DOCUMENT REFERENCE: HA/AB795/V1

ACOUSTIC DESIGN REVIEW AND NOISE IMPACT ASSESSMENT OF PROPOSED GYM TO BASEMENT

MARINE ICES, HAVERSTOCK HILL, CHALK FARM, LONDON NW7 2BL

ACOUSTICS

Our Ref	HA/AB795/V1
Site Address	Marine Ices, Haverstock Hill, Chalk Farm, London NW3 2BL
For	Incyon Ltd
Client Address	29 Lawrence Avenue, London NW7 4NL
Date of Report	13 January 2020
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EXECUTIVE SUMMARY

- Incyon Ltd instructed Healthy Abode Ltd t/a as HA Acoustics to undertake a noise impact assessment and noise break-out for the proposed construction of a gym within the basement at Marine Ices, Haverstock Hill, Chalk Farm, London NW7 2BL.

- HA Acoustics has undertaken an environmental noise survey at the site in order to determine prevailing background noise levels that are representative of the nearest noise sensitive receptors (NSR). The nearest NSR to the proposed gym is the commercial units located on the first floor and the second NSR is the residential flats located on the second floor of the same building.

- Initially a physical sound insulation test and breakout assessment was going to be performed, however due to the incomplete construction (open elements) this was not possible. Therefore, a theoretical breakout assessment and acoustic design review was agreed with the client.

- A baseline noise survey and assessment has been undertaken in line with the guidance contained in BS 4142:2014, measurements being taken over continuous 15-minute periods.

- The unattended survey was conducted on Friday 6th December 2019 – Monday 9th December 2019, at a fixed monitoring point, located at the front of the site.

- The typical background noise level has been calculated at 51dB $L_{A90,15mins}$.

- Using the provided technical plans and all available details provided by the client an acoustic design review has been performed to determine whether the proposed construction is sufficient to reduce noise breakout from the proposed gym. Recommendations for improvements have been provided where necessary.

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1. INTRODUCTION

1.1. Incyon Ltd instructed Healthy Abode Ltd t/a HA Acoustics to undertake a noise impact assessment and acoustic design review at Marine Ices, Haverstock Hill, Chalk Farm, London NW3 2BL. Initially a sound insulation test and breakout assessment was going to be performed, however due to the incomplete construction this was not possible. Therefore, a theoretical breakout assessment and acoustic design review was agreed with the client

1.2. Marine Ices, Haverstock Hill, Chalk Farm is currently undergoing a redevelopment and is proposing to construct a 24hr Gym in the basement of the new development, the noise from which could have the potential to affect existing noise sensitive properties nearby as well as new noise sensitive properties within the same building.

1.3. The purposes of this report are:

- To determine prevailing environmental noise levels affecting surrounding properties due to nearby noise sources (e.g. road traffic etc.);

- Based on the above, to present noise emission limits in accordance with the requirements of BS 4142:2014, and

- To provide acoustic design advice and mitigation recommendations based upon the provided architectural drawings and proposed noise emission criteria.

    - This report is for guidance and no liability can be accepted, based on the information provided herein.

2. SITE DESCRIPTION

2.1 Marine Ices, Haverstock Hill, Chalk Farm, London NW7 2BL (hereafter referred to as 'the site') is going to be a newly developed mixed residential and commercial premises. The building shall contain a basement, commercial premises on the ground floor and four storeys of residential flats located above.

2.2 The site is located in a mixed use residential and commercial area. Residential premises are also located immediately to the east within The Enterprise Bar & Hotel. Chalk Farm Underground Station is located approximately 40 metres to the west of the front of the site. The majority of nearby premises are commercial in nature, with some residential premises located in the local area. Haverstock School is located approximately 50 metres to the north-west of the site.

2.3 The nearest noise sensitive receptor (NSR) to the proposed gym is noted to be the commercial premises located on the ground floor of the same building. Although there is no requirement to test between commercial properties, it can be confidently assumed that if the noise impact assessment indicates that the specific sound source has a low impact at this premises then it can be safely assumed it will be met at other properties of equal distance and/or those further away.

2.4 At the time of installation and collection of the monitoring equipment, the dominant noise sources emanated from road traffic, overhead airplane movements and some commercial and residential activity noise. These noise sources are considered normal to the site location. No significant abnormal noise sources were identifiable. It is considered that the measured noise levels are reasonable given the location of the measurement position.

3. NOISE EMISSION CRITERIA

3.1. National Planning Policy Framework

3.2. In March 2012, the National Planning Policy Framework (NPPF) came into force and was revised in February 2019. This document replaces a great many planning guidance documents, which previously informed the planning system in England.

3.3. The NPPF (2019) sets out the Government's economic, environmental and social planning policies for England and these policies articulate the Government's vision of sustainable development.

3.4. The Noise Policy Statement for England (NPSE) published 2010 applies to *'all forms of noise, including environmental noise, neighbour noise and neighbourhood noise'.*

3.5. **Paragraph 180 of the NPPF (2019) considers noise, stating:**

"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 impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;*
- *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; and*
- *c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation."*

3.6. National Planning Policy is guided by the NPPF. With regard to noise, the terms 'significant adverse impact' and 'other adverse impacts' are defined in the explanatory notes of the 'Noise Policy Statement for England' (NPSE). These state that there are two established concepts from toxicology that are currently being applied to noise impacts, for example, by the World Health Organisation. They are:

- 'NOEL – No Observed Effect Level, this is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise, and

- LOAEL – Lowest Observed Adverse Effect Level. This is the level above which adverse effects on health and quality of life can be detected.

3.7. Extending these concepts for the purpose of this NPSE leads to the concept of SOAEL - significant observed adverse effect level. This is the level above which significant adverse effects on health and quality of life occur'. However, no specific noise limits for LOAEL and SOAEL have been defined. Therefore, guidance from other acoustic standards must be employed to determine suitable levels within the overall principal of the National Planning Policy Framework.

3.8. **Client's Requirements**

3.9. The proposed site lies within the jurisdiction of the Local Authority, London Borough of Camden. A noise assessment has not been requested by the council, but the client has requested an impact assessment and acoustic design review to ensure that the proposed 24hr gym does cause adverse noise impacts within the local area.

3.10. No set criteria has been provided by the Client. It is understood that the Client wishes to ensure that activities and operations from within the gym would not affect the NSR.

3.11. It is understood that the gym will be operational for 24 hours, 7 days a week. As the gym is to be constructed within the basement, noise can only travel via airborne through the party floor, or structurally.

3.12. It is noted that no mechanical plant has been specified at this time. It is recommended that if mechanical plant is specified later, a full BS4142 assessment is carried out to ensure there are no negative impacts at nearby noise sensitive receivers. Based on the current monitoring data, the criteria to be met under BS4142:2014 is a maximum rating noise level of 51dB $L_{A90,T,}$ when measured at the NSR.

3.13. **Sound Insulation Design Criteria**

3.14. Building Regulations do not specify sound insulation criteria between commercial premises, but it is recommended that values of at least those set out in the Approved Document E of the Building Regulations 2003 (as amended 2010, 2013 and 2015) for purpose built dwelling houses (displayed below in table 3.1 and highlighted in green) are achieved. Due to the high level of impact and airborne noise within gym facilities, the party floor would require a higher performance.

Table 0.1a Dwelling-houses and flats – performance standards for separating walls, separating floors, and stairs that have a separating function		
	Airborne sound insulation sound insulation $D_{nT,w} + C_{tr}$ dB (Minimum values)	Impact sound insulation $L'_{nT,w}$ dB (Maximum values)
Purpose built dwelling-houses and flats		
Walls	45	-
Floors and stairs	45	62
Dwelling-houses and flats formed by material change of use		
Walls	43	-
Floors and stairs	43	64

Table 3.1 Performance standards for separating walls and floors

Source Building Regulations ADE: 2015

3.15. The Approved Document E sound insulation performance standards are appropriate for walls, floor and stairs that separate spaces used for normal domestic purposes. A higher standard of sound insulation may be required between spaces used for normal domestic purposes and communal or non-domestic purposes.

3.16. No criteria was set by the client.

3.17. Noise levels from within Gyms will exceed those in typical domestic spaces due to the operation of the equipment and any background music; as such a higher standard of sound insulation is required.

3.18. Ideally the separating partitions should achieve a minimum reduction of 50db $D_{nT,w}$ + Ctr to ensure that transmitted sound is reduced sufficiently to ensure no adverse effects at the NSR. Once the client has decided upon final mitigation details, further acoustic design work may be required to confirm measures taken are sufficient.

