

Project

Land West of Reach Road, Burwell -
Noise Impact Assessment of Proposed Gas
Generator Sets

Prepared for

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By

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Summary

SRL Technical Services Limited has been commissioned by Island Green Power UK Limited to provide a noise impact assessment in support of a planning application for a site at Reach Road, Burwell, Cambridgeshire.

Gas generator sets are proposed to be installed at the site which will be used to supply additional power to the National Grid, as and when required.

The nearest noise sensitive properties are residential dwellings on Reach Road to the east and north of the site. The existing noise environment at those houses consists of noise from occasional road traffic on Reach Road.

I have assessed the noise from the proposed gas generator sets at the nearest noise-sensitive residential receptors in accordance with BS 4142:2014. The result of our assessment shows that noise from the gas generators will have a low impact with appropriate attenuation.

Section 5 of this report gives the maximum sound pressure levels and sound power levels of the generators and associated equipment required to achieve appropriate noise levels at the nearest noise sensitive receptors.

Alex Hancock

For and on behalf of

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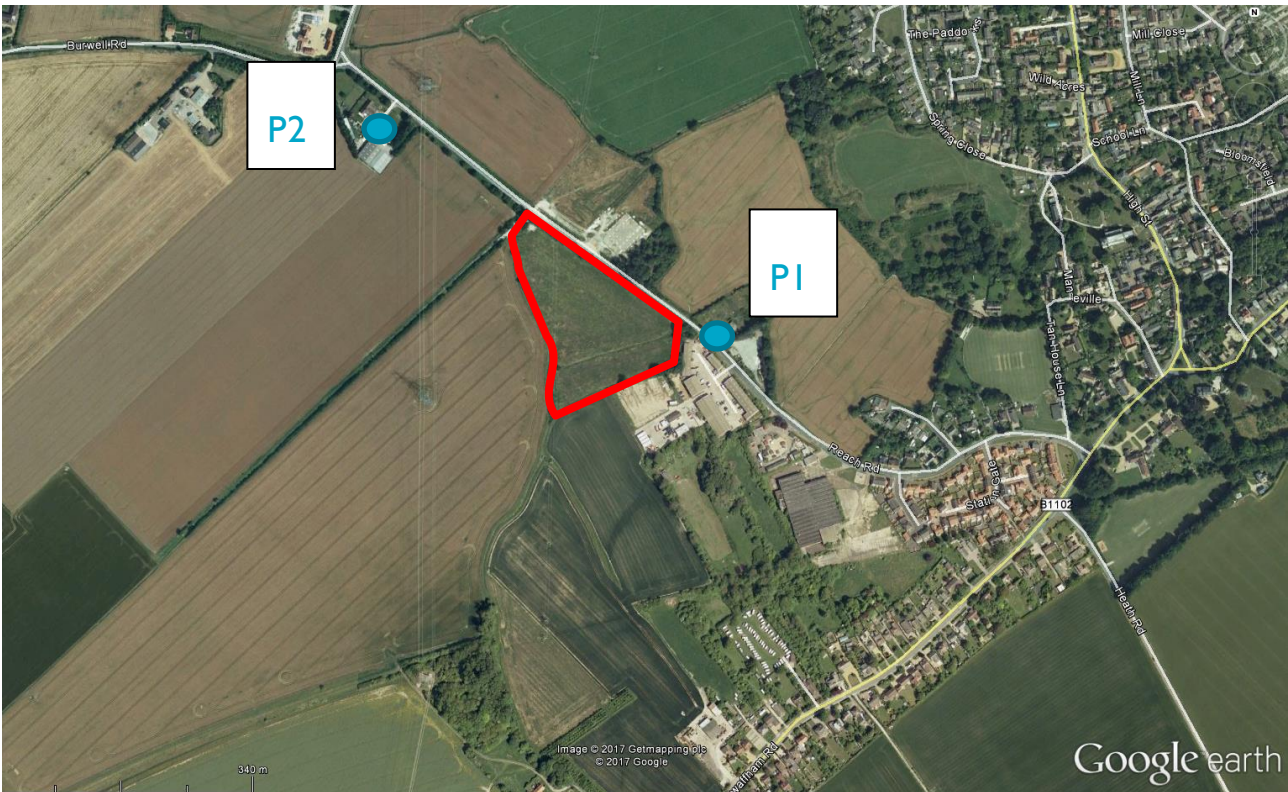
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1.0 Introduction

Island Green Power UK Limited is applying for planning permission to install gas generator sets on a site west of Reach Road in Burwell, Cambridge, see Figure 1.

Figure 1 also shows the nearest residential receptors to the site, located at P1 and P2.

Figure 1 - Site Plan of Land West of Reach Road Site

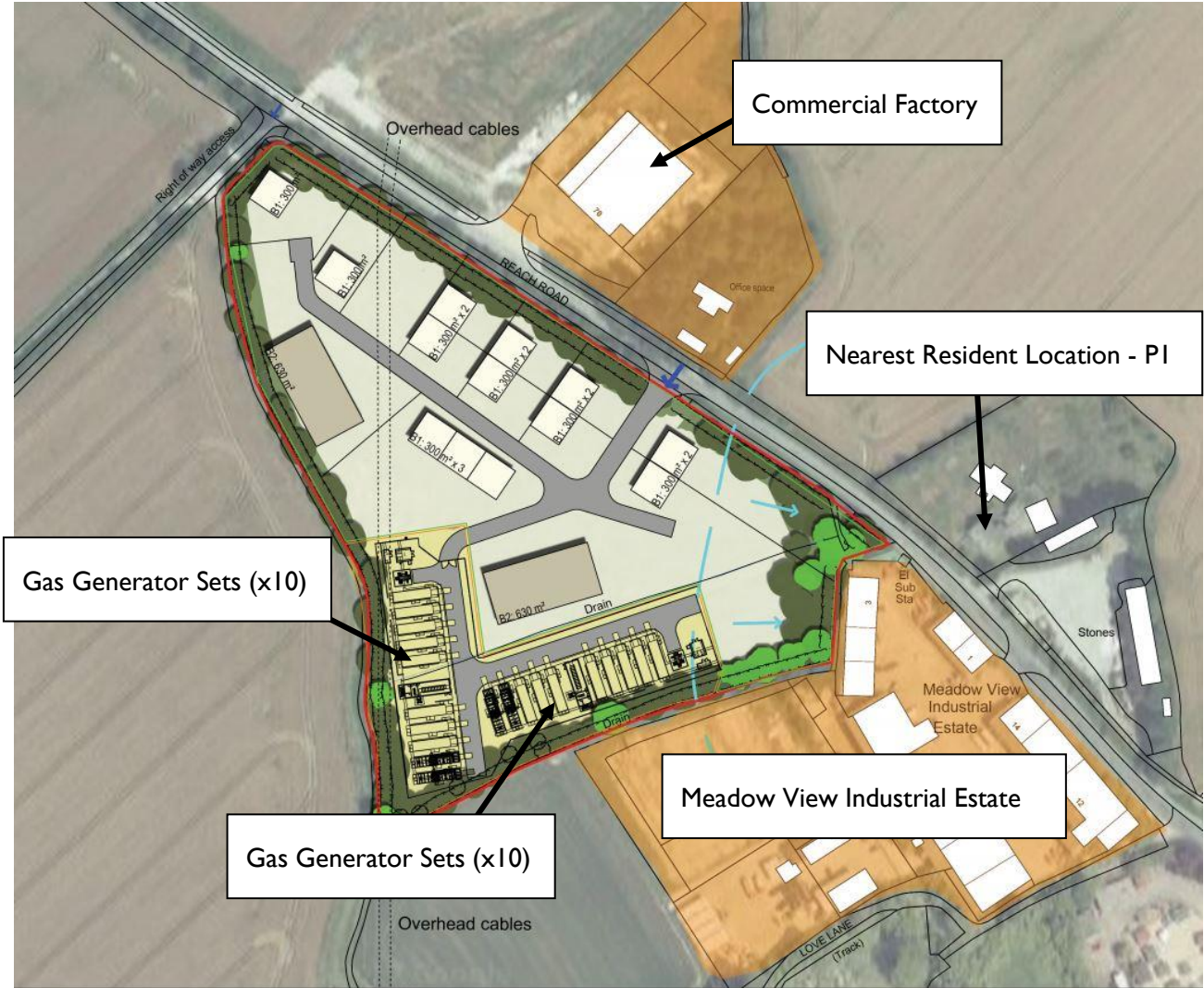


The proposed site layout, comprising of 20 generator sets is shown in Figure 2 overleaf. I understand that the gas generator sets will typically operate during the daytime, but they could potentially run at any time during a 24-hour period.

The main noise source affecting the site is occasional road traffic on Reach Road (to the north east). There are commercial units to the north and east of the site containing several factory units but manufacturing activities were only audible on site from the unit to the north.

There are no other significant noise sources associated with surrounding developments.

Figure 2 - Proposed layout of generator sets on the land west of Reach Road Site



2.0 Noise Criteria & Assessment Methods

Our aim is to:

- establish the typical background noise levels at the nearest noise sensitive receptors;
- assess whether the existing residents are likely to be adversely impacted by gas generator set noise in accordance with BS 4142:2014.

2.1 BS 4142:2014 Methodology

BS 4142:2014 'Methods for rating and assessing industrial and commercial sound' provides a method to assess whether "sound of an industrial and/or commercial nature" is likely to have an adverse impact at noise sensitive receptors.

BS 4142's assessment methodology considers not only how loud the noise is but also its acoustic character (e.g. whether it contains hisses, bangs or clicks). The assessment is then based on how loud (and how annoying) the source noise is compared with the existing background noise level at the receptor.

The difference between the rating level and the typical background level can then be interpreted using the following guidance from BS 4142:2014, depending on the context:

- If the rating level is 10 dB or more above the background level, this indicates a significant adverse impact.
- A difference of around +5 dB is likely to be an indication of an 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.

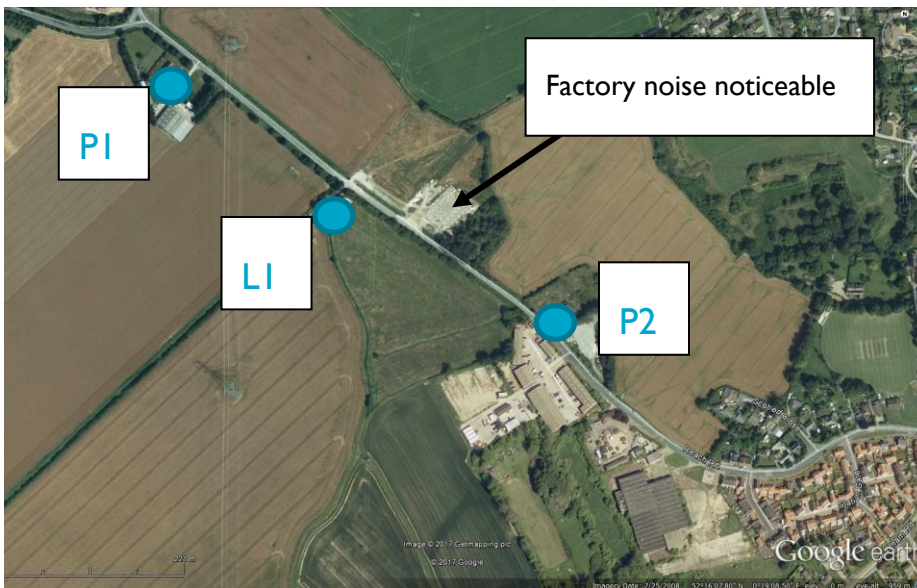
3.0 Noise Climate

I visited the site on 9th June 2017 at 12:00 and installed an unattended noise monitor close to the western boundary of the site. The location was chosen to be representative of the background noise levels at the two closest noise sensitive receptors. The monitor was left for five days to determine the variation in background noise levels over an extended period.

Attended noise measurements and observations were also taken at the nearest noise-sensitive receptors. P1 is dominated by occasional road traffic from Reach Road. Receptor P2 was dominated by occasional road traffic from Reach Road and Meadow View Industrial Estate.

Figure 3 shows the noise logger and attended measurement locations. Survey details are given in Appendix A and our noise measurement data are summarised in Appendix B.

Figure 3 - SRL noise survey measurement locations



4.0 Noise Impact Assessment

I have assessed the measured noise levels to determine the representative background noise levels at the nearest noise sensitive receptors during the daytime (07.00-19.00), evening (19.00-23.00) and night time (23.00-07.00). These levels are summarised in Table 1.

Table 1: Representative background noise levels

| Typical Day L _{A90} , dB | Typical Evening L _{A90} , dB | Typical Night L _{A90} , dB |
|--------------------------------------|--|--|
| 34 | 31 | 27 |

Noise data has been provided for the standard solution "75 dBA" generator set and I have summarised this data in Appendix C. SRL previously assessed noise from these generators found their noise emissions exceeded the background noise levels at the nearest noise sensitive receptors. Therefore, a quieter "65 dBA" generator set has now been proposed. We have predicted noise levels for the various sources associated with the "65 dBA" generator sets (i.e. enclosure inlet, outlet, exhaust and radiator) using the 1/3 octave noise data previously provided for the "75 dBA" generator set.

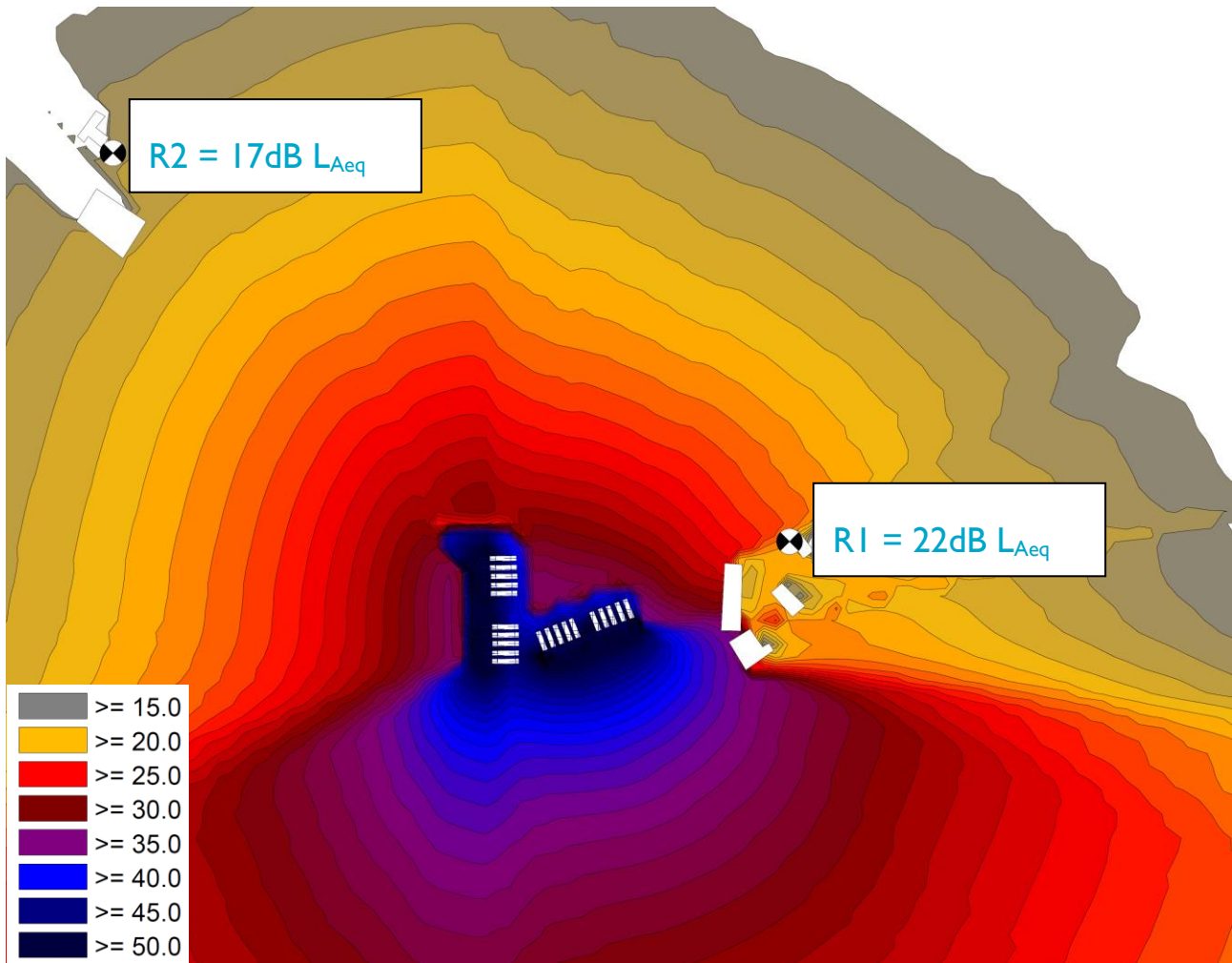
I have used industry standard noise prediction software, Cadna, to predict the levels of noise from the "65 dBA" gas generator sets at the nearest residential receptors. I have found that reducing the overall noise level from the generator sets by 10 dBA is still not sufficient to achieve appropriate noise levels at the nearest noise sensitive receptors. I have therefore also considered a few other options for reducing noise from the generator sets, including:

- further reducing noise emissions from the radiators and outlet;
- a 4-metre high noise barrier; and
- relocating the radiators were relocated from on top of the gas generator set to the back of the unit.

These options are described in more detail in Section 5.

I have incorporated these additional noise mitigation measures into the noise prediction model and I have calculated specific noise levels of 22dB L_{Aeq} at location R1 and 17dB L_{Aeq} at location R2 with all 20-gas generator set units operating, see Figure 4 overleaf.

Figure 4 - Predicted noise level at nearest residential receptors with gas generator sets operating (4m above ground)



I expect the gas generator set noise to be intermittent and tonal in nature and I have therefore applied a character correction of +5dB which is added to the specific noise to account for these characteristics (i.e. +3dB for intermittency and +2dB for tonality which is just perceptible) following guidance in BS 4142:2014.

I understand that the gas generator sets can operate at any time. Therefore, the night-time rating level represents the worst-case situation, as the background noise level is lowest. Applying a +5dB character correction, the predicted rating level at the noise sensitive receptor locations is 27dB LA_{r,Tr} at R1 and 22 dB LA_{r,Tr} at R2.

Table 2 shows that the impact of gas generator set noise will be low at the nearest residential receptors following guidance in BS4142:2014.

