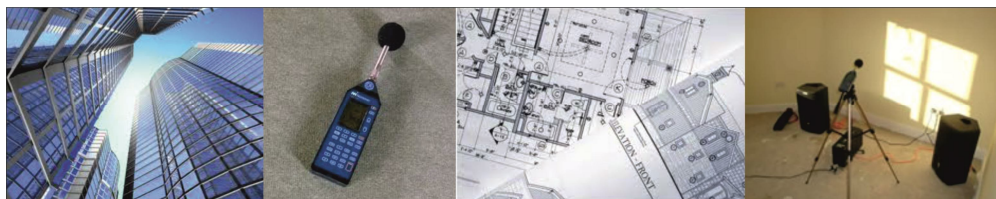


Ian Sharland LIMITED

Noise & Vibration Control Specialists

Ashfield House
Back Lane
Marlborough
Wiltshire SN8 1JJ
Telephone: (01672) 515761
Facsimile: (01672) 512761
Email: office@iansharland.co.uk



PEER 1 DATA CENTRE BUILDING 5000 LANGSTONE TECHNOLOGY PARK HAVANT

ASSESSMENT OF ENVIRONMENTAL NOISE FOR PHASE II WORKS v.2

Client:
eVolve

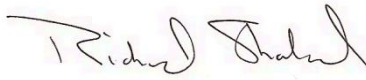
Ref: M2092-Phase II-PA
2 April 2013

R Sharland MA(Cantab), CEng, MSc, MIOA
P Ashford BSc (Eng), MIOA
M Sharland
Ian J Sharland BSc (Eng), CEng, MRAs, FIOA (Associate)

Registered in England & Wales No. 1293250
Reg'd Office: 25 St Thomas St. Winchester SO23 9DD

CONTENTS

1. SUMMARY	2
2. INTRODUCTION.....	3
3. SURVEY OF AMBIENT NOISE.....	4
4. CRITERIA OF ACCEPTABILITY	6
5. DISCUSSION OF SPECIFIC PLANT	8
FIGURE 1 - PROPOSED LOCATION PLAN	9
FIGURE 2 - MEASURED NOISE LEVELS.....	10
FIGURE 3 - PROPOSED STANDBY GENERATOR LOCATIONS.....	11
FIGURE 4 - PROPOSED ROOF PLAN.....	12
FIGURE 5 - EXPANDED ROOF PLANT LAYOUT.....	13
APPENDIX I - CALCULATION OF PLANT NOISE	14

Project Reference	M2092-Phase II - PA
Issue No.	2
Reviewed	Peter Ashford
Signature	
Author	Richard Sharland
Signature	
Date	2 April 2013

This report has been prepared by Ian Sharland Ltd with all reasonable skill, care and diligence, and taking account of the Services and the Terms agreed between Ian Sharland Ltd and the Client. This report is confidential to the client, and Ian Sharland Ltd accepts no responsibility whatsoever to third parties to whom this report, or any part thereof, is made known, unless formally agreed by Ian Sharland Ltd beforehand. Any such party relies upon the report at their own risk.
Ian Sharland Ltd disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the Services.

1. SUMMARY

- 1.1 An assessment of noise has been carried out at the Langstone Technology Park.
- 1.2 Following an initial conversion in 2011/2012, a further area within Building 5000 is to be refurbished to provide additional data centre facilities. This project will involve the addition of new building services plant, including a standby generator and roof-top cooling equipment.
- 1.3 A formal assessment has been commissioned to assess likely noise emissions from the new plant and the possible impact on existing adjacent residential occupiers.
- 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) $L_{Aeq, 5 \text{ mins}}$ 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) $L_{Aeq, 5 \text{ mins}}$ 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 32 dB(A) (no tonal element), and will therefore lie below the recommended noise target.
- 1.7 The new generator will be designed to a noise limit of 69 dB(A) @1m. The equivalent noise level at the facade of neighbouring houses will be 28 dB(A) (a tonal noise, it is noted), and this will 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) has been partially converted to create a new data centre. The second phase of the project is now proposed, and this will involve the addition of a number of items of building services plant.
- 2.3 It is again 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) To predict the resulting noise levels at the nearest residential properties due to the new plant and to compare these against the recommended limits.
 - (iv) As necessary, to specify noise control measures which will ensure that the targets are achieved.
- 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 level¹, 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.
- 4.8 The environmental noise surveys described in Section 3 of this report were undertaken prior to Phase I of the conversion project. The noise limit set for the equipment associated with Phase I was derived from this principle of '10 dB below', so as to leave the ambient noise climate unchanged.

