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Planning Statement

Continued Use of Unit as a Gymnasium with Amended Hours to Reflect the 24/7 Nature of the Land Use

Land at 47 Crogsland Road
London
NW1 8AY

April 2023

Document Reference: 3261
London Borough of Camden

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Introduction

1. This Planning Statement has been prepared by Plainview Planning Ltd in support of a full planning application for *"Continued Use of the Unit as a Gymnasium with Amended Hours to Reflect the 24/7 Nature of the Land Use"* at land at 47 Crogsland Road, Camden, London, NW1 8AY.

2. The gym is operated by Anytime Fitness, a well regarded worldwide gym company who successfully operate 160+ 24/7 gyms around the country inclusive of gyms in close proximity to residential properties, similar to this site.

Site Context and Designations

The Site

3. The application site is situated to the north-east of Haverstock Hill and the west of Crogsland Road. The focus of this application is the basement level where the gymnasium is located, including the access at the ground floor level.

Planning Policy Map Designations

4. According to the Camden Local Plan policy map the site is within the Camden Town Centre. The site is not within a Conservation Area and is not listed. These considerations are discussed in the planning policy section of this report.

Planning History

5. There have been a number of historic planning applications on the site, confirmed by the online planning application database. Most relate to the discharge of conditions of the base permission which is detailed below.

Date	Reference	Description	Decision
10-02-2021	2020/1487/P	Variation of condition 2 (approved plans)...of planning permission ref. 2015/0487/P dated 22/12/2016 (as amended by ref. 2020/3347/P dated 30/7/2020 and 2017/3018/P dated 13/6/2017)...namely for addition of plant, reconfiguration of basement and ground floor layout to provide gym (Class D2), supermarket (Class A1) and restaurant (Class A3) and elevational alterations.	Granted - subject to a Section 106 legal agreement
30-07-2020	2020/3347/P	Amendment to description of development of planning	Granted

		permission ref. 2015/0487/P (dated 22/12/2016)...namely to replace the reference to cinema (Class D2) with assembly & leisure (Class D2)	
10-01-2019	2018/6077/P	Alterations to internal unit configuration as an amendment to planning permission ref. 2015/0487/P...	Granted
19-04-2018	2018/1323/P	Details of brickwork relating to Condition 3 (vi) of 2015/0487/P...	Granted
08-06-2017	2017/3018/P	Reduction in the depth of the basement and provision of internal cycle store at ground floor level, as an amendment to planning permission ref 2015/0487/P...	Granted
26-5-2-17	2017/3001/P	Details of SUDS in relation to Condition 7 of planning permission 2015/0487/P...	Granted
26-05-2017	2017/2967/P	Details of Acoustic insulation in relation to Condition 17 of planning permission 2015/0487/P...	Granted
26-05-2017	2017/2678/P	Details of Landscaping in relation to Condition 5 of planning permission 2015/0487/P...	Granted
26/05/2017	2017/2271/P	Details of temporary works in relation to condition 20 of planning permission (2015/0487/P)...	Granted
26/05/2017	2017/2269/P	Details of contaminated land in relation to condition 13 (a) of planning permission 2015/0487/P...	Granted
12-05-2017	2017/2270/P	Details of bin storage (condition 9) and cycle storage (condition 10) in relation to planning permission (2015/0487/P)...	Granted
03-06-2016	2016/2778/P	Demolition of existing building (with retention of existing facade on Crogsland Road) in advance of redevelopment of site (as proposed in planning application reference 2015/0487/P)	Prior approval required - approval refused
02-02-2015	2015/0487/P	Demolition of existing buildings, with retention of facade at 45-47 Crogsland Road and construction of a part 4/part 5 storey building with basement comprising flexible use of cinema (class D2) at basement and ground level with ancillary restaurant and bar (class A3/A4) at ground level or retail class (class A1 at basement and ground floor level and 19 residential dwellings (8 x 1 bed, 9 x 2 bed and 2 x 3 bed units) on upper floors with associated cycle parking, amenity space and refuse and recycling storage.	Granted

6. In summary, on 30 July 2020, a NMA approval (ref. 2020/3347/P) was granted to replace the reference to cinema (Class D2) with assembly and leisure (Class D2). Then

on 10 February 2021, a fresh permission was granted (ref. 2020/1487/P), by way of a S73 to vary the approved plans condition to reconfigure the basement layout to provide a gym (Class D2), in addition to other things.

7. A further s73 application (ref. 2022/3930/P) was submitted to vary a condition to extend the opening hours for a gym. Resolution to grant permission subject to a Deed of Variation to the original s106 was issued. Due to the lack of conclusion on the signing of the Deed of Variation, a decision notice was never issued.

Background

8. Condition 14 of 2020/1487/P currently reads:

> *"The D2 and A3 uses hereby permitted shall not be carried out outside the following times: 08:00 to 23:00 Sunday to Thursday and 08:00 to 00:30 Friday and Saturday.*
>
> *Reason: To safeguard the amenities of the adjoining premises and the area generally in accordance with the requirements of policies A1 and A4 of the Camden Local Plan 2017."*

9. Since the granting of permission 2020/1487/P via S73 application, there has been a use class change whereby Classes D2 and A3 do not exist anymore. They are subsumed by Class E.

10. The gymnasium currently operates in line with Condition 14 of 2020/1487/P.

The Proposal

11. This application seeks the use of the gymnasium only at basement level for 24/7 opening.

12. This application does not seek to vary the opening hours of the other uses restricted by Condition 14 of permission 2020/1487/P.

13. The Applicant accepts that the 24/7 operation of the gymnasium is contingent upon it being operated in line with the approved acoustic report.

14. It is pertinent to note at this juncture that use of the basement as a gymnasium has been approved. This application does not seek to confirm the acceptability of the use of the basement as a gym - it is merely to extend the opening hours which are currently restricted.

15. The gym will be operated by Anytime Fitness who successfully operate a large number of 24/7 gyms around the country inclusive of gyms in close proximity to residential properties, similar to this site. It is intended to operate the gym on this basis.

16. In support of the application, an Acoustic Design Review and Noise Impact Assessment of Proposed Gym to Basement prepared by HA Acoustics, and a Noise Assessment has been prepared by KP Acoustics.

Planning Policy

17. Section 38(6) of the Planning and Compulsory Purchase Act 2004 requires that decisions must be made in accordance with relevant Development Plan Documents unless material considerations indicate otherwise.

18. The Development Plan comprises the Camden Local Plan (Local Plan) was adopted in 2017 and the London Plan 2021. A material to consideration is the National Planning Policy Framework 2021 (NPPF).

19. The relevant policies of the Local Plan are set out below:

    - Policy C3 Cultural and leisure facilities
    - Policy C5 Safety and security
    - Policy A1 Managing the impact of development
    - Policy A4 Noise and vibration
    - Policy TC4 Town centre uses

20. The relevant policies of the London Plan are set out below:

    - D14 Noise

Planning Considerations

Principle of Development

21. It is pertinent to note at this juncture that use of the basement as a gymnasium has been approved. This application does not seek to confirm the acceptability of the use of the basement as a gym - it is merely to extend the opening hours which are currently restricted.

Operation of a Gymnasium 24/7

22. Policy C3 - Cultural and leisure facilities of the Local Plan supports the provision and retention of sports facilities. It notes that there is a very high level of demand for sports facilities in the Borough and that they should be located in central locations to allow as many people as possible to enjoy their benefits, providing they do not have an adverse impact on the surrounding area or the local community.

23. Policy HC6 Supporting the night-time economy of the London Plan, at paragraph 7.6.1 notes that the night-time economy is becoming increasingly important to London's economy, with the Mayor keen to promote London as a 24-hour global city with the night-time economy generally focused within town centres.

24. The site is within an area of regional/sub-regional importance according to Figure 7.6 - Town centres and night-time economy roles - distinguishing those of international, sub-regional and more than local importance.

25. The 24 hours operation would meet the Mayor's objectives, cementing London's status as a global city, and meeting the needs of its diverse population with different working hours. A 24 hour gym provides services to people who work in shifts or unsociable hours. Many of the Applicant's active members are nurses, in the police force and firefighters - key workers who are vital to ensure London is safe and functions as a global city. Other members are employees of the 'night time economy'. A 24 hour gym provides leisure opportunities for workers who finish in late evenings or early mornings.

26. It should also be noted at this juncture that Anytime Fitness has a successful track record in operating gyms in close proximity to residential uses. Indeed, they have secured approval for 24/7 operations at: Anytime Ruslip, which is located below residential units at a busy junction in west London; Anytime Fitness Woolwich, which is co-located in a mixed-use development with Tesco Extra on the second floor and residential units on a podium; Anytime Fitness Tulse Hill; and Anytime Fitness Raynes Park.

27. The proposed 24/7 operation of the gymnasium in the Town Centre is therefore considered to be in line with the aims of policy C3 of the Local Plan, the London Plan and Paragraph 185 of the NPPF subject to its impact on the amenity of the area.

Impact on Neighbouring Amenity - Noise

28. Condition 12 of planning permission 2020/1487/P relates to noise levels at the development and notes that noise levels should not exceed 10dB(A) below the

existing background measurement (LA90). This indicates a level of noise which is considered to be acceptable by the Council.