4. ENVIRONMENTAL NOISE SURVEY METHODOLOGY

4.1. An unmanned environmental noise survey was undertaken at a single measurement location at the front of the site. The survey was undertaken between 13:00 hours on the Friday 6th December 2019 and 14:30 hours on Monday 9th December 2019. As construction works were being carried out on the site during the Friday and Saturday, the assessment period has been reduced to 24 hours on Sunday 8th December 2019.

4.2. The sound level meter (SLM) was mounted to the front of the site, approximately 1.5 metres above ground level. The SLM was positioned away from nearby reflective surfaces. The position is considered to be 'free-field' therefore acoustic corrections of -3dB have not been applied to the measurements. The position is considered to be representative of background noise levels at the nearest identified NSR. The monitoring position is identified in Appendix A.

4.3. The equipment used for the noise survey is summarised in Table 4.1.

Equipment	Description	Quantity	Serial Number
Svantek 977	Class 1 automated logging sound level meter	1	69298
ACO Pacific 7052E	Class 1 ½" microphone	1	69584
Larson Davis CAL200	Class 1 Calibrator	1	14432

Table 4.1 Description of Equipment used for Noise Survey

4.4. Ambient, background and maximum noise levels (L_{Aeq}, L_{A10}, L_{A90} and $L_{Amax,F}$ respectively) were measured throughout the noise survey in consecutive 15-minute periods.

4.5. The noise survey and measurements were conducted, wherever possible, in accordance with BS7445-1:2003 'Description and measurement of environmental noise. Guide to quantities and procedures'. Measurements were made generally in accordance with ISO 1996-2:2007 'Acoustics – Description, measurement and assessment of environmental noise – Part 2: Determination of environmental noise levels'.

4.6. Weather conditions throughout the entire noise survey period were noted to be cold to mild (approximately 9-13° Celsius), generally dry, with cloudy skies (approximately 70-100% cloud cover) and a light wind (<5m/s). These weather conditions were checked against and confirmed by the use of the Met Office mobile application available on smart phone technology. These conditions were maintained throughout the whole survey period and are considered reasonable for undertaking environmental noise measurements.

4.7. The noise monitoring equipment was calibrated before and after the noise survey period. No significant drift was recorded. Equipment calibration certificates can be provided upon request.

4.8. **Acoustic Design Review**

4.9. The acoustic design review has been undertaken utilising Insul v9.0 acoustic modelling software.

4.10. The software calculates the predicted sound insulation of different materials from laboratory tested samples. The material composition, thicknesses and densities are used to calculate both the overall sound reduction as well as octave band sound reduction data.

4.11. By comparing the calculated sound reduction of a partition to the measured sound pressure level, a sound transmission level is derived. This is the expected level of sound, which will pass through/be re-radiated by the partition.

4.12. It is reasonable to assume an 8dB worse performance by the actual constructed partition compared to the calculated level. This is due to the real world effects of flanking and due to the variability of workmanship in the construction.

5. NOISE SURVEY RESULTS

5.1. The ambient and background noise levels at the measurement position as seen in appendix A are provided below and have been based on an analysis of the monitoring data.

5.2. A summary of the data results is provided in Table 5.1. The time history can be seen in appendix B (TH1).

	Ambient Noise Level $L_{Aeq, 15min}$	Typical Background Noise Level $L_{A90, 15min}$
Day (07:00 – 23:00)	65dB	56dB
Night (23:00 – 07:00)	63dB	51dB
Operating Hours: 24/7, therefore night-time levels have been used.	63dB	51dB

Table 5.1 Summary of typical noise measurement data

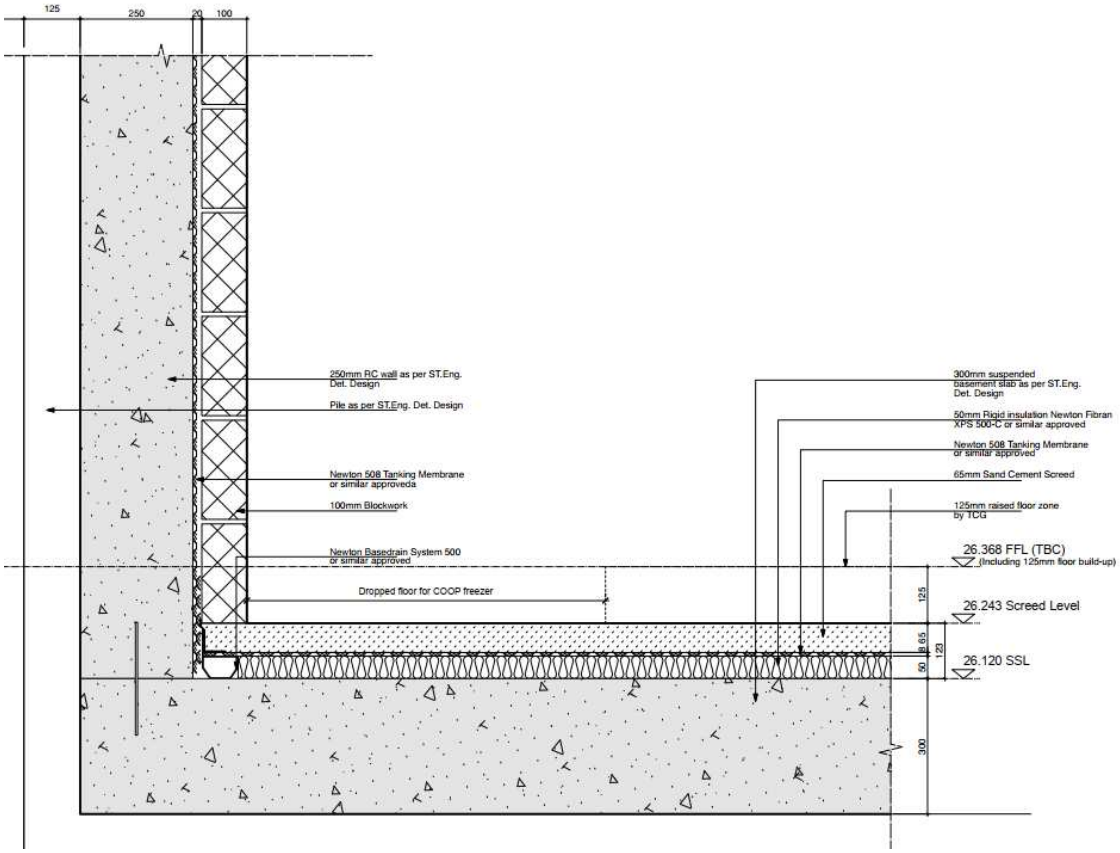
5.3. Due to the presence of nearby construction works, the Friday, Saturday and Monday have been omitted from the results of the survey. The levels presented in table 5.1 have been calculated from the 24 hour Sunday period.

5.4. These noise levels are considered normal to the site location. No significant abnormal noise sources were identifiable during installation or collection of the equipment. It is considered that the measured noise levels are reasonable given the location of the measurement position.

6. PROPOSED CONSTRUCTIONS

6.1. External Facades

6.2. The proposed external façade build-up is presented below, as laid out in architectural drawing dE05:



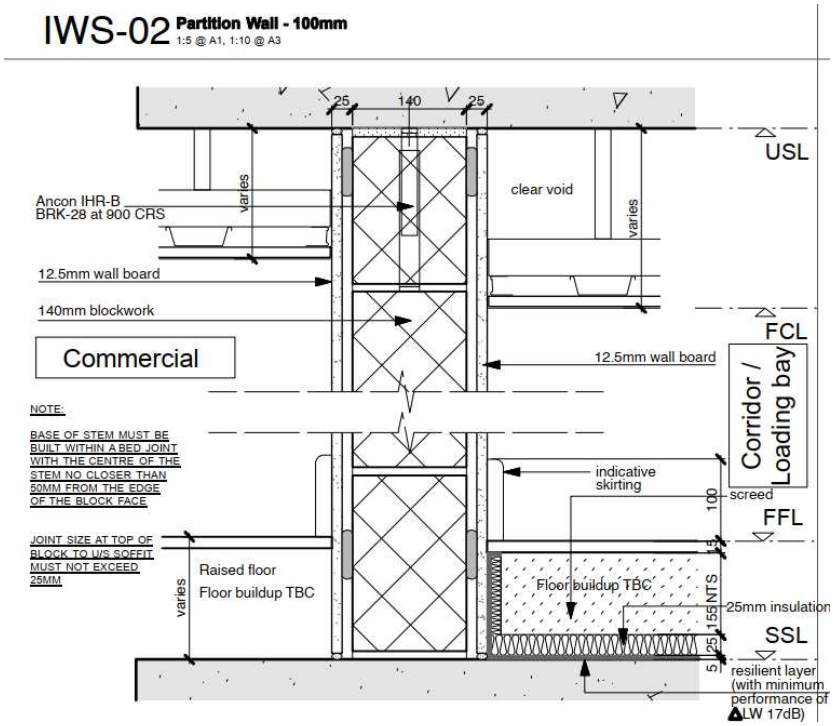
- 125mm Pile
- 250mm Reinforced Concrete Wall
- 20mm Newton 508 Tanking Membrane
- 100mm Blockwork

6.3. As the gym will be housed within the basement and therefore underground, the external facades do not need to be specified for airborne sound insulation performance, although it is important to ensure all joining sections between the walls and ceiling are isolated to ensure structural noise or vibration does not travel through the structure of the building itself (see recommendations in section 8 below).

6.4. Internal Walls

6.5. Three internal wall constructions have been proposed for the commercial premises. The predicted sound insulation performance for the partitions has been calculated in Insul v9.0 acoustic modelling software and is presented below each wall build-up:

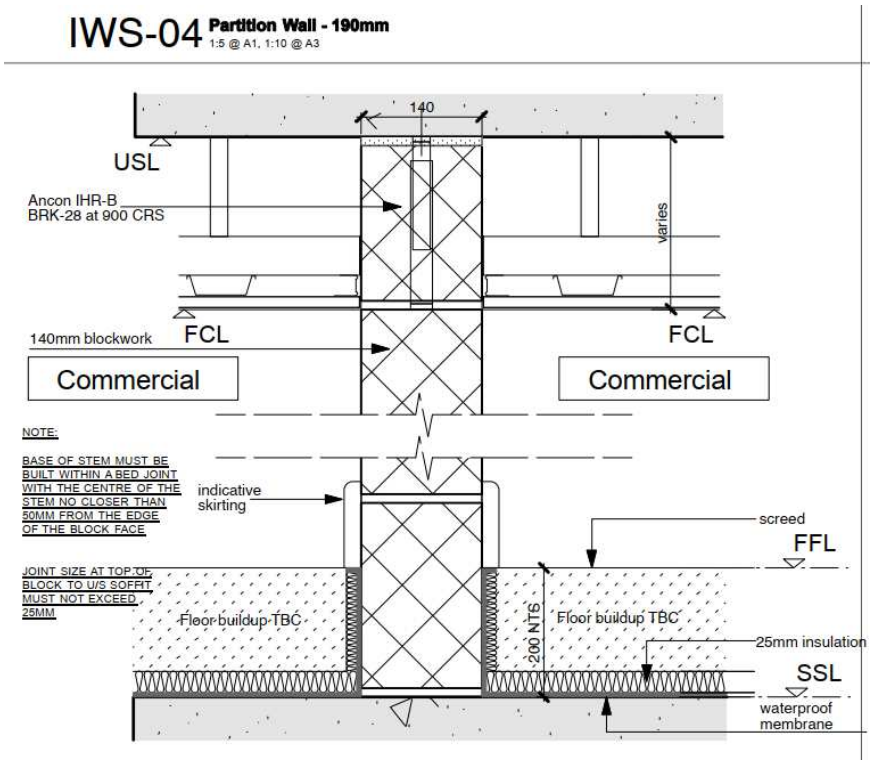
IWS-02 Partition Wall



- 12.5mm Wall Board
- 12.5mm Dot and Dab Plasterboard Adhesive
- 140mm Blockwork
- 12.5mm Dot and Dab Plasterboard Adhesive
- 12.5mm Wall Board

Predicted sound insulation performance: 47dB R_w + Ctr

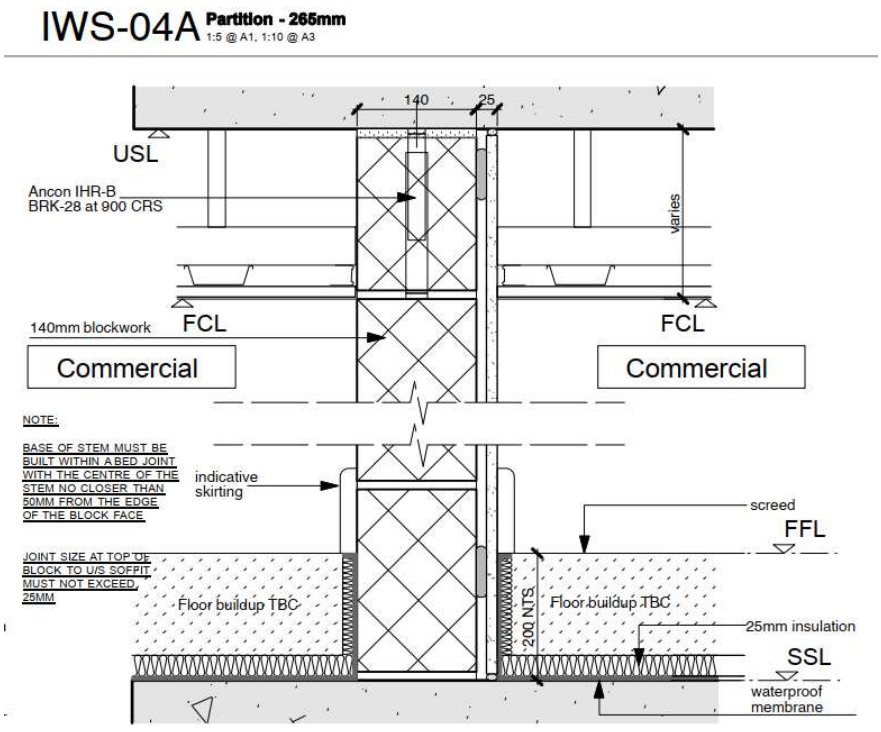
IWS-04 Partition Wall



- 140mm Blockwork

  Predicted sound insulation performance: 47dB R_w + Ctr

IWS-04A Partition Wall



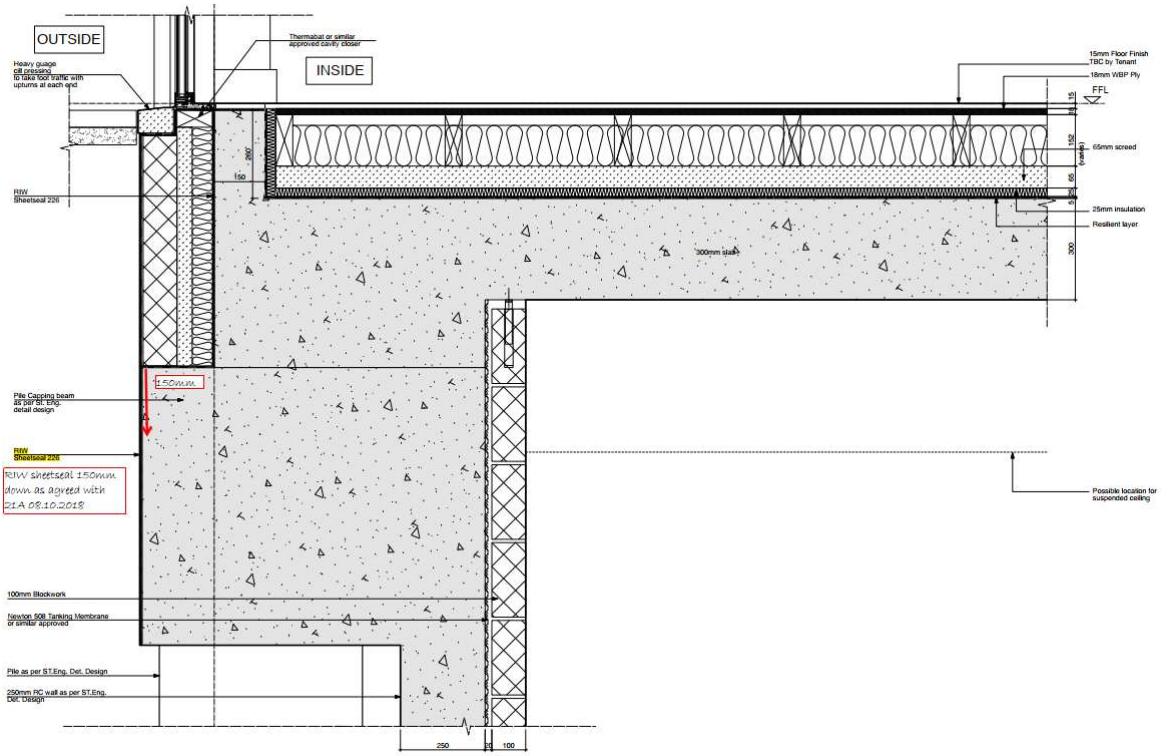
- 140mm Blockwork

- 12.5mm Dot and Dab Plasterboard Adhesive
- 12.5mm Plasterboard

Predicted sound insulation performance: 47dB R_w + Ctr

6.6. **Separating Floor**

6.7. The proposed separating floor construction build-up is presented below and has been taken from architectural drawing dE04:



- 15mm Floor Finish (TBC by Tenant)
- 18mm WBP Ply
- *152 x 50mm Timber Frame at 500mm centres
- 65mm Screed
- 25mm Insulation
- 5mm Resilient Layer
- 300mm Concrete Slab

Predicted sound insulation performance: 49dB R_w + Ctr

*Frame material has not been specified within the drawings and has therefore been assumed.

6.8. **Ducts and Pipework**

6.9. No details have been provided in regard to ducts and pipework and therefore cannot be. Recommendations for the installation of ducts and pipes to reduce the potential for sound transmission through these areas have been provided in section 8 below.

7. NOISE IMPACT ASSESSMENT

7.1. Historic sound level measurements undertaken by HA-Acoustics show that sound levels from gyms and health clubs, including background music and the use of fitness equipment is typically between 70-80dB $L_{Aeq,T}$. For the purposes of this assessment, a level of 80dB $L_{Aeq,1hour}$ has been assumed as a worst case scenario.

7.2. Table 3.2 details the spectral data from historical measurements for the overall level of 80dB $L_{Aeq,t}$ These levels are used within this report for the assessment.

Octave Band Frequency (Hz)	63	125	250	500	1000	2000	4000	dB(A)
Average Music Level, dB $L_{Aeq,1hour}$	81	84	77	73	76	74	69	80

Table 3.2 Octave band data of typical gym noise levels.

7.3. The calculated R_w + Ctr levels for each partition represent predicted laboratory performance. It is reasonably expected that the real world sound reduction performance will be reduced by up to 8dB, due to flanking and workmanship. This has been accounted for in the break-out calculations.

7.4. Comparisons of typical gym noise levels against the predicted sound reduction levels of the proposed partitions are presented in appendix C. By comparing the measured $L_{Aeq,1hour}$ gym sound pressure levels to the calculated sound reduction of each partition, a sound transmission level is derived. This is the level of sound, which is expected to pass through the partition, adding to the internal noise level in the receiving room. The calculated noise transmission levels for each partition are:

- IWS-02 = 40dB $L_{Aeq,T}$
- IWS-04 = 41dB $L_{Aeq,T}$
- IWS-04A = 40dB $L_{Aeq,T}$
- Separating Floor = 41dB $L_{Aeq,T}$

7.5. The separating floor needs to be improved to ensure break-out noise does not negatively impact nearby receptors, as this is the most direct path for the sound to travel.

7.6. The performance of the internal wall partitions could cause transmission of sound to the commercial premises on the ground floor due to airborne noise entering stairwells or via structure borne vibrations.

8. RECOMMENDATIONS FOR IMPROVEMENTS

8.1. External Facades

8.2. The external facades do not present an immediate problem through airborne noise, though it is important that the external façade structure is isolated from other partitions to ensure structure borne vibrations and flanking paths are avoided.

8.3. The implementation of a floating floor within the gym would assist in reducing structure borne vibrations transferring into the external facades and other partitions, especially from the dropping of weights. An example construction of a suitable floating floor is laid out in Approved Document E section 3.65:

- Floating Floor (b) Sand cement screed floating layer with resilient layer

  Floating Floor (b) should meet the following specification:

  - Floating layer of 65mm sand cement screed or a suitable proprietary screed product with a mass per unit area of at least 80kg/m^2. Ensure that the resilient layer is protected while the screed is being laid. A 20-50mm wire mesh may be used for this purpose;
  - Resilient layer consisting of either
    - a) A layer of mineral wool of minimum thickness 25mm with density 36kg.m^3, paper faced on the upper side to prevent the screed entering the resilient layer, or
    - b) An alternative type of resilient layer which meets the following two requirements:
      - i. Maximum dynamic stiffness (measured according to BS EN 29052-1:1992) of 15MN.m^3, and
      - ii. Minimum thickness of 5mm under the load specified in the measurement procedure of BS EN 29052-1:1992, 1.8kPa to 2.1kPa.

8.4. Internal Walls

8.5. To reduce the potential noise break out into corridors and stairwells it is recommended that the corridor facing partitions are upgraded by including resilient bars with absorptive material placed within the cavity. An example construction is presented below:

- 12.5mm Soundbloc Plasterboard
- 12.5mm Dot and Dab Plasterboard Adhesive
- 140mm Blockwork

- 50mm x 45mm Timber Studs at 600mm centres
  - cavity infilled with Rockwool (40kg/m^3)
- Resilient bars
- 2x 12.5mm Soundbloc Plasterboard

Predicted sound insulation performance: 58dB R_w + Ctr

8.6. It is noted that the architectural drawings show that internal wall partitions for the commercial premises have been designed with suitable isolation from the flooring and ceilings.

8.7. **Separating Floor**

8.8. It is recommended that the separating floor is upgraded to improve the sound insulation performance, especially around 125Hz. The addition of a suspended ceiling should provide the required improvements. An example of a suitable floor build up is presented below:

- 15mm Floor Finish (TBC by Tenant)
- 18mm WBP Ply
- 152 x 50mm Timber Frame at 500mm centres
- 65mm Screed
- 25mm Insulation
- 5mm Resilient Layer
- 300mm Concrete Slab
- 300mm Suspended Light Steel Grid Ceiling
  - Cavity infilled with Rockwool (40kg/m^3)
- 12.5mm Soundbloc Plasterboard

Predicted sound insulation performance: 76dB R_w + Ctr

8.9. **Ducts and Pipework**

8.10. There is a possibility for flanking noise through ducts and pipes. To minimise the effects of flanking, the following is recommended:

- All ducting and pipework that passes through the gym is lagged in mineral wool (25mm thick, minimum density 25/kg/m^3) before boxing in with a double layer of acoustic plasterboard.

- Where ducts or pipework penetrate through separating walls/floors, it must be ensured that there is no rigid contact, but an airtight seal should be achieved using non-hardening mastic. Any fire stopping should also allow for a flexible, rather than rigid contact.

8.11. **Other recommendations**

8.12. It is also recommended that a lobby door system is installed between the gym and the common areas, such as corridors containing stairwells. This would reduce the escaping of noise through these openings which would otherwise reduce the effectiveness of the partitions.

8.13. Shock absorbent rubber matting should be installed within the free-weight and barbell areas to reduce the potential for structure borne impact noise from the dropping of weights.

8.14. All exercise machines should be installed on shock absorbent rubber mounts to reduce the potential for structure borne impact noise.

8.15. Punching bags should not be installed on frames which contact the building partitions, but should be free-standing if possible to reduce structure borne vibrations.

9. UNCERTAINTY

9.1. The levels of uncertainty in the data and calculations are considered to be low given the robust exercise undertaken in noise monitoring and the confidence in the statistical analysis.

9.2. All measurements taken on-site by instrumentation are subject to a margin of uncertainty. This is relatively small, with a sound level meter manufacturer's margin of uncertainty at +/-1.1dB. It is due to the tolerances associated with the Class 1 sound level meter and calibrator equipment used to measure background.

- The meter and calibrator used have a traceable laboratory calibration and were field calibrated before and after the measurements.

9.3. Manufacturers' data for the plant is likely to be robust. Detailed calculations and resultant noise levels at the residential location are considered to be confidently predicted.

9.4. Uncertainty in the calculated impact has been reduced by the use of a well-established calculation method.

9.5. Calculations of the sound reduction of partitions are dependent on the accuracy of Insul v9.0 acoustic modelling software. Where the exact material could not be inputted into the model, a suitable replacement has been selected.

10. CONCLUSION

10.1. A baseline environmental noise survey has been undertaken at Marine Ices, Haverstock Hill, Chalk Farm, London NW7 2BL. The noise survey was undertaken at a fixed monitoring point, representative of the nearest noise sensitive receptor.

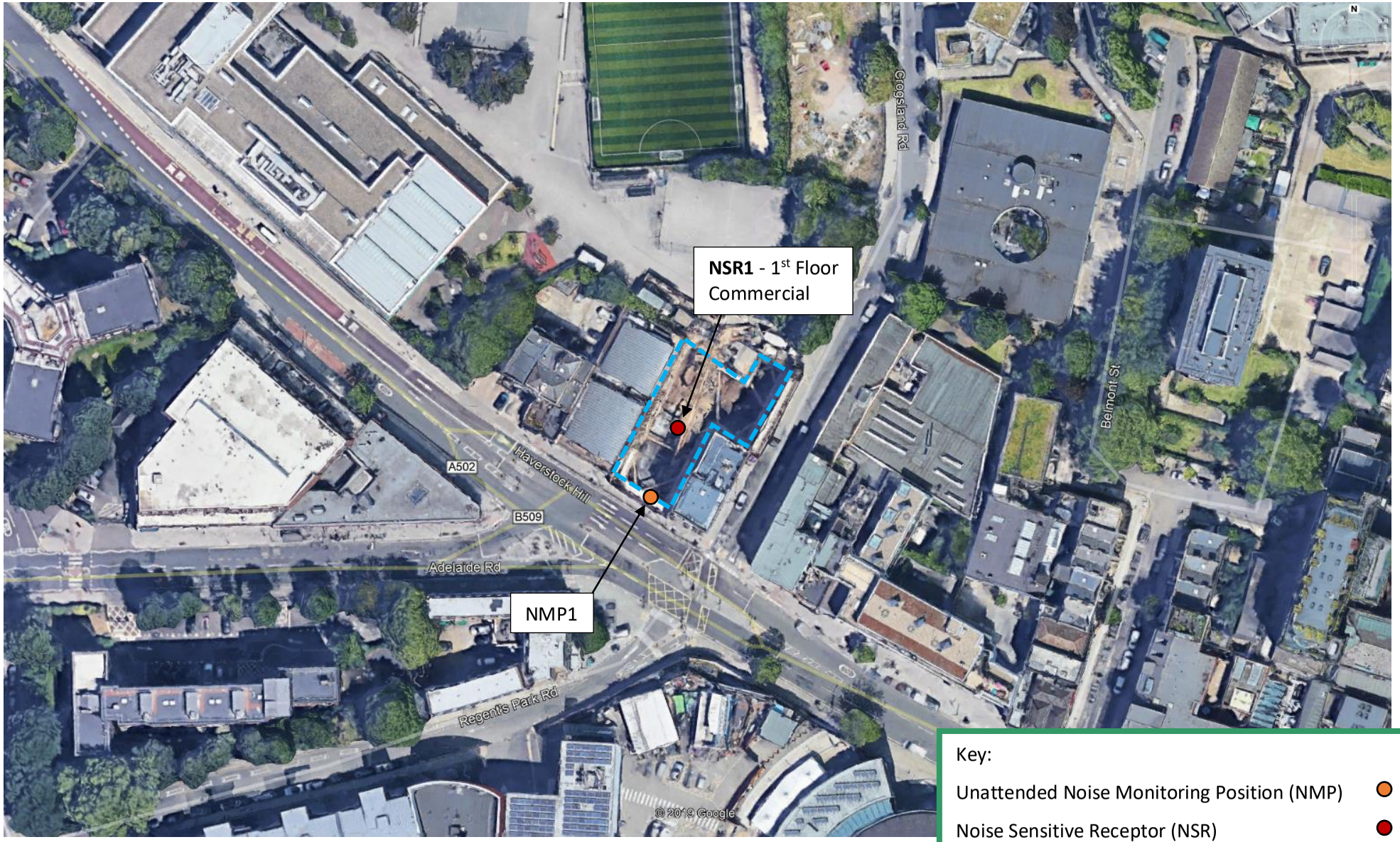
10.2. The typical night-time background level at the site has been calculated at 51dB $L_{A90,15mins}$.

10.3. An acoustic design review of the proposed constructions has been undertaken utilising the technical drawings and information provided by the client.

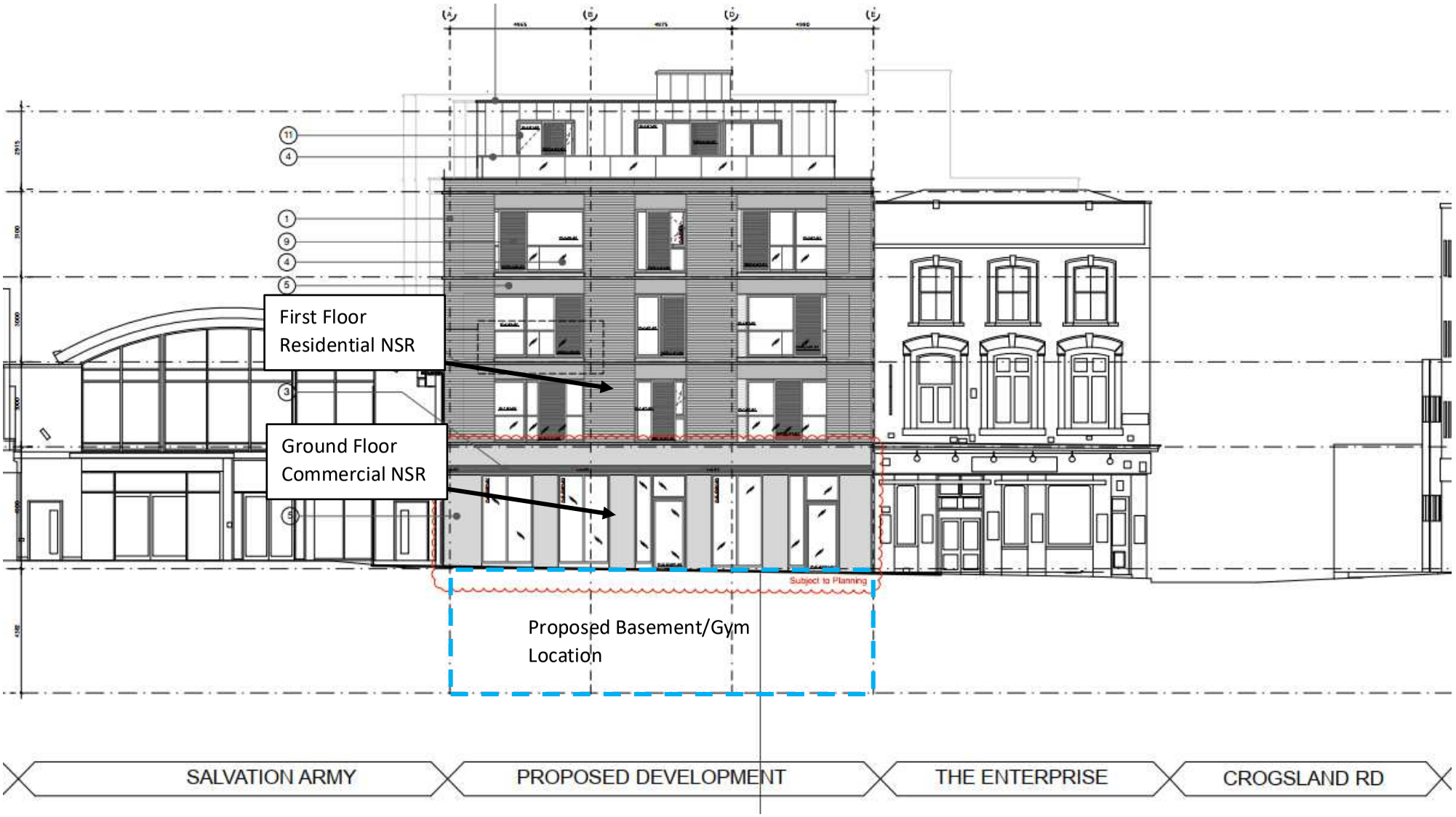
10.4. Recommendations to improve the sound insulation of the proposed structure have been provided along with recommendations to reduce the potential noise impact from the proposed 24-hour gym.

10.5. Considering the results of the noise survey, the illustrative layouts and the calculations, the predicted resultant noise levels from the gym are predicted to meet appropriate and reasonable guidance and the relevant noise criteria. Therefore, an adequate level of protection against noise for occupants of the nearest noise sensitive receptor is afforded; including when factoring in potential uncertainty.

Appendix A – Site plan illustrating the noise measurement positions, site boundary and noise sensitive receptors (SP1)



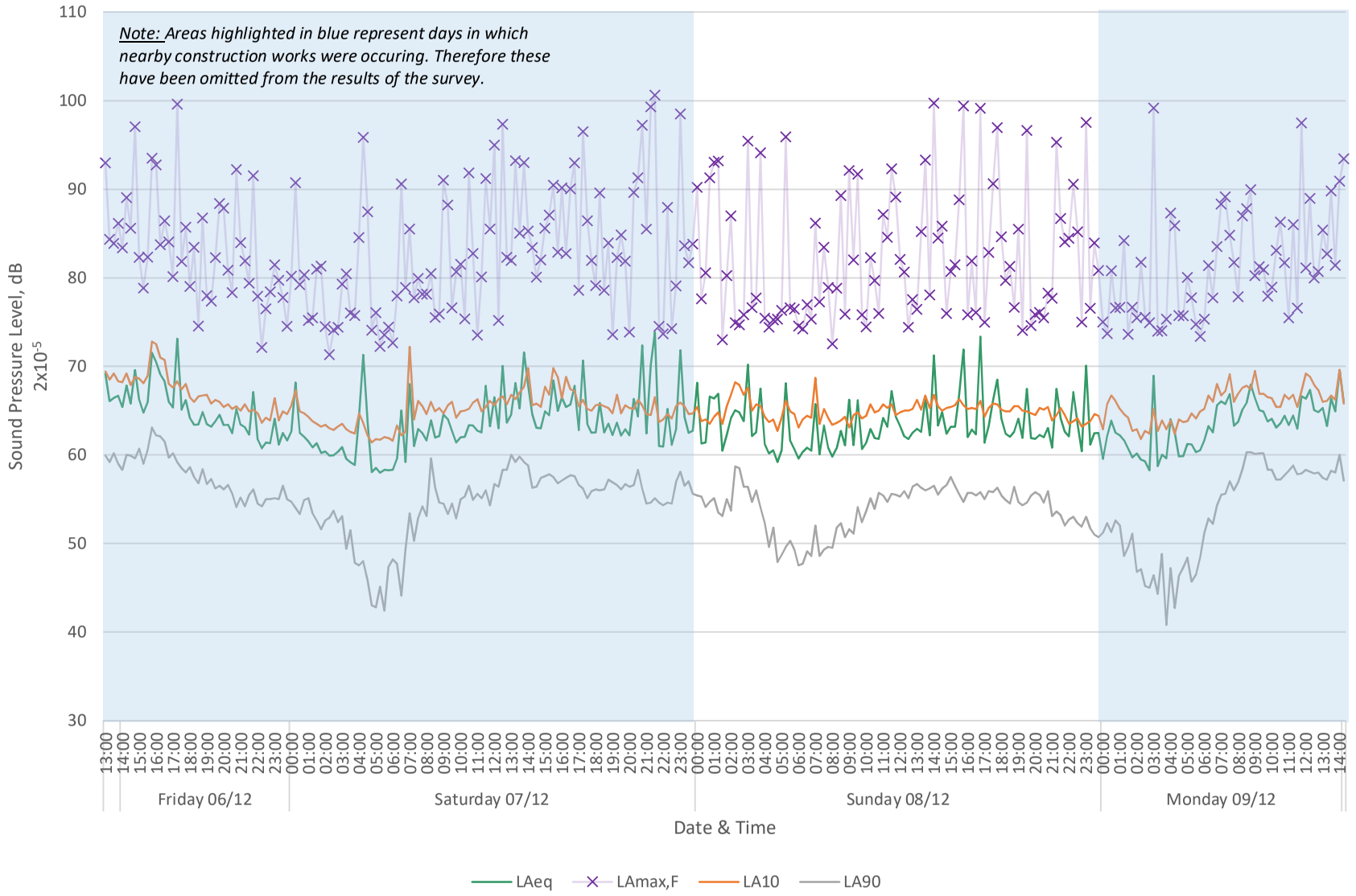
Appendix A – Elevation drawings highlighting the location of the gym and the NSRs



Appendix B - Time History 1 (TH1)

Marine Ices, Haverstock Hill, Chalk Farm, London
Friday 6th December 2019 - Monday 9th December 2019

ACOUSTICS



Appendix C - Acoustic Calculations

IWS-02

Source: Proposed Gym

	Frequency Spectral Data (Hz)							
	63	125	250	500	1000	2000	4000	dB(A)
Average Music Level (LAeq,1hour)	81	84	77	73	76	74	69	80
Sound Reduction Index of Partition*	-41	-43	-40	-46	-53	-58	-64	
Penalty for on-site testing	8	8	8	8	8	8	8	
Calculated Transmitted Level	**48**	**49**	**45**	**35**	**31**	**24**	**13**	**40**

**Construction build-ups are predicted based on information provided by client*

IWS-04

Source: Proposed Gym

	Frequency Spectral Data (Hz)							
	63	125	250	500	1000	2000	4000	dB(A)
Average Music Level (LAeq,1hour)	81	84	77	73	76	74	69	80
Sound Reduction Index of Partition*	-40	-42	-39	-46	-53	-59	-64	
Penalty for on-site testing	8	8	8	8	8	8	8	
Calculated Transmitted Level	**49**	**50**	**46**	**35**	**31**	**23**	**13**	**41**

**Construction build-ups are predicted based on information provided by client*

IWS-04A

Source: Proposed Gym

	Frequency Spectral Data (Hz)							
	63	125	250	500	1000	2000	4000	dB(A)
Average Music Level (LAeq,1hour)	81	84	77	73	76	74	69	80
Sound Reduction Index of Partition*	-40	-42	-40	-46	-54	-60	-65	
Penalty for on-site testing	8	8	8	8	8	8	8	
Calculated Transmitted Level	**49**	**50**	**45**	**35**	**30**	**22**	**12**	**40**

**Construction build-ups are predicted based on information provided by client*

Separating Floor

Source: Proposed Gym

	Frequency Spectral Data (Hz)							
	63	125	250	500	1000	2000	4000	dB(A)
Average Music Level (LAeq,1hour)	81	84	77	73	76	74	69	80
Sound Reduction Index of Partition*	-46	-35	-53	-64	-71	-78	-100	
Penalty for on-site testing	8	8	8	8	8	8	8	
Calculated Transmitted Level	**43**	**57**	**32**	**17**	**13**	**4**	**-23**	**41**

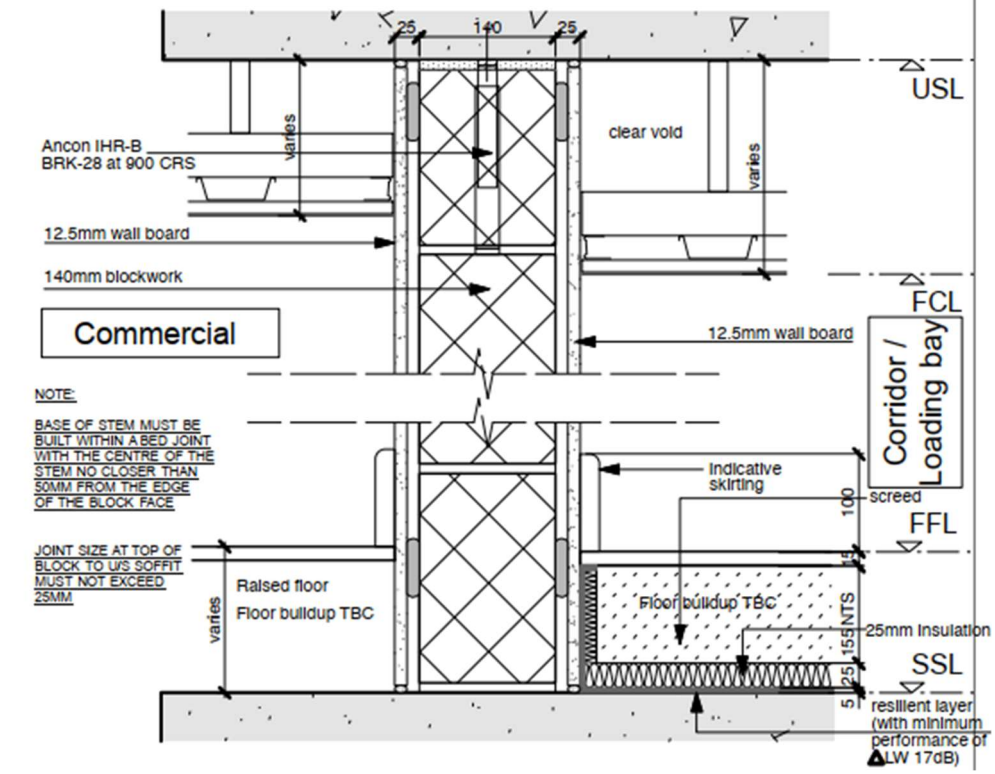
**Construction build-ups are predicted based on information provided by client*

