



GLJ Recycling Ltd

Permit application supporting documents

2 - Amenity Management Plans

23 August 2019

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Contents

1	Litter and Dust Management	4
1.1	Litter	4
1.1.1	Inventory of Litter Sources	4
1.1.2	Control Measures	4
1.1.3	Monitoring	5
1.1.4	Non-Conformity	5
1.2	Dust	5
1.2.1	Inventory of Dust Sources	5
1.2.2	Control Measures	6
1.2.3	Monitoring	7
1.2.4	Non-Conformity	7
2	Noise and Vibration Management	8
2.1	Noise and Vibration Management	8
2.2	Background Noise	9
2.3	Noise Inventory	10
2.4	Shredder Noise Assessment	10
2.5	Generators	9
3	Odour Management	12
	Appendices	
A	Noise Risk Assessment & Procedure	13
B	Noise Impact Assessment 5217/NIA1_Rev 2	16

1 Litter and Dust Management

1.1 Litter

The objective of the site's management system is to ensure no litter escapes the site boundary.

Litter generally consists of light wastes, predominantly paper and plastic, which contaminate the primary waste streams accepted at the site. It can be generated during storage, handling and transport of waste to and from the site.

1.1.1 Inventory of litter sources

The following locations within the site have been identified as potential sources of litter.

Table 1: Potential litter sources

Location
Metal reception area
Shredder output bay
Fragmentiser Fluff stockpile
Shear
Shear stockpiles

1.1.2 Control measures

Handling techniques

When transporting waste around the site, operatives and plant drivers are instructed to minimise the height to which waste is lifted and tipped. This ensures that waste is less likely to be windblown when released from grabs and vehicles.

Use of bays and skips

Stockpiles are enclosed by concrete bays, which shield storage areas from the wind and reduce the likelihood of light wastes becoming mobile. Smaller volumes are stored in enclosed skips which are periodically emptied or bulked up within the bays later. Minimising stockpiles outside of engineered areas reduces the risk of light waste drying out and being picked up by the wind in open areas.

Catch fencing

Where litter is observed to be escaping from certain sources, catch fencing can be installed to isolate this litter at source and allow it to be removed to the appropriate waste storage location or residual waste skip. Site boundaries will be monitored during routine checks and fencing considered should litter be found to be crossing the boundary.

Consideration of weather

Litter is more likely to occur in windy weather. Where high winds are affecting site operations the site manager will monitor whether light wastes are leaving the operational area. Where this does appear to be a risk then the relevant waste handling operations will be suspended until the weather has improved, or additional control measures (such as catch fencing) have been put into place.

1.1.3 Monitoring

Daily checks

As well as in-process monitoring the site manager or another member of the company's management team shall carry out a daily check of key issues including litter within their site walkover. Any litter reaching the site boundaries (which are some distance from the operational areas) will be recorded and operatives deployed immediately to collect the escaped material, place it in bin liners and deposit it alongside the site's residual waste for collection.

1.1.4 Non-conformity

In the event of litter escaping the site boundary a non-conformity with the site's environmental management system shall be raised. Corrective action shall include contacting the affected party and arranging for site staff to carry out a clean-up of the area. In the unlikely situation that a litter escape is so serious as to be deemed environmentally significant (likely only in the case of several residential properties being affected), then a Notification shall be made to Natural Resources Wales.

1.2 Dust

In the context of this plan, dust refers to particulates, including PM₁₀s, that are mobilised and become airborne due to the permitted waste management activities. Dust can have a range of negative local environmental effects, including:

- Short-term and chronic health impacts on people in the locality
- Visual impact through dust settling on window sills, vehicles and other outdoor spaces
- Smothering of neighbouring habitat.

It is necessary to ensure that dust from the activities of GLJ Recycling Ltd does not escape the site boundary. The most effective way to manage this is by preventing dust becoming airborne at source.

1.2.1 Inventory of dust sources

The following locations within the site have been identified as potential sources of dust.

Table 2: Potential dust sources

Location

Site haul roads
Storage areas for fine material
Fragmentiser Fluff stockpile
Shear
Shear stockpiles
New concrete lays
Metal shredder stacks
Metal shredder access points

Location

Metal reception/handling area

1.2.2 Control measures

Waste inventory control

Certain wastes are more likely to generate dust than others. Generally, scrap metal is not a dusty waste. However, construction and demolition wastes are inherently dusty and therefore must be managed slightly different. Wastes that are dusts, powders or loose fibres are not accepted at the site, and indeed are prohibited by the site's environmental permit conditions. Metal wastes that are lightly contaminated with dust (e.g. rebar from demolition jobs) will be sprayed with water whilst stored in the metal reception area. In the event of a waste arriving at the site that appears to be either prohibited or to consist of overly dusty material then this will be identified at the weighbridge and the waste haulier refused permission to tip at the site.

Where a waste is accepted onto the site that demonstrates excessively dusty characteristics once it has been unloaded, then this material will be containerised and sheeted prior to disposal off site.

Handling techniques

Within the metal processing area, small pieces of metal and dirt can accumulate on site surfaces. This must be cleared as it represents a hazard to site staff and to vehicle tyres. Some scrap metal recyclers 'brush' this area using heavy plant and a 'brush' of metal, such as rebar. This tends to scrape concrete particles from the surface and create airborne concrete and metal dust that can be caught by the wind.

This technique will be avoided, particularly in breezy weather, with housekeeping carried out by magnets, buckets and manual brushing

When moving waste around the site, operatives are trained to minimise the dropping of waste, with wastes being placed into position as much as is possible. This reduces the risk of dust becoming airborne.

The site manager retains the discretion to suspend waste handling operations in extreme weather conditions should it become impossible to operate without generating dust, specifically, where it is believed that this may affect off-site receptors.

Washing down and damping surfaces

During dry conditions, running vehicles over site haul roads and concrete pads can lift dust. To ensure that undue dust is not generated by vehicle movements, site roads are damped down using a bowser in dry conditions. Water is collected via water stillages collecting directly from Non Ferrous building roof guttering for this purpose. A Capex programme of roadway improvement is also in place at GLY Recycling Ltd to reduce the dust and noise associated with vehicle running.

Consideration of weather

Escape of dust from the site is more likely to occur in windy weather. Where high winds are affecting site operations the site manager will monitor whether dust is visibly leaving the operational area. Where this does appear to be a risk then the relevant waste handling operations will be suspended until the weather has improved, or additional control measures (including the damping down of waste) have been put into place.

Enclosure of dust sources

The New metal shredder will be enclosed within a protective structure that prevents fugitive airborne particles escaping the treatment area. An automatic spray system injects water into the metal shredder to reduce dust emissions. Water is also added to the shredder bay to provide suppress particulate emissions.

The metals cleaning exhaust is fitted with a cyclone and bag filtration system to remove particulates from the airstream, allowing these particles to be collected and disposed of as waste. Stockpiled fines are removed from the site on a daily basis (occasionally every other day should volumes at that time be too low to justify daily collection). (Please see Report 4 – Technical Summary)

1.2.3 Monitoring

Visual monitoring

During site operations, the supervisor and operatives within a work area are instructed to visually monitor the level of dust seen leaving their part of the site.

Where visible levels of dust are witnessed, a member of the management will be notified so that an assessment can be made of whether off-site receptors are being affected and additional control measures, including damping down, will be arranged.

Daily checks

Dust monitoring is carried out during the site management team's daily walkover. However, it is recognised that visual monitoring for dust at the boundary is highly dependent both on the activity being carried out on site and the prevailing wind direction. Therefore, periodic checks of the site boundary downwind of the waste management activities will be carried out during days with stronger winds, to ensure that no nuisance is being caused.

The outcome of these checks will be recorded in the site diary.

Stack monitoring

In order to ensure the effectiveness of stack emission particulate abatement systems, periodic monitoring will be carried out by a third-party, MCERTS-qualified monitoring team. Monitoring will be programmed on an annual basis, with additional monitoring carried out after any significant process changes (i.e. changes to feedstocks, abatement system maintenance or the installation of new shredding plant).

