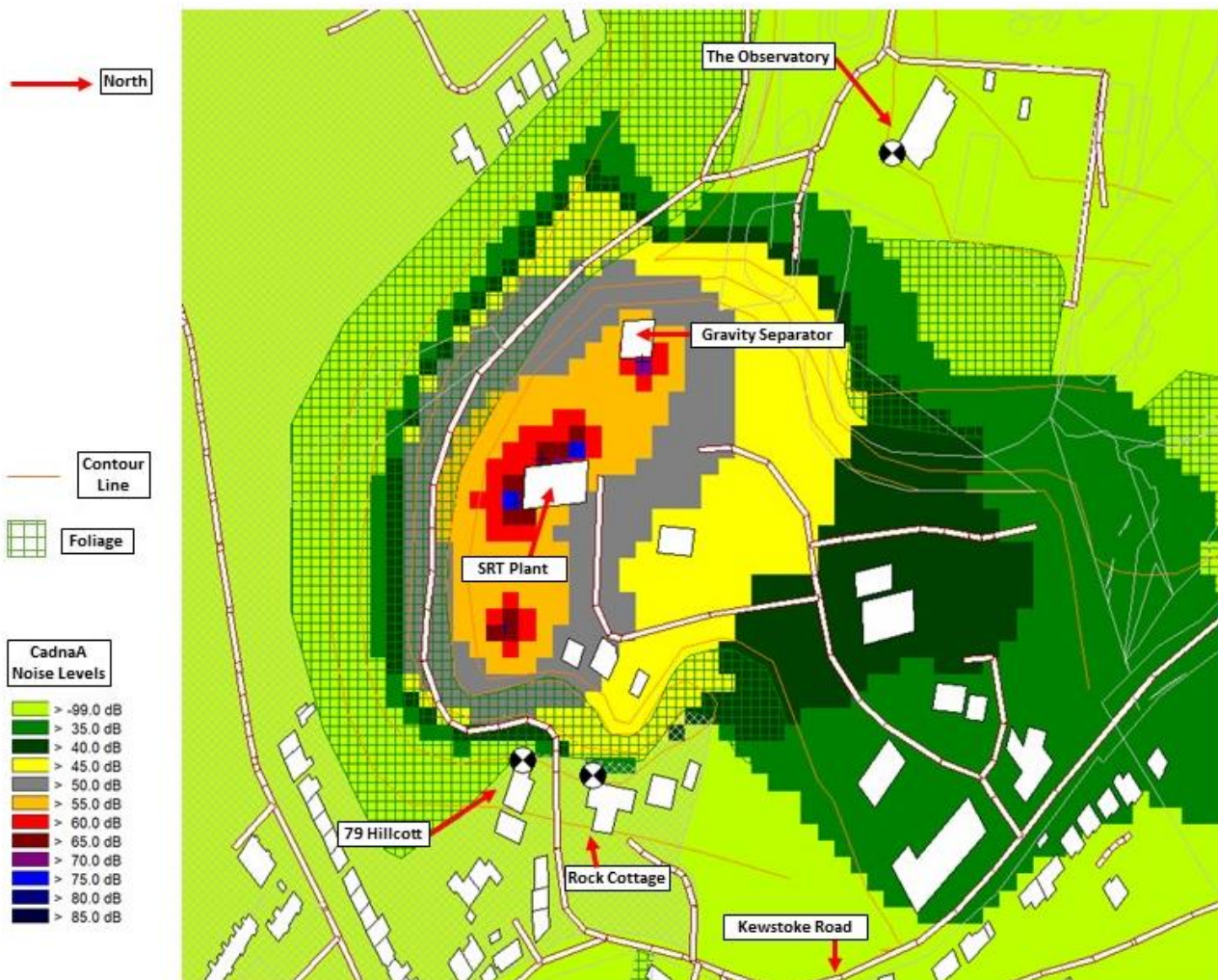
Sound Power Level (SWL) calculated using:

$$SWL = L + 20\log(r) + 11 - 10\log(Q)$$

**Table B4 – CadnaA Calculated Noise levels at NSRs**

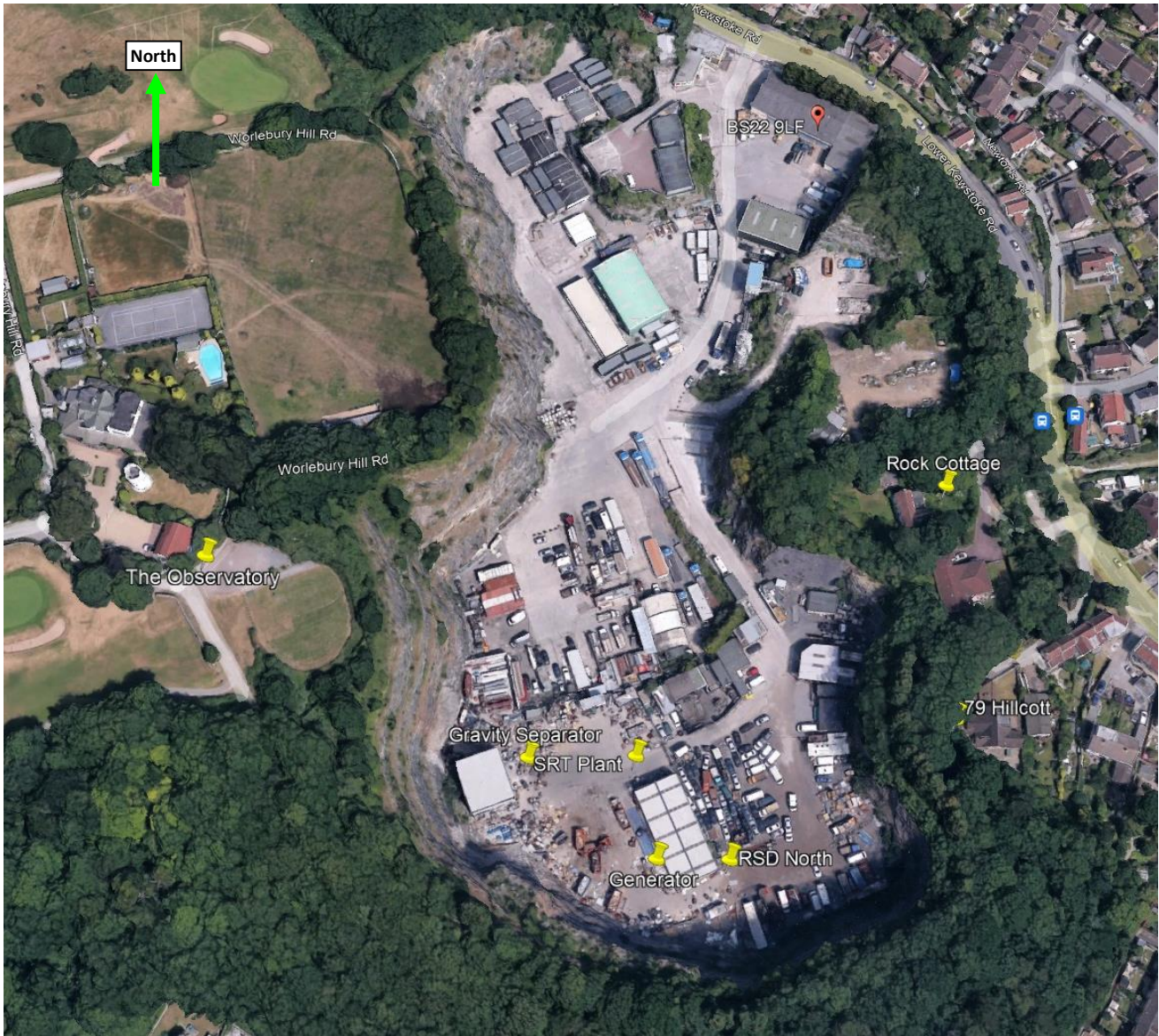
Location	dB(A)
The Observatory	31
79 Hillcott	32
Rock Cottage	31

