

EXTERNAL PLANT NOISE ASSESSMENT

CLIENT

Dunham Bush
Downley Road
Havant
Hampshire
PO9 2JD

SITE

Proposed External Plant Room
Dunham Bush
Downley Road
Havant
Hampshire
PO9 2JD

SURVEY DATE (S)

4th – 6th February 2015

Report By



Mr. B. J. Scrivener MIOA-

Sound Advice Acoustics Ltd
2 West Links, Tollgate, Chandlers Ford, Hampshire, SO53 3TG
Tel: 0800 180 4005
soundadviceacoustics.co.uk

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Introduction:

Sound Advice Acoustics Ltd has been instructed by Dunham Bush Ltd, to carry out the relevant noise assessments and calculations at their existing manufacturing facility at Downley Road, Havant, Hampshire where a proposal has been made for the construction of an external plant room at the rear of the premises.

The proposed plant would operate between the hours of Monday to Friday 8am – 6pm and therefore assessment and calculations are to be made within this time frame.

It is proposed to install 2 x EX2.480 tower's onto the roof section of the proposed plant room. The new plant room itself will also contain several pieces of plant although the final selection is yet to be made. Therefore a maximum noise level criteria is to be set for this plant room to which all selected plant must adhere to when calculated at 1.0m outside the plant room doors.

Therefore, this noise assessment has been carried out in order to identify the existing background noise levels associated with the nearest residential dwellings to the proposed plant room during the operational hours. In order to aid in the assessment process, the supplied noise data is to be inputted on to a 3D acoustic model in order to demonstrate the calculated noise levels at the nearest affected neighbouring residential façade.

British Standard 4142 : 2014 is to be adopted for the basis of this background noise level assessment. A BS 4142 : 2014 noise assessment will be carried out in order to demonstrate that the new externally mounted plant units associated with the site will not have a significant and demonstrable adverse impact on the nearest noise sensitive premises in accordance with the National Planning Policy Framework.

References and evaluations are to be made to the National Planning Policy Framework 2012 (NPPF) and the Noise Policy Statement for England 2010 (NPSE). The purpose of this document is to include all aspects of environmental noise within assessments i.e. environmental noise, neighbour noise and neighbourhood noise. Noise is to be considered alongside other relevant issues relating to the site and should not be considered in isolation, according to the NPSE.

There are several key phrases within the NPSE aims and these are discussed below.

“Significant adverse” and “adverse”

There are two established concepts from toxicology that are currently being applied to noise impacts, for example, by the World Health Organisation. They are:

NOEL – No Observed Effect Level

This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.

LOAEL – Lowest Observed Adverse Effect Level

This is the level above which adverse effects on health and quality of life can be detected.

Extending these concepts for the purpose of this NPSE leads to the concept of a significant observed adverse effect level.

SOAEL – Significant Observed Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur.

It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available.

BS 4142 : 2014 supersedes the 1997 version and has been developed to move more in-line with the National Planning Policy Framework 2012 (NPPF) and the Noise Policy Statement for England 2010 (NPSE).

External noise levels are to be recorded over, what has been considered for the site, an average / typical time period in order to assess the daytime noise levels. Levels have been recorded over more than one day in order to ensure the uncertainty of measurement aspects of BS 4142 : 2014 have been satisfied and that the data recorded is representative for the purpose of a robust assessment.

The purpose of this assessment is to ensure the acoustic protection of noise sensitive premises within the close proximity of the proposed plant room and roof mounted units. Noise sensitive premises are not restricted to residential dwellings as offices can be affected by unwanted external noise. However, the site is surrounded with residential properties within the immediate vicinity and therefore the residential properties neighbouring the site have been considered the most noise sensitive to that of the proposed plant.

Procedure:

External noise levels were recorded over a typical weekend period including 4th – 6th February 2015 at position 1 as detailed on the attached plan sketch layout.

Position 1 was located at the rear of the building in order to capture a representative background noise level of that of the residential properties neighbouring the site.