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

- 4.9 This equipment is now installed and operating but, in order to ensure the most conservative design parameters, the derivation of the targets for the Phase II conversion will also be based on the pre-existing noise levels from the original 2011 survey.
- 4.10 That exercise suggested a minimum level of 44 dB(A) L_{A90} at night, which therefore implies a target level of 34 dB(A) $L_{Aeq, 5 \text{ mins}}$ for the new, Phase II plant.
- 4.11 Discussions with Havant Borough Council 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.
- 4.12 In both cases, a further reduction is required if the noise from the plant is tonal.
- 4.13 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) $L_{Aeq, 5 \text{ mins}}$ 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) $L_{Aeq, 5 \text{ mins}}$ 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.

- 4.14 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 Phase II of the conversion of Building 5000 will involve the addition of

- 1 new stand-by generator
- 3 Excool ventilation units
- 6 Emerson Liebert condensers

Generators

- 5.2 The new generator 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 1m².
- 5.5 The combined noise level from the new unit, at the facade of the residential properties some 145m away, would then be 28 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 The proposed plant for the room will comprise three Excool EXC-ARR6 chillers, four Emerson Liebert MCL165 condensers and two Emerson Liebert MCM160 condensers. Figure 4 provides a roof plan layout, indicating these units alongside existing Excool chillers and further condensers which may form part of subsequent projects in the building (not part of the current application).
- 5.7 The rated noise levels for these units are as follows:
- | | |
|------------------------|---------------------------|
| Excool EXC-ARR6 | 70 dB(A) @1m |
| Emerson Liebert MCL165 | 70 dB(A) @1m ⁴ |
| Emerson Liebert MCM160 | 70 dB(A) @1m ⁴ |
- 5.8 Appendix I provides a calculation of noise radiating from this roof mounted equipment, to the adjacent residential properties, some 200 - 220m away.
- 5.9 The result of the calculation is a predicted facade noise level of 32 dB(A). This value is some 2 dB below the recommended limit of 34 dB(A)⁵, offered in Para 4.11, and is therefore deemed to be acceptable.

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

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

⁴ Noise levels confirmed by Evolve Consulting, based on predicted operational duty of the units

⁵ This target reflects the manufacturer's data that the chiller and condenser noise will not be tonal

