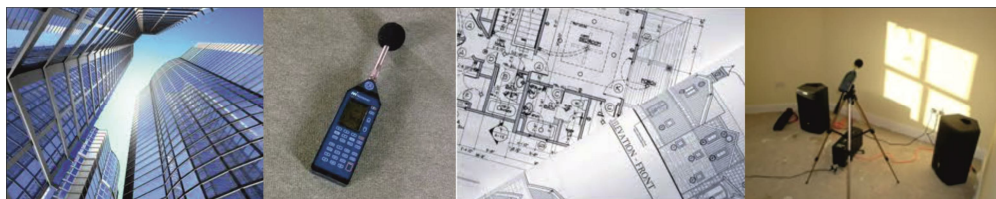


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PEER 1 DATA CENTRE BUILDING 5000 LANGSTONE TECHNOLOGY PARK HAVANT

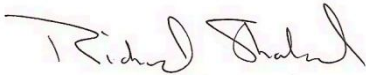
ASSESSMENT OF ENVIRONMENTAL NOISE FROM NEW ROOF PLANT ASSOCIATED WITH PHASE I & II

Client:
eVolve

Ref: M3472-Phase I/II-PA
22 October 2015

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Issue No.	3
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1. SUMMARY

- 1.1 An assessment of noise has been carried out at the Langstone Technology Park.
- 1.2 Following works to create a data centre within Building 5000, two further condensing units are to be installed on the roof.
- 1.3 A formal assessment has been commissioned to assess likely noise emissions from this new plant and the possible impact on existing adjacent residential occupiers.
- 1.4 This study has confirmed the pre-existing ambient noise levels in the area, and the design target used for the design of new plant:

Noise from new building services plant should be limited to a cumulative level of 40 dB(A) $L_{Aeq, 5 \text{ mins}}$ during the day, and 34 dB(A) $L_{Aeq, 5 \text{ mins}}$ at night (2300 - 0700), 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.

- 1.5 A detailed analysis of the noise data quoted for the two units indicates a combined level at the residential windows of 36 dB(A) on full load during the day, and 30 dB(A) at night, on a reduced load. With no indication of a tonal concentration to the noise generated, these levels would meet the stated design criteria.