Sample measurements were recorded over continuous 15 minute samples and from this data the hourly LAeq daytime values have been evaluated. Sound Pressure Levels were recorded on the following setting along with a full octave band frequency analysis measured simultaneously and between 31.5 Hz and 16.0 kHz.

Daytime 07:00 – 23:00

LAeq 1 HOUR dB LA10 1 HOUR dB
L_AMAX 1 HOUR dB LA50 1 HOUR dB
L_AMIN 1 HOUR dB LA90 1 HOUR dB

Night Time 23:00 – 07:00

LAeq 15 MINUTES dB LA10 15 MINUTES dB
L_AMAX 15 MINUTES dB LA50 15 MINUTES dB
L_AMIN 15 MINUTES dB LA90 15 MINUTES dB

Measurement procedures are to be adopted from BS 4142 : 2014 and the representative background sound level for the assessment location determined over the period of interest. Determination of background sound levels for daytime and night time analysis has been carried out in accordance with section 8 of BS 4142 : 2014.

From the downloaded recorded results both the daytime and night time were assessed and used within the above calculations as LAeq 1 HOUR dB levels for daytime and LAeq 15 MINUTES dB for night time.

Apparatus:

The equipment was calibrated using a sound pressure level of 114.0 dB at an octave band centre frequency of 1000Hz with reference to $2 \times 10^{-5} \text{ Nm}^{-2}$ before and after the tests and the equipment set to have no inaccuracy greater than 0.2 dB.

All the following equipment was calibrated in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service (UKAS) on the following dates. Calibration schedules are implemented within Sound Advice Acoustics Ltd in accordance with UKAS directive LAB 23.

Description	Make	Type	Serial No.	Calibration Intervals	Last Calibrated	Next Due Calibration
Integrated Sound Level Meter	Norsonic	140	1403140	2 YEARS	27.05.2014	27.05.2016
12.5mm Microphone (with windshield)	Norsonic	1220	52260	2 YEARS	27.05.2014	27.05.2016
Microphone Pre – Amplifier	Norsonic	1201	30233	2 YEARS	27.05.2014	27.05.2016
Calibrator	Norsonic	1251	31310	1 YEAR	16.06.2014	16.06.2015
The above equipment was calibrated using a sound pressure level of 114.00 dB at an octave band centre frequency of 1000Hz with reference to $2 \times 10^{-5} \text{ Nm}^{-2}$ before and after the tests and the equipment set to have no inaccuracy greater than 0.5 dB.						

Environmental Conditions:

The following weather conditions have been recorded in accordance with requirements of BS 4142 : 2014 using a Davis Vantage Pro 2 weather station model number 6152UK.

<i>Date</i>	<i>Time</i>	<i>Temp External</i>	<i>Wind Speed</i>	<i>Wind Direction</i>	<i>Barometric Pressure</i>	<i>Rain Fall</i>
04/02/2015	07:00 AM	3	0	---	1036.7	0
	08:00 AM	4.3	0	ESE	1034.2	0.05
	09:00 AM	2.8	1	NW	1030.5	0
	10:00 AM	4.1	2	NW	1030.9	0
	11:00 AM	5.2	2	N	1030.4	0
	12:00 PM	5.4	3	N	1030	0
	01:00 PM	5.9	2	N	1030	0
	02:00 PM	5.7	2	N	1030	0
	03:00 PM	5.9	3	N	1029.6	0
	04:00 PM	4.9	3	N	1029.8	0
	05:00 PM	4.2	3	N	1030.5	0
	06:00 PM	3.6	2	N	1031.1	0
	07:00 PM	3	2	N	1031.8	0
	08:00 PM	2.5	1	N	1032.4	0
	09:00 PM	2.2	2	N	1032.8	0
	10:00 PM	2.1	2	N	1033	0
	11:00 PM	1.8	2	N	1033.5	0
	12:00 AM	1.3	1	N	1033.9	0
	01:00 AM	1.3	1	N	1034.2	0
	02:00 AM	0.9	0	N	1034.3	0
	03:00 AM	0.7	0	N	1034.4	0
	04:00 AM	0.2	0	---	1034.3	0
	05:00 AM	0.1	0	---	1034.6	0
	06:00 AM	1	0	N	1034.9	0
05/02/2015	07:00 AM	1.4	0	N	1035.8	0
	08:00 AM	1.9	0	N	1036.5	0
	09:00 AM	3.9	1	N	1036.7	0
	10:00 AM	4.7	1	N	1037.4	0
	11:00 AM	5.3	1	N	1037.3	0
	12:00 PM	6.6	2	N	1036.9	0
	01:00 PM	6.2	1	N	1036.7	0
	02:00 PM	5.8	1	N	1036.9	0
	03:00 PM	5.9	1	N	1036.9	0
	04:00 PM	5.7	1	N	1037	0
	05:00 PM	5.6	1	N	1038	0
	06:00 PM	5.5	1	N	1038.3	0