FIGURE 1 - PROPOSED LOCATION PLAN

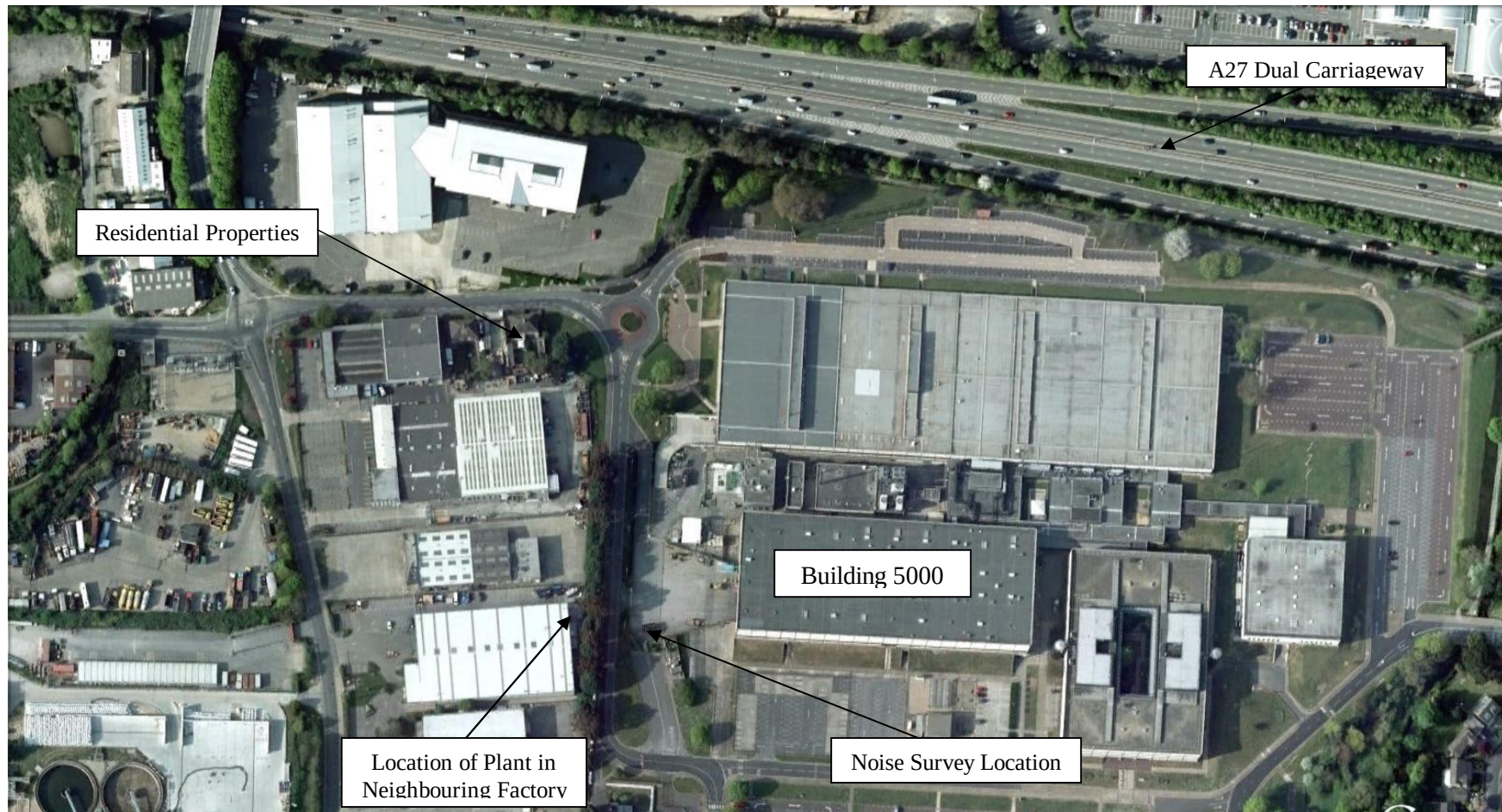
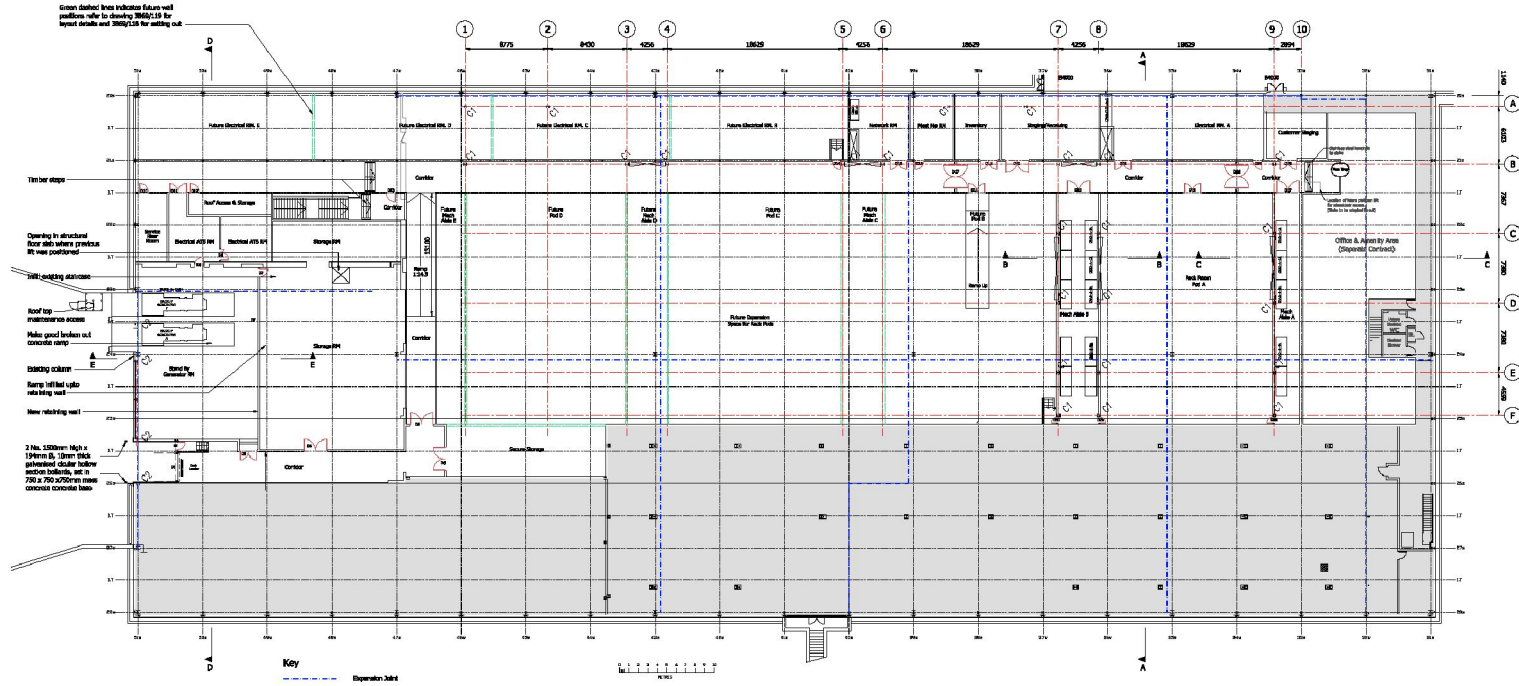


