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Environmental Noise Assessment

Swimming School and Gym
Lot 3046 (#160) Butler Boulevard, Butler

Reference: 22067353-01

Prepared for:

[redacted]

Report: 22067353-01

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Date:	Rev	Description	Prepared By	Verified
14-Jul-22	0	Issued to Client	Matthew Nolan	Matt Moyle

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1 INTRODUCTION

A commercial development comprising a swimming school and gym is proposed at Lot 3046 (#160) Butler Boulevard, Butler (Refer *Figure 1-1*). Due to the nature of the development and the proximity to noise sensitive premises, a noise impact assessment is required. The nearest future noise sensitive premises are located to the east and south of the subject site.

Noise sources considered were those associated with gym training, rooftop mechanical plant, patrons in the alfresco dining area and vehicles in the car park. Noise from these items were assessed against the prescribed standards of the *Environmental Protection (Noise) Regulations 1997* by way of noise modelling.

Figure 1-1 Site Locality

The following opening hours proposed for each building are:

- Gym - 24 hours a day, 7 days a week;
- Swimming pool – 6.00am – 9.00pm, 7 days a week.

With regard to the Regulations, both the gym and pool will operate within the most stringent night-time period (10.00pm - 7.00am). The site layout of the development is depicted in *Figure 1-2*. Elevations of each building are shown in *Figure 1-3* and *Figure 1-4.*

Site drawings used in this assessment are included in *Appendix A*.

Appendix B contains a description of some of the terminology used throughout this report.

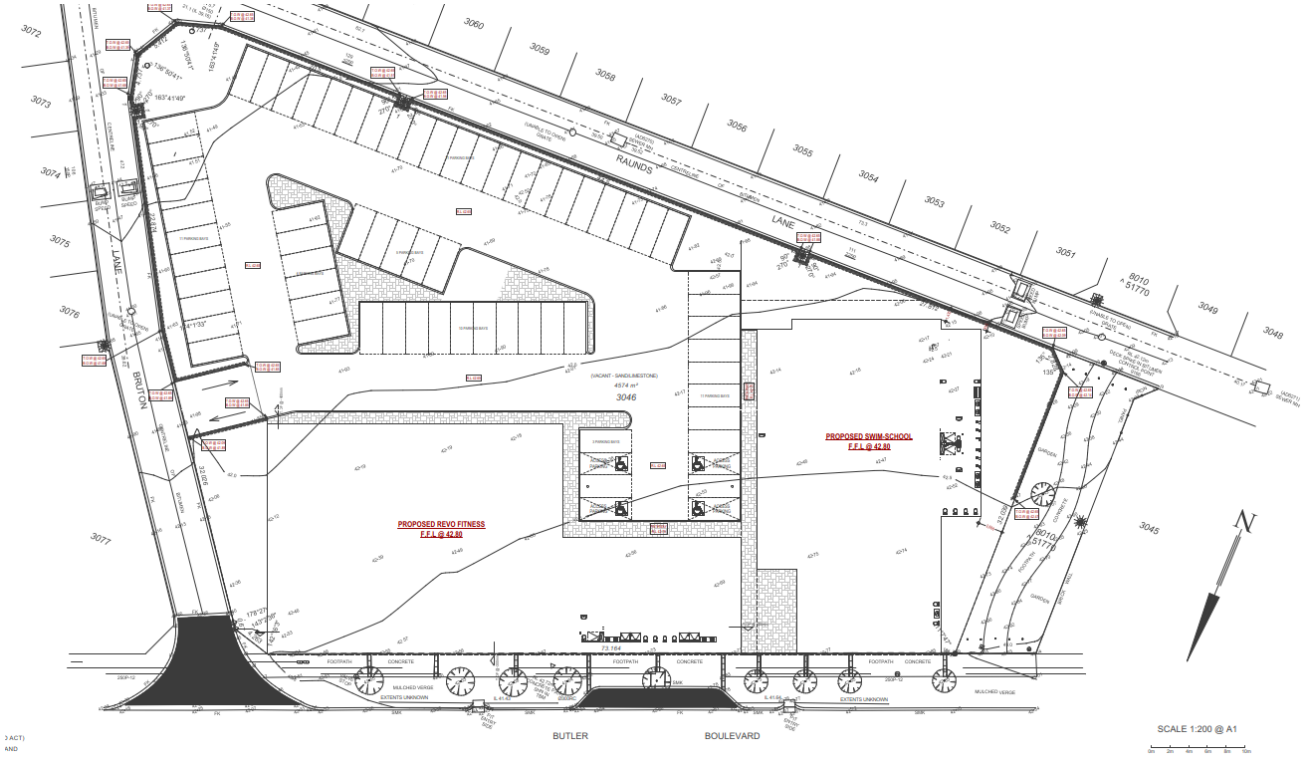

Figure 1-2 Development Site Layout (Laxxon Construction Design)