06/02/2015	07:00 PM	5.4	1	N	1038.7	0
	08:00 PM	5.4	0	N	1039.1	0
	09:00 PM	4.8	0	N	1039.1	0
	10:00 PM	4.6	0	---	1039.3	0
	11:00 PM	4.4	0	N	1039.1	0
	12:00 AM	4.2	1	N	1039.1	0
	01:00 AM	3.7	0	N	1039.2	0
	02:00 AM	3.8	1	N	1039.1	0
	03:00 AM	4.5	0	N	1038.9	0
	04:00 AM	4.7	0	N	1038.6	0
	05:00 AM	4.4	0	N	1039	0
	06:00 AM	3.7	0	N	1039.8	0
	07:00 AM	2.9	0	N	1039.9	0
	08:00 AM	3.1	0	N	1040.5	0
	09:00 AM	4.1	1	N	1040.8	0
	10:00 AM	5.4	1	N	1040.7	0
	11:00 AM	6.3	1	N	1040.6	0
	12:00 PM	7.7	0	N	1040.5	0
	01:00 PM	8.5	0	N	1040.1	0
	02:00 PM	8.8	0	N	1039.9	0
	03:00 PM	9.6	0	N	1039.9	0
	04:00 PM	8.3	0	N	1039.6	0
	05:00 PM	6.7	0	N	1039.8	0
	06:00 PM	4.2	0	N	1039.5	0
	07:00 PM	2.3	0	N	1039.6	0
	08:00 PM	1.1	0	---	1039.3	0
	09:00 PM	0.3	0	---	1039	0
	10:00 PM	-0.2	0	---	1038.4	0
	11:00 PM	-0.5	0	---	1037.9	0

Results:

$L_{Aeq,t}$ - The equivalent A weighted sound pressure level recorded over a time interval of 15 minutes night time and 1 hourly daytime.

$L_{A90,t}$ - The A weighted sound pressure level that is exceeded for 90% of the time period 15 minutes night time and 1 hourly daytime.

The following lowest recorded noise level has been evaluated at position 1 which is considered to be relevant to the assessment of noise levels within the close proximity

RECORDED BACKGROUND NOISE LEVELS

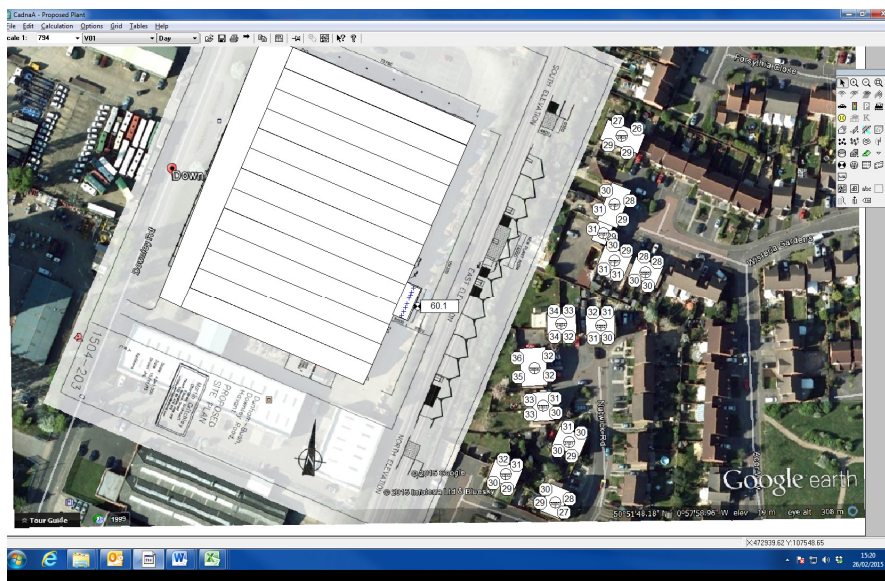
POSITION 1 4 th – 5 th February 2015												
Date / Time	LAeq	LA90	Octave Band Centre Frequency (Hz)									
			31.5	63	125	250	500	1.0 k	2.0 k	4.0 k	8.0 k	16.0 k
08:00 - 18:00 DAYTIME LA90 1 HOUR	62.0	47.0	64.8	60.2	56.4	55.3	58.0	57.9	55.2	51.1	45.3	37.2