29. Condition 19 of planning permission 2020/1487/P sets out, *"No music shall (sic) emitted from the commercial part of the development shall be audible at any residential/noise sensitive premises".*

30. In support of the application, an Acoustic Design Review and Noise Impact Assessment of Proposed Gym to Basement report was prepared by HA Acoustics, and a Noise Assessment has been prepared by KP Acoustics.

31. The scope of the Acoustic Design Review and Noise Impact Assessment of Proposed Gym report extended to the *proposed* construction of the gym and that at the time of their survey/assessment, and due to incomplete construction, only a theoretical breakout assessment and acoustic design review had been completed as opposed to a real survey.

32. The report finds that the typical night time background noise level at the site is 51dB LA90 (daytime readings were taken but were higher, as the proposal is for a 24/7 operation, the lower figure has been used). The report makes recommendations to improve the sound insulation of the space in order to ensure that an acceptable sound level from a 24/7 gym is achieved.

33. Appendix C of the acoustic report demonstrates that a level of 41db is achievable with the proposed sound insulation. This assessment also includes an average music level from the gym.

34. This level of 41dB is 10dB below the night time background noise level recorded of 51dB LA90. The proposal is therefore considered to comply with conditions 12 and 19 of the permission 2020/1487/P.

35. The report also concludes that *'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.'*

36. Further to this, a Noise Assessment has been prepared by KP Acoustics. The main objective of the report was to provide recommendations for gym floor coverings to mitigate against any noise impact on surrounding commercial or residential units. 'Smashtiles' have been recommended by the acousticians. The recommended floor covering has since been installed in order to avoid excessive sound transferal to the commercial units above.

37. The Applicant is happy to accept a condition requiring that the acoustic protection is included.

38. It has therefore been demonstrated that any noise generating use can be operated without causing harm to the amenity of neighbouring properties or the surrounding area. The application is therefore considered to be in line with the aims of Policies A1 and A4 of the Local Plan, Policy D14 of the London Plan, paragraph 185 of the NPPF, and with Conditions 12 and 19 of permission 2020/1487/P.

39. Therefore the use of the space itself should not cause any nuisance or disturbance to neighbours, including those using and living above the gym.

Safety and Security and Movement of People

40. It has been noted previously by an Inspector at a site in Lewisham, London under appeal reference APP/C5690/A/13/2207484 (see Appendix A) that the 24/7 operation of a gymnasium would be very unlikely to generate more than a trickle of patrons during unsocial hours and that a small number of visitors, spread out through the night should not be significant within such a densely built-up residential area where there must be occasional comings and goings to and from residential properties. The Inspector also noted that they saw no reason why gym patrons would be particularly prone to committing acts of anti-social behaviour.

41. A 24 hour gym is materially different from the night time economy (bars and entertainment) in that users are unlikely to informally congregate outside the premises.

42. Data has been collected by Anytime Fitness for their existing 24/7 gym operations in Balham, Stratford East, and Kilburn. 'Gym usage' refers to average visiting hours.

43. The following trends have been identified:

    - Usage is generally flat from 5am to 4pm with two peaks, in the early morning and lunch hours
    - There is a distinct peak between 4pm and 8pm
    - Usage decreases significantly from 8pm
    - Usage is negligible from 9pm to 5am

44. Gym usage in off-peak hours from 9pm to 5am is insignificant. It does not exceed 10% of daily usage.

45. The extended operation of the gymnasium on a 24/7 basis is not considered to have a negative effect on the safety and security of the area and may in fact improve passive surveillance. The proposed 24/7 operation of the gymnasium is therefore considered to be in line with the aims of policy C5 of the Local Plan.

46. It should also be noted that opposite the site, on Crogsland Road, 'Selina Hotel' is open 24/7. Next door to the site is a pub/hotel with the reception open 24/7. This demonstrates that neighbouring uses operate on a 24/7 basis and therefore would not be particularly sensitive noise receptors that would be negatively impacted by the extended opening hours of the gym proposed.

Material Considerations

Local Benefits

47. The proposal will provide 24/7 access to a high quality sports facility operated by a worldwide gym company. Sports facilities are noted as being in demand within the Local Plan and will also provide additional employment opportunities in line with Policy GG5 of the London Plan and potentially provide a boost to the local economy.

48. The 24/7 operation of a gymnasium could also aid community health and well-being by providing facilities for local residents to remain active.

Conclusion

49. The purpose of the original condition 14 of 2020/1487/P was to safeguard the amenities of the adjoining premises and area generally from noise and disturbance. It has been demonstrated in this statement and supporting Noise Assessments that there are no detrimental impacts as a result of the amended hours of operation that would impact upon the amenity of neighbouring properties or on the area. The proposals accord with Development Plan policies, and the NPPF and therefore it is respectfully requested that this application is approved.

50. We trust that you have all you need to consider this application favourably, however if you require any further information from us please do not hesitate to contact us.

Appendix A

The Planning Inspectorate

Appeal Decision

Site visit made on 3 April 2014

by Les Greenwood MRTPI

an Inspector appointed by the Secretary of State for Communities and Local Government

Decision date: 25 April 2014

Appeal Ref: APP/C5690/A/13/2207484
Unit 2B, Birdwood Avenue, Lewisham, London SE13 6UR

- The appeal is made under section 78 of the Town and Country Planning Act 1990 against a refusal to grant planning permission.
- The appeal is made by Actilife Ltd against the decision of the Council of the London Borough of Lewisham.
- The application Ref DC/13/83517, dated 13 May 2013, was refused by notice dated 7 August 2013.
- The development proposed is the use of the site as a 24 hour gym.

Application for Costs

1. An application for costs was made by Actilife Ltd against the Council of the London Borough of Lewisham. This application is the subject of a separate decision.

Decision

2. The appeal is allowed and planning permission is granted for the use of the site as a 24 hour gym in accordance with the terms of the application Ref DC/13/83517, dated 13 May 2013, subject to the conditions set out in the attached Schedule.

Main issue

3. The main issue is the effect of the proposal on living conditions at neighbouring residential properties, with regard to potential noise and disturbance from late night and early morning use of the appeal premises.

Reasons

4. Unit 2B is large ground floor unit within a block of residential flats, surrounded mainly by other blocks of flats. The unit has an existing planning permission for Class D2 (Assembly and Leisure) uses, limited to opening hours of 07:00 to 23:00 each day in order to safeguard the amenities of adjoining residents. The appeal proposal is for use as a gymnasium (which would be within Use Class D2), to be open 24 hours a day, 7 days a week.

5. The appellant's noise report recommends noise limits for the use and these can be set by planning conditions. Therefore the use of the building itself should

not cause any nuisance or disturbance to neighbours, including those living above the gym. The Council's main concern, however, relates to the comings and goings of patrons at unsocial hours and potential anti-social behaviour outside the premises. Much is made in the appellant's submissions of the light use of such gyms during late nights/early mornings and the difference between this particular use and other potential uses in Class D2.

6. I accept that the proposed use as a gym would be very unlikely to generate more than a trickle of patrons during unsocial hours. I agree that it would be significantly different in this respect to some other potential uses falling within Class D2. This small number of visitors, spread out through the night, should not be significant within such a densely built-up residential area where there must be occasional comings and goings to and from the flats as well. I see no reason why gym patrons would be particularly prone to committing acts of anti-social behaviour.

7. Subject to the noise control conditions referenced above and to another condition limiting use of the premises to a gym as proposed, I conclude that the proposal would not unduly affect living conditions at neighbouring residential properties. The proposal therefore accords with the aims of Policy ENV PRO11 of the Lewisham Unitary Development Plan (2004) and Policy DM26 of the proposed submission version of the Development Management Local Plan (2013), to protect sensitive uses from excessive noise and to resist development that would lead to unacceptable levels of noise. This is also in line with the National Planning Policy Framework's emphasis on preventing existing development from being adversely affected by unacceptable levels of noise pollution. I furthermore find no conflict with the more recently published National Planning Practice Guidance.

8. Local residents have also raised concerns about security, traffic and parking. I see no significant evidence suggesting that these issues would be materially affected, particularly given the anticipated light usage of the proposed gym during the hours not already permitted.

9. Turning back to the matter of conditions, I also impose a condition listing the approved plans, for the avoidance of doubt and in the interest of proper planning. I have amended the Council's suggested wording in places in the interest of clarity and concision.

10. The appellant has requested that any condition limiting the use to a gym should allow the premises to revert to other Class D2 uses if the 24 hour gym use ceases. I am sympathetic to this request. However, implementation of this permission would appear to supersede the previous permission and no wording has been suggested which would adequately provide such flexibility while also protecting the amenity of local residents. The condition as imposed therefore limits use to a gym, as proposed.

11. For the reasons set out above, and having regard to all other matters raised, I conclude that the appeal should succeed.

Les Greenwood

INSPECTOR

[Schedule of Conditions follows]

SCHEDULE OF CONDITIONS

1) The development hereby permitted shall begin not later than three years from the date of this decision.

2) The development hereby permitted shall be carried out in accordance with the following approved plans: LON104-001 and D10517-C.