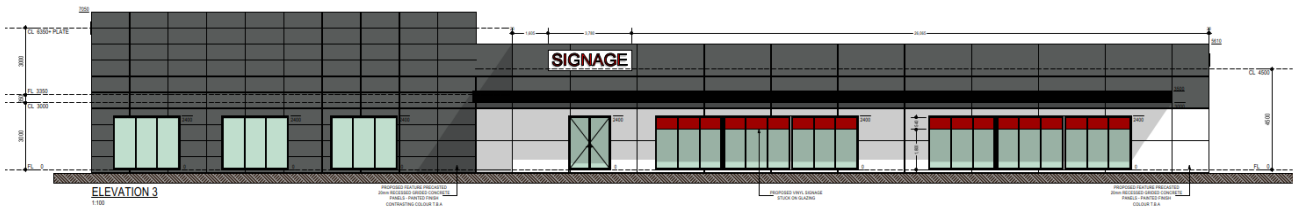

Figure 1-3 Gym Elevation 3 (Laxxon Construction Design)

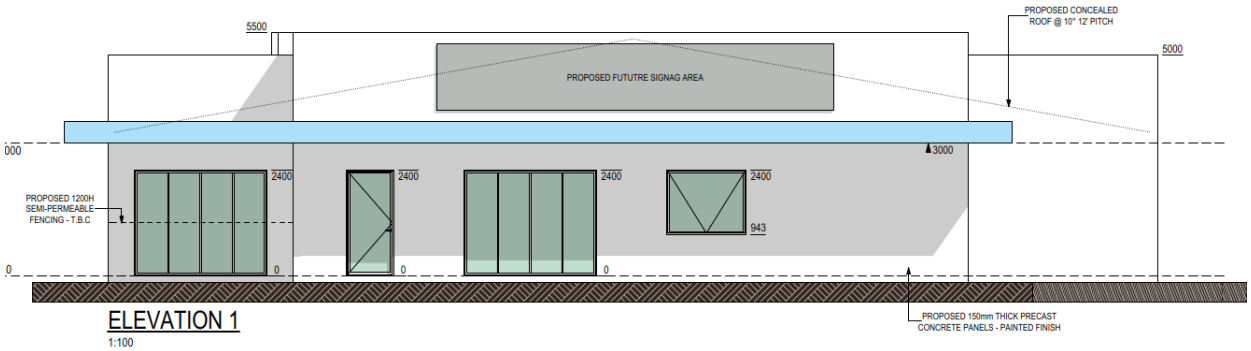

Figure 1-4 Swim School Elevation 1 (Laxxon Construction Design)

2 CRITERIA

Environmental noise in Western Australia is governed by the *Environmental Protection Act 1986*, through the *Environmental Protection (Noise) Regulations 1997* (the Regulations).

Regulation 7 defines the prescribed standard for noise emissions as follows:

"7. (1) Noise emitted from any premises or public place when received at other premises –

a) must not cause or significantly contribute to, a level of noise which exceeds the assigned level in respect of noise received at premises of that kind; and

b) Must be free of:

i. Tonality;

ii. Impulsiveness; and

iii. Modulation".

A "…noise emission is taken to *significantly contribute to* a level of noise if the noise emission exceeds a value which is 5 dB below the assigned level…"

Tonality, impulsiveness and modulation are defined in Regulation 9. Noise is to be taken to be free of these characteristics if:

a) The characteristics cannot be reasonably and practicably removed by techniques other than attenuating the overall level of noise emission; and

b) The noise emission complies with the standard after the adjustments of *Table 2-1* are made to the noise emission as measured at the point of reception.