Table 2 - BS4142 Assessment of Gas Generator Sets Operating

| | R1 | R2 |
|--|-------------------|-------------------|
| Predicted noise level at each receptor (L_{Aeq} , dB) | 22 | 17 |
| Rating Level Correction (dB) | +5 | +5 |
| Rating Level at each receptor ($L_{A,T,r}$, dB) | 27 | 22 |
| Daytime: Rating – Background (34 dB L_{A90}) | -7 | -12 |
| Daytime: BS 4142 Assessment Rating | Low impact | Low impact |
| Evening: Rating – Background (31 dB L_{A90}) | -4 | -9 |
| Evening: BS 4142 Assessment Rating | Low impact | Low impact |
| Night-time: Rating – Background (27 dB L_{A90}) | 0 | -5 |
| Night time: BS 4142 Assessment Rating | Low impact | Low impact |

This assessment shows that noise from the gas generator sets does not exceed the background noise level with the additional noise mitigation measures described. This is an indication that noise from the gas generator sets will have a low impact at the nearest noise sensitive properties.

5.0 Recommendations

Our assessment is based on the following noise mitigation measures being provided.

Radiator Noise

I've found that the dominant noise source associated with the gas generator sets is the radiators. Therefore, for the gas generator sets to have a low impact as defined by BS 4142, the radiator noise source must be reduced by 21 dBA. The upper limit for the sound power level of the radiators is **73 dBA**.

Generator Set Noise

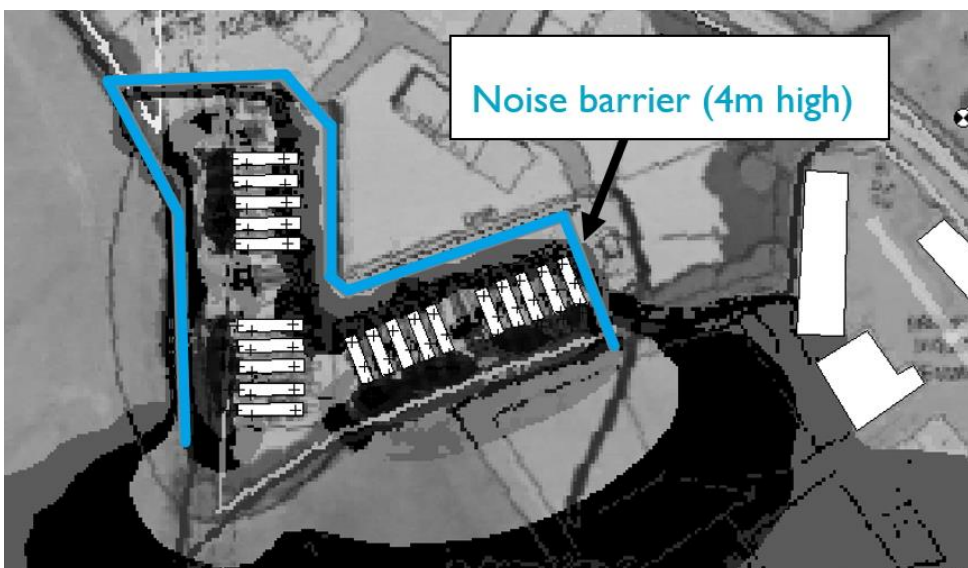
Each of the noise sources associated with the generator enclosures must be reduced so that their sound pressure levels don't exceed the upper limits given below:

- Inlet: maximum sound pressure level **63 dBA @ 1m**
- Outlet: maximum sound pressure level **59 dBA @ 1m**
- Exhaust: maximum sound pressure level **56 dBA @ 1m**

4-Metre High Barrier

A 4-metre high noise barrier is required around the gas generator units, see Figure 5. For the barrier to be effective, the barrier needs to be as close as possible to the gas generator sets. The barrier will need to have a mass per unit of surface area $>7\text{kg/m}^2$ with no gaps or openings at joints of the barrier.