Appendix D – Provided Technical Drawings

Internal Wall Partitions

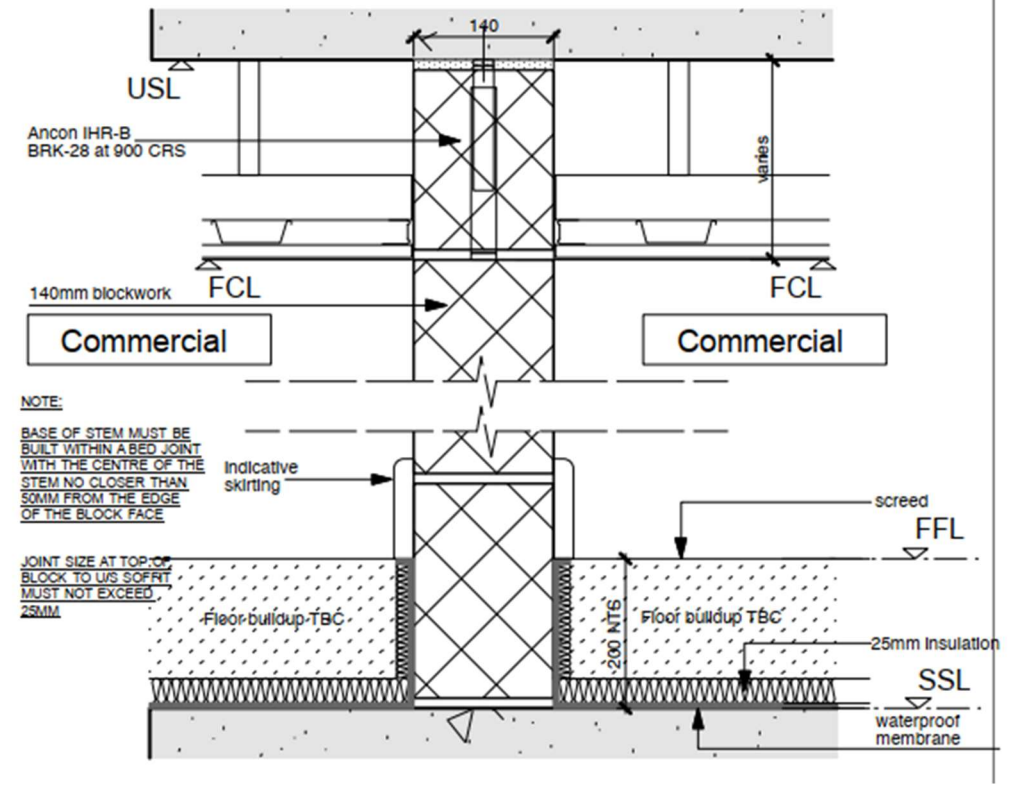
IWS-02 Partition Wall - 100mm

1:5 @ A1, 1:10 @ A3



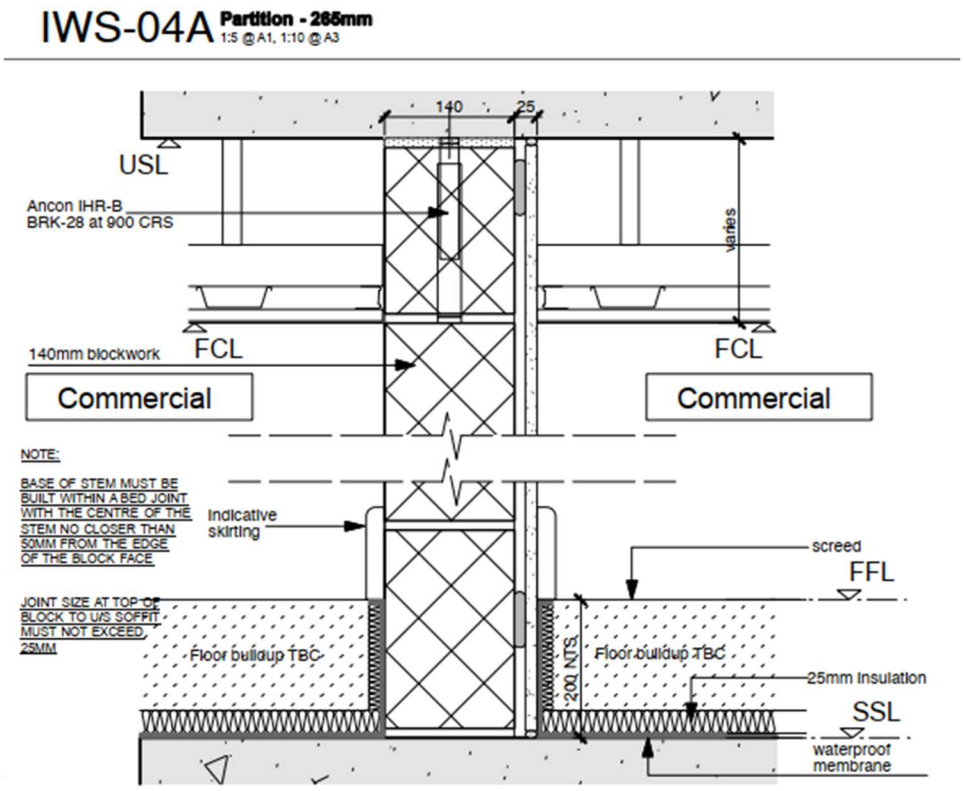
IWS-04 Partition Wall - 190mm

1:5 @ A1, 1:10 @ A3

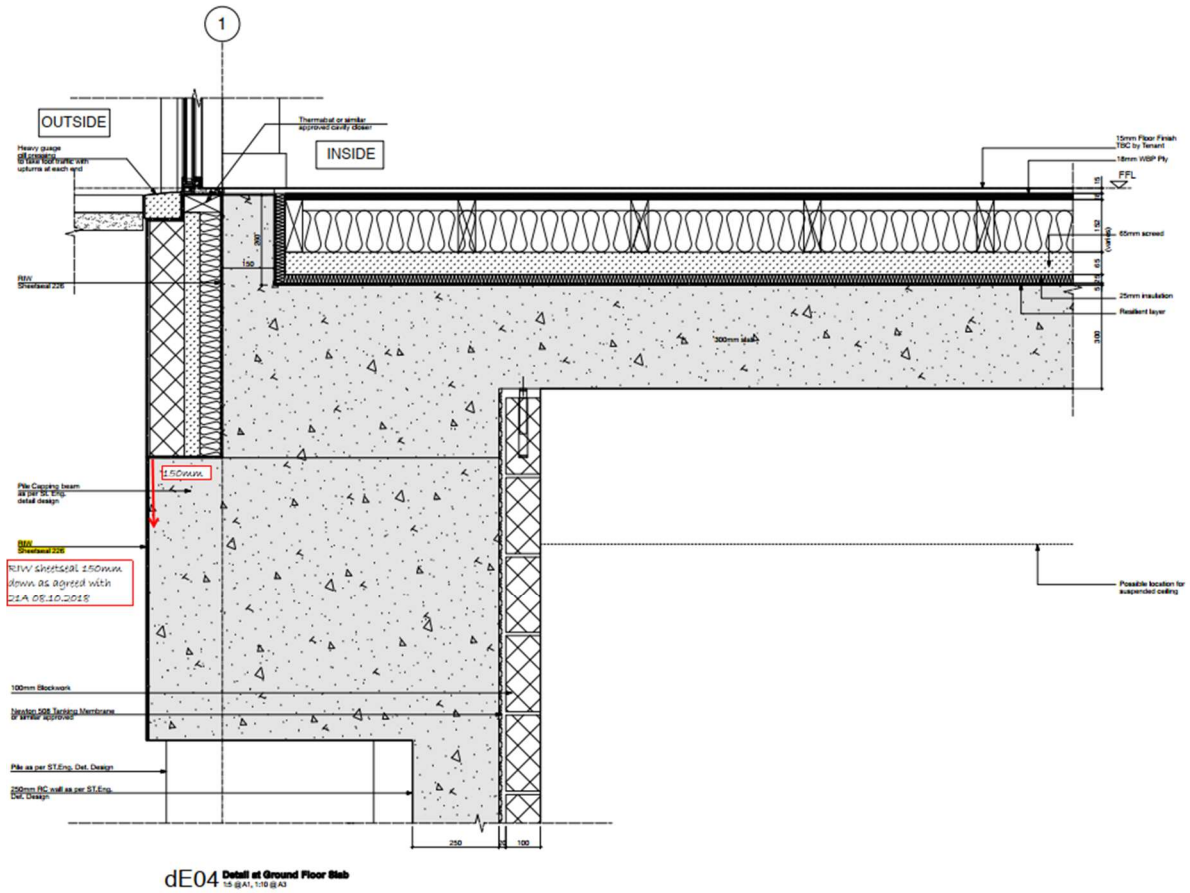


Appendix D – Provided Technical Drawings

Internal Wall Partitions

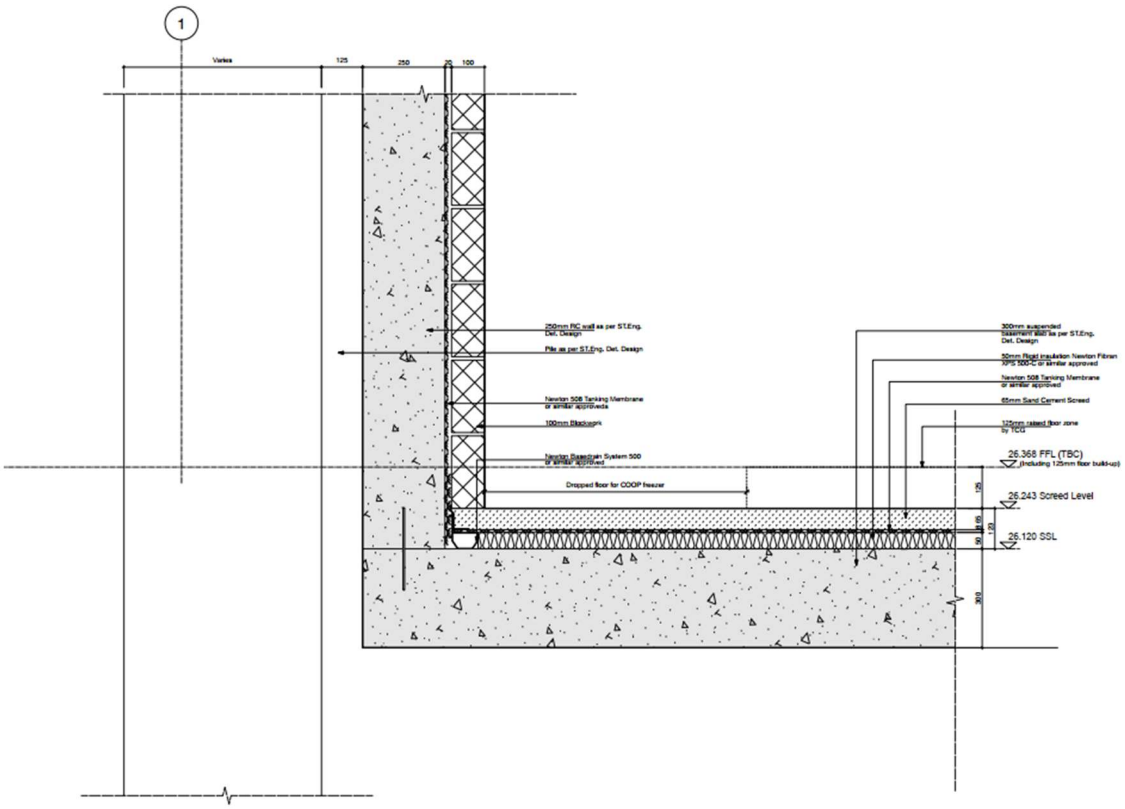


Separating Floor Partition



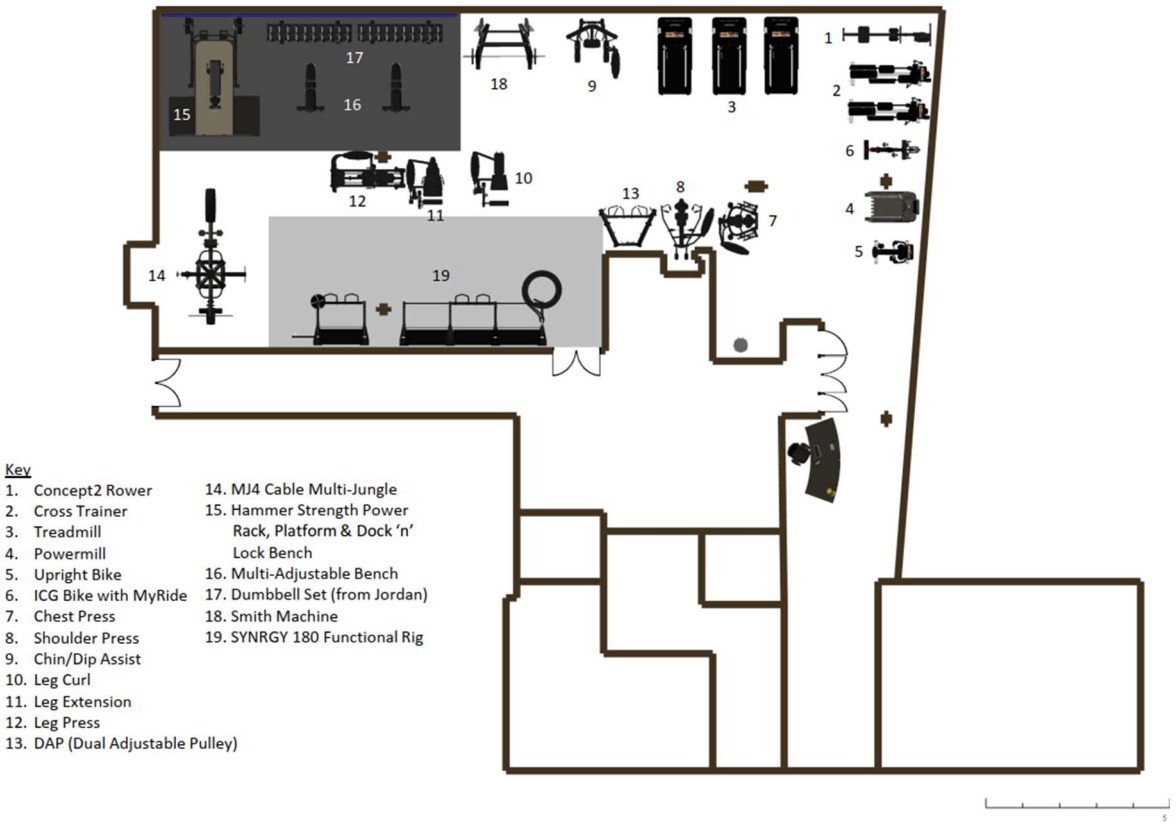
Appendix D – Provided Technical Drawings

Basement Floor Construction



dE05 **Detail at Basement Floor Slab and Floor buildup**

Proposed Gym Layout



Key

1. Concept2 Rower
2. Cross Trainer
3. Treadmill
4. Powermill
5. Upright Bike
6. ICG Bike with MyRide
7. Chest Press
8. Shoulder Press
9. Chin/Dip Assist
10. Leg Curl
11. Leg Extension
12. Leg Press
13. DAP (Dual Adjustable Pulley)
14. MJ4 Cable Multi-Jungle
15. Hammer Strength Power Rack, Platform & Dock 'n' Lock Bench
16. Multi-Adjustable Bench
17. Dumbbell Set (from Jordan)
18. Smith Machine
19. SYNRGY 180 Functional Rig