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THE GYM LTD, LOMBARDY RETAIL PARK, HAYES
OPERATIONAL NOISE MANAGEMENT PLAN

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Report Ref:	ASI2102.210430.R2.2	Title:	OPERATIONAL NOISE MANAGEMENT PLAN
Client Name:	THE GYM LTD		
Project Manager:	Matthew Sugden		
Report Author:	Ben Alexander		
Clarke Saunders Acoustics Winchester SO22 5BE		This report has been prepared in response to the instructions of our client. It is not intended for and should not be relied upon by any other party or for any other purpose.	

1.0 EXECUTIVE SUMMARY

- 1.1 The Gym Ltd recognises its responsibility to the local community to operate its gyms without disturbing or causing annoyance to its neighbours.
- 1.2 This report has been prepared by Clarke Saunders Associates in support of a planning application for change of use of the premises from retail to 24-hour gym use.
- 1.3 The report details physical measures and managerial policies to be implemented to suitably manage the environmental effects of operational noise breakout from the building, members' use of car parking, and from building services noise emissions.
- 1.4 Where necessary, mitigation measures will be determined according to planning controls typically / specifically set by the Local Planning Authority.

2.0 INTRODUCTION

- 2.1 The Gym Ltd (TGG) intends to occupy Unit 1, (formerly a Mothercare retail outlet) at Lombardy Retail Park, Hayes for use as a 24-hour gym.
- 2.2 TGG recognises its responsibility to the local community to operate its gyms without disturbing or causing annoyance to its neighbours. This primarily means controlling noise disturbance. As such, this report has been instructed to support the proposed hours of operation and demonstrate the measures that will be adopted to ensure that operation of the gym does not adversely affect nearby receptors.
- 2.3 When housed in a retail unit, acoustic issues arising from the gym would primarily be limited to environmental effects of operational noise breakout from the building, members' use of car parking and building services noise emissions. Attached units also require consideration of airborne and structure-borne noise and vibration transmission.
- 2.4 This report details physical measures and policies to be implemented to suitably manage the environmental effects associated with the proposed gym operation.

3.0 GENERAL DEFINITIONS

3.1 Neighbours:

The term 'neighbour' in the context of this document refers to any resident of the community whose amenity could be affected by operation of the gym. In this case, the closest neighbours are dwellings on St Christopher's Drive, the closest of which is situated at least 20 m from the southern facade of the gym demise.

3.2 Staff:

All employees, contractors or casual labour under the direct control of the gym's management, including management personnel.

3.3 Gym Members:

This refers to all non-staff users of the gym.

4.0 CONTROL OF POTENTIAL NOISE EFFECTS

4.1 It is understood that identification and recognition of potential causes of disturbance assist greatly in planning to avoid difficulties with neighbours. Management of operational noise as well as that from patrons/staff accessing the premises should, therefore, be considered and assessed to satisfy the Local Authority.

4.2 FIXED EXTERNAL PLANT

4.2.1 Cooling and heating of The Gym premises typically employs the following plant:

- 6 no. Mitsubishi condensers type PUZ-ZM250YKA

4.2.2 The manufacturer has confirmed that these units generate the sound pressure levels at one metre presented in Table 1, when operating at maximum duty.

UNIT	FREQUENCY (Hz)							
	63	125	250	500	1000	2000	4000	8000
PUZ-ZM250YKA, Cooling	70	61	58	56	56	50	42	36
PUZ-ZM250YKA, Heating	72	63	61	61	57	53	49	43

Table 1: Condenser sound pressure levels at 1 metre

[dB ref. 20µPa]

4.2.3 Information provided by the manufacturer has confirmed that the units can be run at a 'low noise' setting during the night-time period, which reduces noise levels by 3 to 4 dB.

4.2.4 Ventilation of The Gym premises typically employs the following plant:

- 1 no. Swegon Gold F RX air handling unit

4.2.5 The manufacturer has confirmed that these units generate sound power levels presented in Table 2, when operating at maximum duty.

UNIT	FREQUENCY (Hz)							
	63	125	250	500	1000	2000	4000	8000
Gold F RX Fresh Air In (FA in)	76	75	75	64	56	53	49	52
Gold F RX Discharge	82	77	79	81	78	77	75	75
Gold F RX (Breakout)	73	65	58	62	47	46	43	46

Table 2: Air handling unit sound power levels

[dB ref. 20µPa]

4.2.6 All plant will be installed at the rear of the gym demise, behind the existing masonry boundary wall as indicated on ASI2102/SP1. Air handling plant will be installed 1.5m from the condensers and extending to a height of 2m above ground.

4.2.7 Once plant is installed, the nearest residential receptors on St Christopher's Drive will be at least 39 metres from the closest plant items.

4.2.8 An overnight environmental noise survey has been undertaken¹ between the late morning of 19th April 2021 and the afternoon of 20th April 2021, to determine the prevailing background sound pressure levels over the daytime, (07:00 – 23:00 hours) and night-time, (23:00 – 07:00) periods. The lowest background sound pressure levels for each period have been determined to be:

- $L_{A90,5min}$ 42 dB during the daytime;
- $L_{A90,5min}$ 40 dB during the night-time

4.2.9 To control the noise impact on nearby noise sensitive receptors, criteria of 5 dB below the lowest background sound pressure level for each, daytime and night-time periods, respectively, have been targeted. The target criteria selected are therefore as follows:

- L_{Aeq} 37 dB for daytime periods; and
- L_{Aeq} 35 dB for night-time periods.

4.2.10 Analyses shows that compliance with the stated criteria can be achieved at the nearest noise-sensitive receptors during both daytime and night-time periods without the need for in-duct attenuation or further mitigation measures.

4.2.11 A summary of the calculations is shown in Appendix B.

4.2.12 In addition, all rotating plant, e.g. fans and pumps, will be installed on appropriate anti-vibration mountings. All connected piping and ductwork should be isolated from the soffit for a distance of at least twenty pipe/duct diameters from the plant item unless high quality flexible connectors are fitted.

4.3 OPERATIONAL NOISE BREAKOUT

4.3.1 Amplified music is not played at a high volume within TGG premises, however the rhythmic nature of the music requires consideration. From data obtained at other TGG sites, average reverberant noise levels of $L_{Aeq,5min}$ 70dB to 73dB and maximum levels of up to around $L_{AF,max}$ 85dB are typical inside the gym.

4.3.2 The entertainment system within the gym will incorporate an electronic music limiter which will be set prior to opening and, thereafter, locked away to prevent unauthorised tampering.

4.3.3 Entry to the gym will be via a lobbied access. TGG premises feature a secondary 'portal' security doorset within the entrance area through which members pass to gain access to the main gym space. The lobby will not be served by the entertainment system and will, therefore, act as a 'noise lock' between the gym and the exterior.

4.3.4 The building comprises rainscreen cladding walls, with lightweight profiled metal roof.

¹ following procedures in BS 7445:1991 (ISO1996-2:1987) *Description and measurement of environmental noise Part 2- Acquisition of data pertinent to land use*

- 4.3.5 As part of the gym fit-out, works will be undertaken to make good or replace acoustically weak elements of the external fabric, such as unused doors, in order that a reasonable standard of sound insulation may be expected.
- 4.3.6 Tests of noise breakout were undertaken from the rear and front facades of the building, which both feature doors – currently the weakest points in the facade. This data can be used to predict levels of noise breakout from typical gym activity and music at the nearest dwellings located at least 20 metres to the south, on St Christopher's Drive.
- 4.3.7 On the basis of the on-site breakout tests, operational noise breakout from the gym use, i.e. due to amplified music and equipment, is expected to give rise to noise levels no greater than $L_{Aeq,T}$ 26dB and $L_{AF,max}$ 38dB at the nearest residential receptors. Given that such levels are lower than the lowest background noise level measured during the environmental noise survey, ($L_{A90,5min}$ 40 dB), noise from the gym operation is likely to be generally inaudible to occupants of nearby dwellings.
- 4.3.8 Gym fit out will also consider the likelihood of airborne and impact sound transmission to other attached uses and appropriate mitigation works would be implemented.

4.4 EXTERNAL ACTIVITY NOISE

- 4.4.1 An acoustic fence has been erected along the southern boundary of the retail park, of approximately 2.5m in height, which assists in protecting dwellings on St Christopher's Drive to the south against noise from the car parking areas.
- 4.4.2 Calculations have been undertaken to quantify the risk of noise from closing of car doors in the car park having an adverse effect on residential properties on St Christopher's Drive.
- 4.4.3 Based on measurements of a car in a car park having its door forcefully closed, noise levels of around 56 dB $L_{Amax,fast}$ would be expected at these receptors. The corresponding internal noise level where a window is partially opened for ventilation will be less than 45dB $L_{Amax,fast}$, which is generally in line with World Health Organisation guidelines².
- 4.4.4 Noise from reasonable external activity from the customers of the centre and staff is not expected to disturb occupants of nearby residential properties.