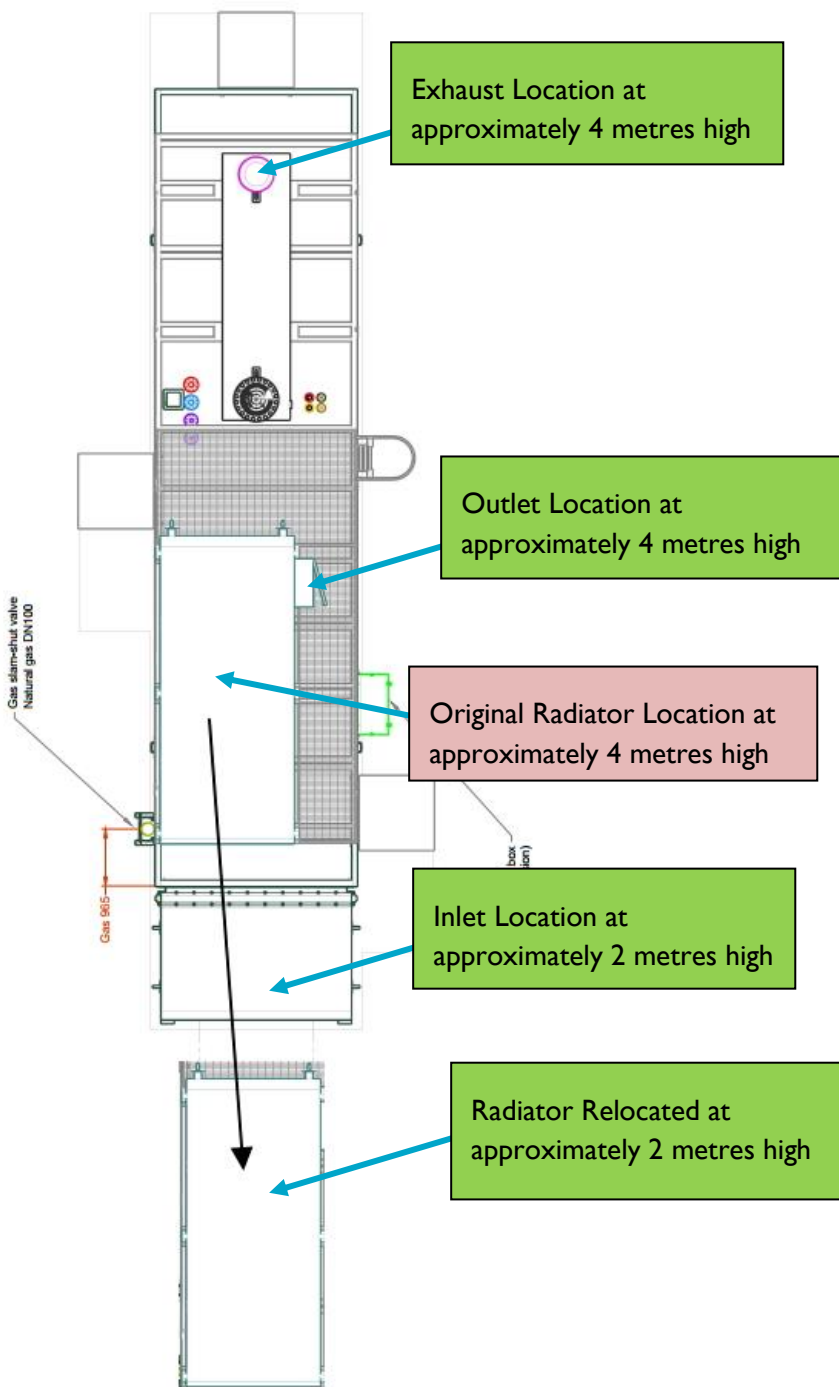
Figure 5 - 4-Metre High Noise barrier



Relocating the radiators

The radiators must be relocated from on top of the gas generator set (approximately 4m high above ground level) to the rear of the unit (approximately 2m high above ground level), see Figure 6.

Figure 6 - Generator Set Radiator Relocation



Appendix A - Survey Details

A1. Location of Survey

Land West of Reach Road, Burwell, Cambridge CB25

A2. Date & Time of Survey

Start: 09/06/2017 at 12:30

End: 14/06/2017 at 12:00

A3. Personnel Present During Survey

Alex Hancock (SRL)

A4. Weather Conditions during Survey

Friday 09/06/2017 - 14 °C, Cloudy, Light Breeze & High Winds (parts of Friday data not used, Appendix B)

Saturday 10/06/2017 - 14 °C, Overcast, Light Breeze & High Winds (parts of Saturday data not used, Appendix B)

Sunday 11/06/2017 - 17 °C, Mostly Cloudy, High Winds (all Sunday data not used, Appendix B)

Monday 12/06/2017 - 10 °C, Overcast, Partially High Winds (parts of Monday data not used, Appendix B)

Tuesday 13/06/2017 - 13 °C, Cloudy, Light Breeze (all Tuesday data used, Appendix B)

Wednesday 13/06/2017 - 13 °C, Clear, Light Breeze (all Wednesday data used, Appendix B)

Weather information from www.wunderground.com .

A5. Instrumentation

Norsonic - Noise Logger (HL2, Purple)

| Description | Location | SRL No. | Serial | Make | Model |
|---------------------|----------|---------|---------|---------------|-----------|
| Sound Level Meter | Holbrook | 779 | 1404737 | Norsonic | Nor 140 |
| Calibrator (93.9dB) | Holbrook | 169 | 1541905 | Brüel & Kjaer | Type 4230 |

| Description | Location | SRL No. | Serial | Make | Model |
|---------------|----------|---------|--------|----------|-----------|
| Pre-amp | Holbrook | - | 13919 | Norsonic | Type 1209 |
| Microphone | Holbrook | - | 128712 | Norsonic | Type 1225 |
| De-humidifier | Holbrook | - | 330 | Norsonic | Type 1284 |

A6. Calibration Procedure

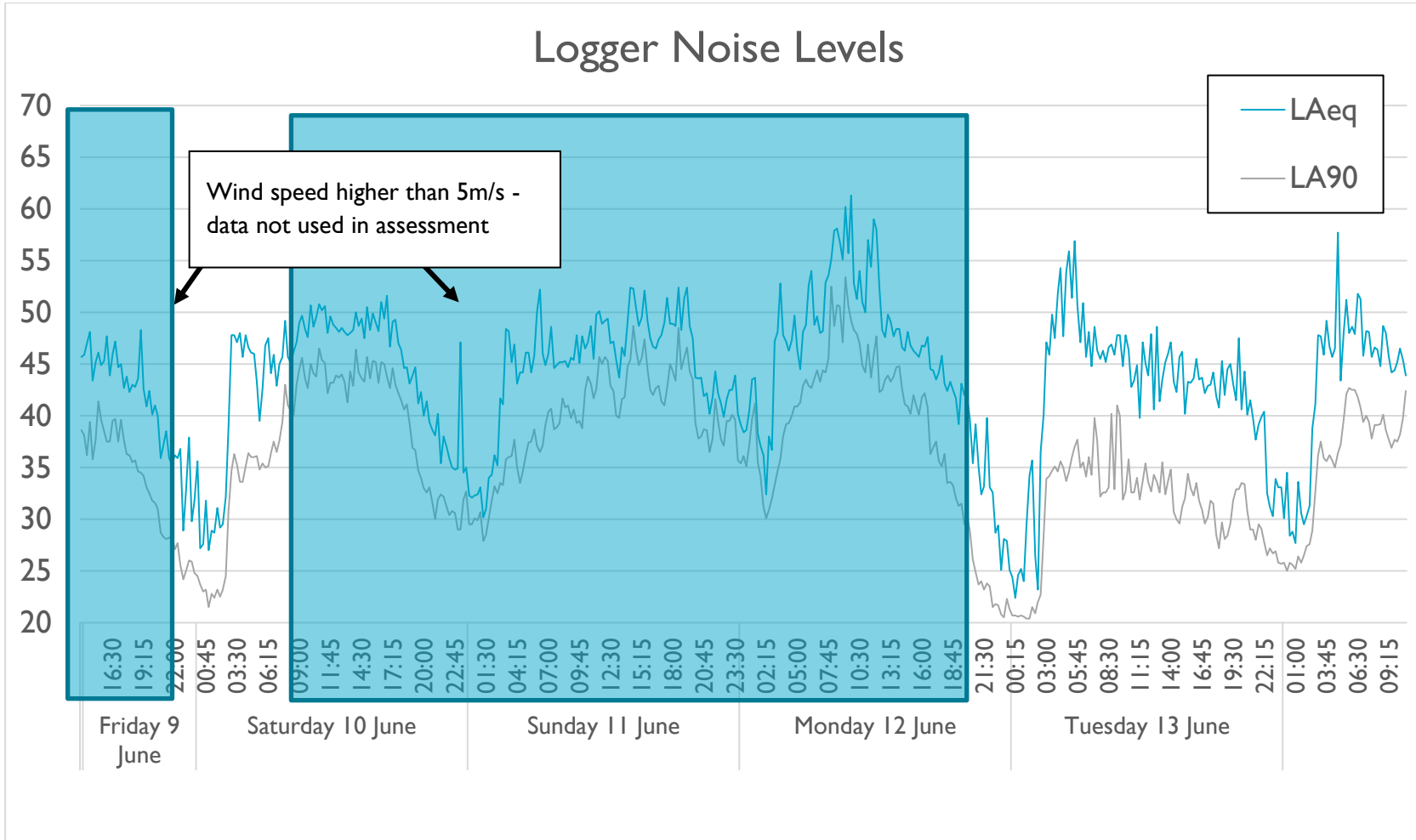
Before and after the survey the measurement, apparatus was check calibrated to an accuracy of ± 0.3 dB using the type 4230 Sound Level Calibrator. The Calibrator produces a sound pressure level of 93.9 dB re 2×10^{-5} Pa at a frequency of 1 kHz.

A7. Survey Procedure

Ambient noise levels were monitored at the site as shown on Figure 3.

The measurements graph is in Appendix B and the parameters used are listed in Appendix C.

Logger LI - Measured Ambient Noise Levels - dB(A)*



* Full Survey data is available on request.

Attended P1 and P2 - Measured Ambient Noise Levels (09/06/2017)

| Position | Time | Duration (Mins: Secs) | L _{A90} dB(A) | L _{Aeq} dB(A) | Comments |
|----------|-------|-----------------------|------------------------|------------------------|---|
| P1 | 14:32 | 13:23 | 39 | 62 | <ul style="list-style-type: none"> • Road traffic on Reach Road (dominant) • Industrial noise just audible • Aircraft overhead |
| P1 | 16:05 | 9:04 | 43 | 58 | <ul style="list-style-type: none"> • Road traffic on Reach Road (dominant) • Industrial noise inaudible • Trees rustling |
| P1 | 16:15 | 15:00 | 43 | 64 | <ul style="list-style-type: none"> • Road traffic on Reach Road (dominant) • Industrial noise inaudible • Trees rustling |
| P2 | 15:00 | 5:13 | 41 | 57 | <ul style="list-style-type: none"> • Road traffic on Reach Road (dominant) • Trees rustling |
| P2 | 15:39 | 4:30 | 37 | 55 | <ul style="list-style-type: none"> • Road traffic on Reach Road (dominant) • Trees rustling • Strimmer audible (dominant) |
| P2 | 15:50 | 10:01 | 35 | 60 | <ul style="list-style-type: none"> • Road traffic on Reach Road (dominant) • Trees rustling |
| P2 | 16:35 | 7:58 | 39 | 59 | <ul style="list-style-type: none"> • Road traffic on Reach Road (dominant) • Trees rustling |
| P2 | 16:45 | 15:00 | 40 | 60 | <ul style="list-style-type: none"> • Road traffic on Reach Road (dominant) • Trees rustling |

SRL Appendix C - Gas Generator Set Noise Data

Enclosure Inlet (attenuated): sound pressure levels @ 1m

| Hz | 50 | 63 | 80 | 100 | 125 | 160 | 200 | 250 | 315 | 400 | 500 | 630 | 800 | 1k | 1.25 k | 1.6 k | 2k | 2.5 k | 3.15 k | 4k | 5k | 6.3 k | 8k | 10k | Total |
|-----------|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|--------|-------|----|-------|--------|----|----|-------|----|-----|-------|
| SPL dB(A) | 41 | 47 | 52 | 57 | 64 | 59 | 61 | 62 | 57 | 50 | 52 | 50 | 32 | 33 | 31 | 30 | 30 | 28 | 52 | 51 | 51 | 59 | 70 | 55 | 73 |

Enclosure Outlet (attenuated): sound pressure levels @ 1m

| Hz | 50 | 63 | 80 | 100 | 125 | 160 | 200 | 250 | 315 | 400 | 500 | 630 | 800 | 1k | 1.25 k | 1.6 k | 2k | 2.5 k | 3.15 k | 4k | 5k | 6.3 k | 8k | 10k | Total |
|-----------|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|--------|-------|----|-------|--------|----|----|-------|----|-----|-------|
| SPL dB(A) | 42 | 48 | 53 | 59 | 66 | 61 | 65 | 66 | 61 | 55 | 57 | 55 | 45 | 46 | 44 | 44 | 44 | 42 | 55 | 54 | 54 | 58 | 69 | 54 | 74 |

Exhaust (attenuated): sound pressure levels @ 1m

| Hz | 50 | 63 | 80 | 100 | 125 | 160 | 200 | 250 | 315 | 400 | 500 | 630 | 800 | 1k | 1.25 k | 1.6 k | 2k | 2.5 k | 3.15 k | 4k | 5k | 6.3 k | 8k | 10k | Total |
|-----------|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|--------|-------|----|-------|--------|----|----|-------|----|-----|-------|
| SPL dB(A) | 60 | 55 | 56 | 47 | 59 | 49 | 27 | 29 | 42 | 40 | 36 | 16 | 28 | 25 | 24 | 24 | 26 | 28 | 28 | 27 | 22 | x | x | x | 67 |



Radiator: sound power levels

| Hz | 50 | 63 | 80 | 100 | 125 | 160 | 200 | 250 | 315 | 400 | 500 | 630 | 800 | 1k | 1.25 k | 1.6 k | 2k | 2.5 k | 3.15 k | 4k | 5k | 6.3 k | 8k | 10k | Total |
|-----------|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|--------|-------|----|-------|--------|----|----|-------|----|-----|-------|
| SWL dB(A) | 41 | 48 | 52 | 76 | 73 | 65 | 78 | 76 | 80 | 80 | 82 | 84 | 84 | 84 | 83 | 83 | 82 | 82 | 80 | 78 | 75 | 71 | 66 | 62 | 94 |

Appendix D - Noise Measurement Parameters

Noise Measurement Parameter Definitions

L_{Aeq} - The "A" weighted equivalent continuous sound pressure level. A representation of a continuous sound level containing the same amount of sound energy as the measured varying noise, over the measurement period. It can be considered as the "average" noise level.

L_{A90} - The "A" weighted sound pressure level that is exceeded for 90% of the measurement period. It is commonly used as the "Background Noise Level".

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