**Figure B1 – CadnaA Noise Model**





**APPENDIX C – MEASUREMENT LOCATIONS**



## APPENDIX D – NOISE TERM GLOSSARY

<b>Decibel (dB)</b>	The unit of measure for sound pressure level, defined as the logarithm of the ratio between the actual sound pressure and a reference sound pressure (20 $\mu$ Pa). Thus a wide set of values can be compressed into a small set of numbers.
<b>L<sub>Aeq</sub></b>	The equivalent continuous A-weighted noise level averaged over the measurement period.
<b>‘A’ Weighting</b>	The ‘A’ weighted acoustic energy scale corresponds closely with the response of the human ear.
<b>L<sub>A90</sub></b>	The noise level exceeded for 90% of the time.
<b>Max L</b>	The maximum root mean square level of weighted sound pressure level over the reference period.
<b>Max P</b>	The maximum level of un-weighted sound pressure level measured over the reference period.
<b>L<sub>EP,d</sub></b>	The daily personal noise exposure defined as total exposure to noise throughout the day, taking into account noise levels in work areas and time spent in them.
<b>SEL (LEq)</b>	The constant level which if maintained for a period of 1 second would have the same acoustic energy as the measured noise event.
<b>Background Noise Level</b>	The noise level exceeded for 90% of the time, which corresponds to the quieter periods. BS 4142:2014+A1:2019 defines a measure of background noise in terms of L <sub>A90</sub> and a 1-hour day time reference period.
<b>Rating Level</b>	The specific noise level plus any adjustments for characteristic features of the noise.
<b>Specific Noise Level</b>	The equivalent continuous ‘A’ weighted sound pressure level at the assessment position produced by the specific noise source over a given reference time interval.
<b>Residual Noise</b>	The equivalent continuous ‘A’ weighted sound pressure level at the assessment position, without the specific noise source present, over a given reference time interval.

## APPENDIX E – ENVIRONMENTAL NOISE LEGISLATION

### Legal duties and liabilities

Legal implications of environmental noise fall into three categories:

- Common law
- Criminal liabilities.
- Rights to compensation or sound insulation.

In addition, the European Union has much legislation fixing maximum sound power levels for vehicles, machines and aircraft – although this is created to aid development of the single market rather than as a specifically environmental measure.

### Common Law Duties

A duty not to interfere with use or enjoyment of land and rights in connection with it, expanded by statute law to provide clearer remedies for complainants and local authorities. The noise standards applied to common law and statutory nuisances are entirely within the remit of the courts, but environmental health officers are employed by local authorities to deal with noise (and other public health) complaints from the public. This category of nuisance applies to all owners or occupiers of property, including vehicles in the street.

Reference should be made to:

- Noise and statutory nuisance Act 1993 – (England & Wales).
- Circular on the ‘Noise and statutory nuisance Act 1993, DoE Circular 9/97– (England & Wales).
- Law of statutory nuisance – part 1 premises– (England & Wales).

### Principles of Noise Nuisance

Some important points have to be satisfied before any noise nuisance action (or defense) can be successful. The principles apply whichever type of proceedings are taken:

- The nuisance must cause definite and substantial interference with personal comfort or enjoyment of property.
- The noise need not be injurious to health.
- There is no fixed standard of comfort, indicating that local conditions (such as background noise) will be taken into account.
- Complainants who newly occupy property already subject to noise have as many rights to redress as occupiers newly affected by noise (‘coming to the nuisance’).
- Temporary noise sources will not generally be accepted as nuisances. **Note** that ‘temporary’ is not the same as ‘intermittent’.
- Buildings operations managed in a reasonable manner are unlikely to be successfully interfered with by the courts.
- Malice by a complainant or defendant will be taken into account.

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- In civil proceedings it is not sufficient to show that all reasonable steps have been taken to prevent the noise occurring. By contrast in statutory proceedings, businesses have a defense that they used the best practicable means to deal with noise when legal action is taken by EHO's under the 'Environmental Protection Act 1990'.
  - Noise resulting from an activity granted planning consent, and which causes a change in the character of a neighbourhood may not be a nuisance.
  - Complainants have to show the defendant knew, or ought to have known of the nuisance.