5.0 MANAGEMENT CONTROLS

- 5.1 In order that activity from the gym or its members and staff does not adversely affect nearby residents, the following management controls will be implemented. The responsibility for this will be assumed by the Duty Manager, although other members of staff may assume the role in the future following suitable training.

5.2 NOISE FROM THE GYM ENTRANCE AND CAR PARK

- 5.2.1 During peak periods, increased numbers of gym members are expected and, noise from speech and car activity in the car park may increase.

² Guidelines for Community Noise, 1999

- 5.2.2 The area of the car park available for members' use during the night-time will be restricted by means of low-height fixed barriers and vertical-swing barriers, as shown in RPS drawing 019700-RPS-SI-XX-DR-A-9017A, shown in Appendix C.
- 5.2.3 Signage will be displayed clearly within the entrance lobby to encourage gym members to keep their voices down when leaving to minimise any disturbance to the neighbours.
- 5.2.4 This will read: *"Please show respect for our residential neighbours by keeping noise to a minimum when using the gym facilities and when entering or leaving the building between the hours of 11pm – 7am"*.

5.3 NOISE FROM SERVICING

- 5.3.1 It is unlikely that the gym will require any regular servicing other than waste collection. TGG will ensure that any servicing or delivery occurs between the hours of 07:00h and 20:00h. Drivers will also be requested to switch off engines and vehicle radios during deliveries.

5.4 CCTV

- 5.4.1 As part of its practice of monitoring member activity, The Gym premises are covered by CCTV with time-stamped video being recorded and stored. Cameras in the entrance lobby will provide footage of activity immediately outside the entrance and, in conjunction with records of members' keycoded access, can assist in the identification of perpetrators of reported antisocial behaviour outside the gym.

6.0 COMPLAINTS HANDLING PROCEDURE

- 6.1 Neighbour complaints will be received via a published contact telephone number which will be answered during opening hours, via answerphone out of hours, or via a dedicated email address. These details will be distributed prior to opening of the gym. Clear instructions will be given to those likely to answer on the procedures for handling complaints politely and respectfully.
- 6.2 A timed and dated log will be kept of all complaints by the Duty Manager, including actions taken and responses given. Other information recorded in the complaints log will include the approximate number of gym members and staff present at the time of the complaint, and any specific activities or conditions which were noteworthy at the time. Any other notes or email communications will be copied and a record kept in the complaint log folder.
- 6.3 Gym staff will aim to respond within one working day, but certainly within a week of the complaint being made, with a response/explanation, as well as any future actions or possible improvements that will be implemented to resolve the issue.
- 6.4 The Gym Ltd will review the frequency of any noise complaints regularly, if necessary, in liaison with the Local Authority, to assess whether further management/control measures are required.



Ben Alexander MIOA
CLARKE SAUNDERS ACOUSTICS



Figure AS12102/SP1

1.1 Acoustic Terminology

The human impact of sounds is dependent upon many complex interrelated factors such as 'loudness', its frequency (or pitch) and variation in level. In order to have some objective measure of the annoyance, scales have been derived to allow for these subjective factors.

Sound	Vibrations propagating through a medium (air, water, etc.) that are detectable by the auditory system.
Noise	Sound that is unwanted by or disturbing to the perceiver.
Frequency	The rate per second of vibration constituting a wave, measured in Hertz (Hz), where 1Hz = 1 vibration cycle per second. The human hearing can generally detect sound having frequencies in the range 20Hz to 20kHz. Frequency corresponds to the perception of 'pitch', with low frequencies producing low 'notes' and higher frequencies producing high 'notes'.
dB(A):	Human hearing is more susceptible to mid-frequency sounds than those at high and low frequencies. To take account of this in measurements and predictions, the 'A' weighting scale is used so that the level of sound corresponds roughly to the level as it is typically discerned by humans. The measured or calculated 'A' weighted sound level is designated as dB(A) or L_A .
L_{eq}:	A notional steady sound level which, over a stated period of time, would contain the same amount of acoustical energy as the actual, fluctuating sound measured over that period (e.g. 8 hour, 1 hour, etc). The concept of L_{eq} (equivalent continuous sound level) has primarily been used in assessing noise from industry, although its use is becoming more widespread in defining many other types of sounds, such as from amplified music and environmental sources such as aircraft and construction. Because L_{eq} is effectively a summation of a number of events, it does not in itself limit the magnitude of any individual event, and this is frequently used in conjunction with an absolute sound limit.
L_{10} & L_{90}:	Statistical L_n indices are used to describe the level and the degree of fluctuation of non-steady sound. The term refers to the level exceeded for n% of the time. Hence, L_{10} is the level exceeded for 10% of the time and as such can be regarded as a typical maximum level. Similarly, L_{90} is the typical minimum level and is often used to describe background noise. It is common practice to use the L_{10} index to describe noise from traffic as, being a high average, it takes into account the increased annoyance that results from the non-steady nature of traffic flow.
L_{max}:	The maximum sound pressure level recorded over a given period. L_{max} is sometimes used in assessing environmental noise, where occasional loud events occur which might not be adequately represented by a time-averaged L_{eq} value.
R	<i>Sound Reduction Index</i> . Effectively the <i>Level Difference</i> of a building element when measured in an accredited laboratory test suite in accordance with the procedures laid down in BS EN ISO 10140-2:2010 and corrected for its size and the reverberant characteristics of the receive room.
D	The sound insulation performance of a construction is described in terms of the difference in sound level on either side of the construction in the presence of a sound source on one side and the reverberant characteristics of the adjoining 'receive' space. <i>D</i> is the arithmetic <i>Level Difference</i> in decibels between the source and receive sound levels when filtered into frequency bands.
R_w D_w	Value of parameter, determined as above, but weighted in accordance with the procedures laid down in BS EN ISO 717-1 to provide a single-figure value.

1.2 Octave Band Frequencies

In order to determine the way in which the energy of sound is distributed across the frequency range, the International Standards Organisation has agreed on "preferred" bands of frequency for sound measurement and analysis. The widest and most commonly used band for frequency measurement and analysis is the Octave Band. In these bands, the upper frequency limit is twice the lower frequency limit, with the band being described by its "centre frequency" which is the average (geometric mean) of the upper and lower limits, e.g. 250 Hz octave band extends from 176 Hz to 353 Hz. The most commonly used octave bands are:

Octave Band Centre Frequency Hz	63	125	250	500	1000	2000	4000	8000
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1.3 Human Perception of Broadband Noise

Because of the logarithmic nature of the decibel scale, it should be borne in mind that sound levels in dB(A) do not have a simple linear relationship. For example, 100dB(A) sound level is not twice as loud as 50dB(A). It has been found experimentally that changes in the average level of fluctuating sound, such as from traffic, need to be of the order of 3dB before becoming definitely perceptible to the human ear. Data from other experiments have indicated that a change in sound level of 10dB is perceived by the average listener as a doubling or halving of loudness. Using this information, a guide to the subjective interpretation of changes in environmental sound level can be given.

INTERPRETATION

Change in Sound Level dB	Subjective Impression	Human Response
0 to 2	Imperceptible change in loudness	Marginal
3 to 5	Perceptible change in loudness	Noticeable
6 to 10	Up to a doubling or halving of loudness	Significant
11 to 15	More than a doubling or halving of loudness	Substantial
16 to 20	Up to a quadrupling or quartering of loudness	Substantial
21 or more	More than a quadrupling or quartering of loudness	Very Substantial

1.4 Earth Bunds and Barriers - Effective Screen Height

When considering the reduction in sound level of a source provided by a barrier, it is necessary to establish the "effective screen height". For example if a tall barrier exists between a sound source and a listener, with the barrier close to the listener, the listener will perceive the sound as being louder if he climbs up a ladder (and is closer to the top of the barrier) than if he were standing at ground level. Equally if he sat on the ground the sound would seem quieter than if he were standing. This is explained by the fact that the "effective screen height" is changing with the three cases above. In general, the greater the effective screen height, the greater the perceived reduction in sound level.

Similarly, the attenuation provided by a barrier will be greater where it is aligned close to either the source or the listener than where the barrier is midway between the two.

APPENDIX B
AS12102 - TGG Hayes
PLANT NOISE CALCULATIONS

Daytime Assessment - Criterion: L_{A,T_r} 37dB

Condensers		63	125	250	500	1000	2000	4000	8000	dB(A)
PUZ-ZM250YKA Heating	Lp @ 1m	72	63	61	61	57	53	49	43	62
Number of:	6	8	8	8	8	8	8	8	8	
Total sound pressure level of condensers		79	70	68	68	64	61	57	51	70
Distance loss	39m	-32	-32	-32	-32	-32	-32	-32	-32	
Screening*		-11	-13	-16	-19	-20	-20	-20	-20	
Specific Noise Level at Receptor	L_{eq}	37	25	21	18	12	9	5	0	20

AHU		63	125	250	500	1000	2000	4000	8000	dB(A)
AHU FA in	Lw	76	75	75	64	56	53	49	52	69
Propagation Correction		-8	-8	-8	-8	-8	-8	-8	-8	
Total level of FA in		68	67	67	56	48	45	41	44	61
AHU Discharge	Lw	82	77	79	81	78	77	75	75	84
Propagation Correction		-8	-8	-8	-8	-8	-8	-8	-8	
Total level of discharge		74	69	71	73	70	69	67	67	76
AHU breakout	Lw	73	65	58	62	47	46	43	46	60
Propagation correction		-8	-8	-8	-8	-8	-8	-8	-8	
Total level of breakout		65	57	50	54	39	38	35	38	52
Total sound pressure level of AHU		75	71	72	73	70	69	67	67	76
Distance loss	40m	-32	-32	-32	-32	-32	-32	-32	-32	
Screening*		-7	-8	-10	-12	-14	-17	-20	-20	
Specific Noise Level at Receptor	L_{eq}	37	31	31	29	24	20	15	15	30

Cumulative Emissions		63	125	250	500	1000	2000	4000	8000	dB(A)
Cumulative noise at receptor		40	32	31	30	24	20	15	15	30

*screening loss limited to 20dB

APPENDIX B
AS12102 - TGG Hayes
PLANT NOISE CALCULATIONS (contd.)

Night-time Assessment - Criterion: L_{Aeq} 35dB

Condensers		63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	dB(A)
PUZ-ZM250YKA Heating	Lp @ 1m	69	60	58	58	54	50	46	40	59
Number of:	6	8	8	8	8	8	8	8	8	
Total sound pressure level in plant area		76	67	65	65	61	58	54	48	67
Distance loss	39m	-32	-32	-32	-32	-32	-32	-32	-32	
Screening*		-11	-13	-16	-19	-20	-20	-20	-20	
Specific Noise Level at Receptor	L_{eq}	34	22	18	15	9	6	2	0	17

AHU		63	125	250	500	1000	2000	4000	8000	dB(A)
AHU FA in	Lw	76	75	75	64	56	53	49	52	69
Propogation Correction		-8	-8	-8	-8	-8	-8	-8	-8	
Total level of FA in		68	67	67	56	48	45	41	44	61
AHU Discharge	Lw	82	77	79	81	78	77	75	75	84
Propogation Correction		-8	-8	-8	-8	-8	-8	-8	-8	
Total level of discharge		74	69	71	73	70	69	67	67	76
AHU breakout	Lw	73	65	58	62	47	46	43	46	60
Propogation correction		-8	-8	-8	-8	-8	-8	-8	-8	
Total level of breakout		65	57	50	54	39	38	35	38	52
Total sound pressure level of AHU		75	71	72	73	70	69	67	67	76
Distance loss	40m	-32	-32	-32	-32	-32	-32	-32	-32	
Screening*		-11	-13	-16	-19	-20	-20	-20	-20	
Specific Noise Level at Receptor	L_{eq}	33	26	25	23	18	17	15	15	25

Cumulative Emissions		63	125	250	500	1000	2000	4000	8000	dB(A)
Cumulative noise at receptor		36	28	25	23	19	17	15	15	26

*screening loss limited to 20dB

AS12102 THE GYM LTD, LOMBARDY RETAIL
PARK, HAYES

APPENDIX C

RPS DRAWING 019700



Indicative image - Low height barrier

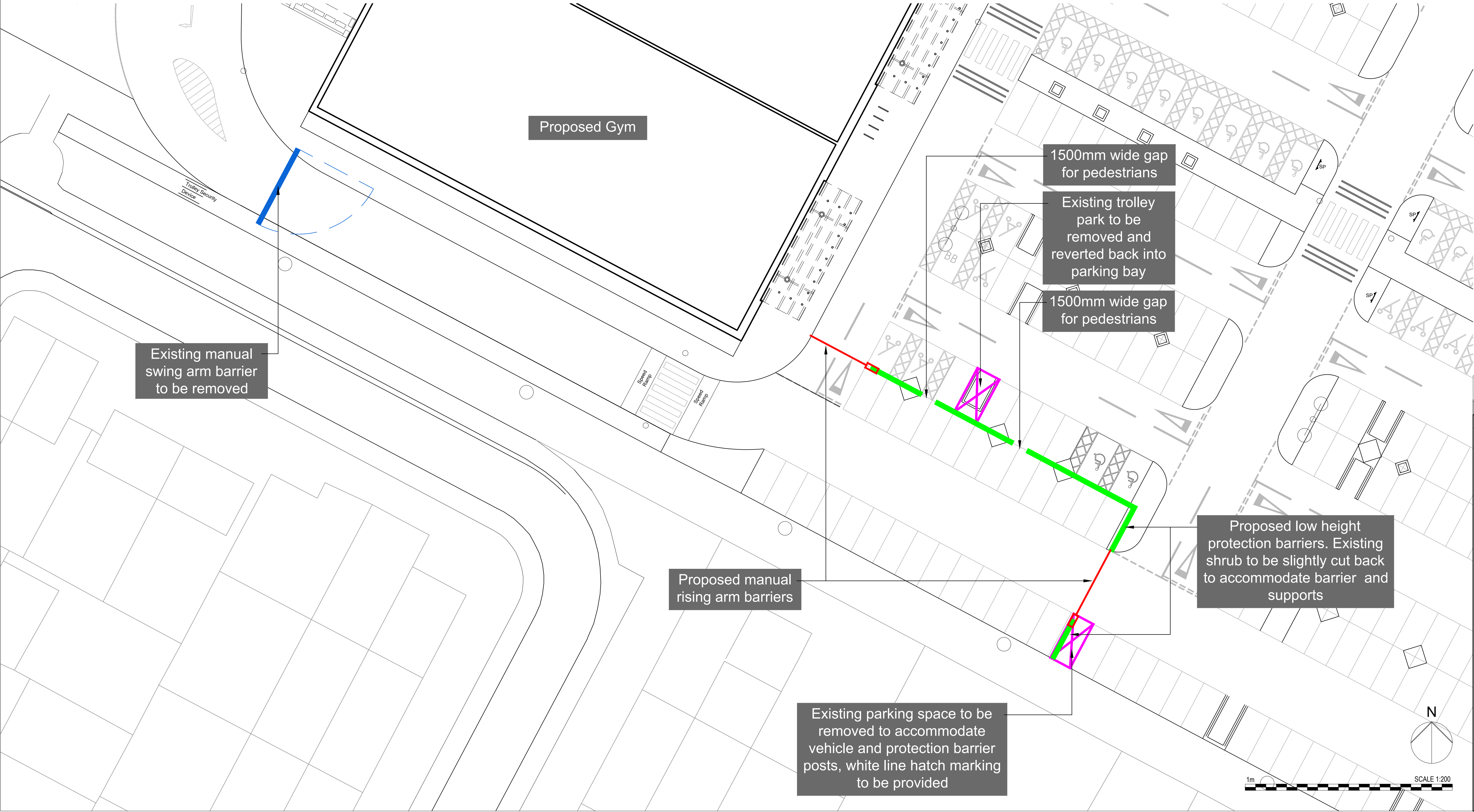


Indicative image - Manual vertical rising arm barrier

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- Notes
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 3. This drawing should be read in conjunction with all other relevant drawings and specifications.

Key

- Crash/ Protection barriers
- Rising Arm barrier
- Swing Arm barrier



P01.1	Indicative counterbalance/ pedestal of rising arm barriers shown	AT	SG	01.06.21
P01	First issue	AT	SG	26.05.21
Rev	Description	By	Ckd	Date

rps MAKING COMPLEX EASY

Sherwood House, Sherwood Avenue,
Newark, Nottinghamshire, NG24 1QQ
T:01636 605 700 E: rpsnewark@rpsgroup.com

Client
AVIVA INVESTORS

Project
Hayes, Lombardy SP

Title
Proposed Car Park

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