POSITION 1 5 th – 6 th February 2015												
Date / Time	LAeq	LA90	Octave Band Centre Frequency (Hz)									
			31.5	63	125	250	500	1.0 k	2.0 k	4.0 k	8.0 k	16.0 k
08:00 - 18:00 DAYTIME LA90 1 HOUR	62.0	43.0	59.8	57.8	55.6	54.3	58.1	57.6	55.5	51.6	45.7	36.3

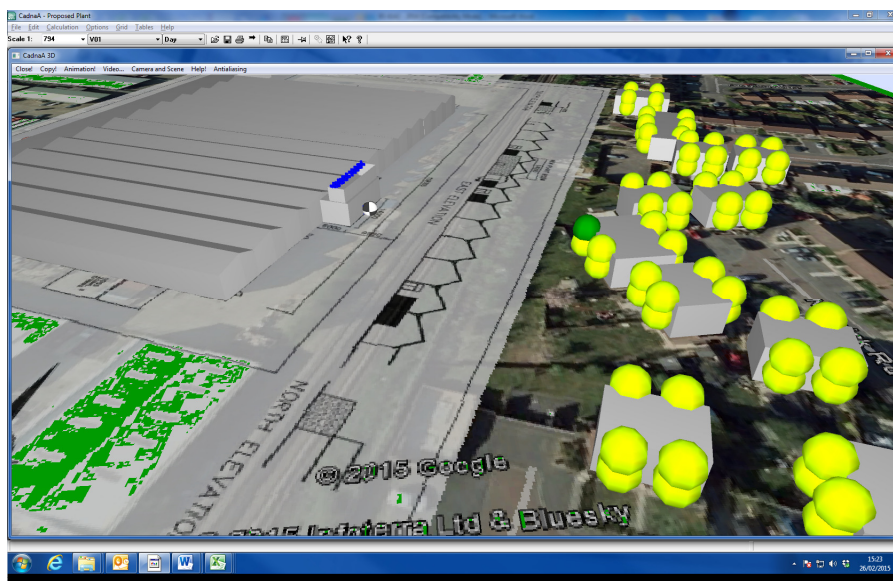
Calculations:

The following calculations have been carried out using the 3D modelling software CADNA A in order to evaluate the noise levels given within this report. The software has taken into account all acoustic propagation corrections in order to ensure an accurate result at the nearest noise sensitive premises.

Daytime



Daytime 3D



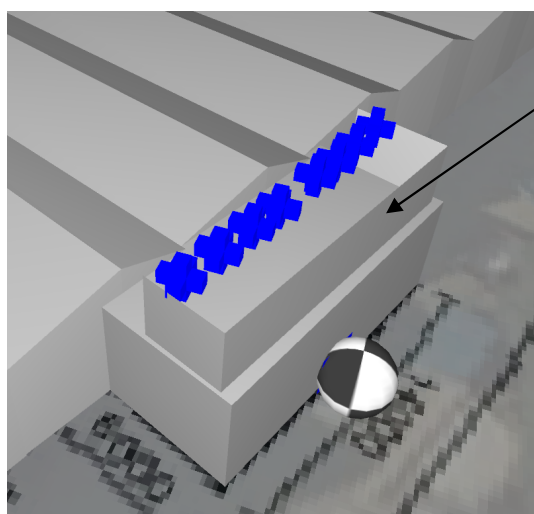
Recommendations:

In order to achieve the noise levels calculated within the above 3D model, the following recommendations are made.