Table 2-1 Adjustments for Intrusive Characteristics

Tonality	Modulation	Impulsiveness
+ 5 dB	+ 5 dB	+ 10 dB

Note: The above are cumulative to a maximum of 15dB.

The baseline assigned levels (prescribed standards) are specified in Regulation 8 and are shown in *Table 2-2*.

Table 2-2 Baseline Assigned Levels

Premises Receiving Noise	Time of Day	Assigned Level (dB)		
		L_{A10}	L_{A1}	L_{Amax}
Noise sensitive premises: highly sensitive area	0700 to 1900 hours Monday to Saturday (Day)	45 + influencing factor	55 + influencing factor	65 + influencing factor
	0900 to 1900 hours Sunday and public holidays (Sunday)	40 + influencing factor	50 + influencing factor	65 + influencing factor
	1900 to 2200 hours all days (Evening)	40 + influencing factor	50 + influencing factor	55 + influencing factor
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and public holidays (Night)	35 + influencing factor	45 + influencing factor	55 + influencing factor
Commercial	All hours	60	75	80

1. ***highly sensitive area*** means that area (if any) of noise sensitive premises comprising —
   (a) a building, or a part of a building, on the premises that is used for a noise sensitive purpose; and
   (b) any other part of the premises within 15 metres of that building or that part of the building;

The combined traffic and land use influencing factors for all surrounding residences, as shown in *Figure 1-1*, has been calculated as shown in *Table 2-3.* With regards to road traffic, Butler Boulevard is within 100m of the nearest noise sensitive premises and is considered a secondary road by examining the VDS loop counts from Main Roads WA at the Butler Boulevard and Exmouth Drive interchange (7,925 vehicles per day at count site #LM01069 in February 2022). It was determined that all residences nearest to the development have the same influencing factor when rounding to the nearest whole number.

Table 2-3 Influencing Factor Calculation – Nearest Residences

Description	Within 100 metre Radius	Within 450 metre Radius	Total
Industrial Land	0 %	0 %	0 dB
Commercial Land	18-24% / 0.9- 1.2 dB	11% / 0.5 dB	1.5-1.7 dB
Transport Factor			**2 dB**
Total			**4 dB**