2. INTRODUCTION

- 2.1 An assessment has been undertaken on the Langstone Technology Park, to determine the likely impact of noise arising from proposed new cooling equipment.
- 2.2 Building 5000 on the Park (see Figure 1) has been partially converted to create a new data storage centre. The first phase of the fitting out for Peer 1 occupation of the formerly redundant Building 5000 on Langstone Technology Park was granted Planning consent on 4th October 2011 (Planning reference APP/11/01298) with Phase 2 being granted consent on 25th June 2013 (Planning reference APP/13/00411).
- 2.3 Earlier studies by Ian Sharland Limited, the most recent being in 2013, have considered the pre-existing ambient noise climate and demonstrated that the initial proposals for new building services plant would have no adverse impact of the existing noise climate.
- 2.4 The current application represents more intensive utilisation of the space and will, as part of the development, involve two new items of plant on the roof of the building. These units provide a 'run and standby' cover and thus only one will operate at any time. It is also confirmed by the Client that, during the night, the cooling load is such that the unit will operate at a reduced speed (with corresponding reduction in the noise emitted)
- 2.5 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.
- 2.6 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 confirm the pre-existing 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.
- 2.7 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 to be undertaken in such assessments is the consideration of the existing ambient noise climate in the vicinity of Building 5000. The following paragraphs describe the exercise conducted prior to the creation of the data centre.
- 3.2 The building services plant is 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.
- 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 4142:2014 "Methods for rating and assessing industrial and commercial sound".
- 4.2 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. For night time operation, the assessment time is reduced to any 15 minute period.
- 4.3 A correction is made to the "specific noise level" if the new noise is noticeably tonal in content, impulsive or intermittent. These adjustments can total 18 dB but for this project (where the equipment will run almost continuously and without impulsive elements), the maximum likely adjustment would be + 4dB for a perceptibly tonal noise.
- 4.4 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), this indicates a significant adverse impact. An excess of 5 dB(A) is said to be an indication of an adverse impact and, where the rating does not exceed the background noise level, this is an indication of the noise having a low impact.
- 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 as is further plant associated with Phase II of the data centre project. In order to ensure the most conservative design parameters, the derivation of the targets for the currently proposed installation will be based on the pre-existing noise levels from the original 2011 survey.
- 4.10 That exercise suggested a minimum level of 50 dB(A) L_{A90} during the day and 44 dB(A) L_{A90} at night (2300 - 0700).
- 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 40 dB(A) $L_{Aeq, 5 \text{ mins}}$ during the day, and 34 dB(A) $L_{Aeq, 5 \text{ mins}}$ at night (2300 - 0700), 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 current proposals include the addition of
2 Emerson Liebert MCL 165 condensers
- 5.2 As confirmed in Section 2, only one unit will operate at any time (the other being a standby unit). Furthermore, the maximum load on the unit at night (2300 - 0700) will be such that it will operated at c.75% of its capacity.
- 5.3 The units have a sound power level of 91 dB(A) Lw when operating at 100% load, and 85 dB(A) Lw when operating on 80% load.
- 5.4 The plant for the room will be sited on the roof, as indicated in Figure 4.
- 5.5 Appendix I provides a calculation of noise radiating from this roof mounted equipment, to the adjacent residential properties, some 190m to the west. The predictions are repeated for both 100% load and 80% load.
- 5.6 The result of the calculation is a predicted facade noise level of 36 dB(A) when operating at full load, and 30 dB(A) on the reduced overnight operation. The octave band data for the units, as shown in Appendix I, indicates no tonal concentration.
- 5.7 It is therefore confirmed that the values comply with both the day time and night time targets given in Para 4.11

