Proposed Wash Plant, Springwell Quarry Landfill

Thompsons of Prudhoe

Princess Way
Low Prudhoe
Northumberland
NE42 6PL

NOISE IMPACT ASSESSMENT REPORT
TOP/SPWP/NIA/07/23

Version: FINAL V1.1

Issued to: Mike Gill
MichaelGill@thompsonsofprudhoe.com
Date of issue: 15 January 2024

Prepared by: Lucas R. Longman BSc.Hons MIOA

Checked by: Michael E. Dodgson Tech IOA

Approved by: Lucas R. Longman BSc.Hons MIOA
Managing Director/Principal Consultant

QEM Systems
Unit 8K
Victoria Ind. Estate
Victoria Road West
Hebburn
Tyne & Wear
t: 0191 483 2455
e: consult@qemsystems.co.uk

CONTENTS

Appendix A – Glossary of Acoustic Terminology
Appendix B – Sound Level Data
Appendix C – Noise Contours
Appendix D – Mitigation Measure Details

2 Introduction

2.1 Consultants brief

2.1.1 Quality Environmental Management Systems Ltd (QEM) were instructed by Thompsons of Prudhoe to prepare a noise impact assessment to support the application for a proposed materials Wash Plant at Springwell Quarry Landfill, Springwell, Tyne & Wear.

2.1.2 The aims of this assessment are:

- Predict the anticipated noise level at the nearest noise sensitive receptor (NSR) during worst case operations from the proposed Wash Plant facility at Springwell Quarry Landfill.
- To assess the impact of noise generated from Springwell Quarry Landfill at the nearest NSRs and compare with relevant guidance level/limits; and
- To assess the requirements for mitigation measures surrounding the quarry during operations to minimise residual impacts upon identified NSRs.

2.1.3 A glossary of technical terminology is provided in **Appendix A** of this report for reference.

2.2 Site Location and Existing Operations

2.2.1 The existing aggregate recycling facility is located in Springwell Quarry Landfill, near Springwell Village, Sunderland. The site is operated by Thompson of Prudhoe.

2.2.2 Thompsons of Prudhoe are applying for a variation to the exiting permit due to the installation of the proposed wash plant that will provide a .

2.2.3 The nearest residential dwellings are located on Railway Close to the east, Red Bungalow to the southeast and Thomas Street to the south.

2.2.4 Operations currently take place between the following hours:

- Monday to Friday 07:00 to 17:00
- Saturday 07:00 to 13:00
- No work undertaken on a Sunday or any public holidays.

2.3 Proposed Scheme

2.3.1 It is proposed to install a aggregate wash plant to increase the efficiency of inert material recycling at the site and to increase the range of secondary aggregates and sands for re-use, whilst diverting material away from landfill. This report therefore provides support for the intended variation to currently permitted activities.

2.3.2 The items of screening activity to be installed include:

- Scalper screen: breakdown and remove oversize material;
- Aggrescrub log washer: scrubbing and classification system (enclosed);
- 3 x deck rising screen: coarse material grading;
- Cone crusher + surge hopper: process oversize material to log washer;
- Sand processing unit: hydrocyclone material classification plant (enclosed);
- Filter press and associated clarified/sludge and clean water tanks; and
- Associated control room, conveyors, pumps and generators

2.3.3 It must be acknowledged that the recycling plant will not result in additional forms of waste being accepted on the site. Therefore, the provision of the new activity and machinery will not materially alter waste volumes, daily throughput, vehicular movements or the designated land use, as defined in the current permit EPR/YP3098ZG/V007.

2.3.4 The screening activity and filter press will be operated during existing weekday operational hours, 07:00 to 17:00 Monday to Friday. During scheduled lunch breaks (12:30 to 13:00) the plant will be powered down. The cone crusher will operate on an on-demand basis dependent upon the quantity of material fed by the surge hopper.

2.4 Site History

2.4.1 An assessment of the site operations as part of a time extension was undertaken in 2016 with an addendum produced in 2018 providing additional background monitoring data and amendments to the proposed scheme.

2.4.2 The outcomes of the assessment included the provision of an acoustic screening bund on the southeast site boundary to mitigate the processing operations in the former quarry floor. Improvements to the cladding of the existing processing and storage buildings were also implemented.

2.4.3 The summary of impacts from this assessment are produced in Table 2-1.

Table 2-1: Impact upon sensitive receptors from 2018 assessment addendum

NSR	Background sound levels* dB L_{A90}	Predicted site noise levels LAeq,1h	Operational vs background
1 – 10 Railway Close	39	44	+5
2 – 15 Red Bungalow	39	42	+3
3 – 63 Thomas Street	43	38	-5

2.4.4 The cumulative change in ambient sound level for the 2018 assessment are detailed in Table 2-2.

Table 2-2: Cumulative impact upon sensitive receptors from 2018 assessment addendum

NSR	Average Residual LAeq,1h	Predicted site noise levels LAeq,1h	Cumulative sound level LAeq,1h	Change in Ambient sound level dB
1 – 10 Railway Close	45	44	48	+4
2 – 15 Red Bungalow	45	42	47	+2
3 – 63 Thomas Street	49	38	49	0

2.4.5 The conditions of Planning Reference 16/01581/MAW, validated in 2020 state:

Condition 8: Noise from site operations shall not exceed the background noise level ($L_{A90,1h}$) by more than 10dB(A) during normal working hours (as set out in Condition 3) at the nearest noise-sensitive property as identified in the submitted Noise Assessment Report.

Condition 9: Notwithstanding the requirements of Condition 8 above, the total noise from site operations shall not exceed 55dB(A) $L_{Aeq,\ 1h\ (free\ field)}$ at the nearest noise sensitive property.

3 Assessment Area

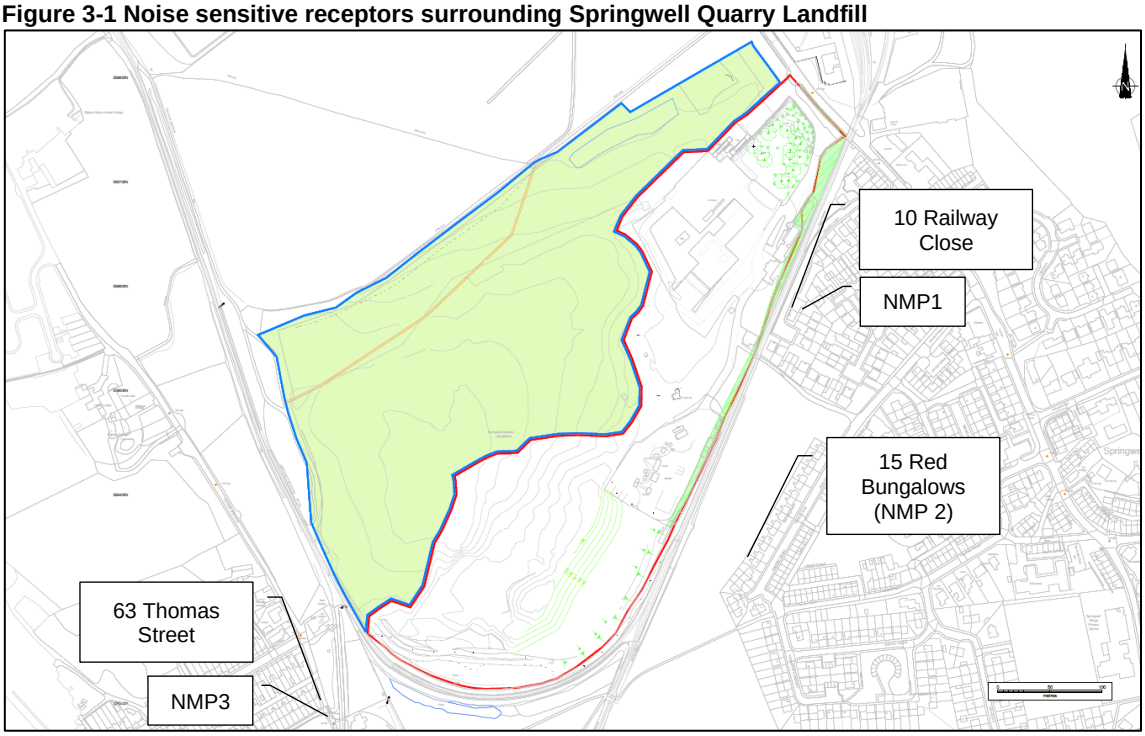
3.1 Noise Sensitive Receptors

3.1.1 Three residential dwellings have been identified as the nearest noise sensitive receptors (NSRs) to the proposed and existing operations at Springwell Quarry Landfill. The details of the proposed assessment locations, i.e., external amenity areas, for each SNR are detailed in Table 3-1 and identified on Figure 3-1.