Ambient air monitoring

In the absence of guidance or published BAT, periodic continuous monitoring events using Frisbee gauges and PM₁₀ meters is proposed, with equipment installed for periods throughout the year, as dust has not been recorded as a problem at the site previously. This is discussed fully in Report 10: Emissions and Monitoring.

Prior to commencing any formal ambient air monitoring programme GLJ Recycling Ltd will seek the advice of the Natural Resource Wales's local monitoring specialists to ensure that the results of the monitoring area sufficiently robust to inform compliance assessment and future remedial action.

1.2.4 Non-conformity

In the event of dust escaping the site boundary a non-conformity with the site's environmental management system shall be raised. Corrective action shall include contacting the affected party and arranging for site staff to carry out a clean-up of the area. Identification of the source of the dust emission will be a priority for investigation so that additional control measures can be put into place to prevent reoccurrence of the incident.

2 Noise & Vibration Management

This plan relates to the control of noise and vibration throughout the site. The site and operations have been configured to control noise emissions from the site according to this Plan, in order to minimise the risk of noise and vibration causing annoyance beyond the site boundary.

The Site Manager will be responsible for identifying situations that could potentially cause a nuisance and for undertaking measures to reduce the impact on surrounding sensitive receptors.

2.1 Noise and vibration management

Noise can be one of the most noticeable impacts from any scrap metal handling operation. Efforts to minimise this nuisance should be considered at all stages of operation right through to closure. Likely sources for significant noise and vibration emanating from the site during normal operations include reversing alarms for all site plant and delivery vehicles, general traffic and the use of the site machinery including the shredder and generators. Gaps between buildings that have been noted to allow the transmission of noise in the past have been sealed using new walls, providing a physical barrier to noise. The risk of noise causing a nuisance to nearby sensitive receptors is therefore considered to be low. Good management and best practices will be used to ensure that noise levels are minimised throughout the life of the site. Such management practices include regular maintenance of the vehicles to prevent an increase in noise levels on the site, pre-arranged construction works, working during specified hours etc.

A new mains electricity supply upgrade, which will be installed, allows the majority of on-site plant, except mobile plant, to be electrically driven using mains electricity rather than off-grid diesel generators. All plant and equipment is maintained in accordance with the manufacturers' instructions.

The main shredder will be mounted on an anti-vibration dampening system. See Report 4 – Technical Summary.

Noise observations are recorded daily during the site walkover inspection which includes along the site's boundary. The site manager has to record whether noise and vibration levels are considered 'Low', 'Medium' or 'High'. If it is found to be required or is in response to a complaint, noise measurements will be undertaken at other sensitive receptors. The operator retains the services of a third-party noise consultant who is able to undertake quantitative noise monitoring in response to specific concerns, and make recommendations where necessary.

Further noise and vibration monitoring might be required at other times for activities associated with the operation that are undertaken at irregular intervals. The Site Manager should consider whether a particular operation may lead to noise or vibration impacts at the sensitive receptors and should arrange for additional monitoring to be undertaken if necessary. Further additional monitoring should also be considered if there is a change of operational procedures such as alternative plant and equipment or should a new noise sensitive receptor be developed within the vicinity of the site.

Noise levels are currently effectively controlled through the limitation of working hours during both construction and operation, with this measure to continue. Future plans to

upgrade the site's shredder with a new Danielli model will be accompanied with new mitigation measures. The new Danielli unit is designed to be enclosed within soundproof cladding and supported Anti-Vibration Supports, in order to reduce the transmission of noise and vibration. It is anticipated that future development of the shredding process will result in an overall reduction in the amplitude of noise arising from site operations.

If a complaint is made with respect to noise or vibration the Site Manager will investigate the possible cause of the complaint and will report the findings to the Environment Agency in accordance with permit requirements. As a minimum, all plant and machinery will be checked and the source of the noise identified so that the necessary remedial action can be taken.

The details of the complaint and actions taken will be recorded in accordance with the site's Environmental Management System. If the noise or vibration leading to the complaint has been caused by a continuing operation, additional noise or vibration surveys can be commissioned to confirm the degree of impact upon the receptor. Where necessary, the Site Manager will make any recommendations for further noise or vibration controls, recording changes within the site's EMS and informing or involving Natural Resource Wales as appropriate.

Explosions are recognised risks associated with the operation of large shredding plant. The existing Bonfiglioli shredder has had a history of explosions, which are generally due to inappropriate waste being concealed within the feedstock. With ongoing inspection procedures, there has only been one complaint in 2019 in relation to Shredder operations.

Baled end of life vehicles (ELVs) are often a source of explosion, as ELV processors earlier in the waste chain fail to properly depollute vehicles or conceal gas bottles within boots which then explode once the bale is fed to the shredder.

The existing shredder is too small to accept baled ELVs, hence it being easier for site operatives to exclude these problematic items.

When the larger plant is commissioned, it is expected that a small amount of baled ELVs may be processed, so robust procedures will be implemented in order to mitigate the increased explosion risk. These will be procedural measures, with suppliers being made to commit to the condition of bales they supply. Individual suppliers' bales will be kept segregated, so that that site operatives can identify the origin of any bales that do explode within the shredder. Any Bales from an untrusted source will be processed through the shear to eliminate the risk. These operators will be issued with warnings and, should the problem recur, potentially be excluded from supply. Natural Resource Wales will also be informed if particular suppliers appear to be providing waste that is not as described (i.e. not depolluted or unduly hazardous).

2.2 Background noise

From the Noise impact assessment carried out in April 2019, a background noise level was monitored at the rear of dwellings located on Newport Road, approximately 215m to the east of the site and an elevated position of dwellings on Chapel Farm Terrace, approximately 150m to the North. During the period of the assessment, the LA₉₀ background noise in these areas is 61dB and 43dB respectively.

2.3 Noise inventory

The following activities have the potential to generate noise that could be considered a nuisance if not properly managed:

Table 3: Inventory of noise sources

Activity	Nature of noise during operational hours
Shredder operation	Continuous
Generator operation	Continuous
Shear operation	Continuous
Tipping/loading of metal	Intermittent
Handling/manual cutting of metal	Intermittent
Tipping/loading of C&D waste	Intermittent
Operation of crusher/screening equipment	Intermittent
On-site plant engines	Continuous
Vehicle movements	Intermittent
Vehicle reversing beacons	Intermittent
Container Loading	Intermittent
Explosions within shredder bay	Abnormal conditions only

It has been noted in the past that operation of the Bonfiglioli shredder is the noisiest aspect of site activities, since operation commenced in 2011 there has only been a small number of complaints from local residents. GLJ Limited liaised with the local authority (NRW & CCBC) regarding this, reporting any noise incidents as soon as possible

With ongoing inspection procedures, there has only been one complaint in 2019 in relation to Shredder operations.

Improvements have been made to site infrastructure and porcedures to mitigate the residual noise that has affected residents and there have been no recent complaints received. (Appendix Noise Risk Assessment & procedure doc, Page 13)

2.4 Shredder noise assessment

A Full Noise Impact assessment has been carried out by Hunter Accoustics Ltd on the 12th July 2019 (Document 5217/NIA1_Rev2) and can be found in the appendix Page 16.

Hunter Acoustics were commissioned to assess the noise impact of the proposed new operation on nearby noise sensitive properties.

This report details results of an ambient background noise survey, including existing activities, and prediction of the overall noise impact when the new item of plant is implemented. Reference is made to current planning guidance.

The report also details to the noise reducing elements that will be incorporated into the new Shredder plant.

In the report it was concluded that overall levels from the new shredder system are indicated to give a significant improvement (7dB) over the existing permitted plant.

3 Odour management

Currently the site does not handle odorous waste streams and any such wastes would be rejected. Therefore, it is not proposed to carry out any proactive odour monitoring at this time.

However, the site management system includes a procedure to react to complaints of monitoring, an extract from which is replicated here:

Assuming that the report is received at the time the odour is allegedly causing a nuisance off-site, then the following steps should be followed.