FIGURE 2 - MEASURED NOISE LEVELS, LANGSTONE TECHNOLOGY PARK



FIGURE 3 - PROPOSED STANDBY GENERATOR LOCATIONS

[illegible]

HEAD, ROBERTS & ASSOCIATES
1 Station Terrace
Sheffield, Hants.
SO21 2BN
Tel: 01992 711111
Fax: 01992 711100
Email: mail@headroberts.co.uk

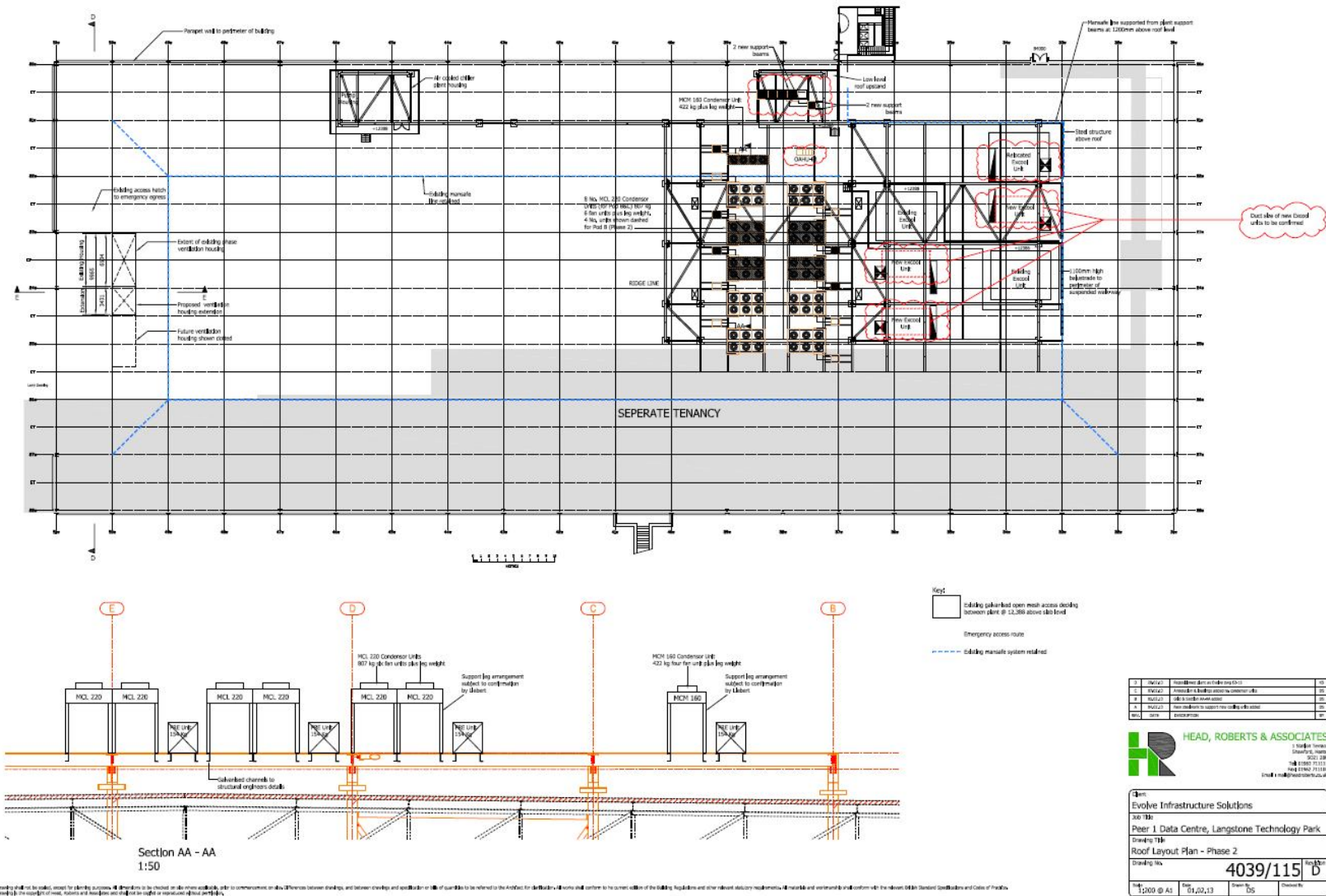
Client	Evolve Infrastructure Solutions
Job Title	Peer 1 Data Centre, Langstone Technology Park