Table 3-1 Noise Sensitive Receptor Details

NSR	Direction from site	Distance from site boundary (m)	National Grid Reference
1 – 10 Railway Close	East	30	NZ 28459 58589
2 – 15 Red Bungalow	Southeast	80	NZ 28415 58346
3 – 63 Thomas Street	Southwest	100	NZ 28000 58204

Figure 3-1 Noise sensitive receptors surrounding Springwell Quarry Landfill



3.1.2 Railway Close is approximately 30 metres from the site boundary with a drop of approximately 2.5 to 3m in elevation from the site to receptor, . The former Bowes Railway line is directly to the east of the site boundary on made ground with Railway Close constructed of sealed tarmac.

3.1.3 In addition to the Bowes Railway line along the eastern boundary there is a vegetated area between Red Bungalows and the site. The restored landfill area in the southeast of the site is 145 m AOD with the receptor and assessment location approximately 140 metres AOD.

3.1.4 Between Thomas Street and the site there is a bridleway approximately 2 metres above that of the identified receptor with further vegetation and the Bowes Railway directly adjacent to the site boundary. The Wagon Inn public house and associated car park are located approximately 70 metres to the north of Thomas Street..

4 Instrumentation

4.1 Baseline Survey

4.1.1 No significant developments and additional sources of noise have been introduced to the assessment area following the 2018 planning application for a time extension. The historical residual and background sound levels from 2015 and 2018 are therefore deemed representative of the prevailing sound climate and have therefore been adopted in this assessment.

4.1.2 The noise monitoring equipment used in the survey is detailed in Table 4-1. All equipment is fully compliant with that specified as Type 1 in British Standard BS EN61672 - 1: 2003: "Electroacoustics. Sound level meters Specifications."

Table 4-1 : Noise instrumentation

Manufacturer	Description	Model	Serial number	Calibration due
Bruel & Kjaer	Sound level meter	2250	3028202	03/12/2024
Bruel & Kjaer	Condenser Microphone	4189	2839704	03/12/2024
Casella	Sound level calibrator	120/1	0966335	02/12/2023
Kestrel	Pocket Weather Tracker	4500NV	580020	N/A

4.1.3 On site calibration was undertaken on the instrumentation prior to and on completion of each survey to check the sensitivity of the measuring equipment. The drift in level was within acceptable tolerance, i.e. <0.5dB.

4.1.4 In addition to field calibration checks, all instrumentation is calibrated at an accredited laboratory at intervals not exceeding those detailed within BS4142:2014+A1:2019; for measurement systems this corresponds to every two years and for calibrators every 12 months.

4.1.5 Copies of the relevant calibration certificates for the instrumentation used in the assessment are provided in available upon request.

5 Methodology

5.1 Background Measurements

5.1.1 BS4142:2014 describes methods for rating and assessing sound of an industrial and/or commercial nature which may include sound from:

- Manufacturing processes;
- Mixed mechanical and electrical plant;
- Loading/unloading of goods and materials at industrial and/or commercial premises; and
- Mobile plant and vehicles that are an intrinsic part of the overall operations i.e. forklift trucks or train or ship movements.

5.1.2 The standard sets out a method of assessing the impact of measured or calculated noise, based on the difference between the "rating level" of the noise source in question and the "background sound level" (L_{A90}). The rating level is derived by adding a correction due to certain characteristics of the noise under consideration, known as the "specific sound level".

5.1.3 The specific noise level is the equivalent continuous A-weighted sound pressure level (L_{Aeq}) of the noise, at the assessment position. The degree of impact is indicated by the difference between the noise from an industrial/commercial source and the existing background noise, as detailed in Table 5-1.

Table 5-1 : BS4142 criterion and significance of impact

Difference between measured background and rating level in dB(A)	Significance of impact
+10	likely to be an indication of a **significant adverse impact**, depending on context
+5	Is likely to be an in indication of an **adverse impact**, dependent upon context.
<0	Indication of the specific sound source having a **low impact**, depending upon the context.

5.1.4 Where possible the noise level produced by the specific source should be determined directly by measurement at the assessment location. Similarly, the background noise level should be determined at the assessment location during a period when the specific noise is not operating or at a position where the measured levels are not influenced by the specific noise.

5.1.5 Dependent on the specific sound being assessed, the presence of certain acoustic features can "increase the significance of impact over that expected from a basic comparison between the specific sound level and the background sound level". These acoustic characteristics include:

- Tonality
- Impulsivity
- Other sound characteristics
- Intermittency

5.1.6 In addition to the margin by which the Rating Level of the specific sound source exceeds the background sound level, emphasis is placed upon an appreciation of the context of the impacts:

"*An effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which the sound occurs/will occur. When making assessments and arriving at a decision, therefore, it is essential to place the sound in context.*"

5.1.7 In addition to the characteristic penalties applied to provide the rating level of a source the standard notes that the impact of the source under assessment should also take into account:

- Context
    - Absolute level of the sound
    - The existing impact of residual sound levels
    - Character and level of the residual sound
    - Sensitivity of receptor and design measures to ameliorate acoustic conditions
- Uncertainty of the assessment
    - Establishment of residual and specific sound levels
    - Variability of background
    - Calculation and assumptions

5.1.8 The methodology detailed within BS4142 is limited to the assessment of specific sound sources and associated rating levels at external areas of identified receptors.

5.1.9 The measurement period for Railway Close and Thomas Street were limited to scheduled meal breaks when all items of plant are tuned off between 12:30 and 13:00.

5.1.10 However, monitoring at Red Bungalow was undertaken on an unattended basis over multiple periods during breaks 09:30-09:45, 12:30-13:00 and 15:00-15:15.

5.1.11 To ensure there was no undue influence on the recorded sound levels monitoring was undertaken during dry periods with wind speeds < 5m/s (the limit of instrument windshield to minimize additional turbulence at the microphone).

5.1.12 Microphones were positioned in free-field locations, i.e. > 3.5m away from acoustically hard surfaces and therefore any influence from reflective sound was also minimized.

5.2 Noise Modelling Prediction Methodology

5.2.1 Noise impact from the proposed wash plant operations will have three main sources, namely:

- Noise from static/semi-static plant such as scalpers, screens, crushers, and front loading shovels loading feed hoppers and road going wagons;
- Noise from sources within enclosures, i.e., log wash and filter press
- Noise from mobile items i.e., road going wagons on internal haul roads.

5.2.2 The prediction of sound pressure levels have been carried out using CadnaA 3D noise modelling software configured to ISO 9613-2:1996 "*Acoustics -- Attenuation of sound during propagation outdoors -- Part 2: General method of calculation*". This standard

describes a method for calculating the attenuation of sound during propagation outdoors in order to predict the levels of environmental noise at a distance from a variety of sources. The method predicts the equivalent continuous A-weighted sound pressure level (as described in ISO 1996).

5.2.3 The data sources, values and assumptions used within the noise prediction model are detailed in section 7 of this report.