FIGURE 1 - PROPOSED LOCATION PLAN

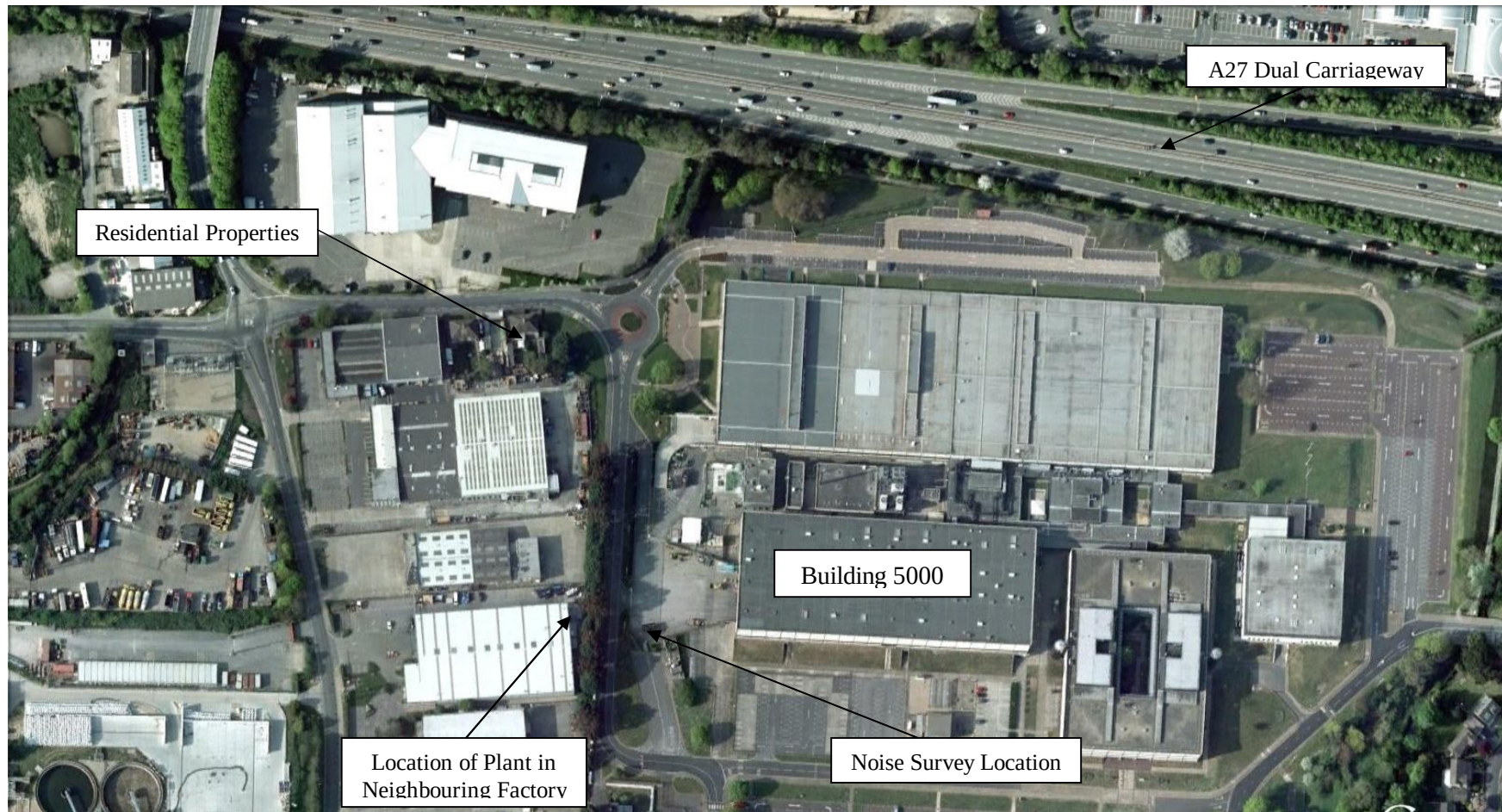