- 1) *Find out the current wind direction. This may be obvious but sometimes, particularly when winds are light, it may not be. <http://www.xcweather.co.uk> allows the company to check recent and forecast wind direction, which will give a good indication of wind conditions.*
- 2) *The person taking the notification should notify a Manager, who should note down what operations are taking place on site at the time.*
- 3) *A member of staff who has not been working in waste handling areas should be chosen to carry out a 'sniff test' odour assessment. Two staff members may be sent for corroboration, but these staff members should not communicate with each other during the actual sniff tests in case they influence each other's results. Odour assessments are naturally subjective. Ideally the staff member should be a non-smoker and should not have drunk any strong beverages (including coffee) or eaten strongly flavoured foods in the hour prior to the assessment. If this is not possible, then a note should be made on the Odour Assessment Record form when it is completed.*
- 4) *The assessor(s) should take copies of document EMS3.15.1 Odour Assessment Form.*
- 5) *The chosen team member(s) should visit a location upwind of the Company's operations and record any odours present. This will identify any odours coming from off-site that may be mistakenly attributed to company activities. At least two monitoring points should be chosen. The assessor(s) should remain at each location for at least five minutes, to allow for fluctuations in wind direction and strength. The Odour Assessment Form should be completed at each location, with any odour detected at other locations also recorded.*
- 6) *Once the upwind assessment has been completed, the assessor(s) should travel to the area of the complaint (or downwind, if the location of the complaint is unknown) and carry out further assessments. Any other odours that may be arising from other sources should also be recorded using the Odour Assessment Form.*

Appendices

A Noise Risk Assessment & Procedure

GLJ Recycling Limited

Version 1 -Apr 19

NOISE

Limit noisy activities to acceptable working hours as noise is more likely to be a nuisance at night, limit person/time spent on machine when possible.

Regularly monitor noise from Chapel Bridge Yard, Cwmcarn from when we are fully working and also when it is shut down, taking into account the impact of the noise levels for the surrounding community.

Spot checks of noise level at pre-selected locations and keeping in contact with Caerphilly County Borough Council Environmental Health Officer and Natural Resources Wales to ensure no complaints.

Drop height of scrap metal falls will be reduced to a minimum.

Reduce Noise from equipment and vehicles by servicing them regularly

Use lower Noise emission Tools

Running shredder at a slower speed.

Reduce vibrations where possible.

Ensure preventative maintenance/inspection is carried out on blade alignment and blade sharpening.

Have a positive noise reduction purchasing policy

- Preparing a machine specification
- Draw attention to the requirements of the Supply of Machinery (Safety) Regulations 1992
- Introduce own company noise limit i.e. realistic noise emission level that GLJ are prepared to accept if possible from incoming plant and equipment given their circumstances and planned machine use.
- Comparing the noise information detailed by the manufacturer to identify low noise machines
- Requiring a statement from companies who are tendering on supplying, saying their machinery will meet with GLJ's noise limit specifications if possible.

GLJR Version 1 Apr 19

GLJ Recycling Limited

Noise and vibration - Risk Assessment

Hazard	Receptor	Pathway	Risk Management techniques	Probability of Exposure	Consequence	Overall risk
Harris Baler Noise	Site operatives Contractors Visitors Surrounding Community	Wind blown	Only operate in working hours, regular monitor noise levels, reduce vibration where possible	Noise reaching Community areas	Nuisance to the surrounding community	Low - distance to community is 400m
Bonfiglioli Noise	Site operatives Contractors Visitors Surrounding Community	Wind blown	Only operate in working hours, regular monitor noise levels, reduce vibration where possible	Noise reaching Community areas	Nuisance to the surrounding community	Low - distance to community is 400m
IFE Waste Screen Noise and Vibration	Site operatives Contractors Visitors Surrounding Community	Wind blown	Only operate in working hours, regular monitor noise levels, reduce vibration where possible	Noise reaching Community areas	Nuisance to the surrounding community	Low - distance to community is 400m
Fuch Noise and Vibration	Site operatives Contractors Visitors Surrounding Community	Wind blown Airborne	Only operate in working hours, regular monitor noise levels, reduce vibration where possible	Noise reaching Community areas	Nuisance to the surrounding community	Low - distance to community is 400m

B Noise Impact Assessment 5217/NIA1_Rev 2

New Shredder

**GLJ Recycling Ltd
Chapel Farm Industrial Estate
Cwmcam, Newport
NP11 7NL**

**Noise Impact Assessment
5217/NIA1_Rev2**

12th July 2019

For: **GLJ Recycling Ltd**
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Contents

1.0	Introduction	3
2.0	Planning Guidance	4
3.0	Noise Sensitive Premises	5
4.0	Environmental Sound Surveys	6
4.1	<i>Procedure</i>	6
4.2	<i>Equipment Used</i>	7
4.3	<i>Weather Conditions</i>	7
4.4	<i>Results</i>	8
5.0	Environmental Noise Criteria	10
6.0	Noise Map Modelling	11
6.1	<i>Existing Shredder/Screening Plant</i>	11
6.2	<i>Proposed Shredder/Screening Plant</i>	12
7.0	Noise Impact Assessment	15
7.1	<i>Existing Shredder/Screening Plant</i>	15
7.2	<i>New Shredder/Screening Plant</i>	16
8.0	Good Practice Guide	17
 Appendix A – Graphs, Tables and Diagrams		18
 Appendix B – Acoustic Terminology		25
 Appendix C – New Shredder Noise Information		26
 Appendix D – Noise Map Models		28

1.0 Introduction

We understand a new shredder is proposed at the GLJ Recycling site on Chapel Farm Industrial Estate in Cwmcarn.

It is understood that an enclosure is also proposed around the new shredder to help reduce noise breakout.

The rear of dwellings on Newport Road (located to the east at an elevated position) have line of sight down to the recycling facility.

Hunter Acoustics have been commissioned to assess the noise impact of the proposed new operation on nearby noise sensitive properties.

This report details results of an ambient background noise survey, including existing activities, and prediction of the overall noise impact when the new item of plant is implemented. Reference is made to current planning guidance.

Graphs, Tables and Diagrams referenced in the report are included in Appendix A.

Acoustic Terminology is given in Appendix B.

2.0 Planning Guidance

Local Planning Authorities, Environmental Health Officers and Regulators refer to British Standard 4142:2014 "Methods for rating and assessing industrial and commercial sound", current guidance for the assessment of industrial noise affecting residential receivers.

This standard describes a rating method comparing L_{Aeq} noise levels from the industrial source with pre-existing background L_{A90} levels at the residential receiver. It advises at a difference (industrial noise - background) of:

- +10dB or higher, likely to be an indication of a significant adverse impact, depending on the context.
- A difference of + 5dB, likely to be an indication of an adverse impact, depending on the context.
- 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.

A sliding scale of penalties can be applied to industrial/commercial sound levels which have acoustically distinguishing characteristics, including tonality, impulsivity and intermittency.

Tonality – A penalty of 2dB for a tone which is just perceptible at the noise receptor, 4dB where it is clearly perceptible, and 6dB where it is highly perceptible.

Impulsivity – A penalty of 3dB for impulsivity which is just perceptible at the noise receptor, 6dB where it clearly perceptible, and 9dB where it is highly perceptible.

Other sound characteristics – Where the specific sound features characteristics that are neither tonal nor impulsive, though otherwise are readily distinctive against the residual acoustic environment, a penalty of 3dB can be applied

Intermittency – If intermittency is readily distinctive against the residual acoustic environment, a penalty of 3dB can be applied.

BS 4142 states under section 11;

"Where the initial estimate of the impact needs to be modified due to the context, take all pertinent factors into consideration, including the following.

- 1) *The absolute level of sound. For a given difference between the rating level and the background sound level, the magnitude of the overall impact might be greater for an acoustic environment where the residual sound level is high than for an acoustic environment where the residual sound level is low.*

Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night.

Where residual sound levels are very high, the residual sound might itself result in adverse impacts or significant adverse impacts, and the margin by which the rating level exceeds the background might simply be an indication of the extent to which the specific sound source is likely to make those impacts worse."

3.0 Noise Sensitive Premises

Site plan 5217/SP1 below shows the proposed approximate location of the existing and proposed metal shredder on the site highlighted in red.

5217/SP1 - Noise Sensitive Premises Highlighted



The nearest sound sensitive receivers to the site are the rear of dwellings located on Newport Road, approximately 215m to the east of the site, at an elevated position and dwellings on Chapel Farm Terrace, approximately 150m to the north, not elevated.

Large industrial units and the A467 lie between the GLJ Recycling site and the residential receivers.

4.0 Environmental Sound Surveys

4.1 Procedure

4.1.1 Continuous Monitoring

A daytime noise survey of the existing climate was undertaken on 30/04/2019 between the hours of 1400 – 1700hrs at Position A and on 03/07/2019 between the hours of 1020-1235hrs at Position B. During this time period ambient noise levels at the residential receiver were measured both with and without the existing shredder in operation.

The following measurement position is shown on site plan 5217/SP1;

- Pos A Located in the garden to the rear of 111A Newport Road with line of sight to the GLJ site however majority of plant appeared screened. Approximately 195m east of the site.
- Pos B Located in lane at the rear of dwellings on Chapel Farm Terrace. Line of sight obscured by trees between openings in buildings on Chapel Farm Business Park. Approximately 150m north of the site.

Parameters including L_{Amax} , L_{Aeq} and L_{A90} were recorded, along with 100ms data for post processing of results.

4.1.2 Sample Measurements

Source measurements were also undertaken approx.5-10m from the existing shredder on 30/04/2019 for comparison with data received for the new shredder.

The following measurement positions shown on site plan 5217/SP2 below were used;

5217/SP2 – Source Sample Measurements



- Pos 1 Approx. 10m away from shredders radiator and engine with direct line of sight to plant. Facing east
- Pos 2 Approx 6-7m from the side of the radiator and engine on the southern side of the plant. Facing north-east.
- Pos 3 Approx 7m from shaker, drum and conveyor belt with the main shredder off. Facing south

Pos 4 At an elevated position 4.5m above local ground height in line with the barrier around the site. 20m from the engine, 10m from the main drum and 7m from the secondary drum. Facing south.

Note: All measurements were taken at a height of 1.5m above local ground height, with the exception of position 4 which was taken at 4.5m above ground height.

4.2 Equipment Used

The following equipment was used:

5217/T1 – Source Sample Measurements

Make	Description	Model	Serial Number	Last Calibrated	Certificate No.
NTi	Type 1 - Sound Level Meter	XL2-TA	A2A-08723-E0	12 December 2018	1612652
	Preamplifier	MA220	1820	12 December 2018	1612650
	Microphone	Capsule	9381	12 December 2018	1612650
NTi	Type 1 - Sound Level Meter	XL2-TA	A2A-10021-E0	24 August 2017	UCRT17/1722
	Preamplifier	MA220	5435	24 August 2017	UCRT17/1722
	Microphone	Capsule	8547	24 August 2017	UCRT17/1722
Rion	Calibrator (94.04dB @ 984Hz)	NC-73	10355197	01 March 2019	UCRT19/1273

The measurement systems were calibrated before and after the surveys, no variation occurred.

4.3 Weather Conditions

Weather conditions were dry and with calm winds throughout the noise measurements.

4.4 Results

4.4.1 Continuous Monitoring at Position A

Time history graph 5217/TH1 in Appendix A shows measured levels at position A.

During this monitoring, there were periods both with and without the existing shredder operating, however road traffic noise controlled the daytime background sound level. Background sound levels increased as the rush hour traffic period approached;

5217/T2a – Summary of 15minute Intervals Logged at Position A

Start Date and Time	Duration (hh:mm:ss)	L_{Aeq} (dB)	$L_{Amax,F}$ (dB)	L_{A90} (dB)
30/04/2019 14:30	0:15:00	68.5	87.6	61.2
30/04/2019 14:45	0:15:00	68.2	81.8	61.5
30/04/2019 15:00	0:15:00	68.1	76.3	63.0
30/04/2019 15:15	0:15:00	68.9	77.8	64.6
30/04/2019 15:30	0:15:00	68.7	76.2	64.5
30/04/2019 15:45	0:15:00	69.1	74.9	65.1
30/04/2019 16:00	0:15:00	69.0	77.6	64.7
30/04/2019 16:15	0:14:54	69.1	76.2	65.7
30/04/2019 16:30	0:06:51.4	69.5	82.4	65.1

Background sound levels are therefore indicated around 61dB $L_{A90,15mins}$.

4.4.2 Continuous Monitoring at Position B

Time history graph 5217/TH2 in Appendix A shows measured levels at position B.

During this monitoring, there were periods both with and without the existing shredder operating. Noise from the GLJ site was audible in the distance, however industrial activity including banging and cutting from closer units on the Chapel Farm Business Park were more dominant.

The levels below are taken from the log when the existing shredder was shut down. We have also excluded a period where a resident was running a loud car engine.

Note: These levels include noise from the closer units on Chapel Farm Business Industrial Estate.

5217/T2b – Summary of 15minute Intervals Logged at Position B

Start Date and Time	Duration (hh:mm:ss)	L_{Aeq} (dB)	$L_{Amax,F}$ (dB)	L_{A90} (dB)
03/07/2019 10:15	0:09:02	51.1	68.5	47.6
03/07/2019 10:30	0:15:00	51.0	62.2	48.2
03/07/2019 10:45	0:14:58	50.1	63.2	46.1
03/07/2019 11:00	0:14:14.4	50.5	73.2	44.0
03/07/2019 11:15	0:14:34	52.8	75.9	47.9
03/07/2019 11:30	0:15:00	51.0	78.6	43.6
03/07/2019 11:45	0:12:04	52.7	75.7	43.4
03/07/2019 12:00	0:14:33	52.5	79.7	43.4
03/07/2019 12:15	0:15:00	51.4	73.2	43.4

Background sound levels are therefore indicated around 43dB $L_{A90,15mins}$.

4.4.2 Source Sample Measurements

Table 5217/T3a below shows source noise measurements undertaken of the existing shredder. Table 5217/T3b in Appendix A includes octave band data.

5217/T3a – Source Sample Measurements of Existing Shredder/Screening Plant

File No	Description	Duration (mm:ss)	LAeq (dB)	LAmx (dB)
000	10m from engine and engine radiator	01:59	86.4	98.4
001	6-7m from the right hand side of the engine and radiator	00:41	97.3	107.1
002	7m from shaker, drum and conveyor belt with the main shredder off	00:22	81.3	83.9
003	7m from shaker, drum and conveyor belt with the main shredder off (more material passed through)	01:40	83.1	96.5
004	7m from shaker, drum and conveyor belt with the main shredder on	01:18	83.6	89.9
005	At an elevated position 4.5m above local ground height in line with the barrier around the site. 20m from the engine, 10m from the main drum and 7m from the secondary drum	01:00	89.4	94.6

5.0 Environmental Noise Criteria

BS 4142 uses background sound levels (L_{A90}) as a basis for assessing impact at residential receivers. Operating hours for the site are as follows;

- Monday – Friday 0800-1700hrs
- Saturday 0800-1200hrs

The following background sound levels are to be used as the basis for setting environmental noise criterion;

- Position A 61dB $L_{A90,15mins}$
- Position B 43dB $L_{A90,15mins}$

Bearing in mind the relatively high background sound climate at Position A, environmental noise criteria are proposed at a plant rating level ($L_{A,T,r}$) not exceeding the existing background (L_{A90}) at SSR 1.

In the context of the rear of dwellings on Chapel Farm Terrace being located immediately adjacent to a well-established industrial estate, we would propose that the new shredder plant should not be any louder than the existing permitted shredder plant.

5217/T4 – Proposed Environmental Noise Limits

Sound Sensitive Receiver (SSR)	Mon-Fri 0730-1630hrs Sat 0800-1200hrs Proposed Rating Limit $L_{A,T,r}$ (dB)
SSR 1 – Rear of Dwellings on Newport Road	61

The above limit should be agreed acceptable with the Local Planning Authority's Environmental Health Officer (EHO).

6.0 Noise Map Modelling

Note: This assessment is for the new shredder/screening plant only and does not therefore cover any other noise sources/activities on the site.

Our analysis has used the proprietary NoiseMap Five computer modelling software, in conjunction with procedures of BS 5228: Parts 1 & 2 2009 'Code of Practice for assessing noise and vibration on construction and open sites'.

This model allows noise levels from sources to be predicted over large distances and varying terrain. Attenuation is included accounting for distance, air absorption, ground absorption and screening losses from site topography/local structures. The analysis predicts resultant noise levels at the SSRs.

Drawings used in our assessment are shown in Appendix C.

6.1 Existing Shredder/Screening Plant

6.1.1 Source Plant Noise Data

The following source noise data has been used in our model, based on measured data on site (section 4.4.2);

5217/T5 - Plant Noise Data Used in Existing Prediction Model (Worst Case 1hr Period)

Description	L _{Aeq} / L _{WA}	(dB)	% On-time / Number of Events	Source Height (m)	Source of data
Main Shredder/Engine	L _{Aeq} at 10m	95	100% on-time	3.5	On-site Measurement
Shaker/Drum/Conveyor	L _{Aeq} at 10m	80	100% on-time	2.5	On-site Measurement
Secondary Drum	L _{Aeq} at 10m	80	100% on-time	2.0	On-site Measurement

Note: A boundary screen has been erected on site at the most critical noise source. Our model assumes line of sight from the critical sound sensitive receivers is removed by existing structures/topography/barriers. Results with screening in place appear to be in line with subjective and measured levels at the receivers, however line of sight should be confirmed to be removed.

6.1.2 Noisemap Analysis

Predicted existing shredder/screening plant $L_{Aeq,1hr}$ daytime levels at critical Sound Sensitive Receiver (SSR) locations are shown in the table below;

5147/T6 – Daytime Noisemap Predictions

Daytime	Level Above Ground	Daytime Level $L_{Aeq,1hr}$ (dB)
SSR1 – Rear of dwellings on Newport Road (<i>east of site</i>)	1.5m	58
	4.5m	58
SSR2 – Rear of dwellings on Chapel Farm Terrace (<i>north of site</i>)	1.5m	52
	4.5m	52

Noisemap 5217/NM1 in Appendix D shows the daytime ($L_{Aeq,1hr}$) noise contour plot across the surrounding area to critical SSRs at 4.5m above local ground height.

6.2 Proposed Shredder/Screening Plant

6.2.1 Source Plant Noise Data

The following source noise data has been used in our model, based on data provided for the new plant by Danieli (*see Appendix C*);

5217/T5 - Plant Noise Data Used in Proposed Prediction Model (Worst Case 1hr Period)

Description	L_{Aeq} / L_{WA} (dB)	% On-time / Number of Events	Source Height (m)	Source of data
Shredder	L_{Aeq} at 2m 95.5	100% on-time	6	Supplier Data
Shredder Motor	L_{Aeq} at 2m 93.3	100% on-time	In building	Supplier Data
Fan Motor	L_{Aeq} at 2m 95.1	100% on-time	1.5	Supplier Data
Cascade Cyclone	L_{Aeq} at 2m 89.9	100% on-time	3 *	Supplier Data
Drum Magnet	L_{Aeq} at 2m 90.8	100% on-time	4	Supplier Data
Material Discharge	L_{Aeq} at 2m 86.0	100% on-time	5	Supplier Data

* We have been informed that noise levels from the cascade cyclone are generated at low level (approx. 3m above ground height) and not at the top of the 14m high cyclone.

Acoustic Enclosure around Shredder

A 10.8m high enclosure is proposed around the shredder part of the plant, as shown on Danieli drawing 6.4729238.E Rev00 dated 25 Feb 2019. We understand the enclosure is open topped, with rubber curtains over conveyor apertures and sliding doors providing access where necessary.

The panels of the enclosure are manufactured from 3mm thick steel, with a Rockwool insulation infill and a perforated inner face to provide sound absorption within the enclosure. Each panel is 6.94m x 1.89m x 0.42m and weighs 700kg (mass per unit area of 53.4kg/m²).

Note: Breakout to the critical residential receivers at high level at SSR1 is likely to be controlled by noise coming over the top of the acoustic enclosure as opposed to through it.

Masonry Building around Shredder Motor

The shredder motor is housed within a concrete building as shown in 3D image in Appendix C. The construction of the building is 215mm dense concrete block with a beam and dense block flat roof.

Roller shutter doors are included on the less critical western elevation at ground and first floor level to provide access for maintenance.

The following sound reduction indices have been used in our assessment;

Element	Description	Sound Reduction Index, R (SRI: BS EN ISO 140) at Octave Band Centre Frequency (Hz)				
		125	250	500	1k	2k
Wall	215mm dense concrete block	42	45	53	60	65
Roller Shutter	Standard roller shutter door	7	14	18	21	17
Roof	Beam and dense concrete block	39	40	49	53	57

Full Acoustic Enclosure to be fitted around Cyclone Fan Motor

We understand that a full enclosure is to be installed around the cyclone fan motor. We have based the model on an absorptive lined acoustic enclosure panel with the following sound reduction index;

Element	Description	Sound Reduction Index, R (SRI: BS EN ISO 140) at Octave Band Centre Frequency (Hz)				
		125	250	500	1k	2k
Enclosure	Based on Emtec PAC 30 Panel	17	23	30	34	41

For budgetary guidance the above figures are based on Emtec PAC30 panel. The successful tenderer shall provide independent laboratory test data showing their enclosure meets the above performance requirements. The inner face of the enclosure should include an absorptive finish (perforated liner with mineral wool backing).

6.2.2 Noisemap Analysis

Predicted levels from the new shredder/screening plant at critical receiver locations are shown in the table below;

5147/T6 – Daytime Noisemap Predictions

Daytime	Level Above Ground	Daytime Level $L_{Aeq,1hr}$ (dB)
SSR1 – Rear of dwellings on Newport Road (<i>east of site</i>)	1.5m	47
	4.5m	47
SSR2 – Rear of dwellings on Chapel Farm Terrace (<i>north of site</i>)	1.5m	45
	4.5m	45

Noisemap 5217/NM2 in Appendix D shows the daytime ($L_{Aeq,1hr}$) noise contour plot across the surrounding area to critical SSRs at 4.5m above local ground height.

7.0 Noise Impact Assessment

7.1 Existing Shredder/Screening Plant

7.1.1 SSR1 – Rear of Dwellings on Newport Road

5189/T7a in Appendix A show the BS 4142 assessments for SSR1 during daytime operational periods with the existing shredder.

A 3dB penalty for impulsivity has been applied to the daytime assessment to allow for distant impact noises occasionally heard at the receivers.

With the rating level not exceeding background, BS 4142 would assess this as being unlikely to have an adverse impact depending on context.

The context in this case, is daytime operations from an existing well-established industrial site.

This is in line with subjective impressions when reviewing audio recordings undertaken at Position A.

7.1.2 SSR2 – Rear of Dwellings on Chapel Farm Terrace

5189/T7b in Appendix A show the BS 4142 assessments for SSR2 during daytime operational periods with the existing shredder.

A 3dB penalty for impulsivity has been applied to the daytime assessment to allow for distant impact noises occasionally heard at the receivers. The majority of banging and impact sounds were from others on of the Chapel Farm Business Park, immediately behind the dwellings.

The measured daytime L_{Aeq} samples with and without the existing shredder unit measured were around the same at 51-52dB, with bangs from Chapel Farm Business Park controlling the ambient sound level.

With the rating level exceeding background by 12dB, BS 4142 would assess this as having a significant adverse impact depending on context.

The context in this case, is daytime operations from an existing well-established industrial site, with banging from other closer users controlling the ambient noise climate.

7.2 New Shredder/Screening Plant

7.2.1 SSR1 – Rear of Dwellings on Newport Road

5189/T8a in Appendix A shows BS 4142 assessments for SSR1 during daytime operational periods with the new shredder plant.

Again, a 3dB penalty for impulsivity has been applied to the daytime assessment to allow for distant impact noises occasionally heard at the receivers.

With the rating level indicated around 11dB below background, BS 4142 would assess this as being unlikely to have an adverse impact depending on context.

A significant improvement is indicated at SSR1 with the new shredder plant.

A significant improvement is also indicated at ground floor level on the site for workers in the vicinity of the new shredder plant, due to the proposed acoustic enclosure.

7.2.2 SSR2 – Rear of Dwellings on Chapel Farm Terrace

5189/T8b in Appendix A shows BS 4142 assessments for SSR2 during daytime operational periods with the new shredder plant.

Again, a 3dB penalty for impulsivity has been applied to the daytime assessment to allow for distant impact noises occasionally heard at the receivers.

The rating level is indicated to exceed background by 5dB but with a significant improvement (7dB) indicated at SSR2 compared to the existing shredder plant.

Banging from other users on the Chapel Farm Business Park controlled the overall ambient noise climate at the rear of dwellings at Chapel Farm Terrace. Levels with and without the existing shredder running equate to 51-52dB L_{Aeq} .

With predicted levels at 45dB L_{Aeq} , these are indicated to fall below the existing ambient noise climate (controlled by other businesses).

Levels are indicated to be in the range of 35-40dB(A) inside dwellings during the daytime through a partially open window and are in the range 50-55dB(A) in rear gardens (which look directly into the businesses on Chapel Farm Business Park and appear to be the source of the highest levels of banging).

Overall therefore levels from the new shredder system are indicated to give a significant improvement (7dB) over the existing permitted plant.

8.0 Good Practice Guide

BS 5228-1:2009 gives general information on control of noise at source. A summary of the practical measures in the choice and use of plant to reduce noise is given below:

- Avoid unnecessary revving of engines and switch off equipment when not required.
- Ensure plant and vehicles are properly maintained, check silencers and bearings.
- If the noise is directional, point the source away from noise-sensitive locations.
- Keep internal haul routes well maintained and avoid steep gradients.
- Use rubber linings in, for example, chutes and dumpers to reduce impact noise.
- Minimise drop height of materials.
- Limit the use of particularly noisy plant or vehicles.
- Start-up plant and vehicles sequentially rather than together.
- Ensure the plant and vehicles are operated with noise control hoods closed.
- Any reversing beepers should be minimised as far as is reasonably practicable and subject to maintaining site safety.

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Project: GLJ Recycling, Cwmcam

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Appendix A – Graphs, Tables and Diagrams

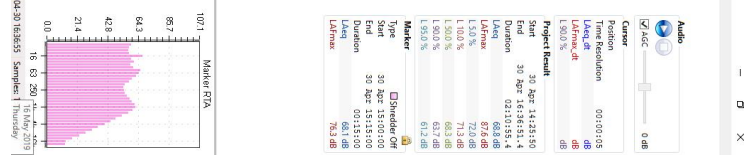
5217/T1b - Source Sample Measurements including Octave Band Data

File No	Description	Duration (mins)	L _{eq} (dB)	L _{max} (dB)	L _q								L _{max}							
					63 Hz	125 Hz	250 Hz	500 Hz	1.0 kHz	2.0 kHz	4.0 kHz	8.0 kHz	63 Hz	125 Hz	250 Hz	500 Hz	1.0 kHz	2.0 kHz	4.0 kHz	8.0 kHz
000	10m from engine and engine radiator	01:59	86.4	98.4	91.1	89.7	82.6	83.3	80.9	78.9	76.4	72.7	104.1	98.9	91.4	93.8	92.1	91.8	92.1	88.9
001	6-7m from the right hand side of the engine and radiator	00:41	97.3	107.1	99.4	97.1	94.7	93.4	91.8	90.7	87.0	82.5	107.2	103.5	101.7	102.6	103.6	100.7	97.5	92.8
002	7m from shaker, drum and conveyor belt with the main shredder off	00:22	81.3	83.9	87.9	85.3	79.4	79.1	74.0	73.6	72.2	65.5	91.0	88.1	83.3	82.3	77.0	78.8	75.7	73.6
003	7m from shaker, drum and conveyor belt with the main shredder off (more material passed through)	01:40	83.1	96.5	88.7	85.1	80.8	78.7	77.0	76.3	74.3	68.0	93.8	96.4	94.8	90.1	91.2	91.9	88.1	82.8
004	7m from shaker, drum and conveyor belt with the main shredder on	01:18	83.6	89.9	88.8	87.9	81.4	79.6	77.9	76.5	74.0	67.0	97.4	98.1	88.3	85.6	85.7	86.5	84.3	78.9
005	At an elevated position 4.5m above local ground height in line with the barrier around the site. 20m from the engine, 10m from the main drum and 7m from the secondary drum	01:00	89.4	94.6	85.8	87.5	85.6	84.8	83.1	83.4	80.4	75.3	94.0	93.8	91.9	92.8	91.7	91.3	87.8	84.7

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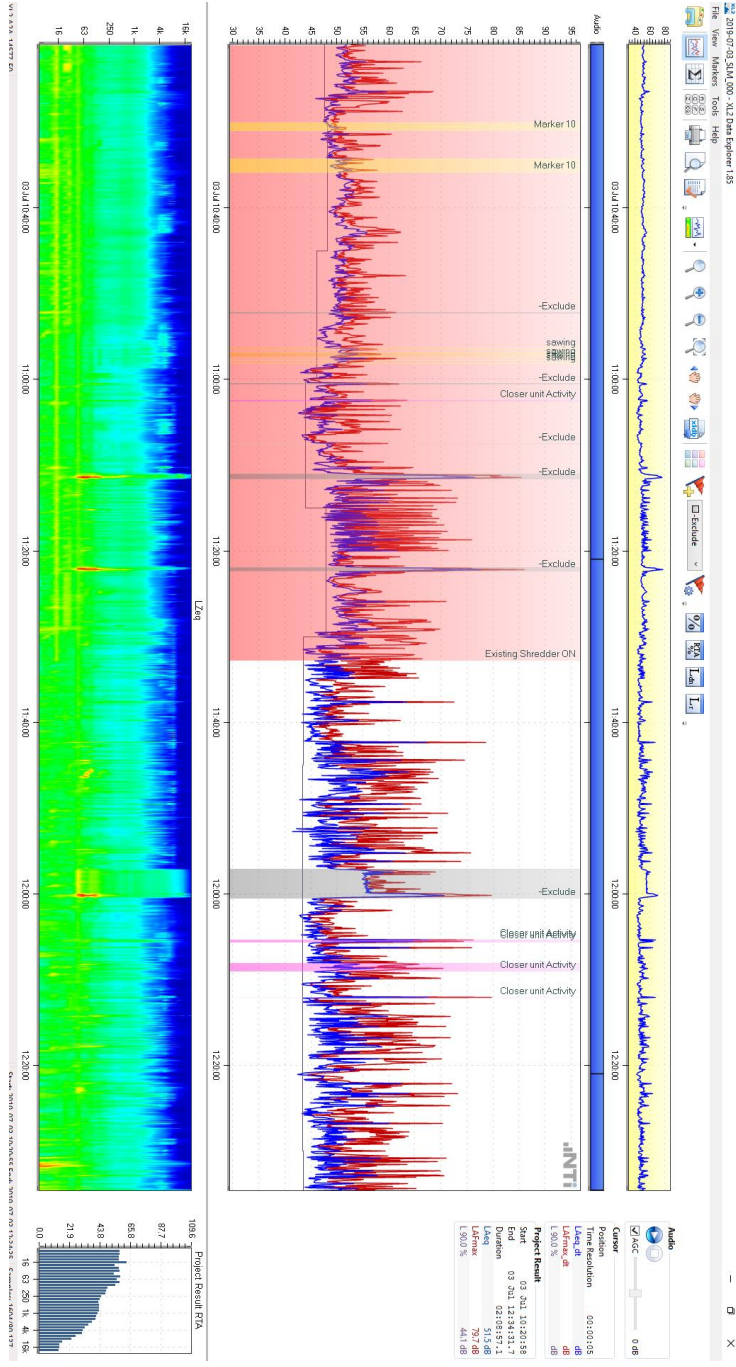
Page 18

12/07/2019



12/07/2019

5217/TH2 - Time History at Position B, Rear of Dwellings on Chapel Farm Terrace (03/07/2019 1020-1235hrs)



Note: Subjectively, bangs and plant from closer businesses on the Chapel Farm Business Park were dominant in comparison to noise from the GLJ site.