5.2.4 The location of the plant and haul road during proposed operations together with the noise sensitive receptors are then added to the model. The contribution from each item of plant and section of haul road, allowing for the attenuation of noise with distance and barrier or ground absorption effects, is then calculated at each receptor. The individual noise levels are then summed to obtain the overall noise level at each receptor in terms of $L_{Aeq, 1hr}$.

5.2.5 The calculations are based on 'worst case' conditions when the plant with the largest sound power level is used and working at full power. The worst-case operational period has also been used therefore allowing the maximum emission levels from typical wash plant operations to be evaluated.

5.3 Plant Noise Emissions

5.3.1 The starting point in predicting noise levels is to determine the noise level of the source(s). There are three methods of obtaining the necessary data:

a. Carry out noise measurements of similar plant, operating in the same mode and at similar power.
b. Use sound power levels given in Annexes C and D of BS5228, 2009, Code of practice for noise and vibration control on construction and open sites.
c. Obtain the maximum permitted sound power level of the plant under
    i. EC Directive 2000/14/EC or
    ii. sound power level produced from dynamic test conditions detailed BS ISO 6395:2008

5.3.2 The sound pressure levels of the proposed mobile and static plant to be utilised at Springwell Wash Plant have been obtained and validated, from similar plant operations with on-site measurements at various distances and were obtained from Report reference AER22-0435-Noise Readings – Expected produced by Terex.

5.3.3 In addition to direct measurements of analogous plan the recommended noise modelling source types and sound power levels for each main source have been adapted from RPS report (ref JAT11497_REPT_01_R0 dated 19th August 2020). The assumptions and recommendations from the RPS report have therefore been adopted in the noise model for this assessment of impact of the proposed aggregate recycling operations.

5.3.4 However, as the log wash and sand separator will be housed within existing buildings the provided sound levels have been calculated as noise emitting buildings. Based on the surface area and reverberant interior sound level the emission for façades and roof have been calculated taking into account the transmission coefficients and openings.

6 Noise Monitoring Data & Modelling Predictions

6.1 Residual and Background Sound Levels.

6.1.1 The results from the noise monitoring surveys to establish the residual and background sound level, when the site was not operational, are provided in Table 6-1.

Table 6-1: Summary of baseline results

Location	Sound levels (dB)	
	Residual, L_{Aeq}	Background, L_{A90}
NMP 1	43	39
NMP 2	45	39
NMP 3	49	43

6.1.2 At NMP 1 and NMP 2, Railway Close and Red Bungalows respectively, the residual sound level is influenced by vehicles on distant and local road network, including A1 to west and A194 to the east.

6.1.3 At NMP 3, the residual acoustic environment is dominated by near constant road traffic from the A1 and also influenced by local roads and activity at the nearby public house carpark.

6.2 Noise Model – Imported Data

6.2.1 The main items imported, and assumptions made when constructing the noise model are provided in Table 6-2.

Table 6-2 Data sources and assumptions adopted with noise model

Item	Source	Details
Proposed Wash Plant Layout	Terex	DWG AutoCAD format
Wash Plant sound emissions	Terex	Terex - Measured at 5, 10 & 15m around identical operating plant.
	RPS	Sound intensity and pressure levels of similar size Wash Plant
Existing building and ground feature layout	Wardell Armstrong	OS Mastermap
Off-site building elevation	Environment Agency	LiDAR Digital Surface Model 1m resolution
Site Building/Feature elevations	Environment Agency	LiDAR Digital Surface Model 1m resolution
Ground elevation	Environmental Agency	LiDAR Digital Terrain Model 1m resolution
Order of reflection from buildings	Cadna A	Max order of reflection = 2

Modelling configuration	Cadna A	ISO 9163 Attenuation of sound during propagation outdoors
Ground absorption	Cadna A	Absorbent ground = 0.75 Hard standing on site = 0

6.3 Noise Model – Sound Level Sources

6.3.1 The sound pressure levels of the proposed mobile and static plant to be utilised at Springwell Wash Plant has been obtained and validated, from similar plant operations with on-site measurements at various distances, and are provided in 6-3 and 6-4.

Table 6-3: Sound Power Levels of static/semi-static Wash Plant items

Item of plant	Proposed Make & Model	Source Type	On time (%)	Elevation (m)	SWL dB(A)
Scalper	Terex AggreScalp	Vertical Area	100	**3.5**	**99**
Log Washer	Terex Aggre Scrub A150	Inside building	100	**6**	**114**
Rinse Deck Screen	Deck Sizing Screen (6 x	Vertical Area	100	**6**	**80**
Separator	Finemaster 120 C-2G	Inside building	100	**6**	**85**
Surge Hopper	Terex H9 Surge	Area	25	**2**	**81**
Cone Crusher	Terex TG120 Cone Crusher	Point	25	**4**	**108**
Top Rake Motor	16m Low Level Rake Thickener	Point	100	**1 a**	**73**
Bottom Rake Motor	16m Low Level Rake Thickener	Point	100	**1**	**93 b**
Overband Magnet	Terex	Point	25	**3.5**	**85**
Vertical shaft Pump	Terex VSP 300 75kW	Point	100	**4**	**82**
Aggregate Stockpile Conveyor	Terex TC6532 Radial	Line	100	**1 – 6**	**81**
Sand stockpile conveyor	Terex TC 5032 Radial	Line	100	**1 – 6**	**73**
Feed Conveyors	Terex Galvanised	Line	100	**1 – 13**	**76**
Control Cabin	Electrical Control Unit	Building	100	**3**	**73 b**
Chemical Dosing Unit	Floc Dosing Unit	Building	100	**3**	**87 b**
Filter Press	AquaClear 2000-165-25	Building	100	**14**	**61 b**
Front loading shovel	TBC	Point	100	3	104
Tractor & bowser	unknown	Line	100	2	98*
Road going wagon	N/A	Line	100	2	109*

*** sound pressure levels are LAmax from mobile plant pass-bys**
a – above roof/top of cylinder b- internal sound level

Table 6-4: Sound Power Levels of static/semi-static Wash Plant items

Item of plant	Source Type	On time (%)	National Grid Reference		Elevation (m)	SWL dB(A)
			Easting	Northing		
Scalper	Vertical Area	100	428339	558577	**3.5**	**99**
			428348	558568		
Rinse Deck Screen	Vertical Area	100	428347	558636	**6**	**80**
			428352	558632		
Overband Magnet – feed	Point	100	428349	558575	**3.5**	**85**
Surge Hopper	Area	25			**2**	**81**
Cone Crusher	Point	25	428350	558612	**4**	**108**
Overband Magnet - crush	Point	25			**3.5**	**85**
Top Rake Motor	Point	100			**1 a**	**73**
Bottom Rake Motor	Point	100			**1**	**93 b**
Vertical shaft Pump	Point	100			**1**	**82**
Front loading shovel	Point	100			3	104
Aggregate Stockpile Conveyor 1	Line	100			**1 – 6**	**81**
Sand stockpile conveyor	Line	100			**1 – 6**	**73**
Feed Conveyors	Line	100			**1 – 13**	**76**
Sand Separator	Building	100			**6**	**85**
Log Wash	Building	100			**6**	**114**
Control Cabin	Building	100	See Tables in section 7.4		**3**	**73 b**
Chemical Dosing Unit	Building	100			**3**	**87 b**
Filter Press	Building	100			**14**	**61 b**

*** sound pressure levels are LAmax from mobile plant pass-bys**
a – above roof/top of cylinder b- internal sound level

6.3.2 Full details of the octave data associated with each item of plant are provided in **Appendix C**. Where relevant table and item number along with its mode of operation have also been provided for data obtained from BS5228 Annex C and D for completeness.

6.3.3 In the case of front-loading shovel and excavator movements these have been modelled as point sources due to the short distance covered. Road going wagons and sources with a defined route, i.e. haul road, have however, been modelled as line sources and the specifics are detailed in section 7.10.