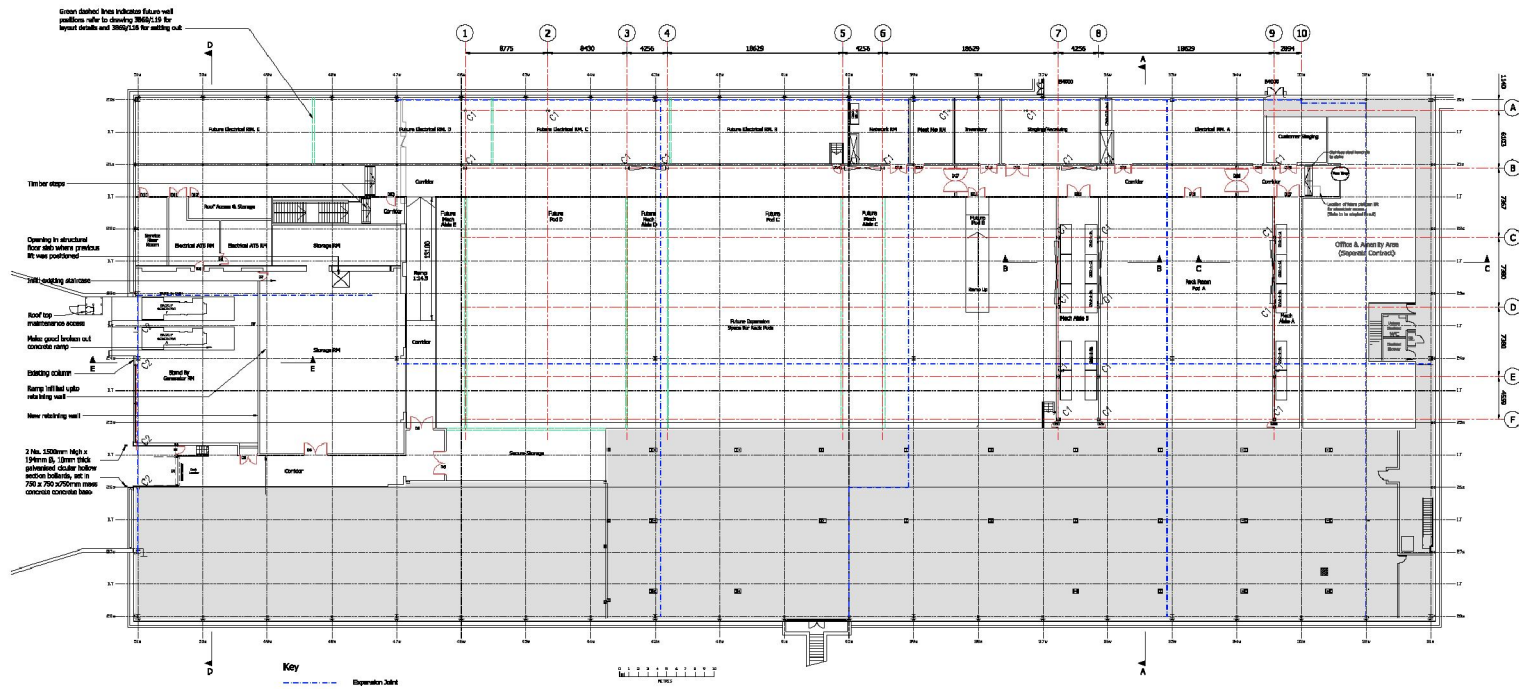


FIGURE 2 - MEASURED NOISE LEVELS, LANGSTONE TECHNOLOGY PARK



FIGURE 3 - PROPOSED STANDBY GENERATOR LOCATIONS



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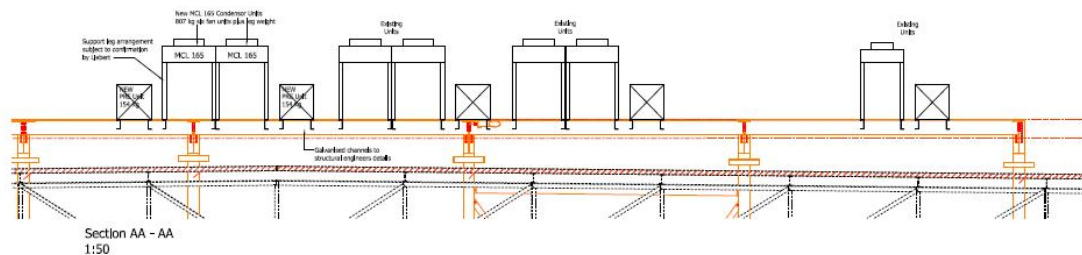
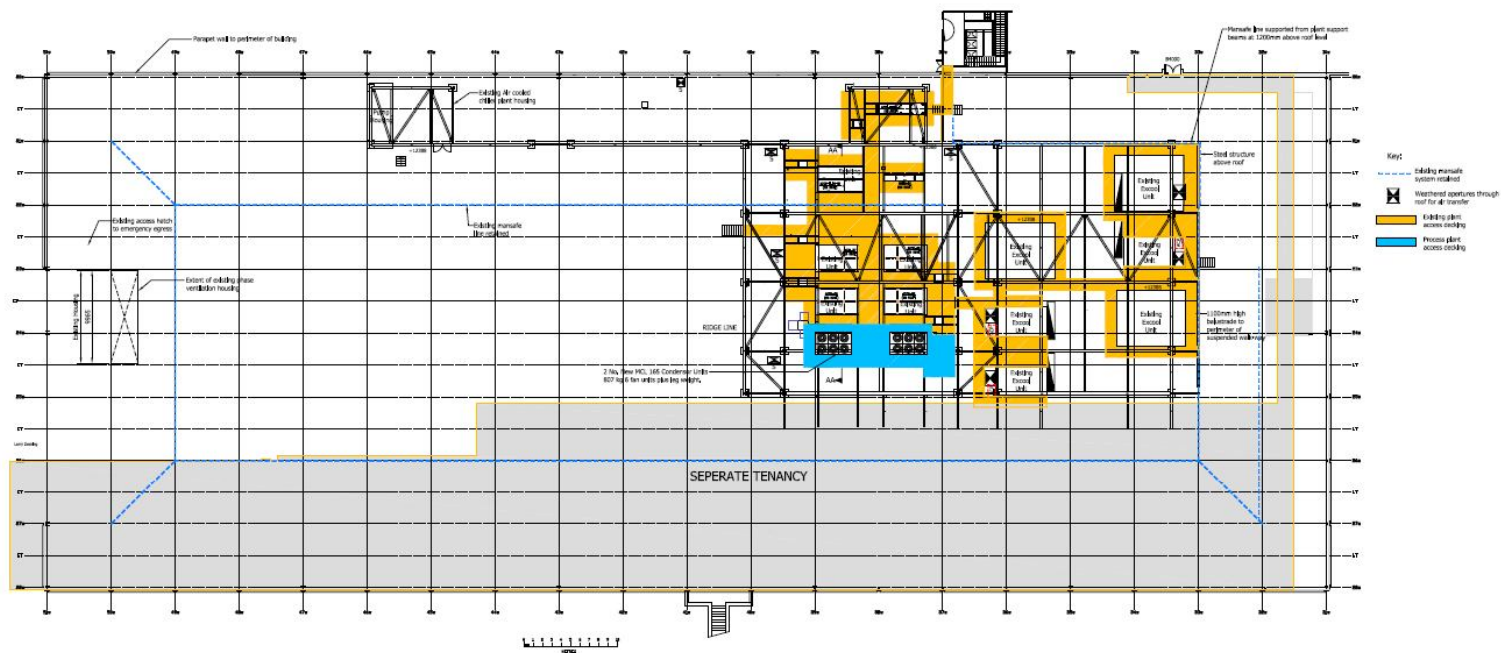
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8	3869/110	Changes to part 1, Level One	10
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Client
Evolve Infrastructure Solutions
Job Title
Peer 1 Data Centre, Langstone Technology Park
Drawing Title
Level One General Arrangement Plan
Drawing No.
3869/110
Scale
1:200 @A3
Date
20.01.18
Drawn By
DS
Checked By
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FIGURE 4 - PROPOSED ROOF PLAN, SHOWING INSTALLATION OF PLANT