DH: 5217_Rev2

Page 20

12/07/2019

Project: GLJ Recycling, Cwmcam

Hunter Acoustics

5217/T7a - BS 4142:2014 Assessment at SSR1 for Existing Shredder/Screening Plant

Results		Relevant Clause	Commentary
Predicted Level at SSR 1	$L_{Aeq(1hr)} = 58\text{dB}$	7.3.2	Predicted level from existing shredder plant
Residual sound level	$L_{Aeq(1hr)} = \text{N/A}$	7.3.3	No correction for residual sound level is applied as we are working with a predicted specific sound level.
Background sound level (daytime)	$L_{A90(0800-1700hrs)} = 61\text{dB}$	8.1.1 8.1.3 8.3	Background sound level measured at rear of SSR1 looking down to industrial estate
Assessment made during the daytime so the reference time interval is 1hr.		7.2	
Specific sound level calculated by correcting the ambient sound level to remove the contribution of the residual sound level.	$L_{Aeq(1hr)} = 58\text{dB}$	7.3.4	
Acoustic feature correction	3 dB	9.2	3dB penalty for impulsivity just perceptible over existing ambient noise from road traffic
Rating Level	$(58 + 3) = 61\text{dB}$		
Background sound level (daytime)	$L_{A90(0800-1700hrs)} = 61\text{dB}$	8.3	
Excess of rating over background sound level	$(61 - 61) \text{ dB} = 0\text{dB}$	11	
Assessment indicates an adverse impact is unlikely depending on context		11	At 0dB above background this is assessed as being unlikely to have an adverse impact.
Uncertainty of assessment		10	Uncertainty in background noise measurements is considered low. Predicted noise levels have been based on measured levels on site and predicted back to the receivers using methodology from BS 5228. Uncertainty is therefore considered low.

DH: 5217_Rev2

Page 21

12/07/2019

Project: GLJ Recycling, Cwmcam

Hunter Acoustics

5217/T7b - BS 4142:2014 Assessment at SSR2 for Existing Shredder/Screening Plant

Results		Relevant Clause	Commentary
Predicted Level at SSR 2	$L_{Aeq(1hr)} = 52\text{dB}$	7.3.2	Predicted level from existing shredder plant
Residual sound level	$L_{Aeq(1hr)} = \text{N/A}$	7.3.3	No correction for residual sound level is applied as we are working with a predicted specific sound level.
Background sound level (daytime)	$L_{A90(0800-1700hrs)} = 43\text{dB}$	8.1.1 8.1.3 8.3	Background sound level measured at rear of SSR2
Assessment made during the daytime so the reference time interval is 1hr.		7.2	
Specific sound level calculated by correcting the ambient sound level to remove the contribution of the residual sound level.	$L_{Aeq(1hr)} = 52\text{dB}$	7.3.4	
Acoustic feature correction	3 dB	9.2	3dB penalty for impulsivity in context of existing industrial noise
Rating Level	$(52 + 3) = 55\text{dB}$		
Background sound level (daytime)	$L_{A90(0800-1700hrs)} = 43\text{dB}$	8.3	
Excess of rating over background sound level	$(55 - 43) \text{ dB} = 12\text{dB}$	11	
Assessment indicates a significant adverse impact depending on context		11	At 12dB above background this is assessed as having a significant adverse impact depending on context. The context in this case are daytime only activities at dwellings backing on to a well established industrial estate, with significant impacts and banging from other closer units compared to the GLJ site.
Uncertainty of assessment		10	Uncertainty in background noise measurements is considered low. Predicted noise levels have been based on measured levels on site and predicted back to the receivers using methodology from BS 5228. Uncertainty is therefore considered low.

Project: GLJ Recycling, Cwmcam

Hunter Acoustics

5217/T8a - BS 4142:2014 Assessment at SSR1 for Proposed Shredder/Screening Plant

Results		Relevant Clause	Commentary
Predicted Level at SSR 1	$L_{Aeq(1hr)} = 47\text{dB}$	7.3.2	Predicted level from new shredder plant
Residual sound level	$L_{Aeq(1hr)} = \text{N/A}$	7.3.3	No correction for residual sound level is applied as we are working with a predicted specific sound level.
Background sound level (daytime)	$L_{A90(0800-1700hrs)} = 61\text{dB}$	8.1.1 8.1.3 8.3	Background sound level measured at rear of SSR1 looking down to industrial estate
Assessment made during the daytime so the reference time interval is 1hr.		7.2	
Specific sound level calculated by correcting the ambient sound level to remove the contribution of the residual sound level.	$L_{Aeq(1hr)} = 47\text{dB}$	7.3.4	
Acoustic feature correction	3 dB	9.2	3dB penalty for impulsivity just perceptible over existing ambient noise from road traffic
Rating Level	$(47 + 3) = 50\text{dB}$		
Background sound level (daytime)	$L_{A90(0800-1700hrs)} = 61\text{dB}$	8.3	
Excess of rating over background sound level	$(50 - 61) \text{ dB} = -11\text{dB}$	11	
Assessment indicates an adverse impact is unlikely depending on context		11	At 11dB below background this is assessed has being unlikely to have an adverse impact.
Uncertainty of assessment		10	Uncertainty in background noise measurements is considered low. Predicted noise levels have been based on measured levels on site and predicted back to the receivers using methodology from BS 5228. Uncertainty is therefore considered low.

DH: 5217_Rev2

Page 23

12/07/2019

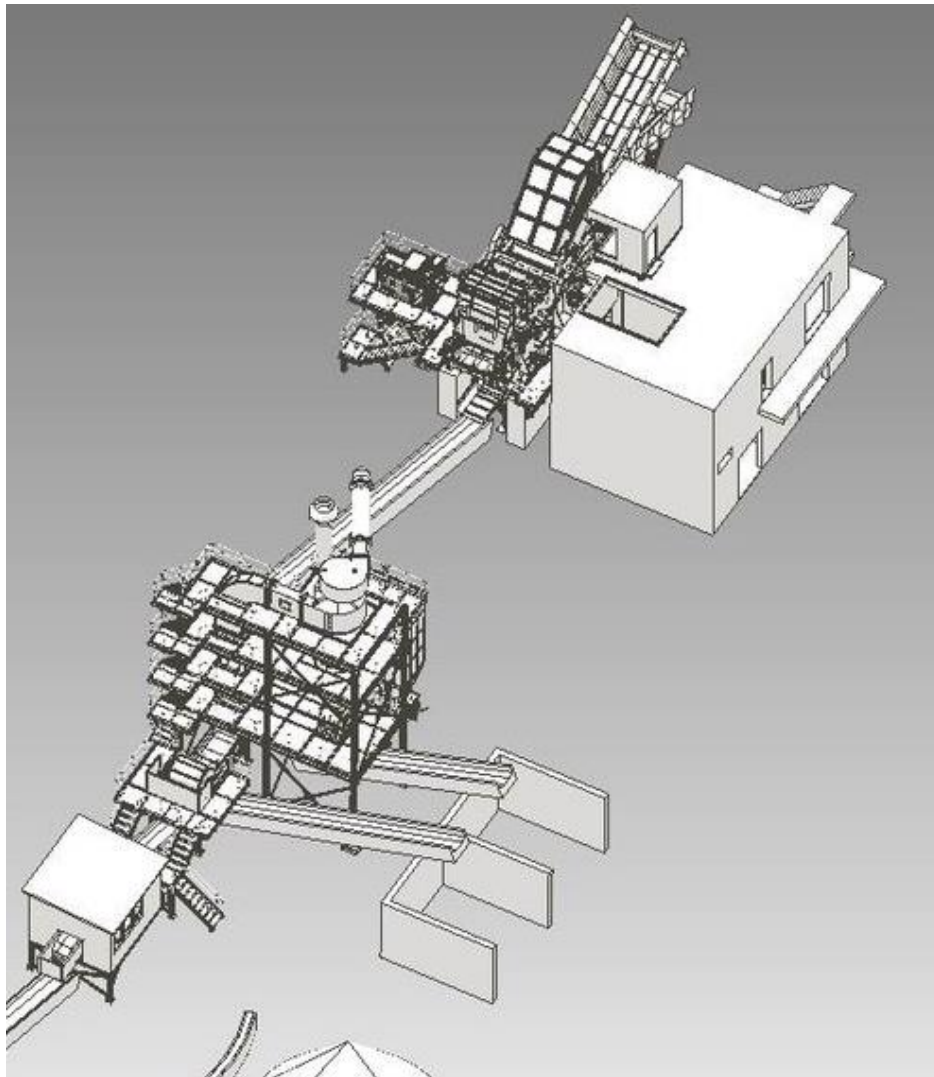
5217/T8b - BS 4142:2014 Assessment at SSR2 for Proposed Shredder/Screening Plant