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	"		

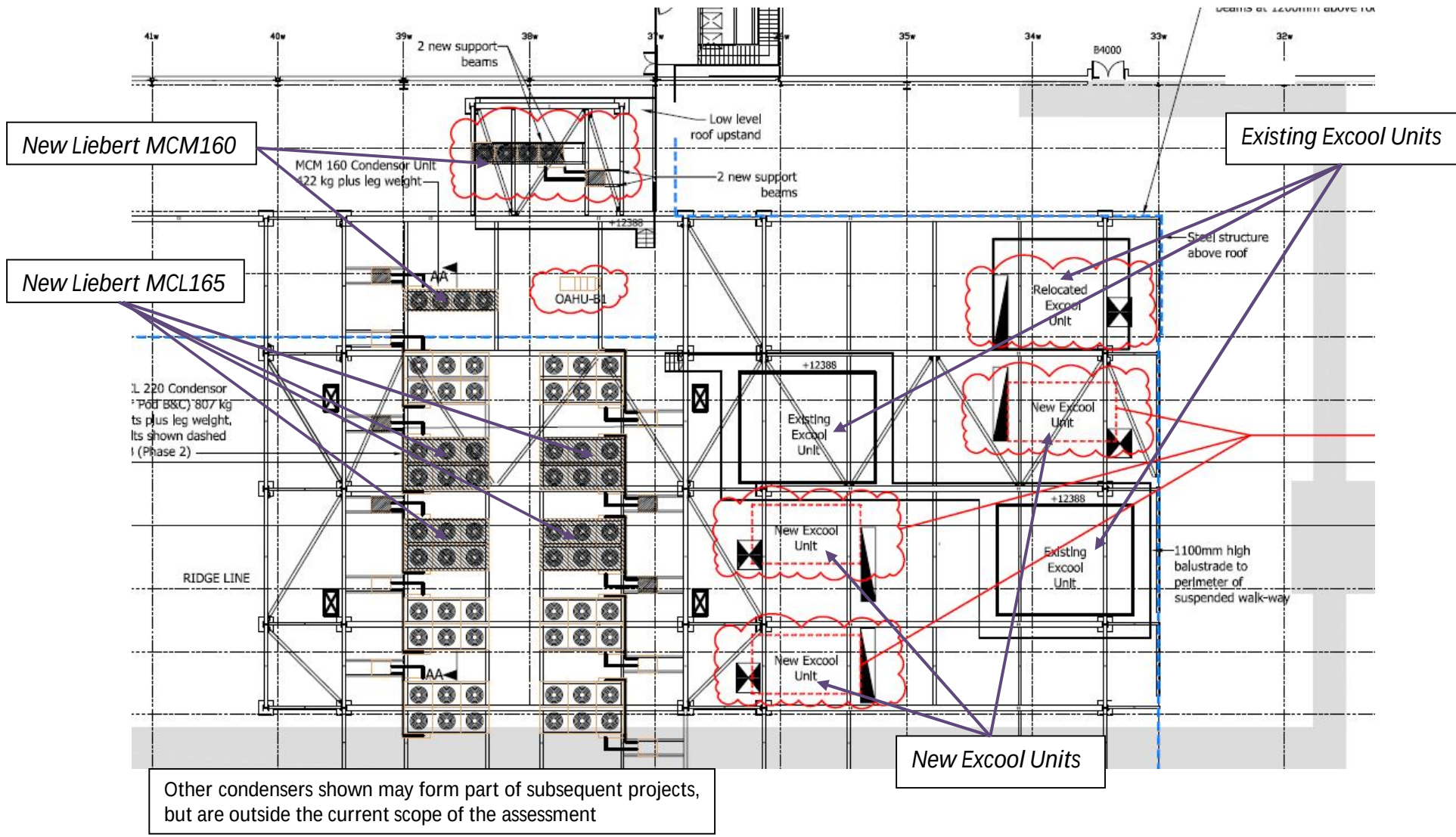
This drawing shall not be copied, except for plotting purposes. All dimensions to be checked on site when applying, prior to commencement on site. Differences between drawings, and between drawings and specification or bills of quantities to be referred to the architect for clarification. All works shall 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 Paul Roberts and Associates and shall not be copied or reproduced without permission.