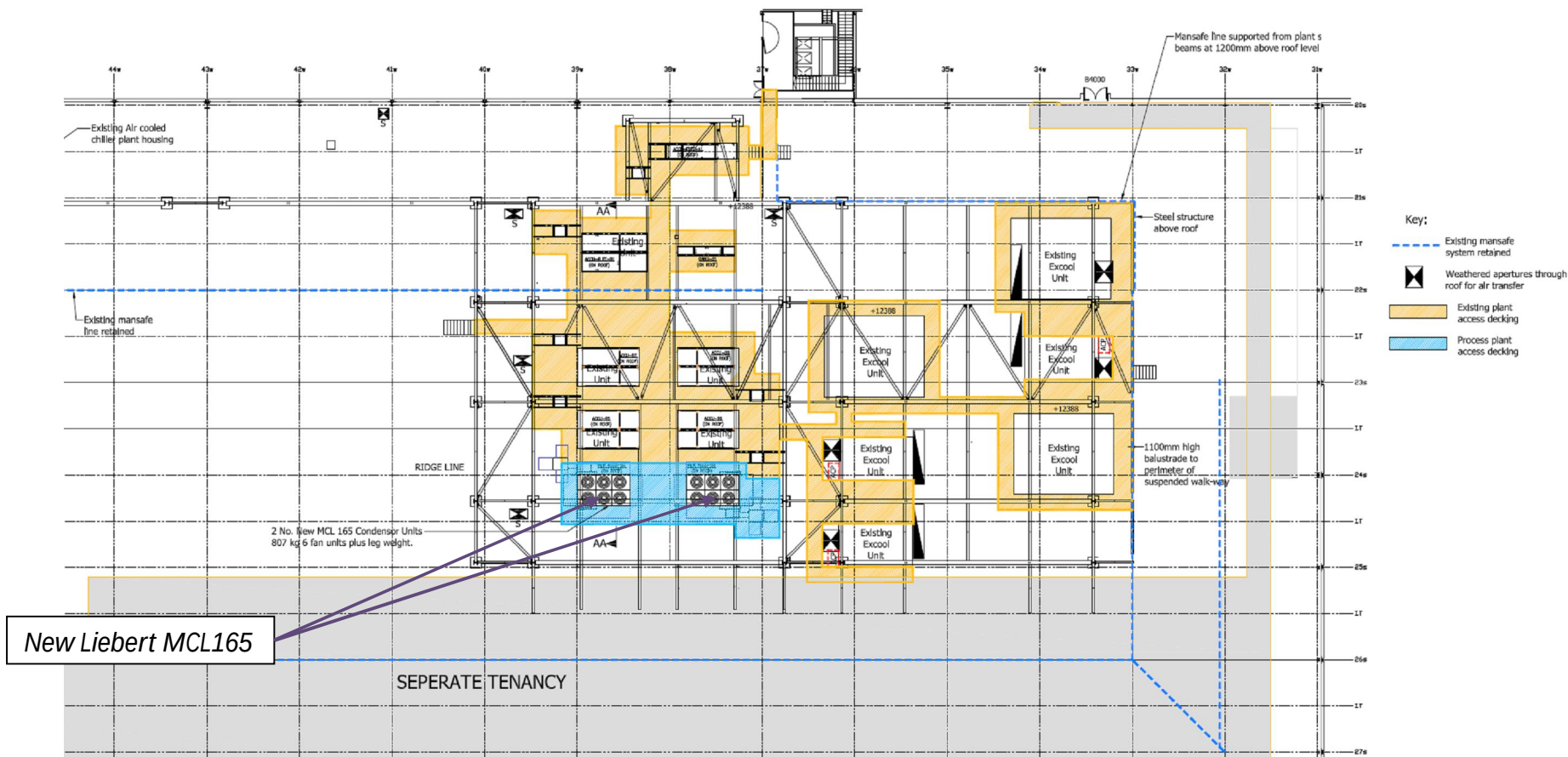
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Rev	Description	By	Date
01	Issue for construction	DR	20/07/15
02	Issue for construction	DR	20/07/15

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Client	Evolve Infrastructure Solutions
Job No	100
Project	Pod 1 Data Centre, Langstone Technology Park
Drawing Title	Roof Layout Plan - Pod B Upgrades
Drawing No	4264/115
Rev	A
Scale	1:200 @ A1
Drawn By	DR
Checked By	DR

FIGURE 5 - EXPANDED ROOF PLANT LAYOUT



Other condensers shown form part of previous projects

APPENDIX I - CALCULATION OF NEW PLANT NOISE

Frequency	Hz	63	125	250	500	1K	2K	4K	8K	dB(A)
Liebert MCL165, 100% spd	dB									
SWL	dB	67	76	79	85	87	85	78	71	91
Directivity	dB	-8	-8	-8	-8	-8	-8	-8	-8	
Correction to 180m	dB	-45	-45	-45	-45	-45	-45	-45	-45	
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	12	21	24	30	32	30	23	16	36
Frequency	Hz	63	125	250	500	1K	2K	4K	8K	dB(A)
Liebert MCL165, 80% spd Nig	dB									
SWL	dB	62	65	74	81	82	76	72	65	85
Directivity	dB	-8	-8	-8	-8	-8	-8	-8	-8	
Correction to 180m	dB	-45	-45	-45	-45	-45	-45	-45	-45	
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	7	10	19	26	27	21	17	10	30