6.4 Onsite Buildings

6.4.1 The prominent buildings as part of the washing facility and those being retained are detailed in Table 6-5.

Table 6-5: On site building location and elevations

Name	National Grid reference		Height (m)	Elevation (m)	Ground (m)
	x	y			
Storage Building – Sand screening	428396	558679	14	159.5	145.5
	428419	558658		159.5	145.5
	428398	558634		159.5	145.5
	428374	558655		159.5	145.5
Process Building (retained)	428385	558646	14	159.5	145.5
	428403	558629		159.5	145.5
	428382	558606		159.5	145.4
	428364	558623		159.5	145.5
Process Building – Log wash	428364	558623	15	160.3	145.5
	428382	558606		160.3	145.4
	428370	558593		160.3	145.4
	428352	558610		160.3	145.3
Filter Press	428333	558701	14	159.5	145.5
	428339	558696		159.5	145.5
	428322	558678		159.5	145.5
	428316	558684		159.5	145.5
Flocculant Dosing Unit	428300	558692	3.5	149	145.5
	428309	558683		149	145.5
	428307	558682		149	145.5
	428298	558690		149	145.5
Control cabin	428381	558648	3.0	148.5	145.5
	428383	558646		148.5	145.5
	428375	558637		148.5	145.5
	428373	558639		148.5	145.5
Workshop (retained)	428423	558554	10	154.6	144.6
	428412	558560		154.6	145.0
	428407	558552		154.6	144.3

	428408	558551		154.6	144.3
	428407	558549		154.6	144.2
	428413	558545		154.6	144.8
	428414	558548		154.6	144.8
	428418	558546		154.6	145.0
Weighbridge cabin	428396	558739	8	153.5	145.5
	428398	558737		153.5	145.5
	428392	558730		153.5	145.5
	428389	558732		153.5	145.5

6.5 Sound reduction indices of building materials

6.5.1 The proposed aggregate recycling facility will include several items of plant enclosed within existing buildings or purpose-built structures in the case of filter press, electrical control and dosing units.

6.5.2 The sound reduction index for the existing structures, proposed cladding and containers utilized in the noise model area detailed in Table 6-6.

Table 6-6 Sound reduction indices of steel clad processing buildings.

Material	Centre Octave Band Frequencies (Hz)							
	63	125	250	500	1k	2k	4k	Rw
Sheet steel with trapezoidal corrugations + mineral fibre 120mm	-	15	20	28	37	43	40	32
AS35 60mm - 0.5mm Trapezoidal sheet steel with 60mm foam	16.2	19.8	23.3	23.1	27.7	38.6	53.9	28
steel sheet with trapezoidal corrugations 45 mm	-	14	16	20	25	29	23	25

6.5.3 The airborne sound reduction index for the 120mm fibre cladding for the filter press sidewalls and roof are based on VDI 2751 data for sheet steel with trapezoidal corrugations and mineral fibre, 32dB(A).

6.5.4 The details and acoustic report data for AS35 were obtained direct from the manufacturer, data sheets DTS015 and SRPIT model report, respectively.

6.6 Internal Sound Pressure

6.6.1 For each sound emitting building the internal sound pressure level (SPL_i, dB) has either been taken from direct measurements or calculated. Where calculations have been undertaken, the sound power level (PWL dB) and number of proposed plant, the mean absorption coefficient (α Aw) and the area of internal surfaces (S in m^2) have been inputted into the following formula.

$$SPL_i = PWL - 10\lg\left(\frac{A}{m^2}\right) + 6\,dB = PWL - 10\lg\left(\frac{\alpha * S}{m^2}\right) + 6\,dB$$

6.6.2 For each sound emitting building the overall internal diffuse sound pressure level for each frequency band and A-weighted internal sound pressure level (SPLi) is presented in Table 6-7 and has used in the modelling of façade and roof emissions.

Table 6-7: Internal Sound Pressure Levels of Emitting Buildings

Emitting building	Centre Octave Band Frequencies (Hz) dB									
	32	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	**SPLi**
Sand processing	84	70	62	60	59	56	58	55	50	63
Log wash	105	99	88	86	85	86	88	89	85	94
Filter Press	77	68	66	58	49	36	48	49	45	60
Flocculant dosing unit	110	95	84	72	72	65	76	82	84	87
Control cabin	92	74	69	66	69	68	64	63	61	73

6.7 Noise emitting buildings

6.7.1 It is proposed that the existing processing building will be extended to enclose the logwasher and also input/output feed conveyors with dimensions of 24.5 x 17.40 x 15. The surface area of the processing building will be 2125m^2 with an absorption coefficient of 0.2 Aw resulting in an internal diffuse sound level of 94 dBA. To reduce the transmission of sound from the processing building to adjacent storage building and off site AS35 60mm cladding will be utilized in the northern and eastern facade of the building.

Table 6-8: Log Wash Processing Building – Sound Emissions

Façade / Roof	Area m^2	Sound Power dBA	SRI of enclosure cladding Rw dB	Sound Power per unit area L_w dB(A)
North	368	85	28	59
East	261	83	28	59
South	368	90	26	64
West	261	88	26	64
Roof	430	90	26	64
Floor	430			
Total	2118			

6.7.2 The existing storage building will house the sand screening plant with two size fractions produced. With an internal surface area of 3762m m^2 and an absorption coefficient of 0.2 Aw the internal diffuse sound level of 63 dBA due to sand screening plant.

Table 6-9: Sand Screening Building – Sound Emissions

Façade / Roof	Area m^2	Sound Power dBA	SRI of enclosure cladding Rw dB	Sound Power per unit area L_w dB(A)
North	438	62	26	35
East	448	63	26	35
South	438	62	26	35
West	448	63	26	35
Roof	995	65	26	35
Floor	995			
Total	3762			

6.7.3 The Filter Press enclosure will be 24m x 8m x 7.25m (width, depth, height), of insulated sheet metal construction and located at an elevation of approximately 7 metres. Based on an internal diffuse sound level of 72dB and a sound reduction index of R_w=32dB from the insulation and sheet steel the sound level per unit area for each façade and roof of the enclosure is provided in Table 6-10.

Table 6-10: Sound Emissions - Filter Press Enclosure

Façade / Roof	Area m^2	Sound Power dBA	SRI of enclosure cladding Rw dB	Sound Power per unit area L_w dB(A)
North and South Facades	58	58	32	41
East and West	165	62	32	41
Roof	193	63	32	41
Floor	193			
Total surface	609			

6.7.4 The flocculant dosing enclosures will be 12m x 2.4m x 3.5m (width, depth, height), of sheet metal construction. Based on an internal diffuse sound of 87dB(A) and a sound reduction index of R_w=25dB from sheet steel, the sound level per unit area for each façade and roof of the enclosure are provided in Table 6-11.

Table 6-11: Sound Emissions - Flocculant Dosing Enclosure

Façade / Roof	Area m^2	Sound Power dBA	SRI of enclosure cladding Rw dB	Sound Power per unit area L_w dB(A)
North and South Facades	43	72	25	56
East and West	9	65	25	56
Roof	29	70	25	56

6.7.5 Emissions from the electrical control cabin, detailed in Table 6-12, are based on an internal sound level of 73 dB(A), cladding having a sound reduction index of 25dB R_w with dimensions 12m x 2.4m x 3m (width, depth, height),.

Table 6-12: Sound Emissions - Electrical Control Enclosure

Façade / Roof	Area m^2	Sound Power dBA	SRI of enclosure cladding Rw dB	Sound Power per unit area L_w dB(A)
North and South Facades	6	52	25	44
East and West	31	59	25	44
Roof	29	59	25	44

6.8 Barrier Attenuation

6.8.1 The use of ISO9613 “Attenuation of sound during propagation outdoors -- Part 2: General method of calculation” within CadnaA software allows for a more detailed method of calculating barrier attenuation incorporating the elevation of the source, barrier and receptor in addition to meteorological conditions and the variation in spectral sources.

6.8.2 As part of the mitigation measures to be adopted, an acoustic earth barrier will be constructed along the eastern site boundary.

6.8.3 Due to the existing site layout and requirement for a one-way system for internal haul roads, the placement of suitable acoustic barriers is limited to the eastern boundary of the site, adjacent to the Bowes Railway Line.

6.8.4 It is proposed that an earth bund of approximately 2.5 metres in elevation will be constructed. The overall elevation of the acoustic barrier will be approximately +147.5m AOD and extend from the northeast corner of the site and approximately 80 metres south of the retained workshop building.

6.8.5 To ensure that the acoustic barrier is contiguous and provides the required level of screening, acoustic fencing with the same elevation as the earth bund, 147.5m , will abut the workshop building therefore providing a continuous barrier.

6.8.6 In addition to the proposed mitigation from this assessment the earth bund in the southeast of the site, associated with planning reference 16/01581/MAW, is to be maintained at an elevation of 3m and extended to abut the proposed earth bund required for the wash plant.

Table 6-13: Acoustic Bund/Barrier

Façade / Roof	National Grid Reference		Elevation (m)	Slope (ratio)	Top width
	Start	End			
Earth bund (north of workshop)	428495 558721	428423 558556	2.5	1:2	1.25
Acoustic Fence (north of workshop)	428419 558566	428417 558557	2.5	-	-
Earth bund (south of workshop)	428419 558540	428378 558456	2.5	-	-
Earth bund (south of workshop)	428413 558546	428409 558535	2.5	1:2	1.25

6.9 Ground Cover Correction

6.9.1 The area between the NSRs and Springwell Quarry landfill site boundary is of an absorbent nature and includes fields, hedgerows and trees. The areas directly outside of the quarry have therefore been calculated as being acoustically absorbing, i.e. absorption = 0.75.

6.9.2 The area of hard standing at the quarry surrounding the entrance, weighbridge and wash plant in addition to areas around receptors and roads have been modelled as acoustically hard and reflective surfaces, absorption = 0.25

6.10 Haul roads and mobile sources

6.10.1 Noise emanating from a road is created by vehicles passing along it and is typically described as a line source. The attenuation due to distance from this source takes into account vehicle speed and the number of vehicle movements per hour.

6.10.2 In order to consider a worst case a total of 20 road going wagon movements within a typical hour has been modelled i.e. 10 vehicles entering and exiting the site. Based on a 10-hour working day and 12 vehicles per hour results in 120 vehicles per day. All mobile sources have been given an elevation of 1.5 metres above the haul route with a speed of 16 km/h (10mph).

Table 6-14: Mobile plant source assumptions

Item of Plant	Movements per hour	Speed (km/h)	Elevation (m)
Road going wagon	10	16	1.5
Tractor & bowser	2	16	1.5

6.11 On-Time Correction

6.11.1 The scalper, log wash, screens and conveyors are assumed to be operating concurrently and for 100% of the assessment period, with no reduction in the sound level due to on-time.

6.11.2 However, due to the on-demand nature of the cone crusher operations an on-time of 25%, i.e. 15 minutes within a reference hour period, has been adopted.

6.11.3 A front-loading shovel will be loading feed hoppers, transferring material from stockpiles and loading road going wagons and each of these operations are assumed to be divided equally, i.e. 33% of the hour assessment period for feed hopper, stockpile and wagon loading activities.

Table 6-15: Percentage on time of proposed operations

Item of Plant & operation	% On-time	Duration within reference hour period
Scalper, log wash, screens and conveyors	100	60
Filter press, electrical and dosing cabins	100	60
Surge hopper and Cone crusher	25	15
Front loading shovel – loading hopper	33	20
Front loading shovel – collecting material	33	20
Front loading shovel – lading wagon	33	20

6.12 Prediction results – No Mitigation

6.12.1 The results of the noise model for operations without mitigation are presented in Table 6-16. These are the potential worst case noise levels that may be experienced at NSRs throughout the various phases of operation based on the assumptions and working method as detailed in previous sections.

Table 6-16: Predicted Noise Levels at NSR for Proposed Wash Plant operations

NSR	NSR	Predicted site noise levels $L_{Aeq, 1hr}$
1	10 Railway Close	48
2	15 Red Bungalow	43
3	63 Thomas Street	33

6.12.2 As the proposed wash plant will not be operating in isolation, an additional scenario with crushing activity in the former quarry floor has also been predicted. The results of the Wash Plant and existing crushing operations are detailed in Table 7-18.

6.12.3 Noise contour plans have also been produced that shows in greater detail the results of the noise prediction modelling, without mitigation. These are shown in Figure D-1 of **Appendix D** of this report.

6.13 Prediction results – With Mitigation

6.13.1 With the proposed acoustic bund the results of the noise model for the presented in Table 6-17. These are the potential worst case noise levels that may be experienced at NSRs throughout the various phases of operation with mitigation measures implemented.

Table 6-17: Predicted Noise Levels at NSR for Proposed Wash Plant operations

NSR	NSR	Predicted site noise levels $L_{Aeq, 1hr}$
1	10 Railway Close	45
2	15 Red Bungalow	42
3	63 Thomas Street	33

7 Impact Assessment

7.1 Acoustic character correction

7.1.1 As the installation is not yet operational, it is therefore not possible to provide a subjective impression of the proposed recycling facility at identified receptors. However, a worst-case operational scenario of the proposed activity will be during the day time, as the facility will not operate in the evening or night-time.

7.1.2 When material is being loaded into the hopper of the wet screening activity there will be a slight variation in the sound level due to the interaction of material. However, given the separation distance and intervening site topography the perceivability of this change at the nearest NSRs will not be noticeable and no correction for impulsivity has therefore been applied.

7.1.3 The proposed wet screening activity will be dominated by low to mid frequencies due to the operations of motors and processing equipment. However, the prominence of discrete frequencies will not be perceptible above the residual sound level at NSRs during the daytime period and as such no correction for tonality has been applied.

7.1.4 As operations from the wash plant, i.e. mobile items of plant motors, and processing screens may be identifiable at sensitive receptors, a +3dB correction for the two nearest receptors on Railway Close and Red Bungalows has been applied.

7.1.5 With mitigation measures in place, i.e. acoustic bund along the eastern boundary, the operations of the wash plant and associated on-site vehicle movements will be minimized at the two nearest identified assessment locations. It is therefore assumed that the main sources at the wash plant will be readily masked by the residual noise climate and no penalty for acoustic character correction has been applied.

7.2 Calculation Stages: NSR 01 – No mitigation

7.2.1 The stages of BS414 impact assessment for NSR 1 (Railway Close) without proposed mitigation are detailed in Table 7-1.

Table 7-1 Calculation stages for NSR 01 – Railway Close without mitigation

Assessment stage	NSR 01	Comments
Specific sound level	47	Modelled sound level for screening activity at NSR 01
Acoustic feature correction	+3	Operations perceivable against residual acoustic environment
Rating level	50	Rating level = Specific level + acoustic correction
Day time background	39	Measured background L_{A90} representative of NSR without proposed operations
Difference with Background	**+11**	Rating level – background level
Initial assessment of Impact	**Significant Adverse**	**The rating level is above the background by > +10 and the initial assessment is of *Significant Adverse* impact, depending on the context**
Assessment of Context	Proposed operations are likely to be masked by, amongst other things, local and more distant road traffic noise in close proximity to the NSR. Residents will be outside dwellings in private amenity areas The operations at the proposed screening activity will have an influence on the existing ambient sound climate. The sound may be heard from the operations but is likely not to cause any change in behaviour or attitude by the resident at residential dwellings on Railway Close	
Impact with Context	Upon consideration of the context the impact during the daytime is likely to be of **Significant Adverse** impact at the identified receptors.	

7.3 Calculation Stages: NSR 02 – No mitigation

7.3.1 The stages of BS414 impact assessment for NSR 2 (Red Bungalow) without proposed mitigation are detailed in Table 7-2.

Table 7-2 Calculation stages for NSR 02 – Red Bungalow without mitigation

Assessment stage	NSR 02	Comments
Specific sound level	43	Modelled sound level for screening activity at NSR 01
Acoustic feature correction	+3	Operations perceivable against residual acoustic environment
Rating level	46	Rating level = Specific level + acoustic correction
Day time background	39	Measured background L_{A90} representative of NSR without proposed operations
Difference with Background	**+7**	Rating level – background level
Initial assessment of Impact	**Adverse**	**The rating level is above the background by > +5 and the initial assessment is of *Adverse* impact, depending on the context**
Assessment of Context	Proposed operations are likely to be masked by, amongst other things, local and more distant road traffic noise in close proximity to the NSR. Residents will be outside dwellings in private amenity areas The operations at the proposed screening activity will have an influence on the existing ambient sound climate. The sound may be heard from the operations	

	but is likely not to cause any change in behaviour or attitude by the resident at residential dwellings on Red Bungalow
Impact with Context	Upon consideration of the context the impact during the daytime is likely to be of **Adverse** impact at the identified receptors.

7.4 Calculation Stages: NSR 03 – No mitigation

Table 7-3 Calculation stages for NSR 03 – Thomas Street without mitigation

Assessment stage	NSR 03	Comments
Specific sound level	33	Modelled sound level for screening activity at NSR 01
Acoustic feature correction	0	Operations not readily perceivable against residual acoustic environment
Rating level	33	Rating level = Specific level + acoustic correction
Day time background	43	Measured background L_{A90} representative of NSR without proposed operations
Difference with Background	**-10**	Rating level – background level
Initial assessment of Impact	**Low Impact**	**The rating level is below the background by 10dB and the initial assessment is of *Low Impact*, depending on the context**
Assessment of Context	Proposed operations are likely to be significantly masked by, amongst other things, local and more distant road traffic noise in close proximity to the NSR. Residents will be outside dwellings in private amenity areas The operations at the proposed screening activity will have a minimal influence on the existing ambient sound climate. The sound may be heard from the operations on occasion but is likely not to cause any change in behaviour or attitude by the resident at residential dwellings on Thomas Street.	
Impact with Context	Upon consideration of the context the impact during the daytime is likely to be of **Low** impact at the identified receptors.	

7.5 Calculation Stages: NSR 01 – With Mitigation

7.5.1 The stages of BS414 impact assessment for NSR 1 (Railway Close) with proposed acoustic bund are detailed in Table 7-4.

Table 7-4 Calculation stages for NSR 01 – Railway Close with mitigation

Assessment stage	NSR 01	Comments
Specific sound level	44	Modelled sound level for wash plant activity at NSR 01
Acoustic feature correction	0	Operations not readily perceivable against residual acoustic environment
Rating level	44	Rating level = Specific level + acoustic correction
Day time background	39	Measured background L_{A90} representative of NSR without proposed operations
Difference with Background	**+5**	Rating level – background level

Initial assessment of Impact	**Adverse**	**The rating level is above the background by +5 and the initial assessment is of *Adverse* impact, depending on the context**
Assessment of Context	Proposed operations are likely to be masked by, amongst other things, local and more distant road traffic noise in close proximity to the NSR. Residents will be outside dwellings in private amenity areas The operations at the proposed screening activity will have an influence on the existing ambient sound climate. The sound may be heard from the operations but is likely not to cause any change in behaviour or attitude by the resident at residential dwellings on Railway Close	
Impact with Context	Upon consideration of the context the impact during the daytime is likely to be of **Adverse** impact at the identified receptors.	

7.6 Calculation Stages: NSR 02 – With Mitigation

7.6.1 The stages of BS414 impact assessment for NSR 2 (Red Bungalow) with proposed acoustic bund are detailed in Table 7-5.

Table 7-5 Calculation stages for NSR 02 – Red Bungalow with mitigation

Assessment stage	NSR 02	Comments
Specific sound level	42	Modelled sound level for screening activity at NSR 02
Acoustic feature correction	0	Operations not perceivable against residual acoustic environment
Rating level	42	Rating level = Specific level + acoustic correction
Day time background	39	Measured background L_{A90} representative of NSR without proposed operations
Difference with Background	**+3**	Rating level – background level
Initial assessment of Impact	**Minor Adverse Impact**	**The rating level is above the background by < +5 and the initial assessment is of *Minor Adverse* impact, depending on the context**
Assessment of Context	Proposed operations are likely to be masked by, amongst other things, local and more distant road traffic noise in close proximity to the NSR. Residents will be outside dwellings in private amenity areas The operations at the proposed screening activity will have an influence on the existing ambient sound climate. The sound may be heard from the operations but is likely not to cause any change in behaviour or attitude by the resident at residential dwellings on Red Bungalow	
Impact with Context	Upon consideration of the context the impact during the daytime is likely to be of **Low** impact at the identified receptors.	

7.7 Calculation Stages: NSR 03 – With Mitigation

7.7.1 The stages of BS414 impact assessment for NSR 3 (Thomas Street) with proposed acoustic bund are detailed in Table 7-6.

Table 7-6 Calculation stages for NSR 03 – Thomas Street with mitigation

Assessment stage	NSR 03	Comments
Specific sound level	33	Modelled sound level for screening activity at NSR 03
Acoustic feature correction	0	Operations not perceivable against residual acoustic environment
Rating level	33	Rating level = Specific level + acoustic correction
Day time background	43	Measured background L_{A90} representative of NSR without proposed operations
Difference with Background	**-10**	Rating level – background level
Initial assessment of Impact	**Low Impact**	**The rating level is below the background by 10dB and the initial assessment is of *Low Impact*, depending on the context**
Assessment of Context	Proposed operations are likely to be significantly masked by, amongst other things, local and more distant road traffic noise in close proximity to the NSR. Residents will be outside dwellings in private amenity areas The operations at the proposed screening activity will have a minimal influence on the existing ambient sound climate. The sound may be heard from the operations on occasion but is likely not to cause any change in behaviour or attitude by the resident at residential dwellings on Thomas Street.	
Impact with Context	Upon consideration of the context the impact during the daytime is likely to remain of **Low** impact at the identified receptors.	

8 Mitigation and Noise Control

8.1 Proposed Mitigation

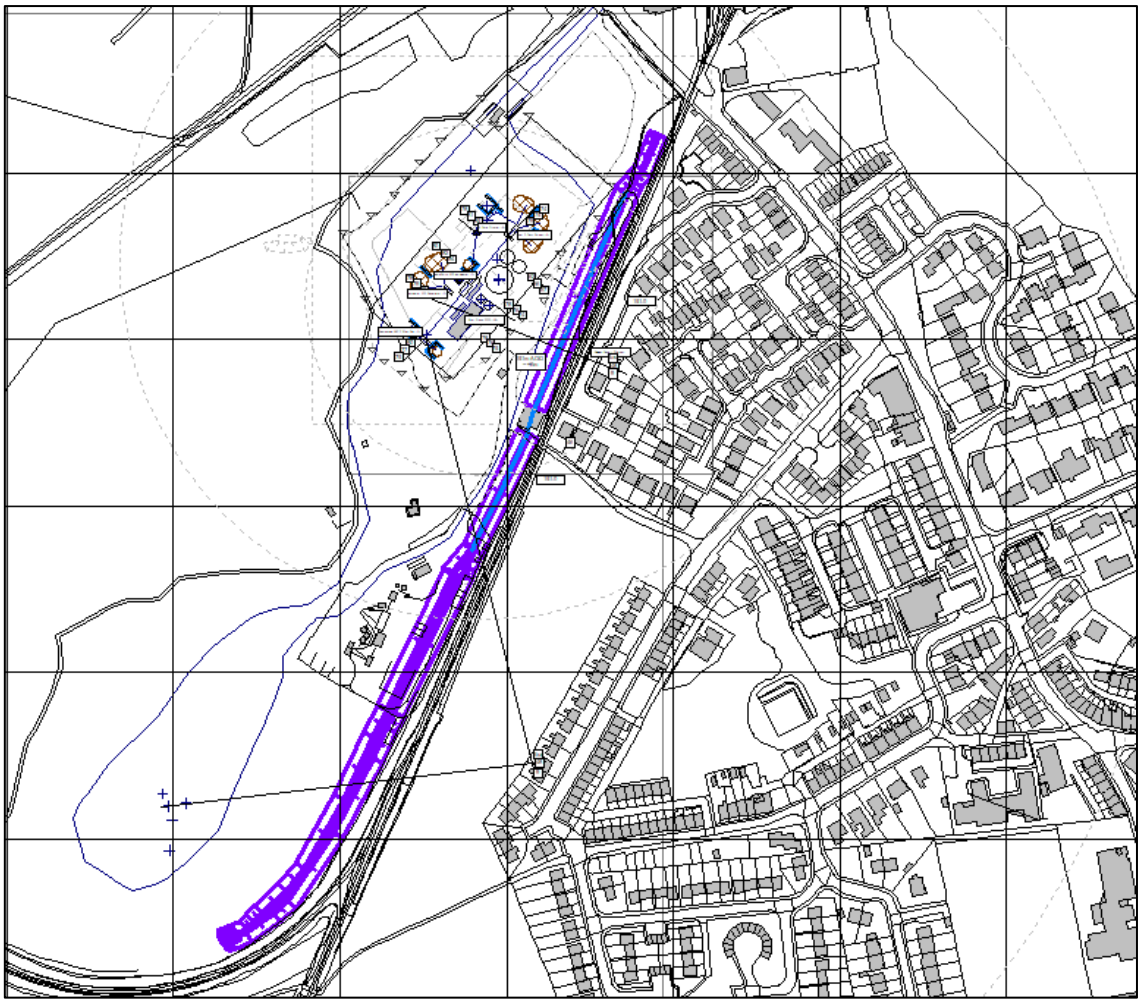
8.1.1 As the noise levels from the proposed Wash Plant exceed the prevailing background at the nearest noise sensitive receptors by up to 11dB there is a requirement for mitigation, to further minimize any potential noise impact upon sensitive receptors.

8.1.2 Due to the existing site layout and requirement for a one-way system for internal haul roads, the placement of suitable acoustic barriers is limited to the eastern boundary of the site, adjacent to the Bowes Railway Line.

8.1.3 It is proposed that an earth bund of approximately 2 metres in elevation will be constructed adjacent to the proposed Wash Plant. The overall elevation of the bund and barrier will be approximately +147.5m AOD and extend from the northeast corner of the site and approximately 80 metres south of the existing workshop building.

8.1.4 Figure 8-1 shows an overview of the mitigation location with further detail provided in Figure E-1 of **Appendix E** of this report.

Figure 8-1 Proposed screening bund in relation to site boundary – Purple bund Blue Acoustic Barrier



8.2 Operational noise control measures

8.2.1 Wherever possible the emphasis on noise control should be upon good design, control at source by good operational practices, correct use and maintenance of plant and use of Best Practice to prevent or minimize emissions. Various measures will be undertaken to ensure that, during all future phases of operation at Springwell Quarry Landfill noise levels will be kept to a minimum.

8.2.2 Mitigation measures include:

- Avoiding unnecessary revving of engines.
- Minimize drop height of quarry material when loading dump trucks.
- Haul road surfaces will be regularly maintained to allow efficient use and minimise vehicle noise.
- Starting up plant and vehicles sequentially rather than all together.

- Restricting vehicle speeds to avoid body slap from empty dump trucks.
- All plant will be operated with doors and engine cowls in the closed position wherever practical.
- Efficient silencers will be fitted to all vehicles and plant.
- A regular and effective plant maintenance programme will be adopted to ensure, among other things, that all plant noise reduction measures continue to operate effectively.

9 Discussion

9.1.1 Within this assessment there are several factors that should be taken into consideration when reviewing the impact of proposed operations on noise sensitive receptors surrounding the site at Springwell.

9.2 Uncertainty

9.2.1 Although every effort has been taken to make the assessment of quarry operations as representative as possible, there is inherently a degree of uncertainty in the sources of data used at various stages.

9.2.2 The baseline measurements are indicative of periods on the day of the survey and whilst representative the established levels are not fixed throughout the day time period. This may account for up to ±2-3 dB(A) dependent upon the time of day and prevailing wind conditions.

9.2.3 The sound level data of items of plant used within the assessment were taken from direct measurements, where possible. For items of plant with no available data available a worst case has been assumed with items of a similar size, power and operation used.

9.2.4 These sources of uncertainty may influence the calculated sound levels at NSRs and associated criteria established from baseline surveys. However, the exceedance of prevailing background at Railway Close and Red Bungalow should therefore be viewed very much as a worst case.

10 Summary & Conclusions

10.1.1 Noise levels from proposed Wash Plant and existing crushing operations at Springwell Quarry Landfill have been calculated for the impact at the nearest noise sensitive receptors and assessed in accordance with relevant noise standards and guidance.

10.1.2 Without mitigation measures, i.e. acoustic earth screening as detailed within this report, the noise levels from the proposed Wash Plant activity will be of Significant Adverse impact (+11dB) at Railway Close NSR 1 and of Adverse impact (+7dB) at Red Bungalows (NSR 2).

10.1.3 At Thomas Street (NSR 3) it has been demonstrated that worst case noise levels from proposed Wash Plant operations will be below the prevailing background (-10dB) and therefore be of Low impact in accordance with BS4142.

10.1.4 For Red Bungalows and Railway Close worst case predicted sound levels, with the benefit of a proposed acoustic mitigation as detailed within this report, are +5dB and +3dB above respective background sound levels. Once the context is taken into consideration the impact will be of Low to Minor Adverse .

10.1.5 For Thomas Street (NSR 3) the impact remains unchanged with proposed mitigation, and is predicted to be of Low impact.

10.1.6 The predictions detailed in this report represent the noise levels at the nearest noise sensitive receptor during worst case operations. Therefore, for much of the time the levels received at the potentially noise sensitive properties will be significantly lower, as a consequence of plant operating for shorter durations, at locations screened by intervening landforms or at greater separation distances.

10.1.7 By implementing the mitigation measures detailed in this assessment, the main sources of noise from site operations will be reduced and the impact upon noise sensitive receptors therefore minimized as much as possible. With the context of the prevailing acoustic environment at identified receptors taken into consideration the impact will be of low impact.

Appendix A: Glossary of Acoustic Terminology

Sound Pressure Level (L_p)
The sound pressure level, L_p, in dB, is the ratio of the sound pressure level and a reference level. The ear is pressure sensitive and therefore measurement of this parameter is useful for assessing the impact on people and is the most commonly used dB scale.

$$Lp = 20 \log_{10} (p/p_0) \text{ dB}$$

Where Lp is the sound pressure level in dB; p is the rms sound pressure fluctuation of the sound of interest and p_0 is the reference sound pressure of audibility ($20\mu p_A$).
When sound pressure level is reported, the location or distance from the source of the sound must be stated. The distance from the source and a host of other environmental factors influence the sound pressure level at a receiver.

Sound Power Level (L_w) or SWL
The sound power level, L_w, is the energy output of a source and is a property of the source itself. The sound power level is a ratio of the power of a source and a reference and is quoted in dB. The sound power level is defined as:

$$Lw = 10 \log_{10} (W/W_0) \text{ dB}$$

Where W is the sound power level of the source (watts) and W_0 is the reference sound power (10^{-12} watts).

Sound Level (L_{pA}) or SPL
Sound level is the value measured with a sound level meter. To make a sound level meter respond more like the human ear, a frequency weighting is applied to most environmental noise measurements. The most commonly used one is the 'A'-weighting. Measurements in dB(A) broadly agree with people's assessments of loudness. A change of 3 dB(A) is the minimum perceptible under normal conditions, and a change of 10 dB(A) corresponds roughly to doubling or halving the loudness of a sound.

Equivalent continuous A-weighted sound pressure level ($L_{Aeq,T}$)
The value of the A-weighted sound pressure level in decibels of continuous steady sound that within a specified time interval, T has the same mean-squared sound pressure as a sound that varies with time. It is given by the following equation:

$$L_{Aeq,T} = 10 \lg_{10} \left\{ (1/T) \int_{t_1}^{t_2} \left(\frac{p_A(t)}{p_0} \right)^2 dt \right\}$$

Where $L_{Aeq,T}$ is the equivalent continuous A-weighted sound pressure level determined over time interval $T = t_2 - t_1$; p_0 is the reference sound pressure ($20\mu p_A$); $p_A(t)$ is the instantaneous A-weighted sound pressure (p_A).

Maximum and Minimum (L_{Amax} and L_{Amin})
The simplest statistical parameters are the maximum level (L_{Amax}) and the minimum level (L_{Amin}) during the measurement period. The L_{Amax} is often used as a measure of the most obtrusive facet of the noise, even though it may only occur for a very short time and is the level of the maximum Root Mean Square reading. L_{Amin} is rarely used, but can be a useful way of identifying a constant noise amongst other intermittent noises.

Percentile Parameters ($L_{n,T}$)
Percentile parameters, L_n values, are useful descriptors of noise. The L_n value is the noise level exceeded for n per cent of the measurement period, which must be stated. The L_n value can be anywhere between 0 and 100. The two common ones are discussed below, but sometimes other values will be encountered.

Background Noise ($L_{A90,T}$)
The most commonly used percentile level is the $L_{A90,T}$, which is the 90th percentile level and is the level exceeded for 90 per cent of the time, T. It will be above the L_{min} and has been adopted as a good indicator of the "background" noise level. It is specified in BS 4142:1997 as the parameter to assess background noise levels. Whilst it is not the absolute lowest level measured in any of the short samples, it gives a clear indication of the underlying noise level, or the level that is almost always there in between intermittent noisy events. BS4142:1997 advises that the measurement period should be long enough to obtain a representative sample of the background level.

Level exceeded for 10% of the Time ($L_{A10,T}$)
$L_{A10,t}$ is the 10th percentile, or the level exceeded for 10 per cent of the time, and was used for road traffic noise assessments since it had been shown to give a good indication of people's subjective response to noise. Although the L_{Aeq} has largely superseded its use for traffic, $L_{A10,T}$ may still be found in acoustic reports discussing road traffic. It is still used to assess traffic noise to determine eligibility for noise-insulation grants where a road is altered or a new one proposed. The $L_{A10,T}$ can be useful in assessing the overall noise climate, for example, if the $L_{A90,T}$, $L_{A10,T}$ and $L_{Aeq,T}$ are all within a few dB, then this indicates that the noise source is fairly constant.

Appendix B:

Appendix C: Sound Level Data

Name	Type	1/3 Oktave Spectrum (dB)																												
		Weight.	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	A	lin
TG Cone Crusher	Lw (c)		97.9	98.4	100.2	109.7	99.2	94.3	94.2	96.7	99.6	99.3	99.3	91.7	97.6	102.1	98.1	94.7	95.4	95.1	96.5	96.2	96.0	95.6	95.1	94.1	93.0	91.1	87.5	107.7	113.6
Feed Conveyor	Lw			88.0			84.0			78.0			75.0			72.0			68.0			68.0			67.0			62.0		75.6	90.1
Overband Magnet	Lw						94.0			81.0			78.0			86.0			80.0			71.0			66.0			71.0		85.3	95.1
Sand Stockpile Conveyor	Lw			88.0			76.0			74.0			70.0			68.0			66.0			66.0			64.0			56.0		72.5	88.6
Aggregate Stockpile Conveyor	Lw			92.0			79.0			74.0			70.0			68.0			65.0			70.0			75.0			79.0		80.9	92.6
Control Cabin	Lw			92.0			74.0			69.0			66.0			69.0			68.0			64.0			63.0			61.0		72.5	92.2
Chemical Dosing	Li			110.0			95.0			84.0			72.0			72.0			65.0			76.0			82.0			84.0		86.9	110.2
Static Screen	Lw			100.0			88.0			74.0			75.0			72.0			74.0			74.0			72.0			70.0		80.1	100.3
Filter Press Building	Lw (c)		69.7	86.0	69.7	66.7	83.0	66.7	56.7	74.0	56.7	52.7	69.0	52.7	55.7	72.0	55.7	42.7	58.0	42.7	47.7	64.0	47.7	47.7	64.0	47.7	39.7	56.0	39.7	72.6	88.4
Filter Press	Li		75.0	77.0	66.0	71.0	68.0	68.0	61.0	66.0	47.0	57.0	58.0	57.0	48.0	49.0	46.0	34.0	36.0	41.0	46.0	48.0	50.0	50.0	49.0	49.0	47.0	45.0	41.0	60.8	80.7
Agg Scalp A165	Lw			114.0			115.0			111.0			110.0			108.0			107.0			108.0			107.0			99.0		114.0	120.1
Low Level Rake Thickener Motor	Lw			97.0			93.0			90.0			86.0			90.0			90.0			85.0			80.0			72.0		93.3	100.3
AggreScalp A165 (1)	Lw (c)		101.4	113.7	105.6	104.5	96.8	93.7	90.6	89.3	90.0	96.2	91.4	85.8	88.9	90.6	90.8	88.7	87.3	86.6	87.5	88.3	87.5	87.3	87.0	85.9	84.5	81.2	76.3	99.4	115.3
AggreScrub A150 (2)	Lw			125.0			119.0			108.0			106.0			105.0			106.0			108.0			109.0			105.0		114.3	126.3
Finemaster 120 Seperator (3)	Lw (c)		98.0	105.0	95.0	91.0	80.0	79.0	75.0	81.0	80.0	76.0	75.0	80.0	75.0	74.0	78.0	72.0	72.0	72.0	75.0	74.0	74.0	73.0	72.0	68.0	66.0	63.0	58.0	85.0	106.3
Rinse 3 Deck Screen	Lw			100.0			88.0			74.0			75.0			72.0			74.0			74.0			72.0			70.0		80.1	100.3
	Lw						72.0			73.0			68.0			74.0			65.0			67.0			50.0					73.7	78.8
Pump	Lw			76.0						77.0			77.0			76.0			77.0			74.0			73.0			68.0		81.5	84.5
HGV Pass by	Lw (c)						109.0			107.0			103.0			98.0			98.0			98.0			96.0			93.0		104.5	112.4
PC210 magnet	Lw (c)			107.6			109.9			110.7			106.1			103.0			97.4			93.9			90.2			85.8		104.6	115.3
Terex XR400 crusher	Lw (c)			107.5			118.7			113.0			110.5			109.7			106.6			102.5			97.9			90.9		111.6	121.1
CAt 966H pushing up waste	Lw (c)			113.6			116.5			109.7			102.5			98.2			98.2			96.3			90.9			83.9		103.6	119.1
Liebherr R912	Lw (c)						106.0			102.0			96.0			96.0			95.0			94.0			89.0			81.0		100.2	108.4

Appendix D: Noise Contour Plans

Appendix E: Proposed Acoustic Mitigation