3) The rating level of the noise emitted from fixed plant and from the premises on the site shall be 5dB below the existing background level measured as 37dBA and detailed in the submitted Report AA479/11/12/12. The noise levels shall be detemined at the façade of any noise sensitive property. The measurements and assessments shall be made in accordance with BS4142:1997.

4) No music shall be played or amplified sound system used which is audible outside of the premises or within adjoining buildings and no music shall be played (other than through earphones or headphones) or amplified sound system used between the hours of 23:00 and 07:00, 7 days a week.

5) Notwithstanding the provisions of the Town and Country Planning (General Permitted Development) Order 1995 or any Order revoking, re-enacting or modifying that Order, the premises shall only be used as a gymnasium and for no other purpose including any other purpose in Class D2 of the Schedule to the Town and Country Planning (Use Classes) Order 1987, or in any provision equivalent to that Class in any statutory instrument revoking and re-enacting that Order.

Appendix B

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
Author	Mr Leo Hawkins PGdip (IOA) BSC (Hons) AMIOA
Checked by	Mr Stuart J G Nixon MSc BSc (Hons) MIOA MCIEH

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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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Appendices

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

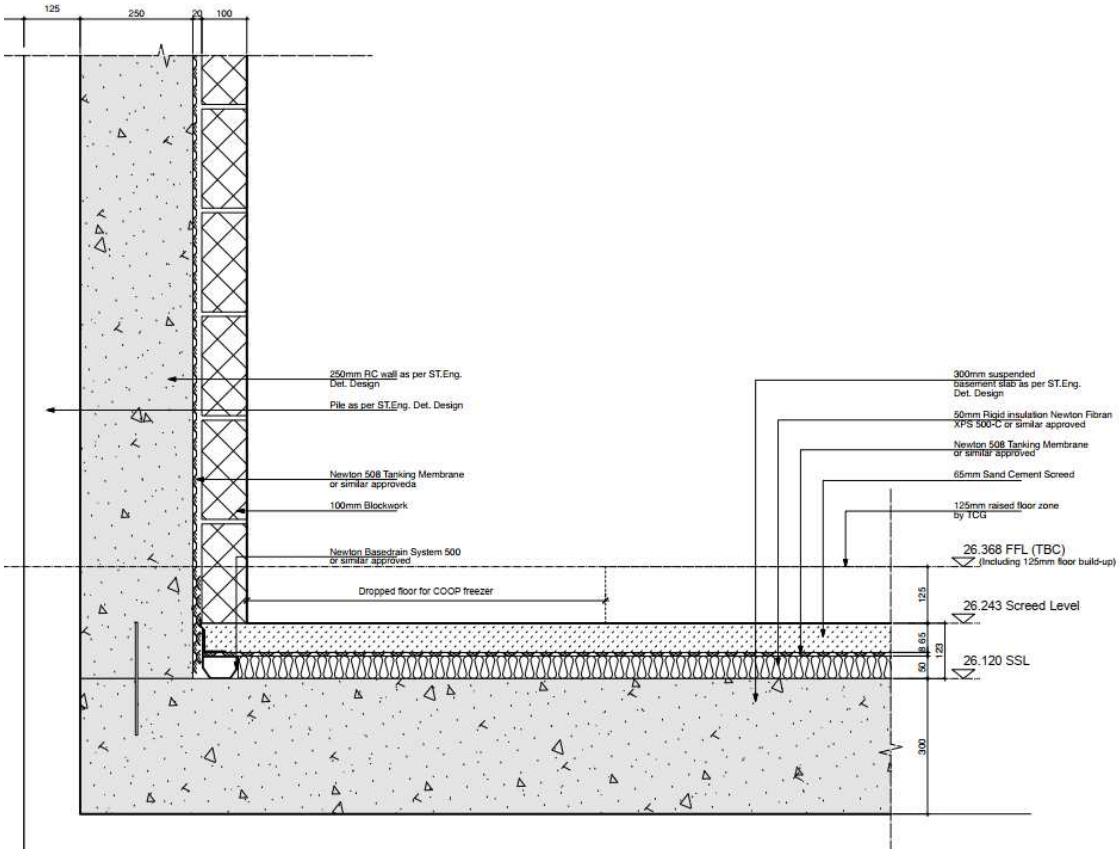
5.3. Due to the presence of nearby construction works, the Friday, Saturday and Monday have been omitted from the results of the survey. The levels presented in table 5.1 have been calculated from the 24 hour Sunday period.

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:



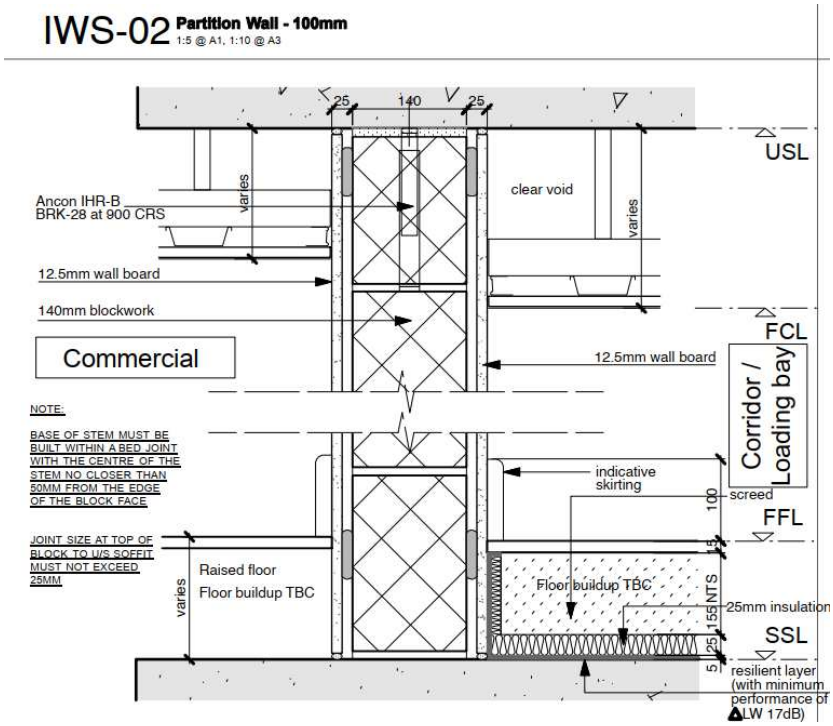
- 125mm Pile
- 250mm Reinforced Concrete Wall
- 20mm Newton 508 Tanking Membrane
- 100mm Blockwork

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:

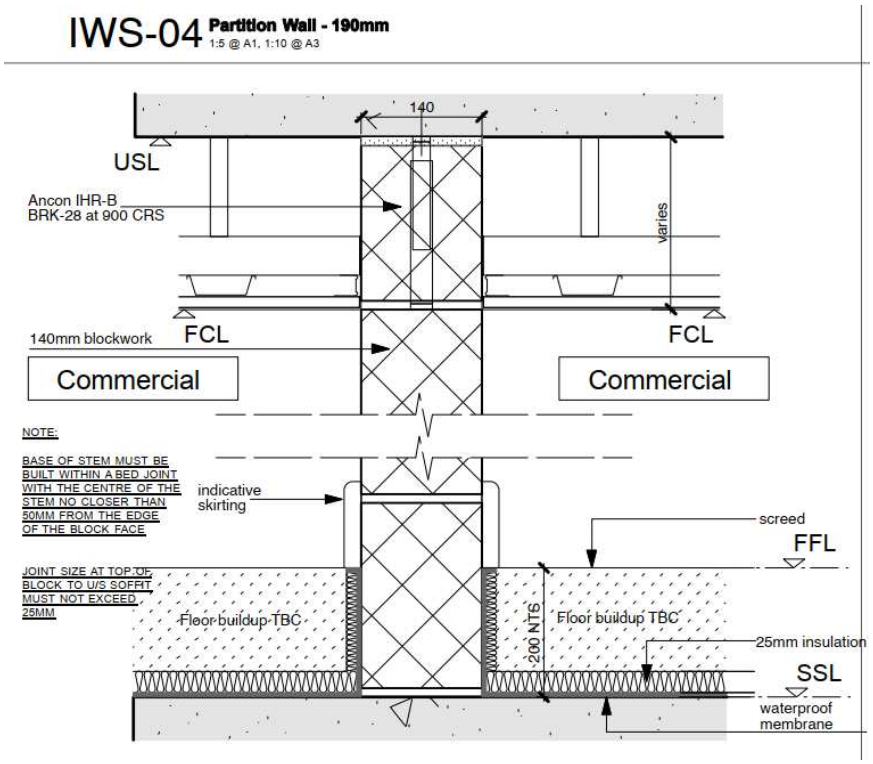
IWS-02 Partition Wall



- 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

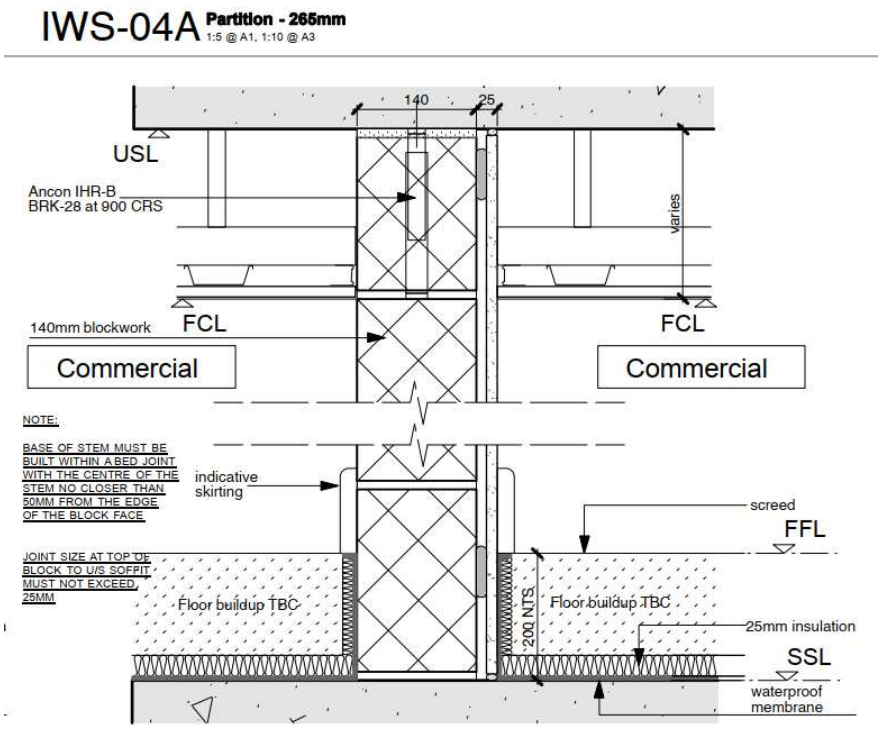
IWS-04 Partition Wall



- 140mm Blockwork

  Predicted sound insulation performance: 47dB R_w + Ctr

IWS-04A Partition Wall



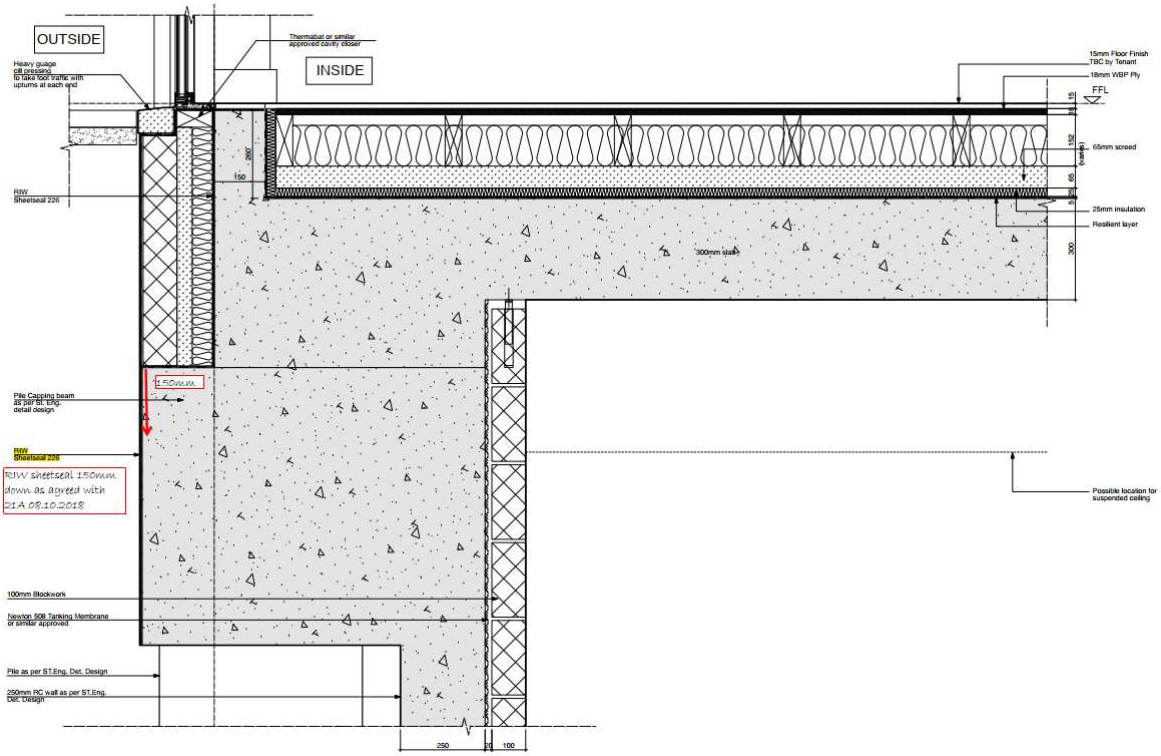
- 140mm Blockwork

- 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.

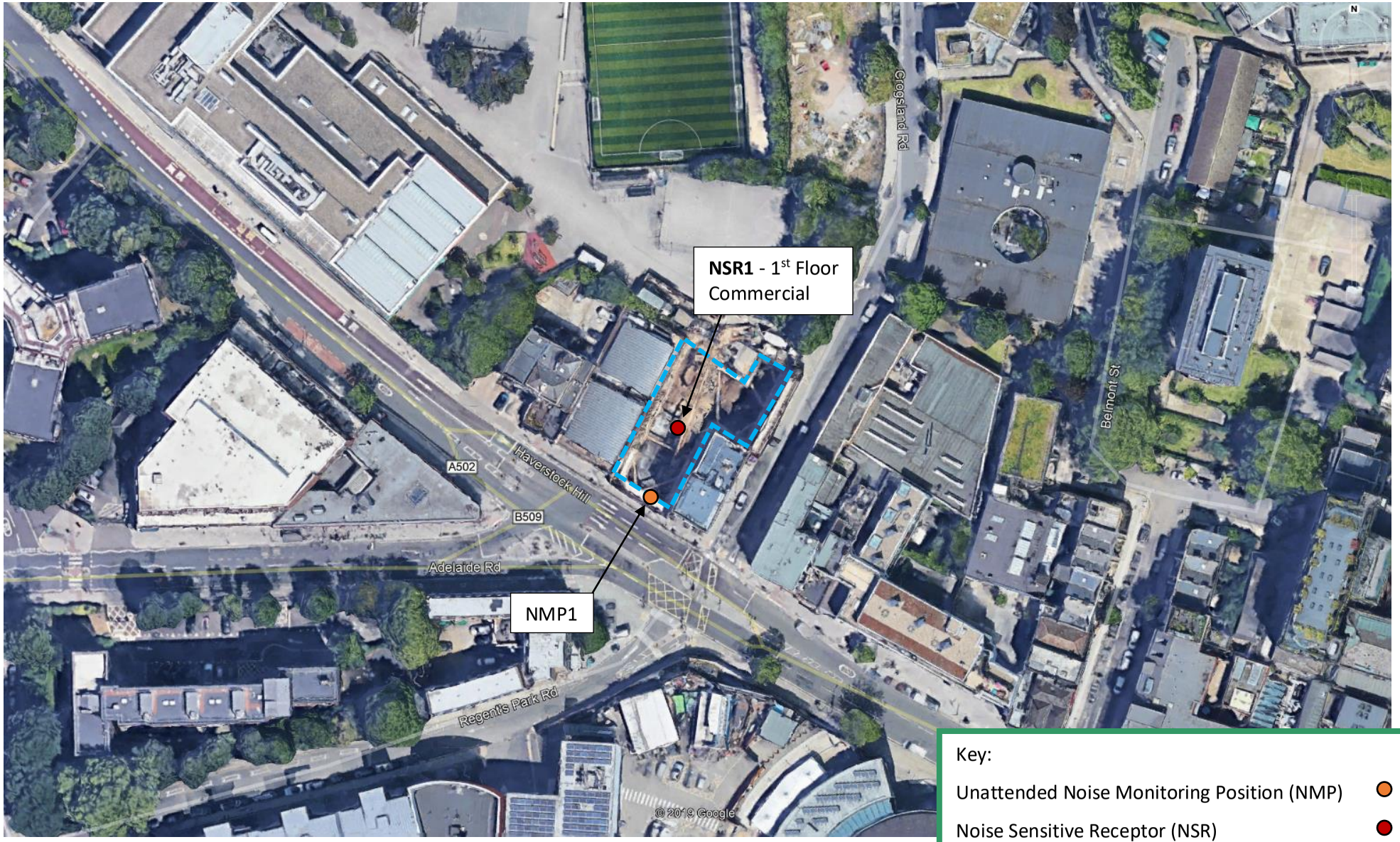
10.2. The typical night-time background level at the site has been calculated at 51dB $L_{A90,15mins}$.