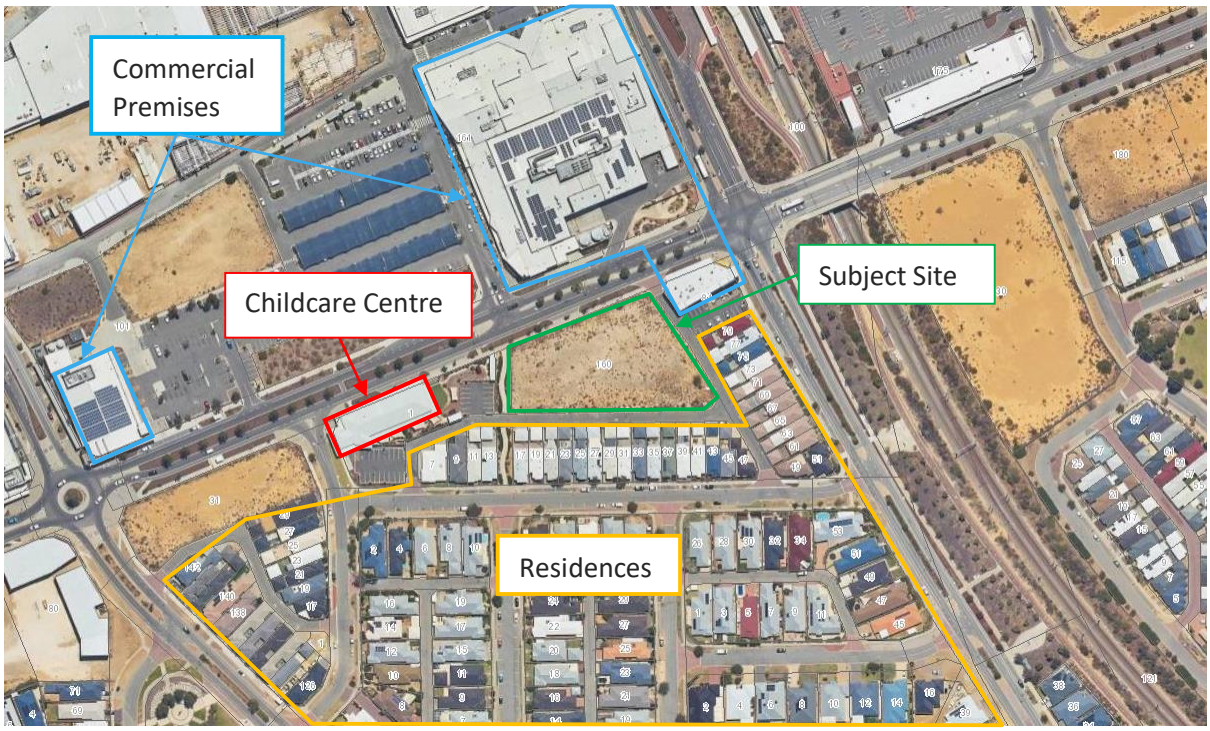

Figure 2-1 Locality of Subject Site and Nearby Receivers (PlanWA Maps)

Table 2-4 shows the relevant $L_{A10,}$ and L_{Amax} assigned levels (including the influencing factors). The L_{A10} assigned level is applicable to the mechanical plant, gym and patron noise, while the L_{Amax} is applicable to car door closing noise.

Table 2-4 Assigned Noise Levels

Premises Receiving Noise	Time of Day	Assigned Level (dB)	
		L_{A10}	L_{Amax}
Nearest Residences	0700 to 1900 hours Monday to Saturday (Day)	49	69
	0900 to 1900 hours Sunday and public holidays (Sunday)	44	69
	1900 to 2200 hours all days (Evening)	44	59
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and public holidays (Night)	39	59
Commercial	All hours	60	80

It is noted the assigned noise levels are statistical levels and therefore the period over which they are determined is important. The Regulations define the Representative Assessment Period (RAP) as *a period of time of not less than 15 minutes, and not exceeding 4 hours*, which is determined by an *inspector* or *authorised person* to be appropriate for the assessment of a noise emission, having regard to the type and nature of the noise emission. An *inspector* or *authorised person* is a person appointed under Sections 87 & 88 of the *Environmental Protection Act 1986* and include Local Government

Environmental Health Officers and Officers from the Department of Environment Regulation. Acoustic consultants or other environmental consultants are not appointed as an *inspector* or *authorised person*. Therefore, whilst this assessment is based on a 4 hours RAP, which is assumed to be appropriate given the nature of the operations, this is to be used for guidance only.

Regulation 3 states the following with regards to vehicles:

> *(1) Nothing in these regulations applies to the following noise emissions —*
>
> *(a) noise emissions from the propulsion and braking systems of motor vehicles operating on a road;*

The car park is considered to be a road and therefore vehicle noise (propulsion and braking) is not strictly assessed. Noise from vehicle doors still require assessment, as they do not form part of the propulsion or braking systems.

3 METHODOLOGY

Computer modelling was undertaken, using the software *SoundPLAN 8.2* with the ISO 9613 algorithms (ISO 17354 compliant) selected. These algorithms have been selected as they include the influence of wind. Input data required in the model are:

- Meteorological Information;
- Topographical data;
- Ground Absorption; and
- Source sound power levels.

3.1 Meteorological Information

Meteorological information utilised is provided in *Table 3-1* and is considered to represent worst-case conditions for noise propagation during the night period. At wind speeds greater than those shown, sound propagation may be further enhanced, however background noise from the wind itself and from local vegetation is likely to be elevated and dominate the ambient noise levels.

Table 3-1 Modelling Meteorological Conditions

Parameter	Night (1900-0700)
Temperature (°C)	15
Humidity (%)	50
Wind Speed (m/s)	Up to 5m/s
Wind Direction*	All

* Note that the modelling package used allows for all wind directions to be modelled simultaneously.

It is generally considered that compliance with the assigned noise levels needs to be demonstrated for 98% of the time, during the day and night periods, for the month of the year in which the worst-

case weather conditions prevail. In most cases, the above conditions occur for more than 2% of the time and therefore must be satisfied.

3.2 Topographical Data

Topographical data was adapted from *Google* in the form of spot heights. Existing buildings have also been included as these can provide barrier attenuation when located between a source and receiver.