FIGURE 4 - PROPOSED ROOF PLAN, SHOWING INSTALLATION OF PLANT



This drawing shall not be used, copied, or altered in any way without the written consent of the client. The client shall be responsible for the accuracy of the information provided to the client. The client shall be responsible for the accuracy of the information provided to the client. The client shall be responsible for the accuracy of the information provided to the client.

FIGURE 5 - EXPANDED ROOF PLANT LAYOUT



APPENDIX I - CALCULATION OF PLANT NOISE

Frequency	Hz	63	125	250	500	1K	2KJ	4K	8K	dB(A)
Excool EXCARR6										
Sound Pressure Level @1m	dB	57	60	61	65	66	63	61	53	70
Correction of 3 Units	dB	5	5	5	5	5	5	5	5	
Correction to 220m	dB	-47	-47	-47	-47	-47	-47	-47	-47	
Screening of Room Edge	dB	-5	-5	-5	-5	-5	-5	-5	-5	
Facade Correction	dB	3	3	3	3	3	3	3	3	
Net SPL	dB	13	16	17	21	22	19	17	9	26
Liebert MCL165										
Sound Pressure Level @1m	dB	57	60	61	65	66	63	61	53	70
Correction of 4 Units	dB	6	6	6	6	6	6	6	6	
Correction to 220m	dB	-47	-47	-47	-47	-47	-47	-47	-47	
Screening of Room Edge	dB	-5	-5	-5	-5	-5	-5	-5	-5	
Facade Correction	dB	3	3	3	3	3	3	3	3	
Net SPL	dB	14	17	18	22	23	20	18	10	27
Leibert MCM160										
Sound Pressure Level @1m	dB	57	60	61	65	66	63	61	53	70
Correction to 200m	dB	-46	-46	-46	-46	-46	-46	-46	-46	
Screening of Room Edge	dB	0	0	0	0	0	0	0	0	
Facade Correction	dB	3	3	3	3	3	3	3	3	
Net SPL	dB	14	17	18	22	23	20	18	10	27
Sound Pressure Level @1m	dB	57	60	61	65	66	63	61	53	70
Correction to 220m	dB	-47	-47	-47	-47	-47	-47	-47	-47	
Screening of Room Edge	dB	-5	-5	-5	-5	-5	-5	-5	-5	
Facade Correction	dB	3	3	3	3	3	3	3	3	
Net SPL	dB	8	11	12	16	17	14	12	4	21
Combined Noise Level	dB	19	22	23	27	28	25	23	15	32