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

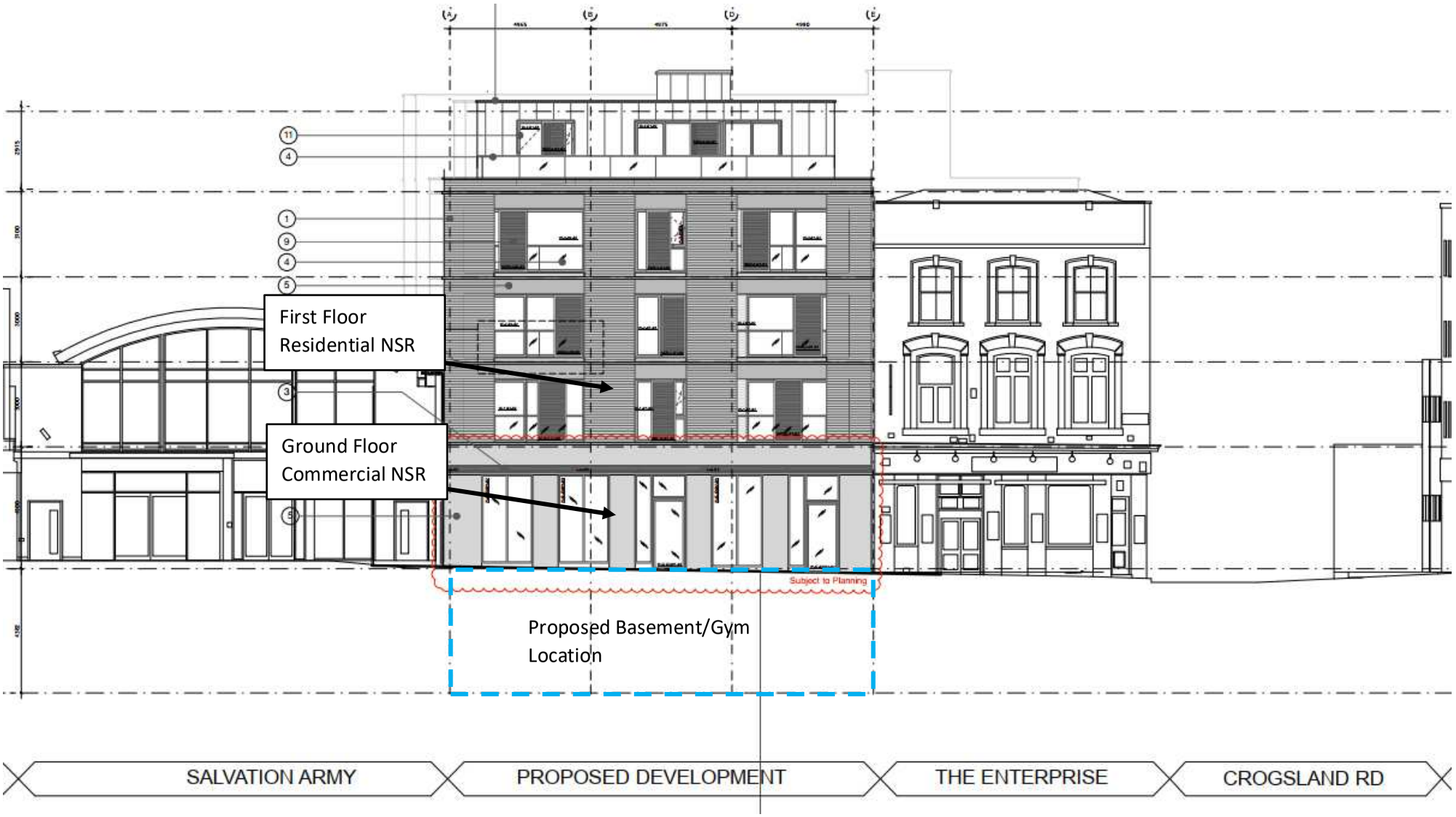
10.4. Recommendations to improve the sound insulation of the proposed structure have been provided along with recommendations to reduce the potential noise impact from the proposed 24-hour gym.

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)



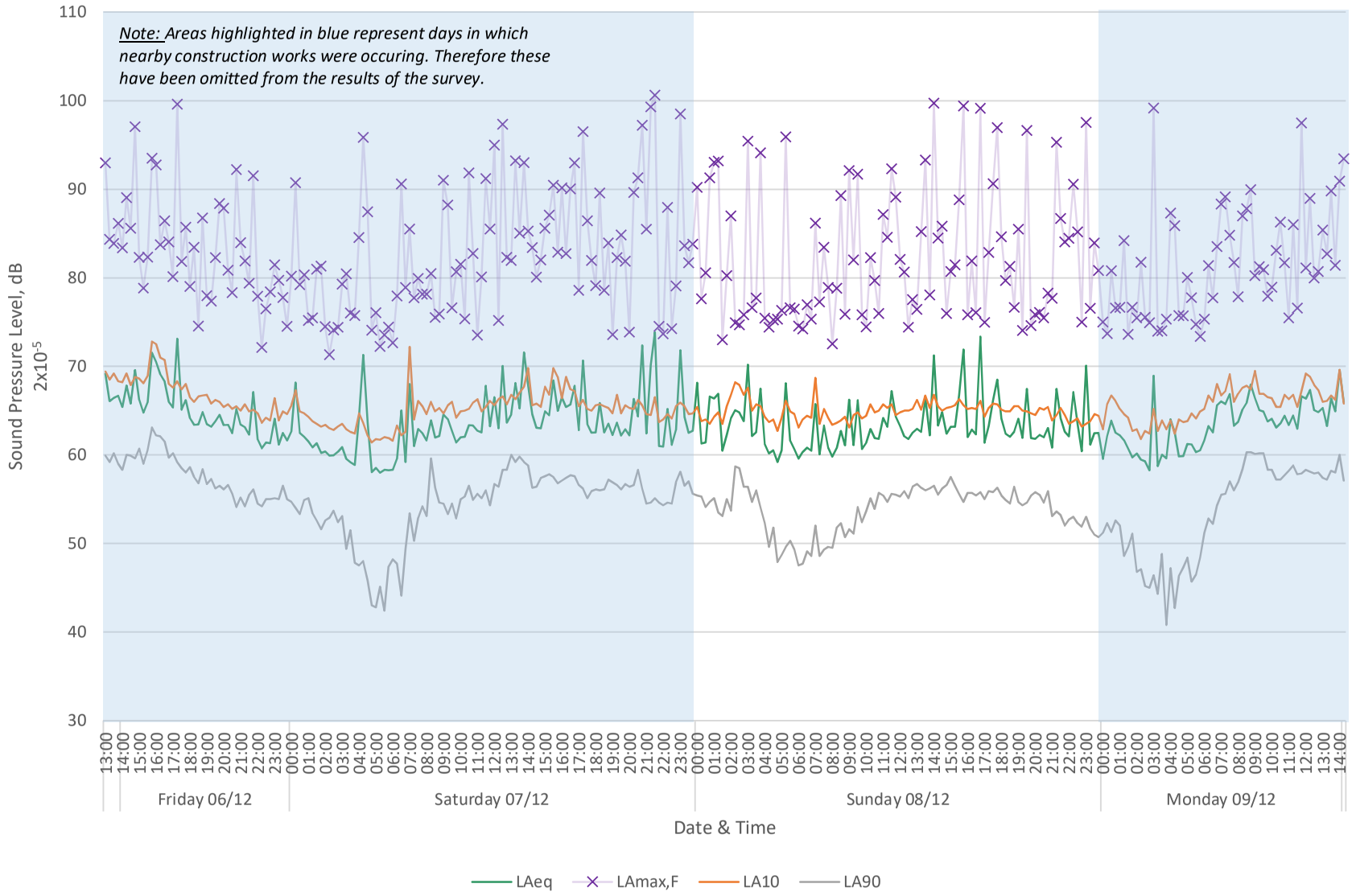
Appendix A – Elevation drawings highlighting the location of the gym and the NSRs



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**

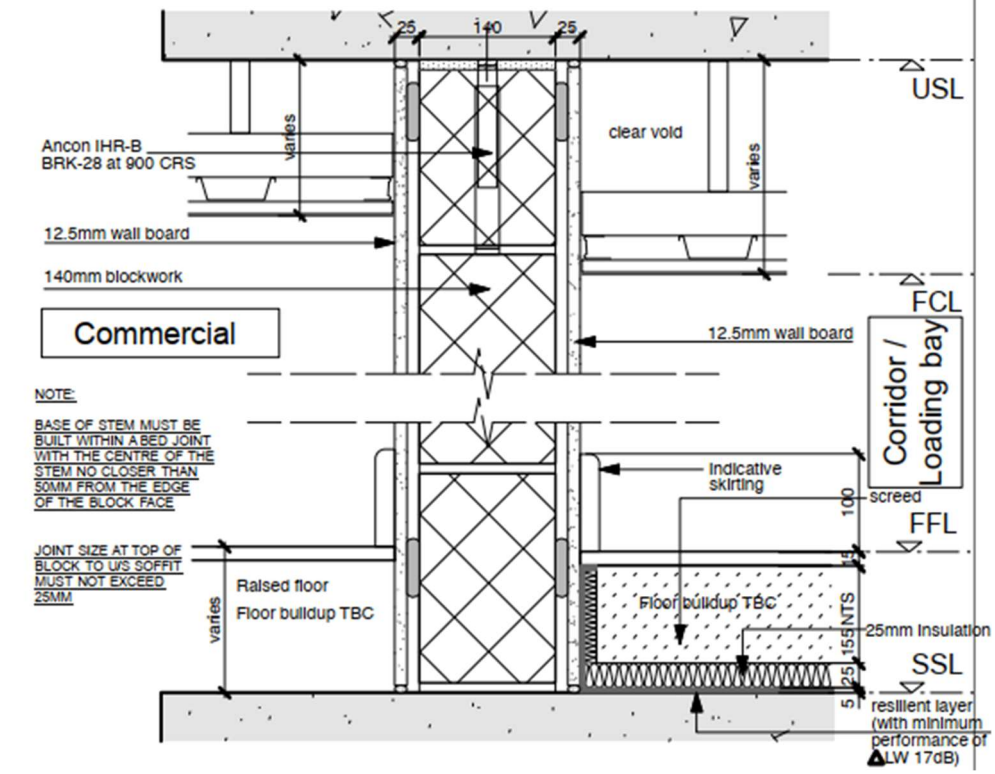
**Construction build-ups are predicted based on information provided by client*

