

ENVIRONMENT

Credit Suisse Asset Management Limited
Bridgewater Manchester (Luxembourg) Holding SARL

70 Great Bridgewater Street
Manchester

**Partial Discharge of Conditions
No.13 and 15**

MCP2390



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Partial Discharge of Condition No.13 and 15

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EXECUTIVE SUMMARY

BWB Consulting Ltd was appointed by Bridgewater Manchester (Luxembourg) Holding SARL to undertake detailed assessment work in support of the application to discharge Planning Conditions 13 and 15 relating to noise, attached to the planning permission (application ref: 129081/FO/2021) for the redevelopment of 70 Great Bridgewater Street, Manchester.

A baseline noise survey was undertaken at the Site in November 2020. The survey, and subsequent assessment work, have been undertaken in accordance with current standards and guidance.

The results of the plant noise assessment indicate that the cumulative plant noise emissions at the nearest sensitive receptors is predicted to be below background noise levels during the day and night-time periods, demonstrating 'low impact'. Through the adoption of the recommended noise control measure outlined in **Section 5** of this report, there can be a high level of confidence that fixed building services plant will be satisfactorily controlled to within the plant noise requirements of MCC as not to prejudice the noise climate and amenity of local people.

The results of the noise breakout assessment to determine the acoustic transmission of airborne sound insulation between the proposed gym space and the adjacent office areas indicate that a floor construction comprising a 300mm concrete floor slab is sufficient in providing acoustic insulation to limit the breakout of noise from the gym space.

Based on the information provided in this report, it is considered that there is sufficient information provided to allow the partial discharge of Planning Conditions 13 and 15 on the scheme, pending submission of the completion reports.

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1. INTRODUCTION

Appointment & Background

- 1.1 BWB Consulting Ltd has been appointed by Bridgewater Manchester (Luxembourg) Holding SARL to undertake detailed assessment work in support of the application to discharge Planning Conditions 13 and 15 relating to noise, attached to the planning permission (application ref: 129081/FO/2021) for the redevelopment of 70 Great Bridgewater Street, Manchester.
- 1.2 A baseline noise survey was undertaken at the Site in November 2020. The survey, and subsequent assessment work, have been undertaken in accordance with current standards and guidance.
- 1.3 Planning Condition 13 states that:

"a) Prior to the installation of any externally mounted ancillary equipment, this equipment shall be acoustically insulated in accordance with a scheme submitted to and approved in writing by the City Council as local planning authority in order to secure a reduction in the level of noise emanating from the equipment.

Externally mounted ancillary plant, equipment and servicing shall be selected and/or acoustically treated in accordance with a scheme designed so as to achieve a rating level of 5dB (L_{Aeq}) below the typical background (L_{A90}) level at the nearest noise sensitive location.

b) Upon completion of the development and within 6 months of the equipment becoming operational, a verification report will be required to validate that the work undertaken throughout the development conforms to the recommendations and requirements in the approved acoustic consultant's report. The report shall also undertake post completion testing to confirm that above criteria is met. Any instances of non-conformity with the recommendations in the report shall be detailed along with any measures required to ensure compliance with the noise criteria. This report shall be submitted to and approved in writing by the City Council as local planning authority within 6 months of the equipment becoming operational along with a timescale that confirms when any necessary changes will be implemented.

Reason - To safeguard the amenities of the occupiers of nearby residential accommodation, pursuant to saved policy DC26 of the Unitary Development Plan for the City of Manchester and policies SP1 and DM1 of the Core Strategy".

- 1.4 Planning Condition 15 states that:

"a) The premises shall be acoustically insulated and treated to limit the breakout of noise in accordance with the Noise Impact Assessment prepared by BWB and dated February 2020 received by the City Council as Local Planning authority on 23 February 2020. This scheme shall be implemented in full before first occupation of the completed development hereby approved.

b) Prior to the construction of the gymnasium, details of how the gym space will be occupied and used (along with associated noise levels) shall be submitted for approval. Any scheme for acoustically insulating the offices adjacent and above the gymnasium against noise generated, shall be submitted to and approved in writing by the City Council as local planning authority and implemented in full before the approved use of the gymnasium commences.

c) Within one month of the completion of the development and before first occupation of the completed development hereby approved, a verification report shall be undertaken to validate that the work undertaken throughout the development conforms to the recommendations and requirements in the approved acoustic consultant's report. The report shall also undertake post completion testing to confirm that above criteria is met. Any instances of nonconformity with the recommendations in the report shall be detailed along with any measures required to ensure compliance with the noise criteria. This report shall be submitted to and approved in writing by the City Council as local planning authority before the use becomes operational along with a timescale that confirms when any necessary changes will be implemented.

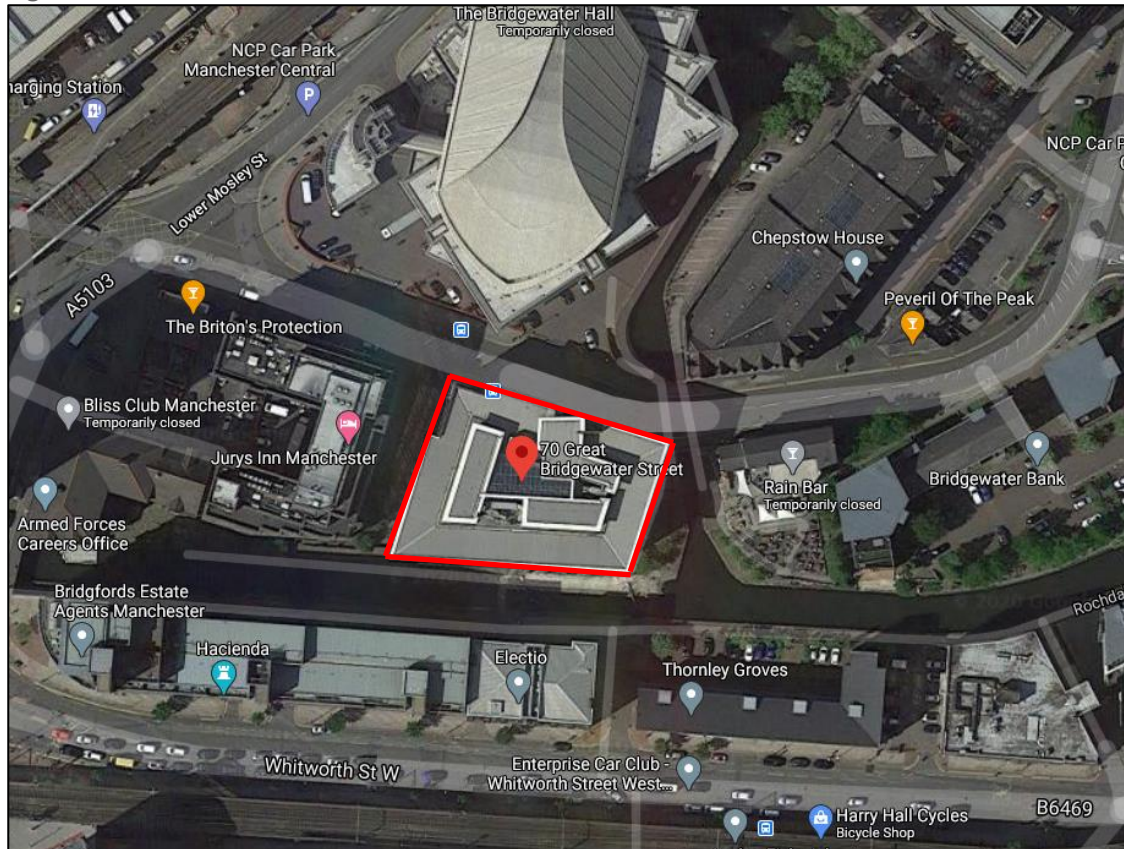
Reason - To ensure an acceptable development in the interests of residential amenity, pursuant to policies DM1 and SP1 of the Core Strategy and saved policy DC26 of the Unitary Development Plan."

- 1.5 This report is necessarily technical in nature, so to assist the reader, a glossary of acoustic terminology can be found in **Appendix A**.

Site Setting

- 1.6 The application site currently comprises existing office space, with a site area totalling 0.44ha. The Site is centred on national grid reference 383776. 397587, and is located within the administrative area of Manchester City Council (MCC).
- 1.7 The site is bordered to the north by Great Bridgewater Street with the Bridgewater Hall concert venue directly opposite the site, and Chepstow House, the residential complex to the north-eastern aspect of the site. To the south, the site is bound by Bridgewater Canal/Rochdale Canal Tow Path, beyond which lay existing commercial/retail premises, and Hacienda Apartment Building to the southwest of the site. To the west, the site is bordered by the entrance to the associated lower-ground building carpark, with the Jurys Inn Hotel directly opposite the parking entrance to the building. To the east of the site is a Public House, named Rain Bar, beyond which lays an existing commercial office building.
- 1.8 **Figure 1.1** details the location of the proposed development.

Figure 1.1: Site Location Plan

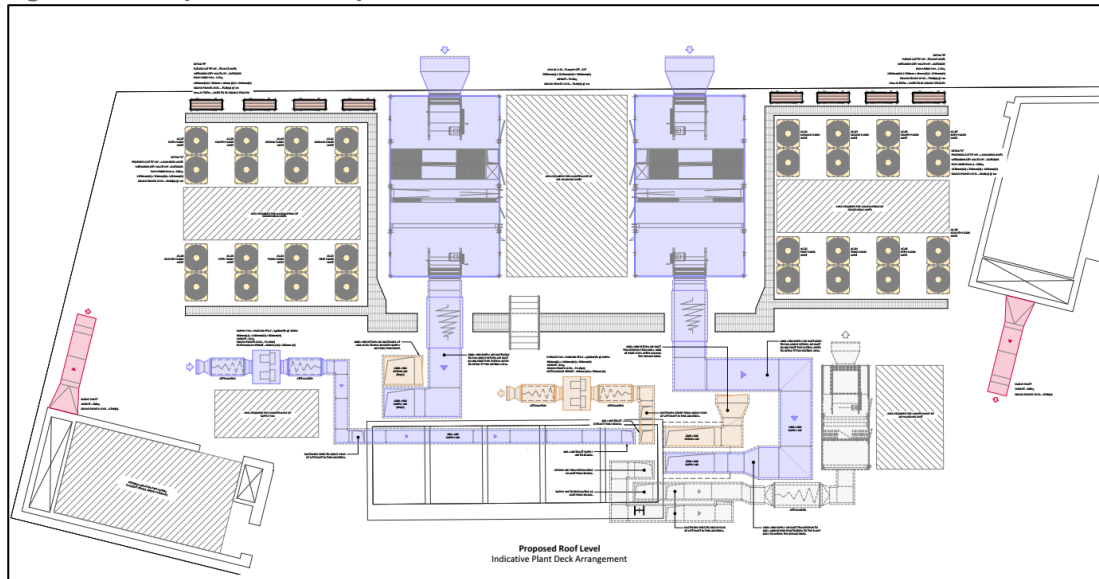


* SOURCE: Google Earth imagery, with indicative red-line boundary.

Proposed Development

- 1.9 The Proposed Development is understood to comprise of the partial demolition and reconfiguration of 70 Great Bridgewater Street to create a new office building (Use Class E), including replacement of building facades, 2-storey extension and alterations to the internal layout including servicing and cycle parking, access, and associated works.
- 1.10 **Figure 1.2** illustrates the details of the rooftop plant type, number, and location associated with the proposed development.

Figure 1.2: Proposed Site Layout Plan



* SOURCE: Building Services Plant drawing produced by Marketaylor Limited (Title: Proposed Plan Roof Level Plant Deck Arrangement – Drawing Ref: RL-50-001).

Plant Schedule

- 1.11 The information provided in **Table 1.1** presents the proposed external plant items associated with the development.

Table 1.1: Schedule of plant equipment & activities

Fixed Plant			
Quantity	Manufacturer	Model	Location
16	Mitsubishi	PUHY-P000	Roof Level
8	Mitsubishi	PUMY-P200	Roof Level
2	-	Smoke Shafts	Atmospheric Discharge
2	AHU-TempAir	TempAir 9 7T-EXT	Roof Level
2	Supply/Extract Fans	PureAir PTS-7	Atmospheric Discharge

- 1.12 Associated manufacturers fixed plant noise data for each plant item can be found on the full building services plant drawing in **Appendix B**.
- 1.13 The anticipated hours of operation are understood to be during standard office working hours between 7am and 7pm.

Existing Noise Sensitive Receptors

- 1.14 The closest existing Noise Sensitive Receptors (NSRs) have been identified as The Bridgewater Hall concert venue, located to the north of the site, Chepstow House, the residential complex to the northeast aspect of the site, the Jurys Inn Hotel to the west,

and the Hacienda apartment building to the southwest. These receptors are listed below in **Table 1.2**.

Table 1.2: Nearest Noise Sensitive Receptors

NSR	Description	Direction
NSR 1	Bridgewater Hall Venue	North
NSR 2	Chepstow House; Residential Complex	Northeast
NSR 3	Jurys Inn Hotel	West
NSR 4	Hacienda Apartment Building	Southwest

2. STANDARDS AND GUIDANCE

National Planning Policy Framework (NPPF)

- 2.1 Published in July 2021, the NPPF¹ document sets out the Government's planning policies for England. It makes the following reference to noise in the section entitled *Conserving and enhancing the natural environment*:

"174. Planning policies and decisions should contribute to and enhance the natural and local environment by:

[...]

e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans."

- 2.2 It also makes the following references to noise in the Section entitled *Ground conditions and pollution*:

"185. Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

a) mitigate and reduce to a minimum potential adverse impact resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life⁶⁰;

b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

⁶⁰ See Explanatory Note to the Noise Policy Statement for England (Department for Environment, Food & Rural Affairs, 2010)."

And

"187. Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a

¹ Department for Communities and Local Government (DCLG) (2012); 'The National Planning Policy Framework', TSO

significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed."

BS 4142:2014+A1:2019 Methods for Rating and Assessing Industrial and Commercial Sound

2.3 The BS 4142² Standard describes methods for rating and assessing the following:

- Sound from industrial and manufacturing processes;
- Sound from fixed installations which comprise mechanical and electrical plant and equipment;
- Sound from the loading and unloading of goods and materials at industrial and/or commercial premises; and
- Sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks, or that from train movements on or around an industrial and/or commercial site.

2.4 The methods use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident. The Standard advises the purpose of the methodology includes the assessment of sound from any plant and activities associated with existing industrial and/or commercial uses at proposed residential dwellings.

2.5 If appropriate, the specific sound level of the source ($L_{Aeq,T}$) is corrected, by the application of one or more corrections for acoustic features such as tonal qualities and/or distinct impulses, to give a 'rating' level ($L_{Ar,T}$). The Standard effectively compares and rates the difference between the rating level of the specific sound and the typical background sound level ($L_{A90,T}$) in the absence of the specific sound.

2.6 The Standard advises that the time interval ('T') of the background sound measurement should be sufficient to obtain a representative or typical value of the background sound level at the time(s) the source in question operates or is proposed to operate in the future.

2.7 Comparing the rating level with the background sound level, BS 4142 states:

"Typically, the greater this difference, the greater the magnitude of impact.

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

A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.

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

² British Standard (BS) 2014, BS 4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound', British Standards Institution (BSI).

background sound level, this is an indication of the specific sound source having a low impact, depending on the context."

BS 8233:2014: Guidance on Sound Insulation and Noise Reduction for Buildings

- 2.8 To help in the design of the building and the control of noise outside and in the building, reference has been made to relevant and credited guidance documents, notably, British Council for Offices (BCO)³ and BS 8233:2014⁴, which recommend suitable external noise intrusion and Internal Ambient Noise Level (IANL) criteria to be met within commercial buildings to ensure the acoustic environment within different room spaces are appropriate to their function. The noise level criteria relevant to the development are presented in **Table 2.1**.

Table 2.1: Internal Noise Criteria in Unoccupied Spaces

Room Space	Level of External Noise Intrusion	BS8233 L _{Aeq,T} Design Range	Criterion
Meeting Rooms, Executive Offices	-	35-45 35-40	Reasonable conditions for study and work requiring concentration
Cellular Offices	NR 35	40-50	
Speculative Offices	NR 38		
Open Plan Offices, Reception Rooms	NR 40 NR 45	45-50 45-50	Reasonable acoustic privacy in shared spaces
Corridors, Toilets	-	45-55	Reasonable speech or telephone conversations

Manchester City Council: Planning and Noise Technical Guidance document

- 2.9 Manchester City Council's (MCC) Planning and Noise Technical Guidance document (Dec 2015) states the following regarding noise and vibration from fixed plant:

'Externally mounted ancillary plant, equipment and servicing shall be selected and/or acoustically treated in accordance with a scheme designed so as to achieve a rating level of 5dB (L_{Aeq}) below the typical background (L_{A90}) level at the nearest noise sensitive location'.

- 2.10 It should be noted that the criteria which is most relevant to the assessment of noise transmission between the basement gym and ground floor office space above has been set using the internal ambient noise level design range stipulated in **Table 2.1** for open plan offices.

³ British Council for Offices (BCO) 'Guide to Specification – Best Practice for Offices' 2019

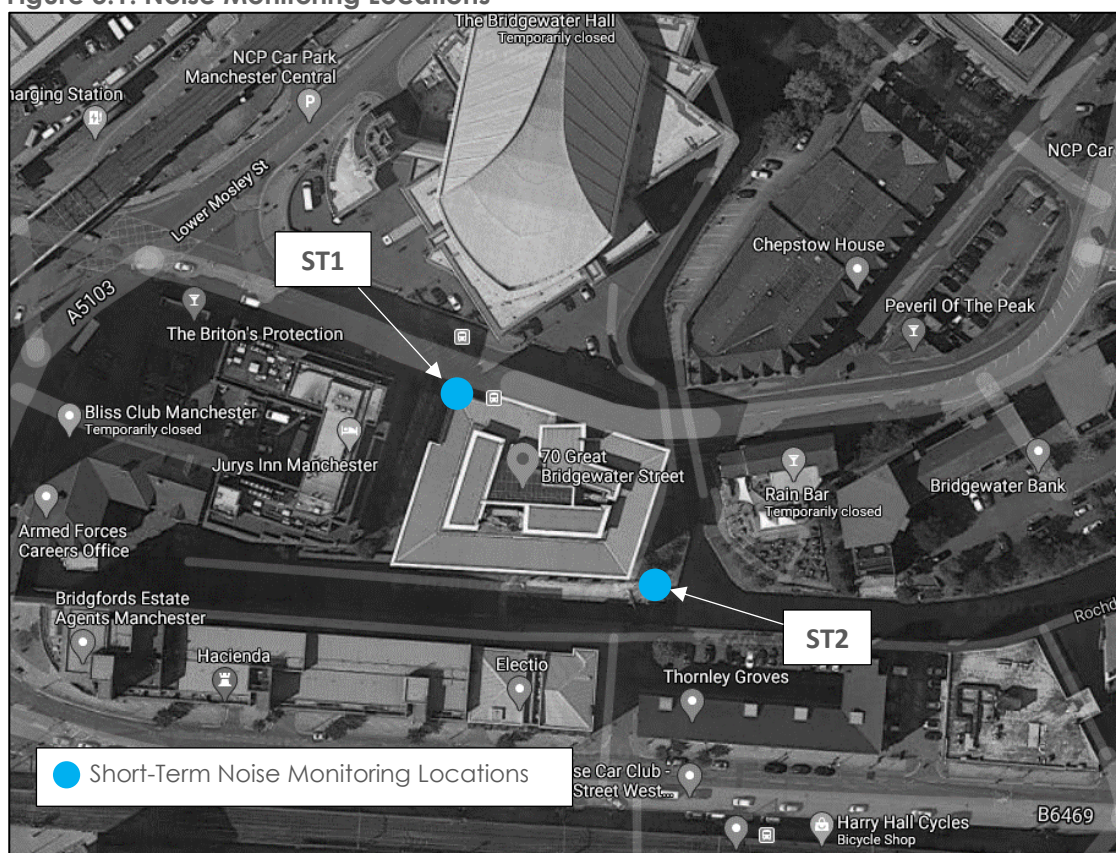
⁴ British Standard (BS) 2014, BS 8233:2014 'Guidance on Sound Insulation and Noise Reduction for Buildings', British Standards Institution (BSI).

3. BASELINE NOISE DATA

Summary

- 3.1 An environmental baseline noise survey was undertaken to establish and quantify the existing noise climate on, and within the vicinity of, the Site.
- 3.2 Attended short-term noise monitoring was undertaken on Wednesday 4th November 2020 along Great Bridgewater Street and Bridgewater Canal/Rochdale Canal Tow Path, at two key short-term (ST) positions illustrated in **Figure 3.1**.

Figure 3.1: Noise Monitoring Locations



*SOURCE: Google Earth

- 3.3 Full details of the baseline survey methodology can be found within the original planning noise impact assessment report (BWB ref. document: 'MCP2390 70 Great Bridgewater Street, Manchester – Noise Impact Assessment_v3.0', dated February 2020).

Noise Measurement Results

- 3.4 A summary of the short-term attended daytime and night-time noise levels measured during the survey periods, are provided in **Table 3.1**.
- 3.5 It should be noted that during the time of the survey, background noise levels may have been lower than usual due to the unprecedented circumstances surrounding COVID-

19. However, the assessment of potential noise impact upon the NSRs would therefore be considered as conservative.

Table 3.1: Summary of Noise Monitoring Results

Monitoring Location	Period / Duration	L _{Aeq,T} dB	L _{A90,T} dB
ST1	Daytime 17:15 – 18:15	71	56
	Night-time 23:30 – 00:00	62	44
ST2	Daytime 18:40 – 19:40	69	49
	Night-time 00:10 – 00:40	44	41
Notes: All figures are rounded to the nearest whole decibel.			

Plant Generating Noise Levels

- 3.6 A summary of the source noise sound power levels emitted by the proposed fixed plant are provided in **Table 3.2**. The sound power levels have been used directly in the assessment, as provided by the appointed MEP engineer.

Table 3.2: Sound Power Levels of Plant Items

Manufacturer	Model	Sound Power Level (L _w)
Mitsubishi	PUHY-P000	83 dB
Mitsubishi	PUMY-P200	75 dB
-	Smoke Shafts	87 dB
AHU-TempAir	TempAir 9 7T-EXT	76 dB
Supply/Extract Fans	PureAir PTS-7	74 dB

4. ASSESSMENT

Condition 13 - Plant Noise Emissions

- 4.1 With the application of MCC's policy on plant noise, requiring that plant should achieve a rating level of 5dB ($L_{Ar,T}$) below the typical background (L_{A90}) level at the nearest noise sensitive location, it follows that the maximum plant emission levels ($L_{Ar,T}$) for fixed mechanical plant presented in **Table 4.1** must be met 1m from the façade of the closest noise sensitive properties, as set out in **Table 1.2**.

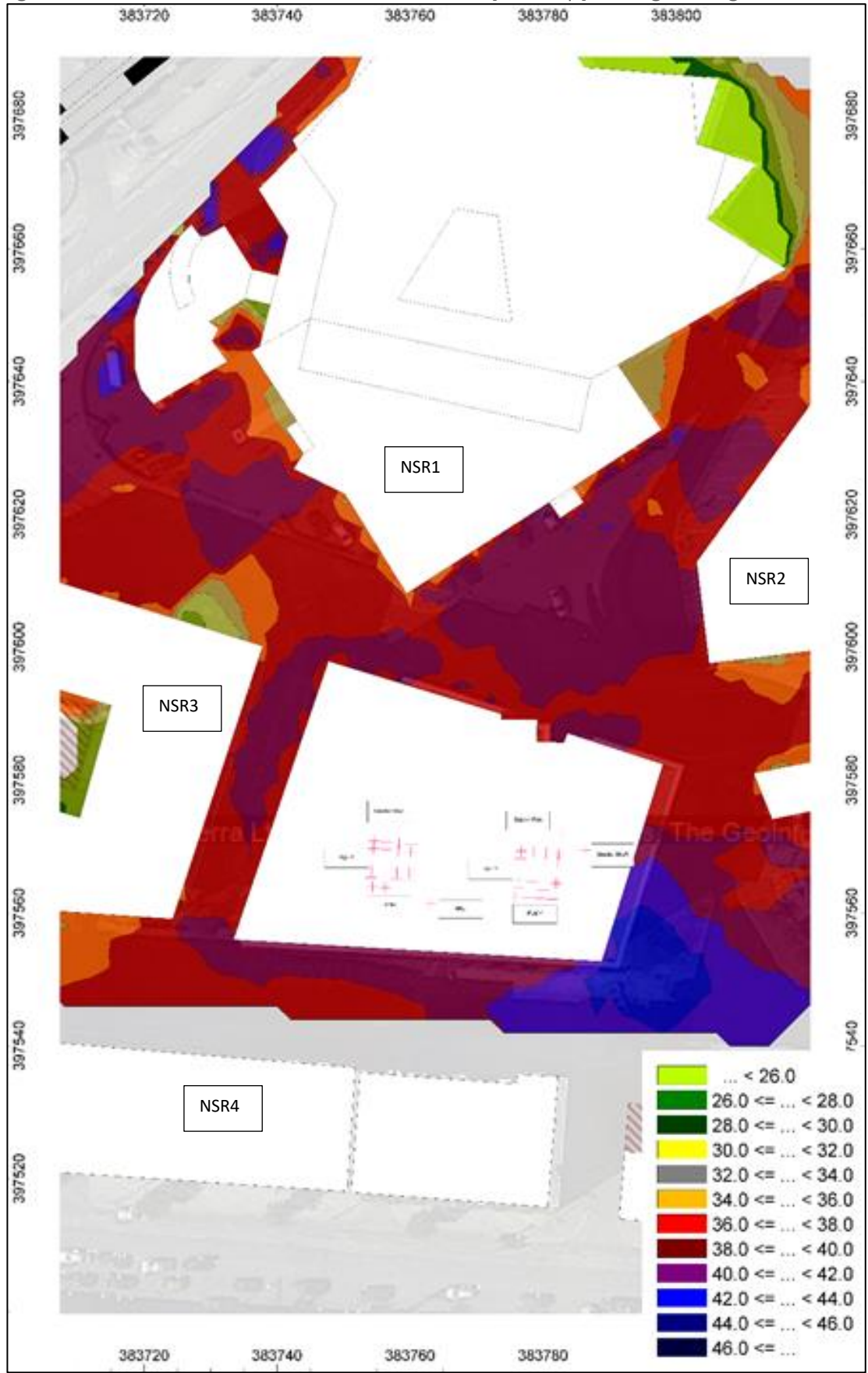
Table 4.1: Plant Noise Limits at Nearest Noise Sensitive Receptors

Location	Period	Typical Measured $L_{A90,T}$	Plant Noise Emission Limit ($L_{Ar,T}$)
All NSRs	Daytime (07:00 – 23:00)	49	44
	Night-time (23:00 – 07:00)	41	36
Notes: ¹ The background noise levels measured at measurement location ST2 was used as the most representative levels to determine the plant emission limits at the NSRs.			

- 4.2 An assessment has been undertaken based on the rooftop plant drawing illustrated in **Figure 1.2**. A 3-dimensional (3D) noise model of the Site has been prepared using the acoustic software package Cadna-A®, which uses the methodology set out in ISO 9613-2⁵, to predict potential noise impact upon the NSRs.
- 4.3 The assumptions used in the model include:
- Mapping Information from Google Maps, with topographic data via light detection and ranging (LIDAR), and proposed architectural layout drawings;
 - Surfaces absorption characteristics have been set as $\alpha = 0.05$;
 - Two (2) number of orders for reflection;
 - To reflect the local ground cover, ground absorption was set to $G = 0.5$ (50% acoustically reflective ground);
 - The site layout plan was incorporated into the noise model in order to account for screening provided by the development itself; and
 - The receptor points have been modelled at the height of the nearest facades to the proposed plant.
- 4.4 The resultant levels at the façades of the NSRs are shown in **Figure 4.1**.

⁵ BS EN ISO 9613-2 - Attenuation of sound during propagation outdoors – Part 2: General method of calculation, GB

Figure 4.1: Noise Contour of Noise Levels at NSRs (dB, $L_{Aeq,T}$) 1.5m grid Height



- 4.5 The assessment has been completed for a worst-case scenario in that it has been assumed all plant would be operating simultaneously and at full-duty (i.e., 100% on-time and capacity) during the quietest daytime periods without mitigation. It should be noted that a night-time assessment has not been undertaken as it is understood that the plant equipment is not expected to operate during the night-time period. The assessment summary of specific noise levels at the NSRs is shown in **Table 4.2**.
- 4.6 In the context of the existing noise climate and limiting criteria, and the plant units presenting no tonal noise elements, an acoustic penalty correction has not been applied.

Table 4.2: Summary of Assessed Specific Noise Levels at the NSR – No Mitigation, dB

Assessment Parameter	NSR 1 (Daytime Period)	NSR 2 (Daytime Period)	NSR 3 (Daytime Period)	NSR 4 (Daytime Period)	Relevant BS 4142 Clause
Specific sound level at NSR ($L_{Aeq,T}$)	44	43	46	46	7.3.5
Acoustic feature correction	0 ¹	0 ¹	0 ¹	0 ¹	9.2
Rating Level ($L_{A,r,T}$)	44	43	46	46	9.2
Background sound level, dB $L_{A90,1hr}$	49	49	49	49	8
Rating Level above Background Sound level, dB	-5	-6	-3	-3	
BS 4142 Impact	Low Impact	Low Impact	Low Impact	Low Impact	-
Meets Adopted MCC criteria? (-5dB)	Yes	Yes	No	No	-
Notes: * Calculation based upon modelling, which takes into consideration any short and long-distance attenuation, and site-specific screening attenuation. Assessment based on the typical representative measured $L_{A90,1hr}$ levels whilst source data derived from source noise levels stipulated in supplier/manufacturers data sheet. 1 Based on previous experience of the type of speed-controlled plant utilised on similar schemes, it is known that they emit noise that is broadband in nature and therefore no acoustic feature correction/penalty has been applied.					

- 4.7 From a review of **Table 4.2**, it can be seen that, for a worst case scenario, a cumulative plant rating noise level of 46 dB $L_{A,r,T}$ is predicted during the daytime periods at NSR3 and NSR4. The plant noise level is -3 dB below the daytime criteria. Though the assessment demonstrates a low impact in accordance with BS 4142, MCC requires that the rating level at the NSR be -5dB. It therefore highlights an exceedance of 2dB in accordance with MCC's Planning and Noise Technical Guidance document.
- 4.8 Based on assessment results there is an objective basis for concluding that noise mitigation measures are required in controlling plant noise at the NSRs, which are considered in the following section.

Condition 15 - Noise Break-out from the Gymnasium

- 4.9 The methodology adopted to determine the acoustic transmission of airborne sound insulation between the proposed gym space and the vertically adjacent office area, takes into account the radiated surface area of the separating element together with each relevant flanking element and correspondent rooms volume, in line with BS EN ISO 16283-1:2014⁶. The method can be briefly described as follows:

1. Determination of R' in line with the following equation:

$$R' = -10 \log \tau' \quad \tau' = \tau_d + \sum_{f=l}^n \tau_f + \sum_{e=l}^m \tau_e + \sum_{s=l}^k \tau_s \quad (3.4)$$

where the indices d, f, e and s refer to the different contributions to the sound transmission.

2. Determination of global noise levels within each relevant space in line with the following equation:

$$R' = L_1 - L_2 + 10 \log \frac{S_s}{A} \quad (3.5)$$

where

- a) L_1 is the average sound pressure level in the source room, in decibels;
- b) L_2 is the average sound pressure level in the receiving room, in decibels;
- c) A is the equivalent sound absorption area in the receiving room, in square metres;
- d) S_s is the area of the separating element, in square metres.

- 4.10 It is important to note that the reverberation time of the receiving room has been calculated in line with the Sabine statistical calculation method.
- 4.11 Archive measurement data taken from BWB's library of noise source data, obtained from a similar project, has been used to represent the indoor ambient noise levels within a typical gym space, as provided in **Table 4.3**.

Table 4.3: Ambient Noise Levels within a Gym Space

Parameter	Sound Pressure Level $L_{Aeq,T}$ Octave Band Centre Frequency Hz (dBA)						Global dB(A)
	125	250	500	1000	2000	4000	
L_{Aeq} (dB)	79	79	70	55	41	41	72

- 4.12 With regards to the assessment limitations, the method described above is limited by the number and type of flanking elements under this assessment.

⁶ BS EN ISO 16283-1:2014, Field measurement of sound insulation in buildings and of building elements - Part 1: Airborne sound insulation

- 4.13 It should also be noted that the noise breakout to the external atmosphere is likely to be contained within the gym space, as it is located at basement floor level, with no window openings proposed through the external facade. Noise from the gym space is therefore unlikely to affect nearby sensitive receptors.
- 4.14 The structural floor slab construction is understood to be a 300mm concrete floor slab. This construction is predicted to provide an airborne sound insulation performance rating of R_w 65 dB (-6 dB C_{tr}). The sound reduction index in octave frequency data is presented in **Table 4.4**.

Table 4.4: Sound Insulation Performance of the 300mm Concrete Floor Slab

Octave Band Centre Frequency Hz (dB)							$R_w + C_{tr}$ (dB)
63	125	250	500	1000	2000	4000	
48	47	54	61	67	71	76	59

- 4.15 **Table 4.5** presents the predicted noise transmission which is expected to occur when the proposed gym space is operating.

Table 4.5: Internal Noise Levels within Office Space during Gym Use

Octave Band Centre Frequency Hz (dB)							$R_w + C_{tr}$ (dB)
63	125	250	500	1000	2000	4000	
40	41	34	18	-3	-21	-26	28

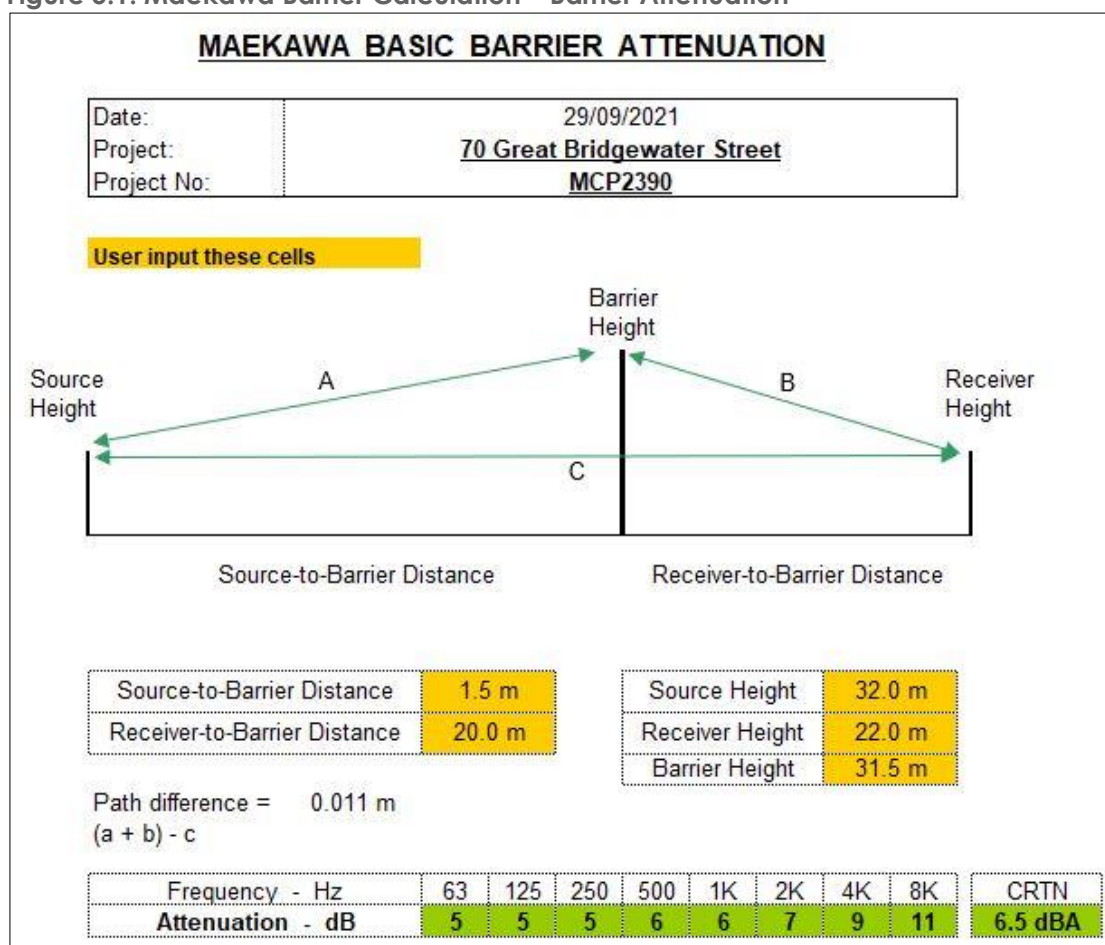
- 4.16 The indoor ambient noise levels within the office area shows levels are below the internal ambient noise levels stipulated in BS 8233, and therefore demonstrates compliance with the requirements of Planning Condition 15. As such, no further consideration of mitigation is required.

5. MITIGATION

Condition 13 - Plant Noise Emissions

- 5.1 To meet the MCC's plant noise standard at NSR3 and NSR4, to achieve a reduction of at least 2dB, several different noise control principles/options have been proposed. Efforts are focused on controlling noise from the dominant and nearest situated plant item, most notably from the Smoke Shaft to achieve the desired result. The following mitigation measure will be implemented:
- Acoustic screen approximately 1.5m high (removing line of sight of the noise source) localised around the smoke shaft on the western aspect of the roof plant scheme.
- 5.2 A Maekawa barrier calculation has been undertaken to demonstrate the reduction that could be achieved with an acoustic screen of 1.5m height, as shown in **Figure 5.1**. The proposed rooftop height of the plant area has been assumed at 30 m relative to the ground level. Therefore, the acoustic screen barrier height has been set at 31.5 m.

Figure 5.1: Maekawa Barrier Calculation – Barrier Attenuation



- 5.3 With this measure in place, a reduction of approximately 6dB could be afforded, which indicates that noise from the proposed plant scheme will be controlled to within the noise requirements of MCC.

6. CONCLUSION AND RECOMMENDATIONS

- 6.1 BWB Consulting Ltd was appointed by Bridgewater Manchester (Luxembourg) Holding SARL to undertake detailed assessment work in support of the application to discharge Planning Conditions 13 and 15 relating to noise, attached to the planning permission (application ref: 129081/FO/2021) for the redevelopment of 70 Great Bridgewater Street, Manchester.
- 6.2 A baseline noise survey was undertaken at the Site in November 2020. The survey, and subsequent assessment work, have been undertaken in accordance with current standards and guidance.
- 6.3 The results of the plant noise assessment indicate that the cumulative plant noise emissions at the nearest sensitive receptors is predicted to be below background noise levels during the day and night-time periods, demonstrating 'low impact'. Through the adoption of the recommended noise control measure outlined in **Section 5** of this report, there can be a high level of confidence that fixed building services plant will be satisfactorily controlled to within the plant noise requirements of MCC as not to prejudice the noise climate and amenity of local people.
- 6.4 The results of the noise break-out assessment to determine the acoustic transmission of airborne sound insulation between the proposed gym space and the adjacent office areas indicate that a floor construction comprising a 300mm concrete floor slab is sufficient in providing acoustic insulation to limit the breakout of noise from the gym space.
- 6.5 Based on the information provided in this report, it is considered that there is sufficient information provided to allow the partial discharge of Planning Conditions 13 and 15 on the scheme, pending submission of the completion reports.

APPENDICES

APPENDIX A: Glossary of Terms

Noise

Noise is defined as unwanted sound. Human ears are able to respond to sound in the frequency range 20 Hz (deep bass) to 20,000 Hz (high treble) and over the audible range of 0 dB (the threshold of perception) to 140 dB (the threshold of pain). The ear does not respond equally to different frequencies of the same magnitude but is more responsive to mid-frequencies than to lower or higher frequencies. To quantify noise in a manner that approximates the response of the human ear, a weighting mechanism is used. This reduces the importance of lower and higher frequencies, in a similar manner to the human ear.

Furthermore, the perception of noise may be determined by several other factors, which may not necessarily be acoustic. In general, the impact of noise depends upon its level, the margin by which it exceeds the background level, its character and its variation over a given period of time. In some cases, the time of day and other acoustic features such as tonality or impulsiveness may be important, as may the disposition of the affected individual. Any assessment of noise should give due consideration to all of these factors when assessing the significance of a noise source.

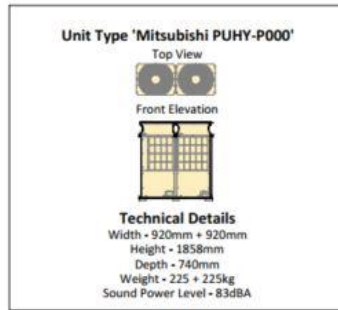
The most widely used weighting mechanism that best corresponds to the response of the human ear is the 'A'-weighting scale. This is widely used for environmental noise measurement, and the levels are denoted as dB(A) or LAeq, LA90 etc., according to the parameter being measured.

The decibel scale is logarithmic rather than linear, and hence a 3 dB increase in sound level represents a doubling of the sound energy present. Judgement of sound is subjective, but as a general guide a 10 dB(A) increase can be taken to represent a doubling of loudness, whilst an increase in the order of 3 dB(A) is generally regarded as the minimum difference needed to perceive a change under normal listening conditions.

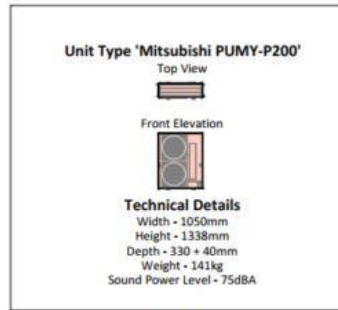
Acoustic Terminology

dB (decibel)	The scale on which sound pressure level is expressed. Sound pressure level is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure (2x10 ⁻⁵ Pa).
dB(A)	A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e. 'A' - weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
L _{Aeq,T}	L _{Aeq} is defined as the notional steady sound level which, over a stated period of time (T), would contain the same amount of acoustical energy as the A - weighted fluctuating sound measured over that period.
L _{Amax}	L _{Amax} is the maximum A - weighted sound pressure level recorded over the period stated. L _{Amax} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the overall L _{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
L ₁₀ and L ₉₀	If a non-steady noise is to be described it is necessary to know both its level and the degree of fluctuation. The L _n indices are used for this purpose, and the term refers to the level exceeded for n% of the time. Hence L ₁₀ is the level exceeded for 10% of the time, and the L ₉₀ is the level exceeded for 90% of the time.
Free-field Level	A sound field determined at a point away from reflective surfaces other than the ground with no significant contributions due to sound from other reflective surfaces. Generally, as measured outside and away from buildings.
Façade Level	A sound field determined at a distance of 1m in front of a large sound reflecting object such as a building façade.

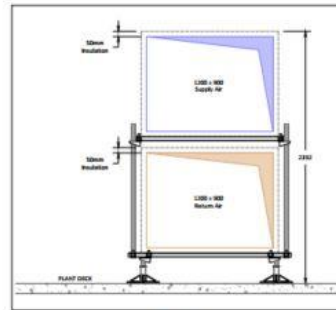
**APPENDIX B: Building Services Plant Drawing
– with Manufacturers Fixed Plant Noise Data**



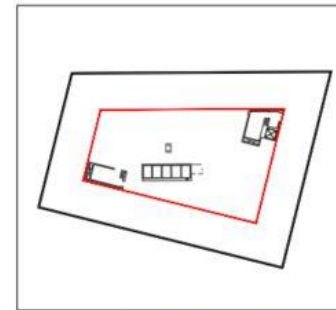
Detail 'A'
Roof Level Section (1:50)



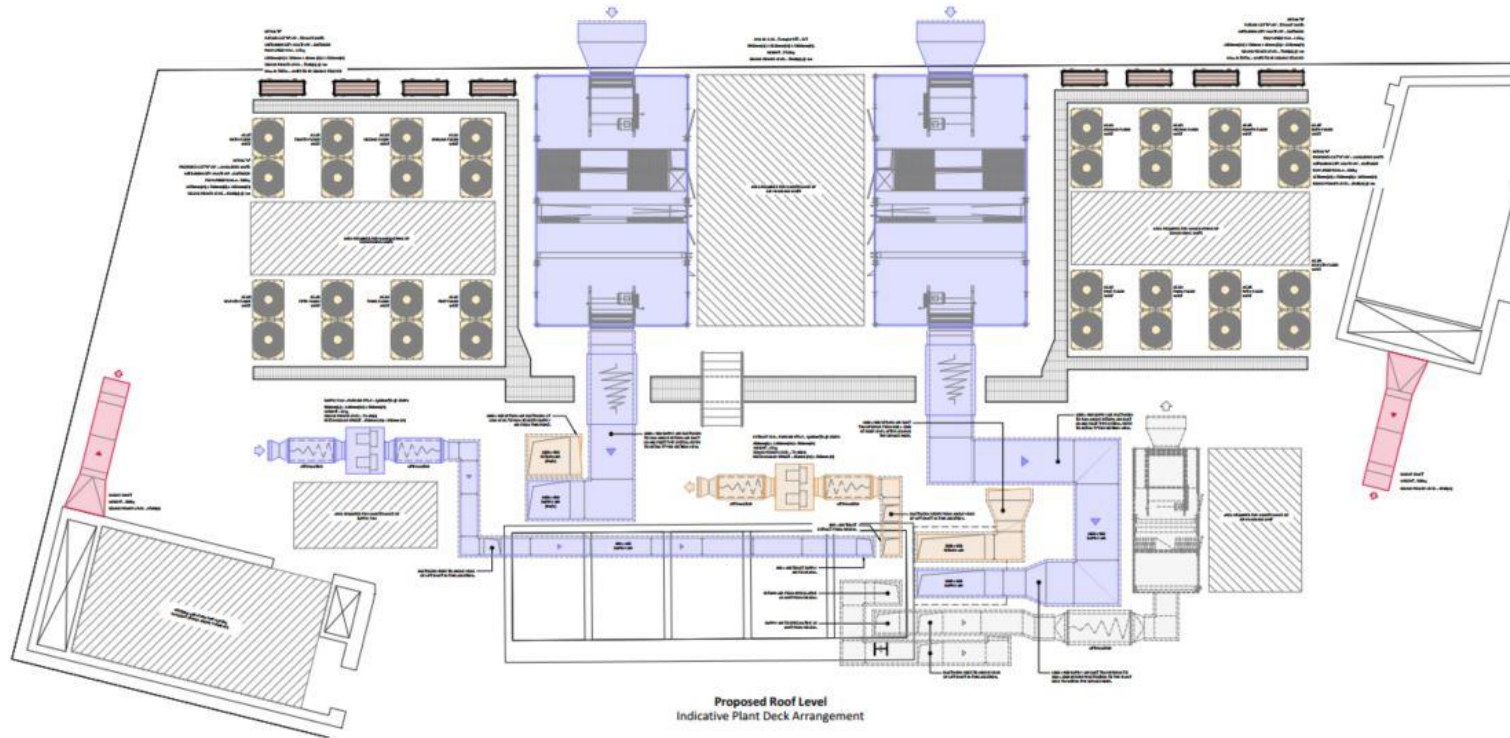
Detail 'B'
Roof Level Section (1:50)



Detail 'C'
Example Ductwork Section (1:20)



Proposed Plant Deck Location Plan
(N.T.S)



Proposed Roof Level
Indicative Plant Deck Arrangement

These dimensions indicate length over painted corners.

Notes

- This drawing shall be read in conjunction with the relevant Masterplan specification and standard industry practice.
- Where necessary, the drawing contains notes and details which shall be verified on site by the Engineering Contractor who assumes full liability. The exact location of all the Engineering Contractor's work shall be verified on site by the Engineering Contractor.
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Schedule

Item	Material	Quantity	Unit
1	100mm concrete	11.00	m ²
2	100mm concrete	1.50	m ²
3	100mm concrete	11.00	m ²
4	100mm concrete	1.50	m ²
5	100mm concrete	11.00	m ²
6	100mm concrete	1.50	m ²
7	100mm concrete	11.00	m ²
8	100mm concrete	1.50	m ²
9	100mm concrete	11.00	m ²
10	100mm concrete	1.50	m ²

Footer

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