3.3 Ground Absorption

Ground absorption varies from a value of 0 to 1, with 0 being for an acoustically reflective ground (e.g. water or bitumen) and 1 for acoustically absorbent ground (e.g. grass). As the area is predominantly hard ground, a conservative value of 0 has been used.

3.4 Source Sound Levels

Note that as the development is at DA stage, the various plant selections are of a generic nature based on similar projects. A detailed review of these elements should be carried out at building permit stage when final selection of plant is known. The sound power levels used in the modelling are provided in *Table 3-2*.

Table 3-2 Source Sound Power Levels, dB

Description	Octave Band Centre Frequency (Hz)								Overall dB(A)
	63	125	250	500	1k	2k	4k	8k	
Swimming School									
Plant Room SAF (inlet)	71	70	80	78	72	72	70	76	**81**
Plant Room EAF (outlet)	79	81	87	86	86	83	79	76	**90**
General Exhaust Fan	71	64	61	64	62	60	57	51	**67**
AC Package Unit x4 on roof, (L_{A10})	-	89	83	80	78	74	64	60	**83**
Cafe Patrons Outer Area (25Pax), L_w	70	56	58	63	85	79	64	54	**86**
Gym									
AC Package Unit x4 on roof, (L_{A10})	-	89	83	80	78	74	64	60	**83**
General Exhaust Fan	71	64	61	64	62	60	57	51	**67**
Gym Noise (Centre of Room L_p) with light music	94	81	70	69	69	65	62	56	**75**
Group Fitness Class (Centre of Room L_p) with music and instructor	98	96	86	85	85	81	78	72	**90**
Carpark									
Car Door Closings (L_{Amax})	71	74	77	81	80	78	72	61	**84**

With regard to the *Table 3-2* noise sources, please note the following:

- Sound levels have been sourced from file data for previous similar projects;
- The AC Packaged Units, were modelled at 1m above roof level;
- The exhaust Fans, SAF and EAF were modelled at 0.5m above roof level, nominally above the plant room area;
- Car door sources were modelled at 1m above ground;
- The group fitness class was modelled on the second upper floor and the general gym noise with light music was modelled on the ground floor;
- Glazing on both buildings has been assumed as 10mm thick toughened glass with an R_w rating of 35 dB;
- The roof/ceiling systems for the swim school was modelled to have minimum acoustic performance of R_w 36 dB. The roof/ceiling systems for the gym was modelled to have a minimum acoustic performance of R_w 45 dB.
- The majority of noise sources are assumed to be present for more than 10% of the time and are therefore assessed against the L_{A10} parameter. The exception is noise from car door closings, which are assessed against the L_{Amax} level.

Two assessment scenarios are considered as follows:

1. L_{A10} Noise – All rooftop mechanical plant, general gym area on ground floor, fitness class area on upper floor and patrons within the swimming school's alfresco dining area all running simultaneously.
2. L_{Amax} Noise – Car door noise sources.

An image of the noise model overview is shown in *Figure 3-1*. As the nearest residential properties have lane-way access oriented toward the development site, calculation receivers have been located in the highly noise sensitive space between the dwelling and the garage units.

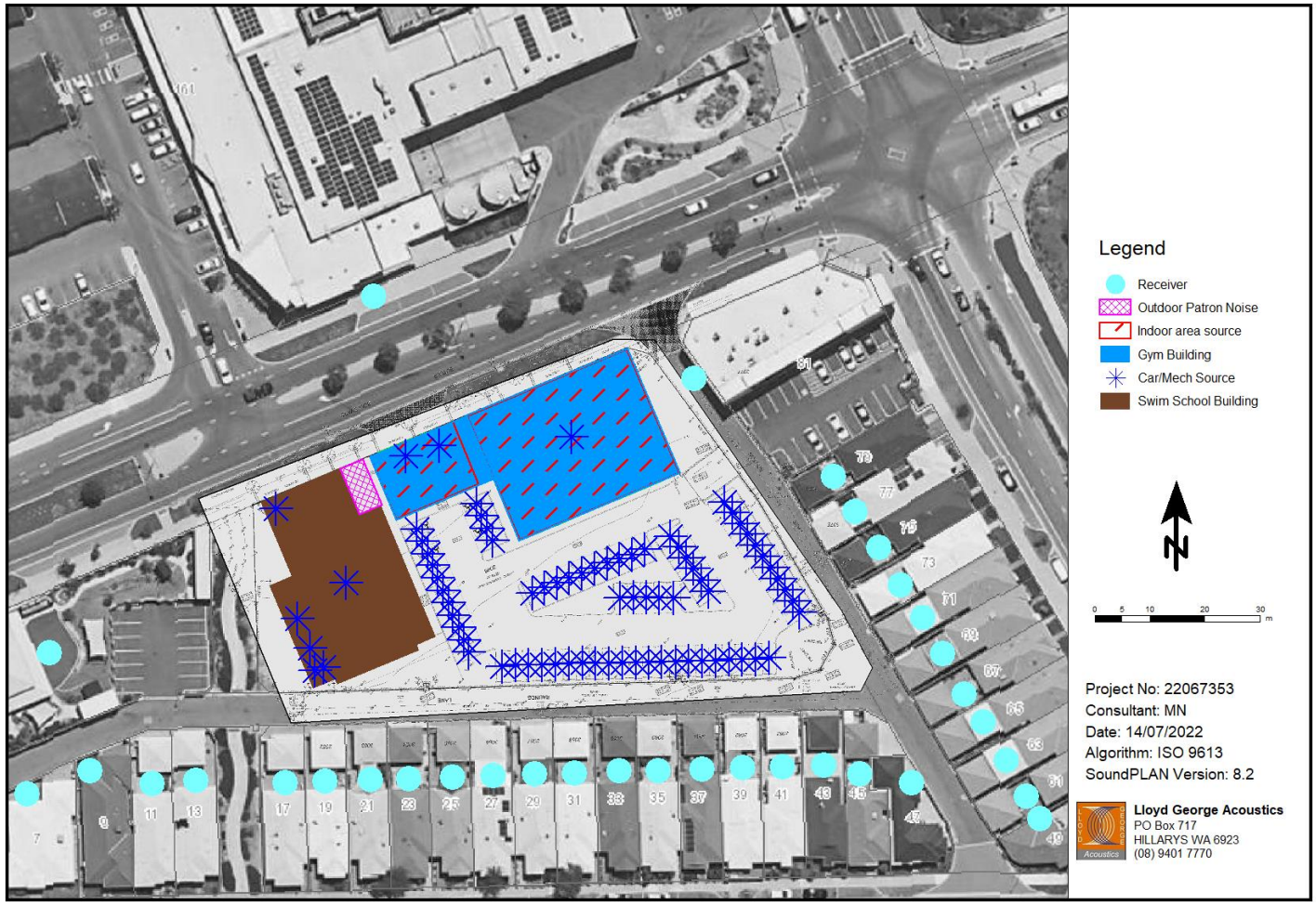

Figure 3-1 2D Image of Noise Model

4 RESULTS AND ASSESSMENT

4.1 Scenario 1 – Night L_{A10}

As the swim school and gym are both operational prior to 7.00am, *Table 4-1* provides the results for this worst-case night-time L_{A10} scenario. This includes noise from all mechanical plant on both rooftops running, patron noise in the alfresco dining area and noise within the two gym areas. *Figure 4-1* provides a noise contour plot for the Night L_{A10} Scenario at ground level. It should be noted that the assessment has assumed all plant will be used simultaneously during this night period, which is conservative as in reality, they will be used more intermittently than during the day.

Table 4-1 Predicted Noise Levels, Scenario 1: Night, L_{A10} dB

Location	Predicted Noise Level Worst-Case Downwind					Critical Assigned Level	Calculated Exceedence
	Rooftop Plant	Patron Noise	Gym Roof	Gym Windows	Combined[1]		
1 Tredegar St (Childcare Centre)	42	29	36	20	43 + 5 = 48	39	+9
7 Tredegar St	32	26	32	14	35 + 5 = 40	39	+1
9 Tredegar St	32	23	28	12	34 + 5 = 39	39	*Complies*
11 Tredegar St	36	24	30	12	37 + 5 = 42	39	+3
13 Tredegar St	45	27	32	14	45 + 5 = 50	39	+11
17 Tredegar St	40	26	31	14	40 + 5 = 45	39	+6
19 Tredegar St	41	26	32	14	41 + 5 = 46	39	+7
21 Tredegar St	41	27	32	15	42 + 5 = 47	39	+8
23 Tredegar St	40	27	32	15	41 + 5 = 46	39	+7
25 Tredegar St	40	26	33	15	41 + 5 = 46	39	+7
27 Tredegar St	38	26	33	17	39 + 5 = 44	39	+5
29 Tredegar St	37	30	33	16	39 + 5 = 44	39	+5
31 Tredegar St	37	26	32	16	38 + 5 = 43	39	+4
33 Tredegar St	35	25	32	15	37 + 5 = 42	39	+3
35 Tredegar St	35	25	32	15	37 + 5 = 42	39	+3
37 Tredegar St	35	24	32	15	37 + 5 = 42	39	+3
39 Tredegar St	34	23	31	14	36 + 5 = 41	39	+2
41 Tredegar St	34	23	31	14	36 + 5 = 41	39	+2