Appendix D – Provided Technical Drawings

Internal Wall Partitions

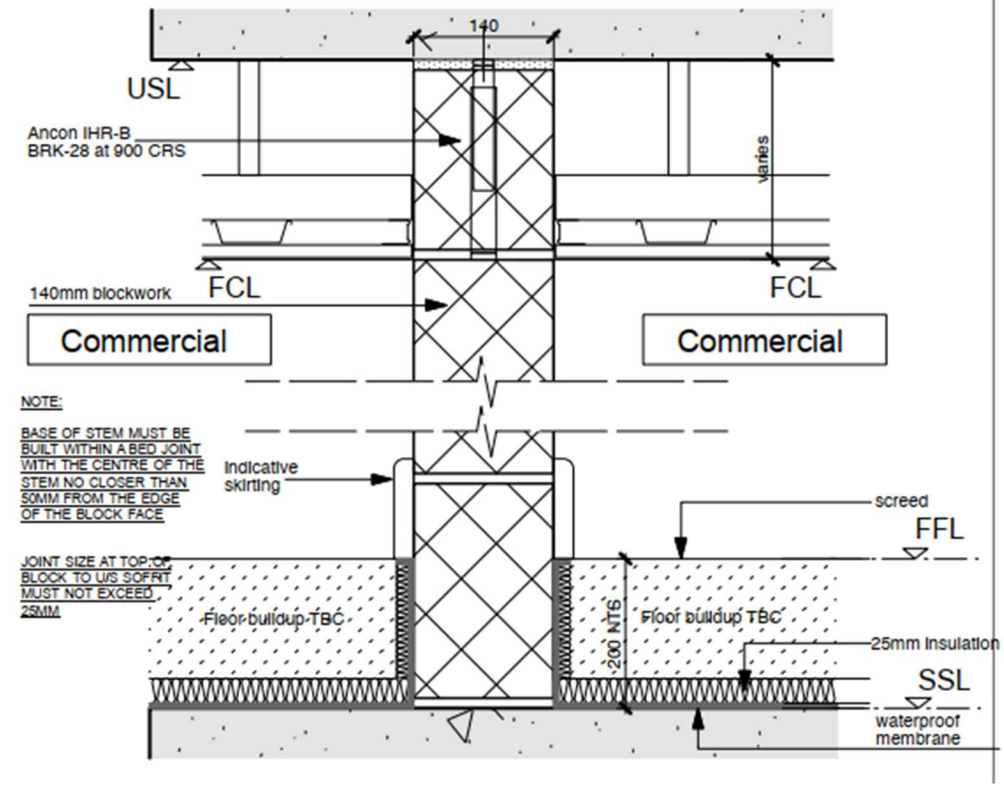
IWS-02 Partition Wall - 100mm

1:5 @ A1, 1:10 @ A3



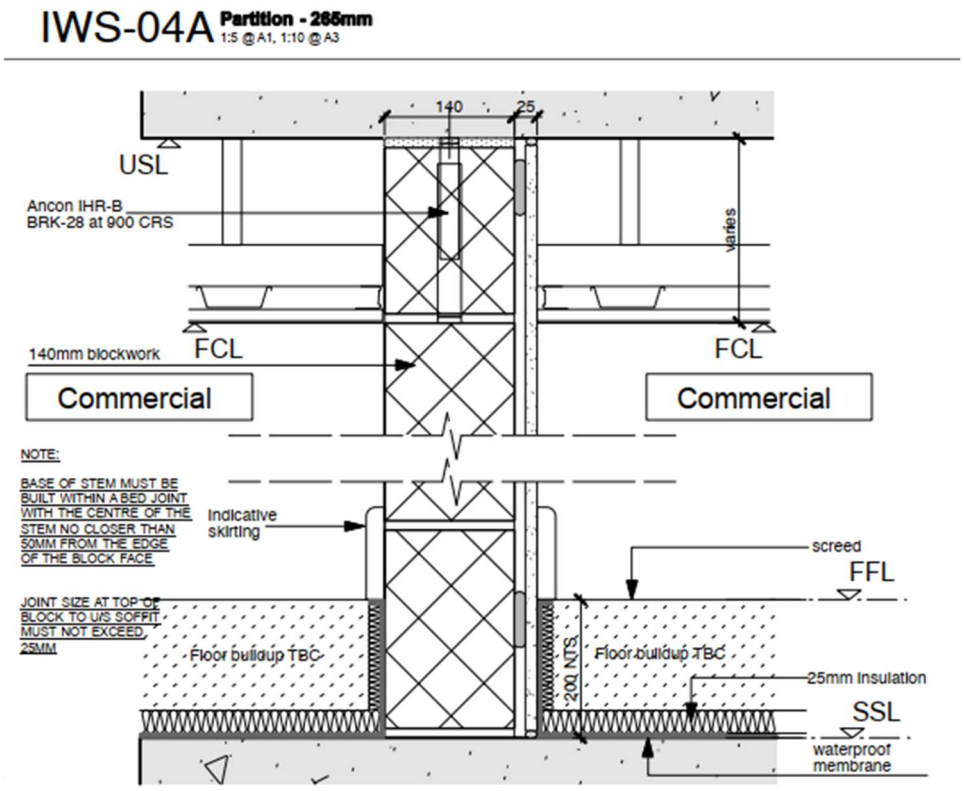
IWS-04 Partition Wall - 190mm

1:5 @ A1, 1:10 @ A3

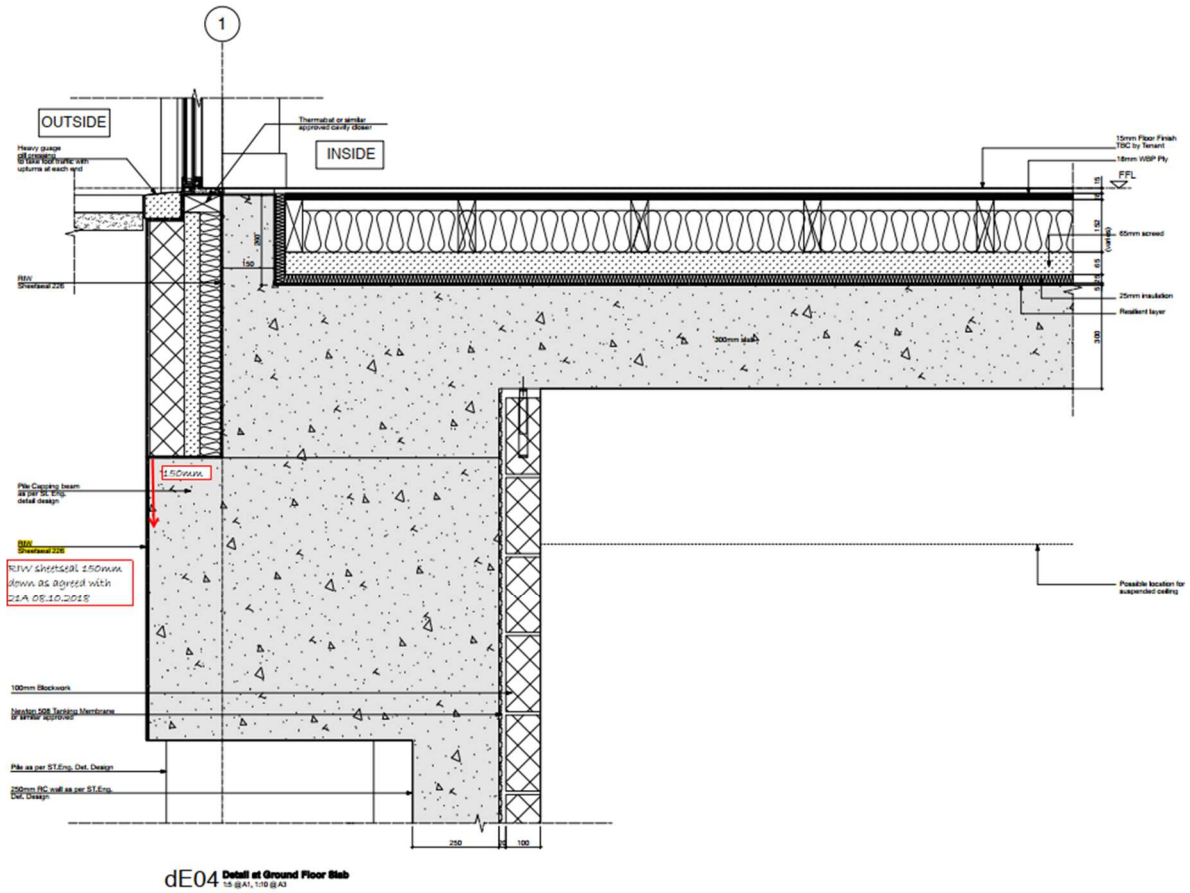


Appendix D – Provided Technical Drawings

Internal Wall Partitions

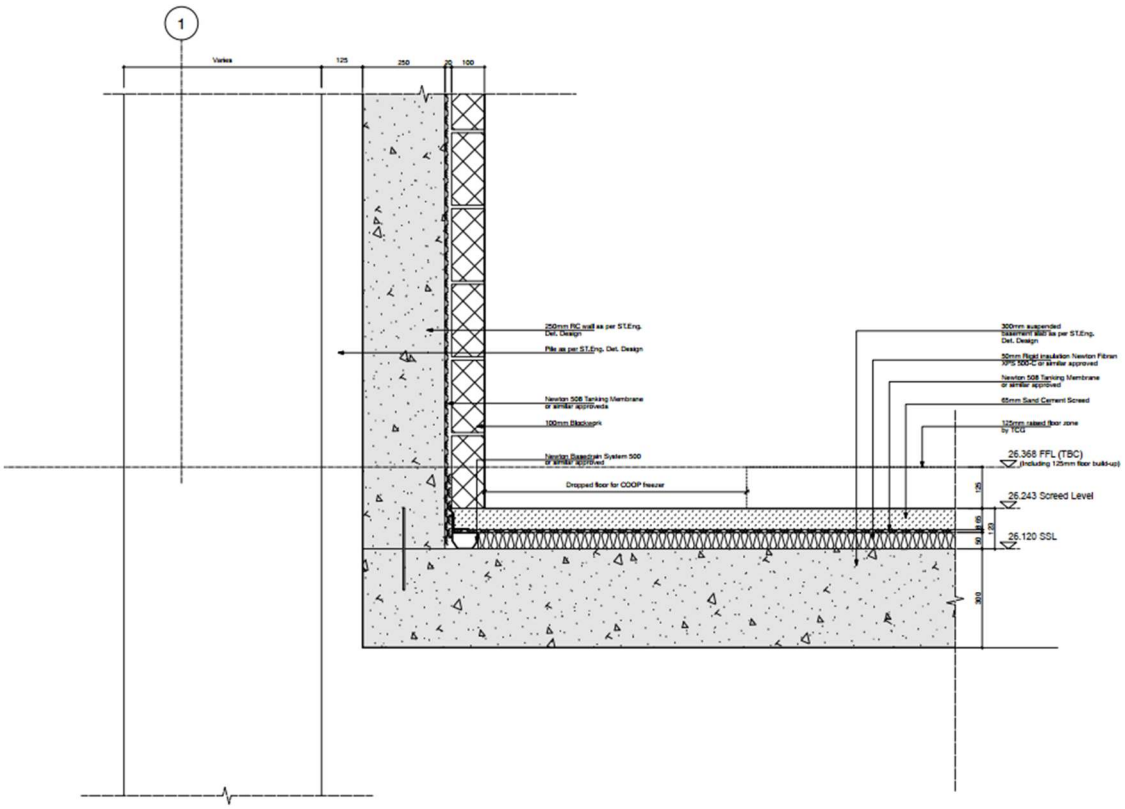


Separating Floor Partition



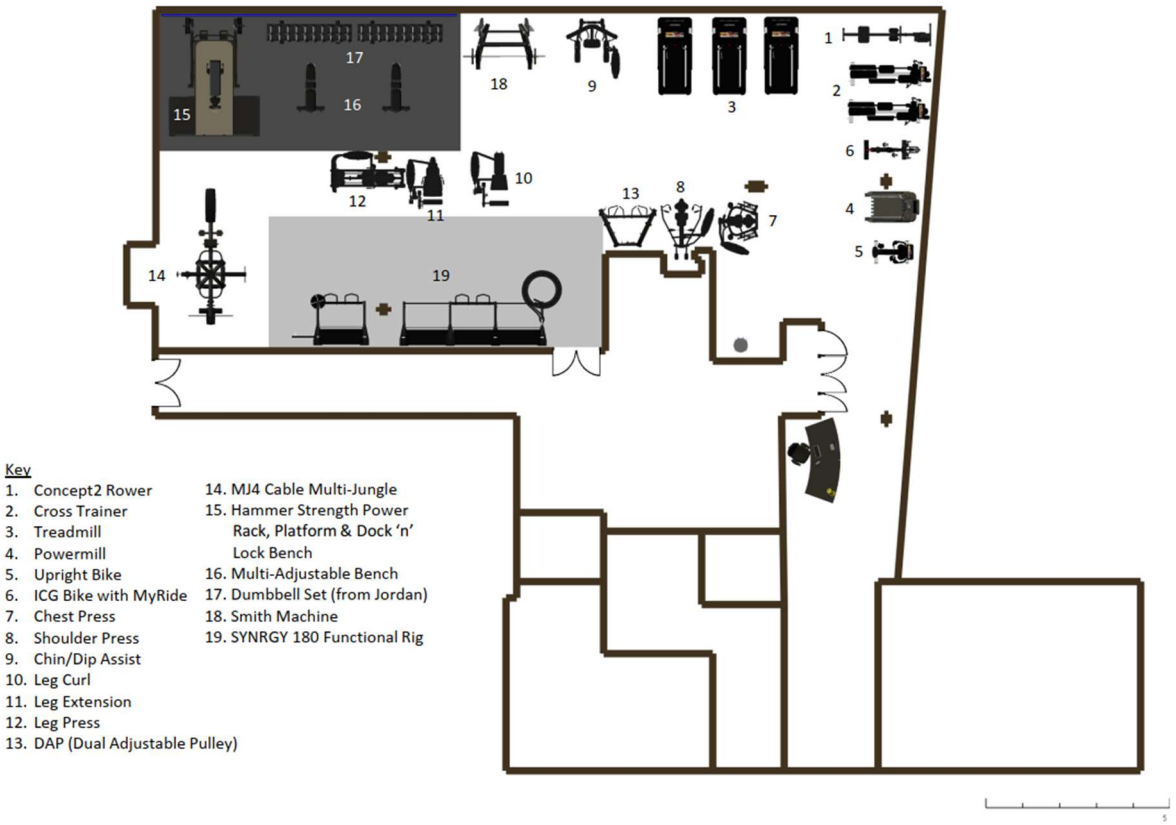
Appendix D – Provided Technical Drawings

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

Appendix C

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Chalk Farm Anytime Fitness London

Gym Noise Assessment
Report 23565.GNA.01

Incyon Ltd
29 Lawrence Ave
London
NW7 4NL

Report 23565.GNA.01 Revision History			
First Issue Date: 10/11/2021			
A		D	
B		E	
C		F	

Written by:	Checked by:	Approved by:
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Contents

List of Attachments

1.0 INTRODUCTION

KP Acoustics Ltd has been commissioned by Incyon Ltd, 29 Lawrence Ave, London, NW7 4NL to undertake an acoustic design review of the proposed gym space at Anytime Fitness Chalk Farm, 7 Crogsland Rd, Chalk Farm, London NW1 8AY.

The main objective of this report is to provide all in-situ findings with regards to the current sound insulation properties of the separating constructions. The key objective is to provide a recommendations for gym floor coverings which would render any noise, or vibration from the operation of the proposed gym, as unimposing as possible to the amenity of any surrounding commercial or residential units.

2.0 SITE DESCRIPTION

The current site is a new gym at basement level. The receiver space which was investigated during the sound insulation investigation was the new commercial unit at ground level, directly above the gym space, in order to assess the current performance of the separating concrete floor.