Ensure that the proposed 8 roof mounted fans located over the two EX2.480 towers are each fitted with a 1D non podded 1000mm long rectangular silencer. Each silencer to offer the following attenuation values

Octave Band Centre Frequency (Hz)							
63	125	250	500	1.0k	2.0k	4.0k	8.0k
4.0	6.0	11.0	17.0	15.0	11.0	9.0	8.0

The above two EX2.480 towers are to be surrounded with a 2.8m high acoustic barrier. This can be constructed from either an extension of the plant room wall or factory manufactured acoustic panels. Either construction would be suitable provided it has a minimum surface density of 13 kg/m² be continuous and sealed to the roof with no gaps. The screen would need to be positioned generally as detailed below and this would allow for sufficient airflow to the rear of the units.



Proposed Acoustic Screen

Any acoustic screen installed should be absorptive on the inner facing panels

With regards to the plant located within the proposed plant room, the precise selection is yet to be made and therefore a calculated noise level at 1.0m from the plant room doors has been identified as 60.1 dB(A) in order to ensure the resultant noise level at the residential premises is not increased.

This noise level should be achieved 1.0m outside the plant room with the doors closed and all plant operating under normal load.

It is proposed that the plant room be constructed using a standard brick and block cavity wall with the following minimum construction values:-

<u>125</u>	<u>250</u>	<u>500</u>	<u>1.0k</u>	<u>2.0k</u>	<u>4.0k</u>	<u>Rw dB</u>	<u>Frequency (Hz)</u>
47.0	53.0	61.0	68.0	73.0	78.0	54.0	dB reduction

It is proposed that the doorset from the plant room to external be selected following further calculations once the proposed internal plant has been selected. The plant criteria set outside will ensure the resultant residential noise levels are suitably protected and this will allow the plant room doors to be designed at a later date once planning has been approved, as the external criteria of 60.1 dB must be achieved regardless of internal noise levels.

BS 4142: 2014 Noise Assessment:

This standard provides a method for measurement and rating of industrial and commercial sound. The rating level (defined in BS 4142:2014) is used to rate the noise source outside residential dwellings and this is defined as the “specific noise source”. This level is obtained by adding a rating penalty for tonal or impulsive characteristics to the equivalent continuous A-weighted sound pressure level of the specific noise source.

Tonality For sound ranging from not tonal to prominently tonal the Joint Nordic Method gives a correction of between 0 dB and +6 dB for tonality. Subjectively, this can be converted to a penalty of 2 dB for a tone which is just perceptible at the noise receptor, 4 dB where it is clearly perceptible, and 6 dB where it is highly perceptible.

Impulsivity A correction of up to +9 dB can be applied for sound that is highly impulsive, considering both the rapidity of the change in sound level and the overall change in sound level. Subjectively, this can be converted to a penalty of 3 dB for impulsivity which is just perceptible at the noise receptor, 6 dB where it is clearly perceptible, and 9 dB 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 3 dB can be applied.

NOTE 2 Where tonal and impulsive characteristics are present in the specific sound within the same reference period then these two corrections can both be taken into account. If one feature is dominant then it might be appropriate to apply a single correction. Where both features are likely to affect perception and response, the corrections ought normally to be added in a linear fashion.

Intermittency When the specific sound has identifiable on/off conditions, the specific sound level ought to be representative of the time period of length equal to the reference time interval which contains the greatest total amount of on time. This can necessitate measuring the specific sound over a number of shorter sampling periods that are in combination less than the reference time interval in total, and then calculating the specific sound level for the reference time interval allowing for time when the specific sound is not present. If the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.