Results		Relevant Clause	Commentary
Predicted Level at SSR 2	$L_{Aeq(1hr)} = 45\text{dB}$	7.3.2	Predicted level from new shredder plant
Residual sound level	$L_{Aeq(1hr)} = \text{N/A}$	7.3.3	No correction for residual sound level is applied as we are working with a predicted specific sound level.
Background sound level (daytime)	$L_{A90(0800-1700hrs)} = 43\text{dB}$	8.1.1 8.1.3 8.3	Background sound level measured at rear of SSR1
Assessment made during the daytime so the reference time interval is 1hr.		7.2	
Specific sound level calculated by correcting the ambient sound level to remove the contribution of the residual sound level.	$L_{Aeq(1hr)} = 45\text{dB}$	7.3.4	
Acoustic feature correction	3 dB	9.2	3dB penalty for impulsivity just perceptible over existing ambient noise from road traffic
Rating Level	$(45 + 3) = 48\text{dB}$		
Background sound level (daytime)	$L_{A90(0800-1700hrs)} = 43\text{dB}$	8.3	
Excess of rating over background sound level	$(48 - 43) \text{ dB} = 5\text{dB}$	11	
Assessment indicates an adverse impact depending on context		11	At 5dB above background this is assessed as having an adverse impact depending on context. The context in this case are daytime only activities at dwellings backing on to a well established industrial estate, with significant impacts and banging from other closer units compared to the GLJ site. A significant improvement (7dB) is indicated over the existing plant this is to replace.
Uncertainty of assessment		10	Uncertainty in background noise measurements is considered low. Predicted noise levels have been based on measured levels on site and predicted back to the receivers using methodology from BS 5228. Uncertainty is therefore considered low.

Appendix B – Acoustic Terminology

Human response to noise depends on a number of factors including: Loudness, Frequency content, and variations in level with time. Various frequency weightings and statistical indices have been developed in order to objectively quantify 'annoyance'. The following units have been used in this report:

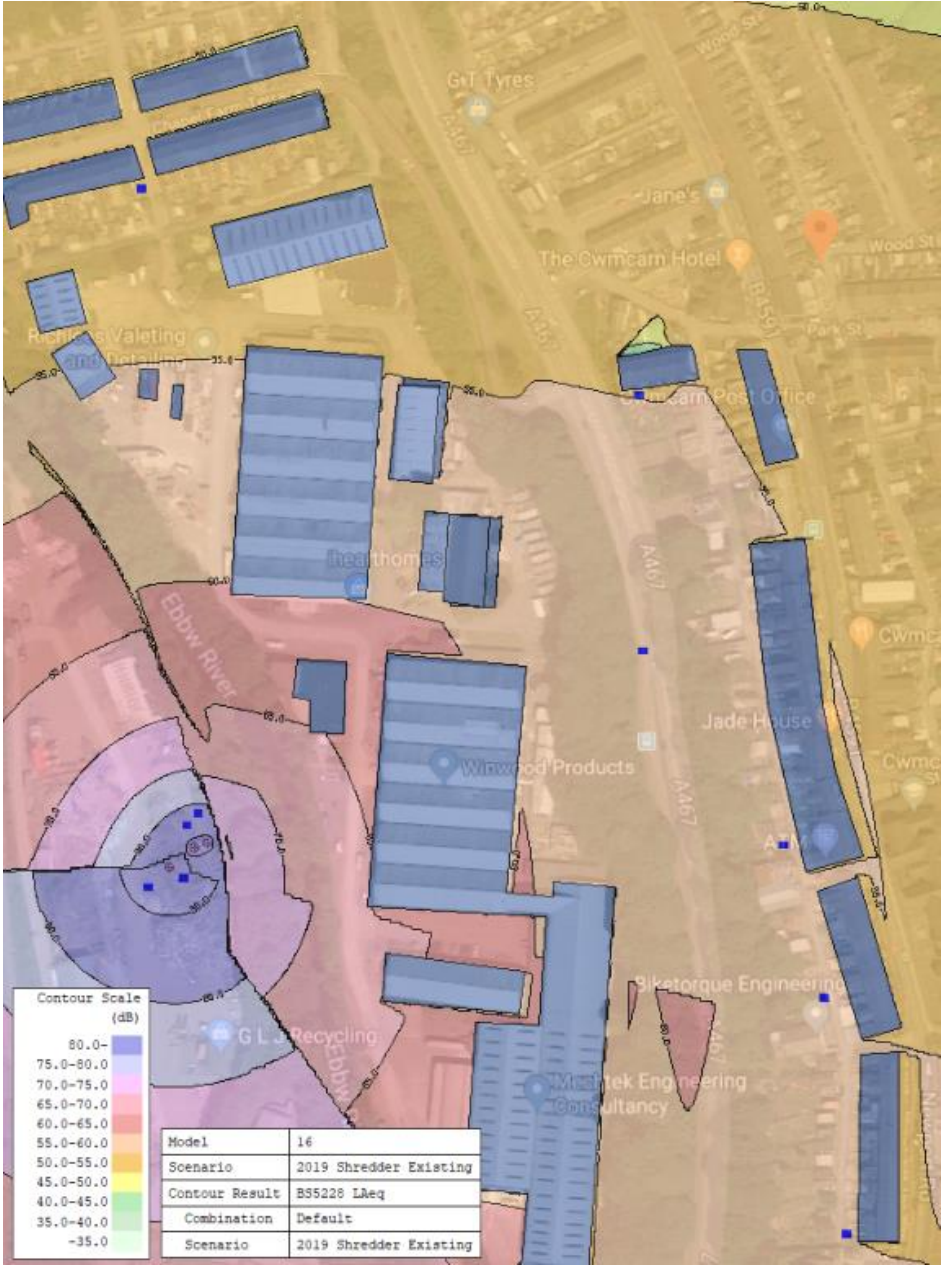
dB(A):	The sound pressure level weighted to correspond with the frequency response of the human ear, and therefore a person's subjective response to frequency content.
L_{eq} :	The equivalent continuous sound level is a notional steady state level which over a quoted time period would have the same acoustic energy content as the actual fluctuating noise measured over that period.
L_{90} :	The sound level which is exceeded for 90% of the measurement period. i.e. The level exceeded for 54 minutes of a 1-hour measurement. It is often used to define the background noise level.
L_{10} :	The sound level which is exceeded for 10% of the measurement period. i.e. The level exceeded for 6 minutes of a 1-hour measurement
L_{max} :	The highest instantaneous sound level recorded during the measurement period.
$L_{A,Tf}$:	The specific noise level plus any adjustment for the characteristic features of the noise



Note: Roof opening on shredder motor room to be fitted with removable concrete panel for access. 10.8m high enclosure around shredder plant not shown in this image.

Appendix D – Noise Map Models

5217/NM1 – Daytime Noise Map of Existing Shredder/Screening Plant



5217/NM2 – Daytime Noise Map of Proposed Shredder/Screening Plant and Enclosure