3.0 FREE WEIGHTS IMPACT NOISE INVESTIGATION

3.1 Procedure

In-situ tests have been undertaken with a 28 kg kettlebell dropped from waist height (approximately 60cm) onto the floor in the basement level proposed gym. A number of tests were undertaken on a combination of impact absorbent materials at the free weights area and opposite machine gym area. Three drops per material combination were undertaken in order to obtain a representative average performance sample of each.

Noise measurements were conducted within the free weights area and opposite machine gym area located directly below the proposed gym space.

The materials tested are as follows:

- Sylomer SR42 15mm – Polyeurathane resilient tile
- Sylomer SR42 30mm – Polyeurathane resilient tile
- Regupol FX-50 50mm – Rubber paving slab
- Smash Tile

3.2 Equipment

The equipment used during testing is shown in Table 3.1 below.

Instrument	Manufacturer and Type	Serial Number
Precision integrating sound level meter & analyser SLM 6	NTi Audio, XL2-TA Calibration No: UCRT20/1873, 1874, 1876 Calibration Date 16/09/2020	A2A-17952-E0
LS5 Active Loudspeaker	RCF ART 310A	TACC01570
Pink Noise Source	NTi Audio Minirator MR-PRO	G2P-RAEXP-G0
Calibrator 3	Rion NC-74 Calibration No: 04174/1 Calibration Date 27/05/2021	34904938

Table 3.1 Instrumentation used during the airborne sound insulation testing

Measured $L_{eq,1sec}$ noise spectral levels inside the ground floor commercial unit due to free weight impacts with different composite materials on the basement level gym are shown in Figure 3.1. The measured impact noise spectral levels are compared to the $L_{eq,30sec}$ noise level inside the ground floor commercial unit.