The procedure defined in BS 4142: 2014 for predicting the likelihood of inverse impacts to noise sensitive premises is based on establishing the difference between the rating level and the background noise level at the assessment position. The greater the difference, the greater the magnitude of impact.

1. A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
2. A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.
3. 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.

The assessment of noise nuisance explicitly falls outside the scope of BS 4142 : 2014. A statutory noise nuisance requires the consideration of both relative and absolute noise levels, material loss of amenity, mitigation options and other non acoustic factors. Section 80, part III of the Environmental Protection Act 1990 provides a defence of “best practicable means” against any nuisance proceedings.

However, it must also be recognised that the simple use of an overall A-weighted noise level can underestimate the degree of disturbance caused by relatively low levels of environmental noise with low frequency components or other discrete characteristics such as tonal, impulsive and / or irregular temporal features.

Therefore the overall approach suggested in BS 4142: 2014 is an important indicator of the acceptability of noise from industrial and commercial premises.

The background noise level recorded has been considered to be representative of the recorded background noise level associated with this site at each of the positions and therefore the following BS 4142 assessment could be expected.

BS 4142 : 2014 Noise Assessment

Results	Daytime (08:00 – 18:00)
Calculated Residential Sound Level	$L_{Aeq} = 36 \text{ dB}$
Residual Sound Level	$L_{Aeq} = 62 \text{ dB}$
Background Sound Level	$L_{A90} = 43 \text{ dB}$
Specific Sound	$L_{Aeq} = 36 \text{ dB}$
Acoustic Feature Correction +3 dB Tonal Penalty +3 dB Intermittency	+6 dB
Rating Level	$L_{Aeq} = 42 \text{ dB}$
Background Sound Level	$L_{A90} = 43 \text{ dB}$
Excess of Rating Over Background Sound Level	-1 dB
Assessment Indicates	Low Adverse Impact

It can be seen from the above assessments that the proposed plant is likely to return an assessment conclusion of Low Adverse Impact

BS 4142 : 2014 suggests that Care is necessary in circumstances where background sound levels are low to ensure that self-generated and electrical noise within the measurement system does not unduly influence reported values, which might be the case if the measured background sound levels are less than 10 dB above the noise floor of the measuring system. The floor of a typical class 1 noise meter is in the region of 14 dB(A) and therefore measurements of less than 24 dB(A) should be assessed with care.

NPPF & NPSE:

The National Planning Policy Framework 2012 (NPPF) and assessments to the Noise Policy Statement for England 2010 (NPSE) should be made in conjunction with each other. Paragraph 123 of the National Planning Policy Framework (NPPF) states the following:

Planning policies and decisions should aim to:

- ✓ avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;
- ✓ mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;
- ✓ recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established; and
- ✓ identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

The Noise Policy Statement for England gives various levels of effect as detailed within this report.

With the proposed plant room installed generally as detailed within this report, the development can be implemented within the guidelines of the aforementioned documents and ensure a development conclusion of **NOEL – No Observed Effect Level**. This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.

Conclusion:

Sound Advice Acoustics Ltd has been instructed by Dunham Bush Ltd, to carry out the relevant noise assessments and calculations at their existing manufacturing facility at Downley Road, Havant, Hampshire where a proposal has been made for the construction of an external plant room at the rear of the premises.

A full external noise assessment has been carried out at the above site in accordance with BS 4142 : 2014 with regards to the proposed plant room.

Section 14 of the National Planning Policy Framework 2012 suggests that planning permission should be granted unless any adverse impacts of doing so would significantly and demonstrably outweigh the benefits, when assessed against the policies in the framework taken as a whole, or specific policies in the framework indicate the application should be restricted.

Based on the calculations and assessments made within this report it is the professional opinion of Sound Advice Acoustics Ltd that provided the remedial acoustic works proposed within this report are carried out, the proposed plant room can operate within the requirements of BS 4142 : 2014, the National Planning Policy Framework 2012, NPPF & NPSE and that, with regards to sound, planning permission can be granted.

Plan Sketch Layout:

