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# PEER 1 DATA CENTRE

# BUILDING 5000, LANGSTONE TECHNOLOGY PARK

## ASSESSMENT OF ENVIRONMENTAL NOISE FOR PHASE I WORKS

15 July 2011

Client: eVolve

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## 1. SUMMARY

1.1 An assessment of noise has been carried out at the Langstone Technology Park.

1.2 Building 5000 is to be converted to provide a new data centre, and this will involve the addition of new building services plant (including standby generators, cooling equipment and a chiller).

1.3 Mindful of existing residential properties in the area, and the users of adjacent commercial buildings, a formal noise impact assessment has been conducted.

1.4 This study has established the existing ambient noise levels in the area, and identified a source of noise which sustains noise levels through the night at a relatively constant level.

1.5 A design target is offered in Section 4 of the report, for limiting noise emitted by the new building services plant.

> *Noise from new building services plant should be limited to a cumulative level of 34 dB(A) $L_{Aeq,\ 5\ mins}$ at the facade of any residential windows in the vicinity of the new development. If the noise generated is tonal or intermittent in character, this target should be reduced by a further 5 dB.*
>
> *Noise from new standby generator sets should be limited to a cumulative level of 44 dB(A) $L_{Aeq,\ 5\ mins}$ at the facade of any residential windows in the vicinity of the new development. If the noise generated is tonal or intermittent in character, this target should be reduced by a further 5 dB.*

1.6 A detailed analysis of the likely noise from other plant on the roof indicates that the facade noise level from the four Excool units and chiller will be 33.5 dB(A) (no tonal element), and will therefore lie below the recommended noise target.

1.7 Generators will be designed to a noise limit of 69 dB(A) @1m. The equivalent noise level at the facade of neighbouring houses will be 31 dB(A) (tonal), and will therefore also fall comfortably within the recommended noise target.

## 2. INTRODUCTION

2.1 An assessment has been undertaken on the Langstone Technology Park, to determine the existing environmental noise climate.

2.2 Building 5000 on the Park (see Figure 1) is to be converted to provide a new data centre, which will involve the addition of a number of items of building services plant.

2.3 It is recognised that there are noise sensitive buildings in the vicinity of the new data centre and it will therefore be necessary to limit noise emissions from the new plant.

2.4 Ian Sharland Limited has therefore been instructed to provide a formal assessment of the current situation. The objectives of the exercise may be summarised as follows:

(i) To determine the ambient noise levels in the vicinity of the new Data Centre;
(ii) From this information, to recommend an overall limit for noise emanating from the site;
(iii) Where plant selections are yet to be made, to develop this limit into targets for the individual items
(iv) Where plant selections have been made, to predict the resulting noise levels at the nearest residential properties and to compare these against the recommended limits.

2.5 This report summarises the activities undertaken in respect of these objectives, and the conclusions which have been drawn.

## 3. SURVEY OF AMBIENT NOISE

3.1 The first exercise undertaken was to establish the ambient noise climate in the vicinity of Building 5000.

3.2 It is understood that building services plant will be concentrated at the west end of the building, close to the boundary of the Technology Park. A Rion NL31 Sound Level Meter was therefore set up as close to that boundary as was possible (see Figure 1).

3.3 The meter was configured to record 15 minute samples of the ambient noise climate. The following acoustic parameters were recorded:

$L_{Aeq}$ The A-weighted equivalent continuous sound pressure level which, over the sample period, contains the same acoustic energy as the time-varying signal being recorded.

$L_{Amax}$ The A-weighted maximum sound pressure level recorded during each sample period (as measured on fast response).

$L_{A90}$ The ambient background noise parameter, as described earlier.

3.4 The survey ran from approximately 15.00 Tuesday 26th April 2011 to 15.00 Thursday 28th April 2011. The weather was acceptable during the survey, with dry conditions and a light south-easterly breeze on the second day (check with wunderground)

3.5 The equipment was calibrated before and after the survey, and indicated no drift in the intervening period.

3.6 Figure 2 indicates the measured levels across the survey period, and these show an interesting variation in noise level during the day time and night time conditions.

3.7 During the day, noise levels are relatively steady. This is thought to be due to an extract system on the facing wall of an industrial unit immediately to the west of Building 5000 (see Figure 1). During the middle of the day, this fan was observed to determine the ambient noise level.

3.8 At approximately 6pm each evening, noise levels begin a steady fall, indicating that this fan was switched off. The levels fall to a minimum at approximately 11pm, at which point the levels suddenly jump back to the day time level. They remain relatively constant throughout the night (whereas a more typical environmental profile would show the levels continuing to fall during the night). It is therefore concluded that the extract system (or another local item of plant) is switched on and operated throughout the night).

3.9 Of particular interest in the lowest level of ambient noise recorded during the survey. In this case, the minimum level on each day/night was found to be a level of 50 dB(A) $L_{A90}$, at approximately 23.00.

3.10 It must be noted that conditions in the absence of the extract plant (which is evidently sustaining the noise levels in this particular area throughout the night) would drop below 50 dB(A) in the middle of the night.

3.11 To clarify this suggestion, an attended noise survey was undertaken in the middle of the night, on Friday 13th May 2011. The site was attended between 01.00 and 02.00, on a clear, still night.

3.12 In the first instance, noise levels were checked at the original survey monitoring position. A level of 61 dB(A) was recorded (very similar to the previous survey's findings), and this was observed to be due to the extract system associated with the neighbouring industrial estate.

3.13 Noise measurements were then taken close to the two semi-detached houses to the north east of the site (see Figure 1). Levels in line with the rear elevation of these properties were found to be between 44 and 46 dB(A) $L_{A90,\ 5\ mins}$, over a 30 minute period. Noise from the extract system remained audible, but the primary noise source here was traffic on the A27 dual carriageway.

3.14 The significance of these figures will be discussed below.

## 4. CRITERIA OF ACCEPTABILITY

4.1 The impact of commercial noise sources on existing residential properties is commonly judged using the methodology of British Standard 4142:1997 "Method for rating industrial noise affecting mixed residential and industrial areas".

4.2 The standard is intended to be used primarily for commercial operations, and for the assessment of noise of an industrial nature. In this situation, the applicability of BS4142 would be subject to considerable debate. However, in the absence of other guidance of this nature, it would provide an indication of likely impact.

4.3 In brief, this rating method determines "specific noise level" generated by the plant under consideration, assessed immediately outside the residential properties most likely to be affected. The value may be measured, if the plant is operating, or calculated, if the plant is being designed. For day time operation of the equipment (0700 - 2300), the noise would be assessed over a 1 hour period, and would therefore take into account the percentage on-time of intermittent operations.

4.4 A correction of + 5 dB(A) is made to the “specific noise level” if the new noise is noticeably tonal in content or intermittent. The result of any such adjustment is then termed the "Rating Noise Level".

4.5 A comparison is then made between the Rating Noise Level and the ambient background noise level[1], at each location of interest .

4.6 If the Rating Noise Level exceeds the ambient background noise level by more than 10 dB(A), complaints are to be expected. An excess of 5 dB(A) is said to be "of marginal significance". If the Rating Noise Level is 10 dB below the ambient background noise level, this is a positive indication that complaints would not be expected.

4.7 Many Planning Authorities will seek to ensure that new noise sources are controlled to a level which will avoid (so far as is possible) the possibility of complaint. They will therefore apply the ‘10 dB below’ criterion. Discussions with the Environmental health Department of Havant Borough Council have confirmed that this is the case for the majority of building services plant.

[1] That is the noise level which would prevail at that time and place, in the absence of any noise from the new plant under consideration. The background noise is normally measured and described as the $L_{A90}$ parameter

4.8 In this instance, the survey suggested a minimum level of 44 dB(A) $L_{A90}$ at night. This implies a target level of 34 dB(A) $L_{Aeq,\ 5\ mins}$ for the new plant

4.9 The discussions with Havant Borough Council also indicated that there would be some relaxation in this criterion for emergency plant, such as the standby generators. Here, it would be acceptable for the noise generated by the plant to be limited to a level equal to the lowest background noise level.

4.10 In both cases, a further reduction is required if the noise from the plant is tonal.

4.11 Overall, subject to formal Local Authority approval, it is therefore recommended that the following design target be applied to this project:

> *Noise from new building services plant should be limited to a cumulative level of 34 dB(A) $L_{Aeq,\ 5\ mins}$ at the facade of any residential windows in the vicinity of the new development. If the noise generated is tonal or intermittent in character, this target should be reduced by a further 5 dB.*
>
> *Noise from new standby generator sets should be limited to a cumulative level of 44 dB(A) $L_{Aeq,\ 5\ mins}$ at the facade of any residential windows in the vicinity of the new development. If the noise generated is tonal or intermittent in character, this target should be reduced by a further 5 dB.*

4.12 If any plant is limited in its hours of operation, it may be possible to relax this target, to recognise the higher levels of ambient noise at that time.

## 5. DISCUSSION OF SPECIFIC PLANT

5.1 It is understood that the conversion of Building 5000 to a new data centre will involve the addition of 2 new stand-by generators, alongside a Chiller and 4 Excool ventilation units on the roof of the building (refer to Figures 3 & 4).

**Generators**

5.2 The two generators will be located in a new plant room at the western end of the building. The external wall of this room will form an acoustic air exhaust louvre, with fresh air provided via a roof top penthouse.

5.3 It is likely that the noise from the generator will be tonal in nature, even when attenuated.

5.4 The Client has confirmed that each generators be designed to achieve a noise level of 69 dB(A) at a distance of 1m[2].

5.5 The combined noise level from these units, at the facade of the residential properties some 145m away, would then be 31 dB(A). This is comfortably within the recommended criterion of 39 dB(A)[3], offered in Para 4.11.

**A/C & Chiller Units**

5.6 It has been confirmed by the Client that the Excool Units (Type EXR250CW) will be operated using a night- mode setting, during which time, the emitted noise level will be 60 dB(A) @1.5m.

| Frequency | Hz | Sound Pressure Level @1.5m | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 63 | 125 | 250 | 500 | 1K | 2K | 4K | 8K | $L_{pA}$ |
| Level | dB | 46 | 47 | 50 | 54 | 55 | 52 | 50 | 42 | 60 |

5.7 Data regarding the Chiller indicates an overall sound power level of 93 dB(A) $L_{wA}$ on 100% load. However, at night, the Chiller (a York YCIV0600PA50) will be set to operated on 50% power, resulting in an overall sound power level of 89 dB(A) $L_{wA}$. The frequency spectra supplied does not indicate any strong tonal concentration.

| Frequency | Hz | Sound Power Level @50% load | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 63 | 125 | 250 | 500 | 1K | 2K | 4K | 8K | $L_{WA}$ |
| Level | dB | 87.0 | 93.0 | 92.0 | 87.0 | 82.0 | 77.0 | 71.0 | 67.0 | 89.0 |

[2] Target reflects the total of noise from the ventilation air inlet, ventilation air outlet and the engine exhaust.

[3] This target reflects the likelihood that the generator noise will be tonal.

5.8 In order to predict likely noise levels at the nearest residential property, the IMMI mapping software has been used.

5.9 Figure 5 shows noise contours around Building 5000 due to the operation of the Chiller and the 4 Excool units. The predicted sound pressure levels at the facade of the residential properties is 33.5 dB(A). This is also within the recommended criterion of 34 dB(A), offered in Para 4.11

**FIGURE 1 - PROPOSED LOCATION PLAN**

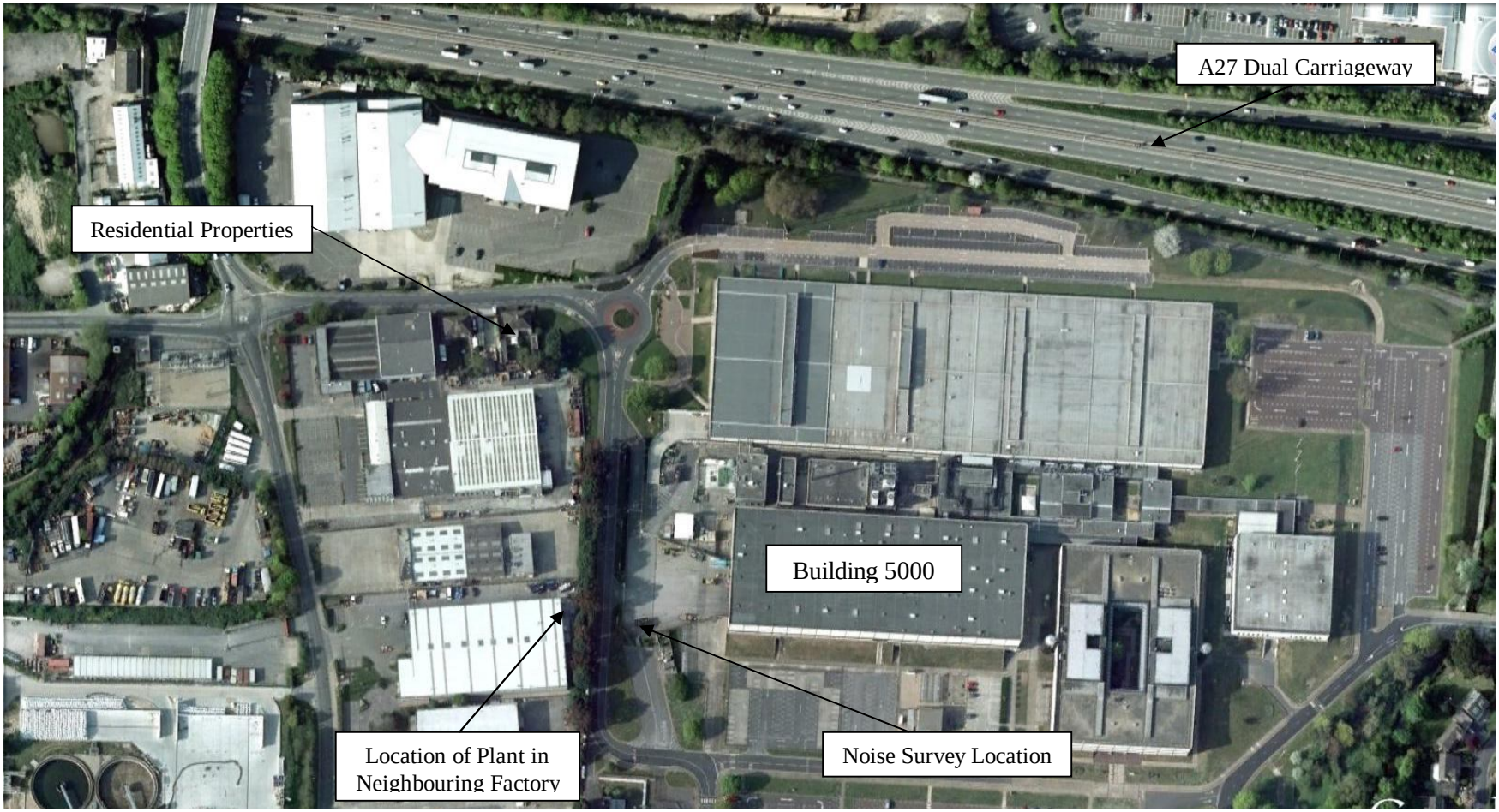
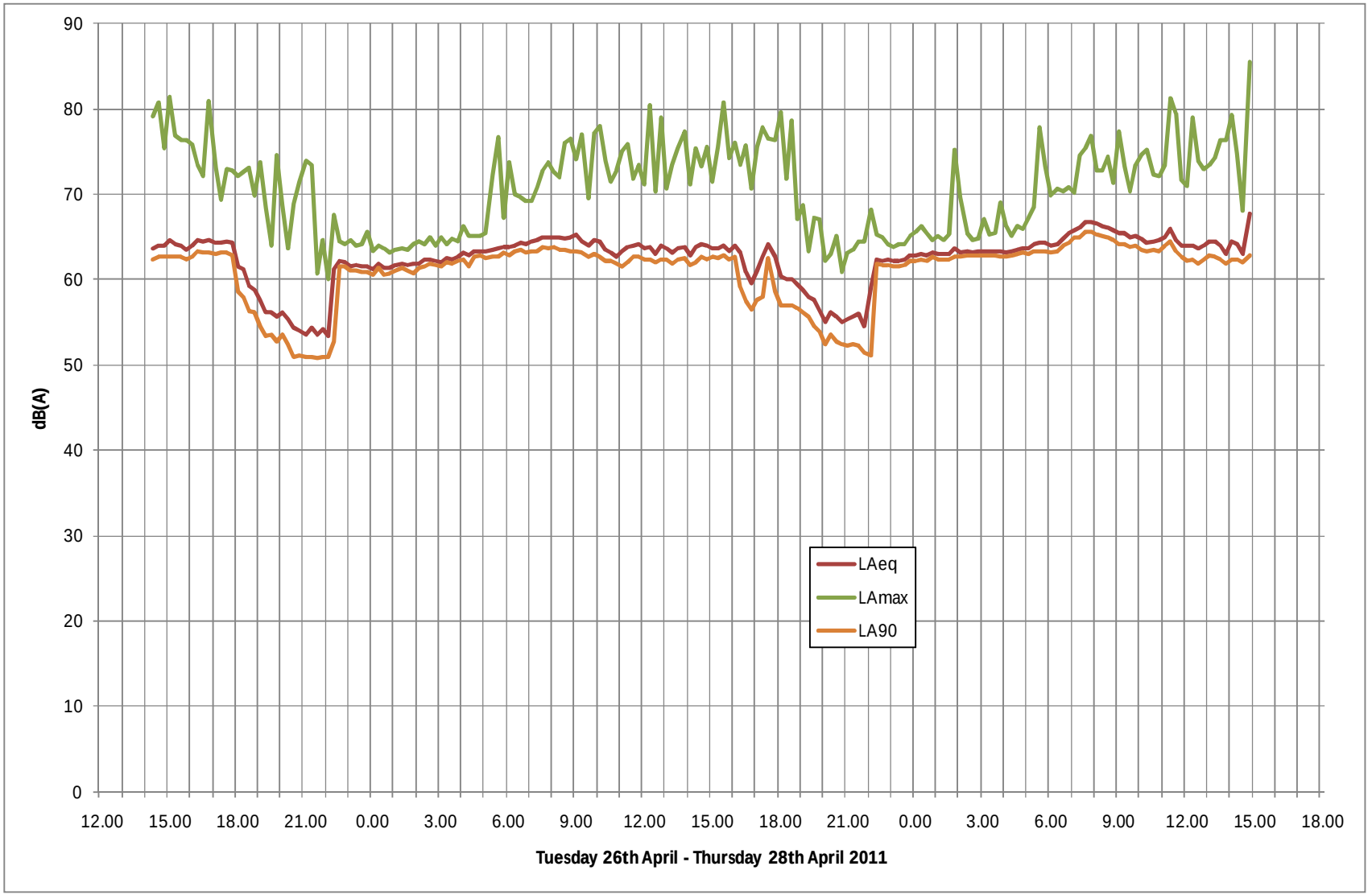
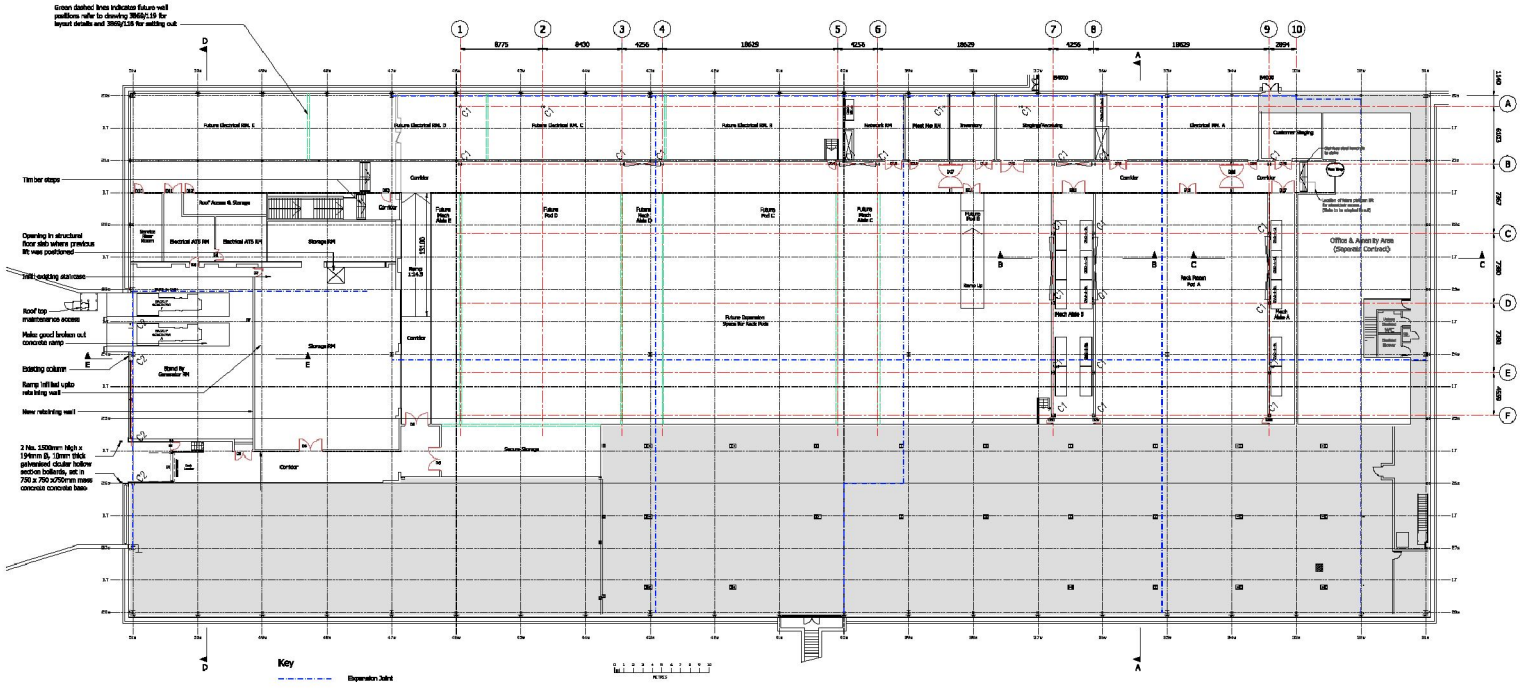


**FIGURE 2 - MEASURED NOISE LEVELS, LANGSTONE TECHNOLOGY PARK**



# FIGURE 3 - PROPOSED STANDBY GENERATOR LOCATIONS




| | | | |
|---|---|---|---|
| T | 06.06.15 | Columns on grid 1 moved | AC |
| S | 02.06.15 | Column numbers for chiller unit & pump revised | AS |
| R | 21.05.15 | External new grid, AC, recess setting out | AC |
| Q | 01.05.15 | Steelwork setting out to support roof plant altered | AC |
| P | 24.03.15 | Steelwork setting out to support roof plant altered - columns shown as 3869/1/C/30 | DS |
| O | 23.03.15 | Openings to support roof plant & louvre added, also 3869/1/C/20 & 21 repositioned to suit AC | DS |
| N | 13.03.15 | Deck number area updated | AC |
| L | 06.03.15 | Floor plan updated | AS |
| K | 26.02.15 | Floor plan updated | AC |
| J | 20.04.15 | Floor plan updated following meeting on Park Smoke | AC |
| H | 18.04.15 | Floor plan updated | AS |
| G | 24.04.15 | Centre positions to upsize to 3nrs each A & each 2 nrs at eastern end of building | AC |
| F | 02.02.15 | Existing electrical services boundary accommodation shown | YG |
| E | 23.01.15 | Corridor redirected at grid, door to mechanical room installed, corridor door 004, windows to Generator & Stock, doors added, and external bollards to building line | DS |
| D | 23.01.15 | Stand by Door 02 position and width altered, office area removed (separate contract) Door 01 repositioned | DS |
| C | 17.12.14 | Treatment of concrete ramp revised | DS |
| B | 27.08.14 | Wall dimensions to separation joint, 006 wall also opening shown | DS |
| A | 05.08.14 | Issue toolbox on first set in. Insertion added to grid, Corridor profiles and Door 10 added, Reason Door 07 noted in Mech. Suite A, Fixture doors shown deleted. | DS |
| REV. | DATE | DESCRIPTION | BY |

This drawing shall not be scaled, except for planning purposes. All dimensions to be checked on site where applicable, prior to commencement on site. Differences between drawings, and between drawings and specification or lists of quantities to be referred to the Architect for clarification. All works shall conform to the current edition of the Building Regulations and other relevant statutory requirements. All materials and workmanship shall conform with the relevant British Standard Specifications and Codes of Practice. This drawing is the copyright of Head, Roberts and Associates and shall not be copied or reproduced without permission.

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Client: Evolve Infrastructure Solutions

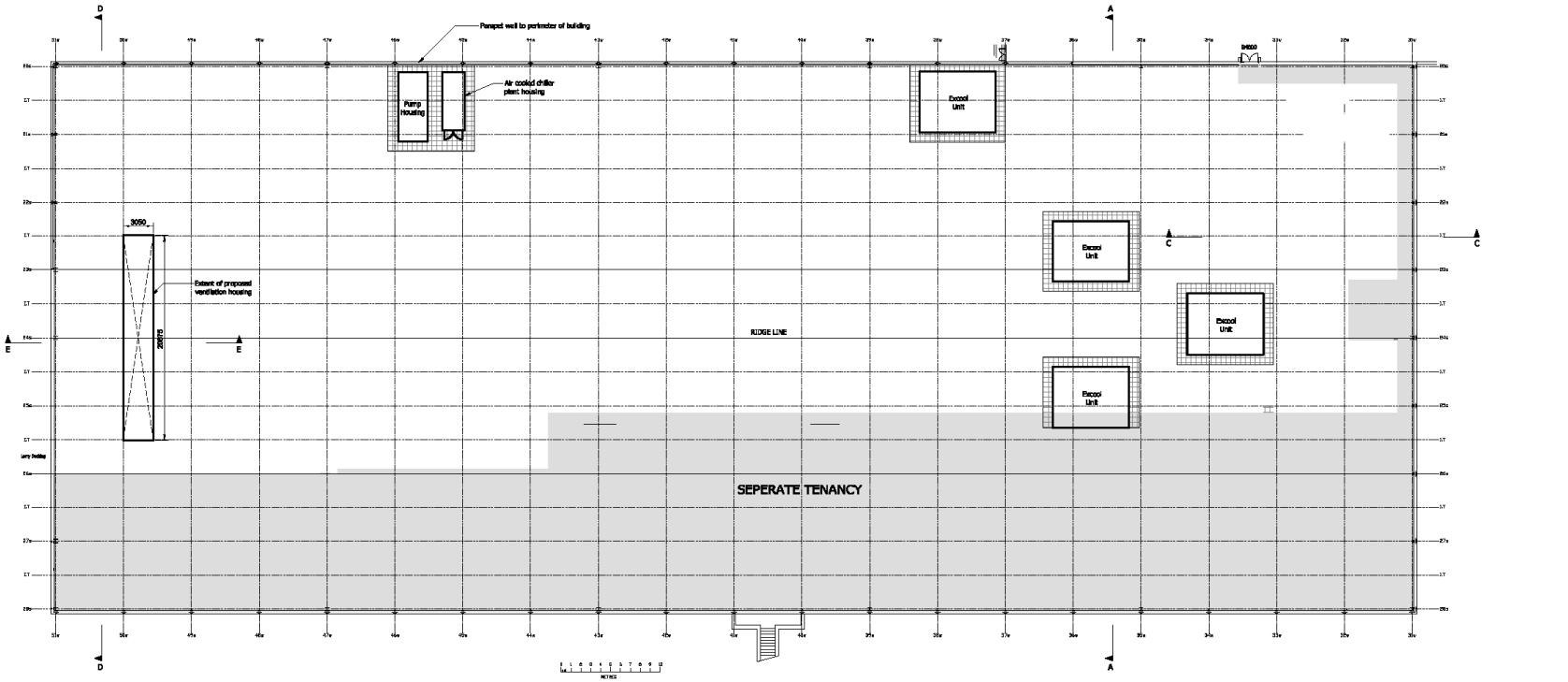
Job Title: Peer 1 Data Centre, Langstone Technology Park

Drawing Title: Level One General Arrangement Plan

Drawing No.: 3869/110 | Revision: Y

| Scale | Date | Drawn By | Checked By |
|---|---|---|---|
| 1:200 @A1 | 20.01.11 | DS | - |

# FIGURE 4 - PROPOSED ROOF PLAN, SHOWING INSTALLATION OF PLANT




| Rev | Date | Description | By |
|---|---|---|---|
| F | 01.07.11 | Scheme revised phase 1 boundaries | AS |
| E | 19.05.11 | Acoustic screen added | AS |
| D | 31.03.11 | Chiller plant relocated, screen deck added | AS |
| C | 24.03.11 | Cooling and Chiller unit housing shown on plan | DS |
| B | 22.03.11 | Roof top ventilation housing repositioned | AS |
| A | 14.03.11 | Line of new roofing on slope | DS |

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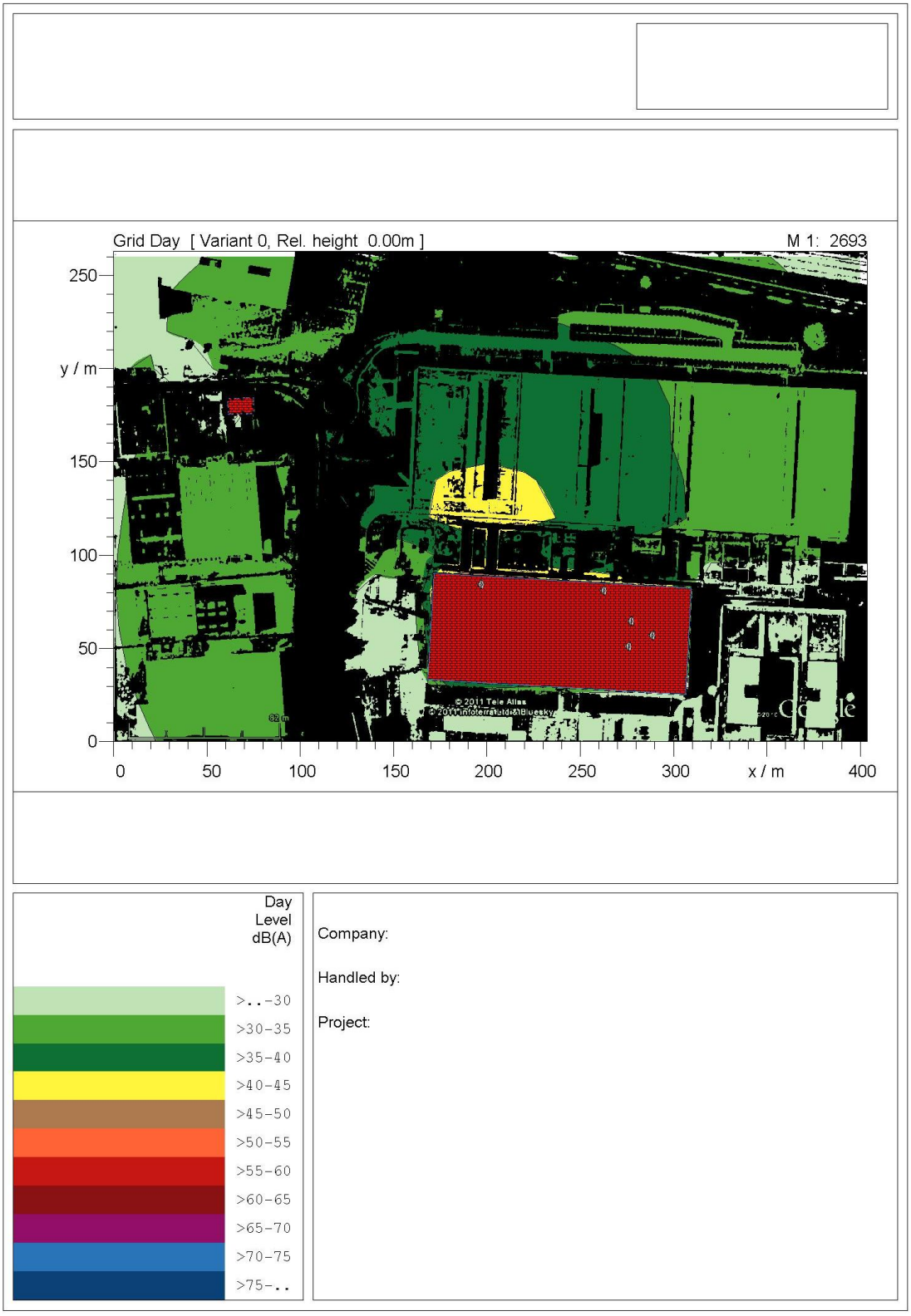
| | |
|---|---|
| Client | Evolve Infrastructure Solutions |
| Job Title | Peer 1 Data Centre, Langstone Technology Park |
| Drawing Title | Roof Layout Plan - Phase 1 |
| Drawing No. | 3869/115 |
| Revision | F |
| Scale | 1:200 @A1 |
| Date | 01.03.11 |
| Drawn By | DS |
| Checked By | - |

**FIGURE 5 - IMMI NOISE MAP FOR OPERATION OF CHILLER & EXCOOL UNITS**




IMMI 2009\d Settings\John\My Documents\john\5301-5400\5301\5301 basic map 4x AC plus chiller chiller 89lw.IPR