Note that exceedances at 125Hz and above are attributed to passing traffic or site works and therefore the exceedance of these peaks over the background cannot be attributed to dropping weights. It was subjectively observed that weight dropped onto the Sylomer products resulted in clearly audible noise in the commercial unit above. The Regupol product yielded some noise, while the Smashtile product reduced the noise to a very faint, or inaudible level in the receiving space.

Based on the results, in order to prevent strongly audible noise caused by weight drops in the commercial unit above, the following vibration control for free weights is recommended:

Basement Gym Floor

- Smashtile

Recommendations for vibration control would only be applied to areas where free weights are to be used.

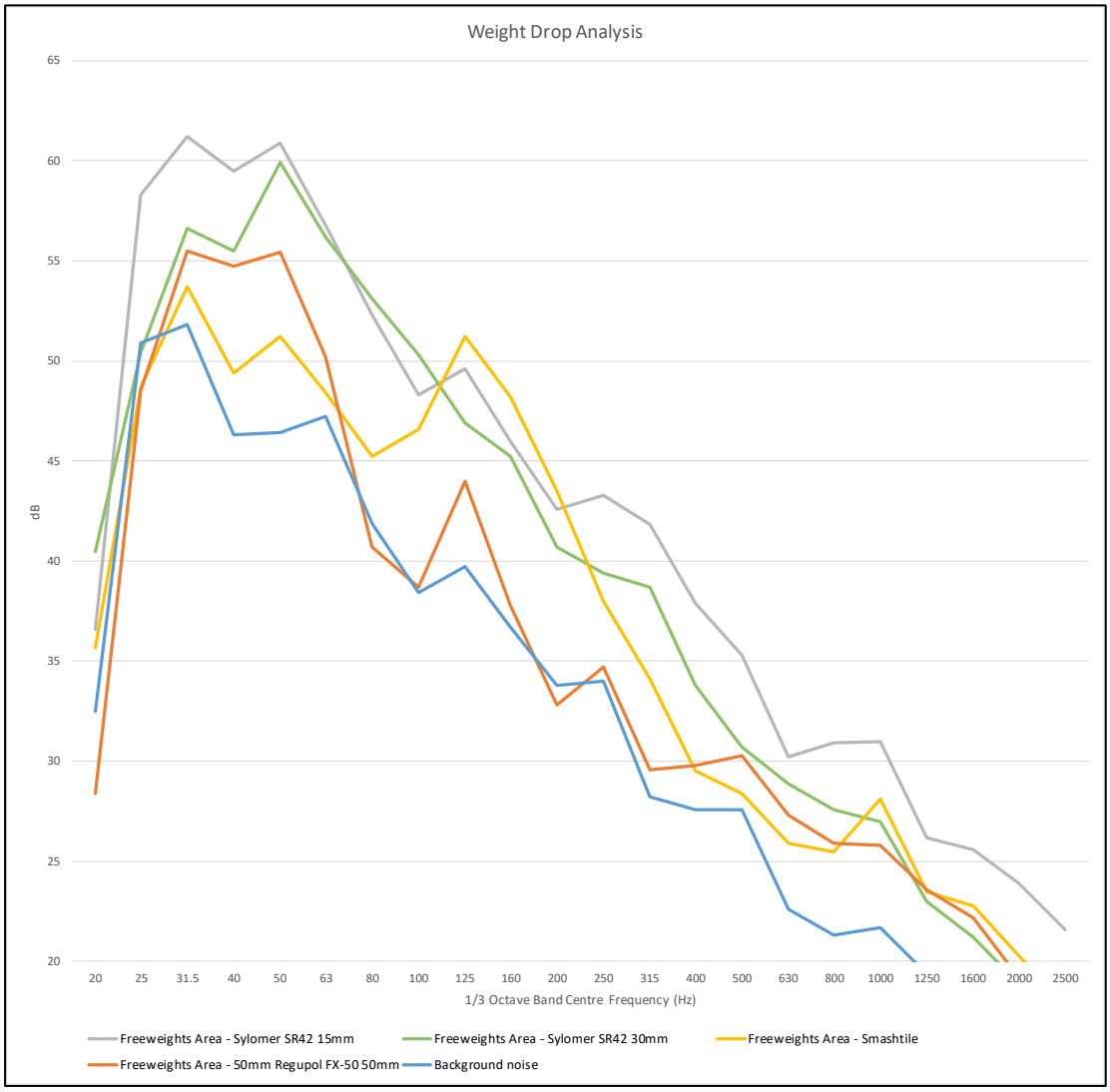

Figure 3.1 $L_{eq,1\ sec}$ noise levels due to 28kg free weight impact at basement floor level measured inside the receiver space and compared against the background $L_{eq,30\ sec.}$

4.0 CONCLUSION

A weight drop test of the proposed gym space at Anytime Fitness Chalk Farm, 7 Crogsland Rd, Chalk Farm, London, NW1 8AY has been undertaken. The results have allowed floor coverings to be recommended to avoid excessive sound transferral to the commercial use above.

It is understood that the free weights area will not be used for Olympic weights and drops of single weights over 30kg and 1 metre height. For significantly higher weights an increased specification of vibration mitigation may be necessary.

APPENDIX A

GENERAL ACOUSTIC TERMINOLOGY

Decibel scale - dB

In practice, when sound intensity or sound pressure is measured, a logarithmic scale is used in which the unit is the 'decibel', dB. This is derived from the human auditory system, where the dynamic range of human hearing is so large, in the order of 10^{13} units, that only a logarithmic scale is the sensible solution for displaying such a range.

Decibel scale, 'A' weighted - dB(A)

The human ear is less sensitive at frequency extremes, below 125Hz and above 16Khz. A sound level meter models the ears variable sensitivity to sound at different frequencies. This is achieved by building a filter into the Sound Level Meter with a similar frequency response to that of the ear, an A-weighted filter where the unit is dB(A).

L_{eq}

The sound from noise sources often fluctuates widely during a given period of time. An average value can be measured, the equivalent sound pressure level L_{eq}. The L_{eq} is the equivalent sound level which would deliver the same sound energy as the actual fluctuating sound measured in the same time period.

L_{10}

This is the level exceeded for no more than 10% of the time. This parameter is often used as a "not to exceed" criterion for noise.

L_{90}

This is the level exceeded for no more than 90% of the time. This parameter is often used as a descriptor of "background noise" for environmental impact studies.

L_{max}

This is the maximum sound pressure level that has been measured over a period.

Octave Bands

In order to completely determine the composition of a sound it is necessary to determine the sound level at each frequency individually. Usually, values are stated in octave bands. The audible frequency region is divided into 11 such octave bands whose centre frequencies are defined in accordance with international standards. These centre frequencies are: 16, 31.5, 63, 125, 250, 500, 1000, 2000, 4000, 8000 and 16000 Hertz.

Environmental noise terms are defined in BS7445, *Description and Measurement of Environmental Noise*.

APPENDIX A

APPLIED ACOUSTIC TERMINOLOGY

Addition of noise from several sources

Noise from different sound sources combines to produce a sound level higher than that from any individual source. Two equally intense sound sources operating together produce a sound level which is 3dB higher than a single source and 4 sources produce a 6dB higher sound level.

Attenuation by distance

Sound which propagates from a point source in free air attenuates by 6dB for each doubling of distance from the noise source. Sound energy from line sources (e.g. stream of cars) drops off by 3dB for each doubling of distance.

Subjective impression of noise

Hearing perception is highly individualised. Sensitivity to noise also depends on frequency content, time of occurrence, duration of sound and psychological factors such as emotion and expectations. The following table is a guide to explain increases or decreases in sound levels for many scenarios.

Change in sound level (dB)	Change in perceived loudness
1	Imperceptible
3	Just barely perceptible
6	Clearly noticeable
10	About twice as loud

Transmission path(s)

The transmission path is the path the sound takes from the source to the receiver. Where multiple paths exist in parallel, the reduction in each path should be calculated and summed at the receiving point. Outdoor barriers can block transmission paths, for example traffic noise. The effectiveness of barriers is dependent on factors such as its distance from the noise source and the receiver, its height and construction.

Ground-borne vibration

In addition to airborne noise levels caused by transportation, construction, and industrial sources there is also the generation of ground-borne vibration to consider. This can lead to structure-borne noise, perceptible vibration, or in rare cases, building damage.

Sound insulation - Absorption within porous materials

Upon encountering a porous material, sound energy is absorbed. Porous materials which are intended to absorb sound are known as absorbents, and usually absorb 50 to 90% of the energy and are frequency dependent. Some are designed to absorb low frequencies, some for high frequencies and more exotic designs being able to absorb very wide ranges of frequencies. The energy is converted into both mechanical movement and heat within the material; both the stiffness and mass of panels affect the sound insulation performance.