Location	Predicted Noise Level Worst-Case Downwind					Critical Assigned Level	Calculated Exceedence
	Rooftop Plant	Patron Noise	Gym Roof	Gym Windows	Combined[1]		
43 Tredegar St	33	22	30	12	35 + 5 = 40	39	+1
45 Tredegar St	34	22	30	12	35 + 5 = 40	39	+1
47 Tredegar St	27	19	26	11	30 + 5 = 35	39	*Complies*
49 Exmouth Dr	28	19	28	10	31 + 5 = 36	39	*Complies*
51 Exmouth Dr	28	18	26	9	31 + 5 = 36	39	*Complies*
61 Exmouth Dr	29	20	28	11	32 + 5 = 37	39	*Complies*
63 Exmouth Dr	29	20	29	11	32 + 5 = 37	39	*Complies*
65 Exmouth Dr	29	20	29	11	32 + 5 = 37	39	*Complies*
67 Exmouth Dr	29	20	29	11	32 + 5 = 37	39	*Complies*
69 Exmouth Dr	29	20	30	13	33 + 5 = 38	39	*Complies*
71 Exmouth Dr	30	20	30	13	33 + 5 = 38	39	*Complies*
73 Exmouth Dr	30	19	29	12	33 + 5 = 38	39	*Complies*
75 Exmouth Dr	31	20	31	14	34 + 5 = 39	39	*Complies*
77 Exmouth Dr	31	21	32	15	35 + 5 = 40	39	+1
79 Exmouth Dr	33	21	31	18	35 + 5 = 40	39	+1
81 Exmouth Dr (Commercial)	38	30	42	22	44 + 5 = 49	60	*Complies*
Woolworths Butler (Commercial)	44	50	43	39	52 + 5 = 57	60	*Complies*

1. Includes + 5 dB adjustment for tonality.

The most critical receivers are located to the south of the swim school building, with a predicted level of up to 45 dB L_{A10} at 13 Tredegar St. The mechanical plant noise during the night period, when background noise is lowest, may be considered to have tonal characteristics, attracting a +5 dB adjustment. Therefore, the assigned level is exceeded by up to 11 dB at this location. The SAF and EAF mechanical plant above the plant room is the main source of noise causing these exceedances.

Commercial receivers are expected to comply at all times.

It is recommended that a follow up verification of mechanical plant selections be carried out at detailed design by a suitably qualified acoustical consultant. In line attenuators on fan outlets and screening of rooftop plant using solid barriers should also be allowed for in the final design. AC plant should be selected and programmed with low-noise running modes during the night.

Figure 4-1 Rooftop Plant, Patron and Gym Noise, dB L_{A10}

Predicted Noise level

= 34
= 39
= 44
= 49
= 54

Legend

- Receiver
- Outdoor Patron Noise
- Indoor area source
- Gym Building
- Car/Mech Source
- Swim School Building

N

0 5 10 20 30 m

Project No: 22067353
Consultant: MN
Date: 14/07/2022
Algorithm: ISO 9613
SoundPLAN Version: 8.2

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4.2 Scenario 2 – Car Park Noise L_{Amax}

Table 4-2 provides the results for the car door L_{Amax} scenario. *Figure 4-2* presents the predicted noise levels from this scenario as noise contours (non-cumulative). The most critical time period is considered to be the night-time, noting this period extends to 9am on Sundays and public holidays. As these noise sources are intermittent in nature, they are assessable against the night L_{Amax} criteria

Table 4-2 Predicted Noise Levels, Scenario 2: Night, L_{Amax} dB

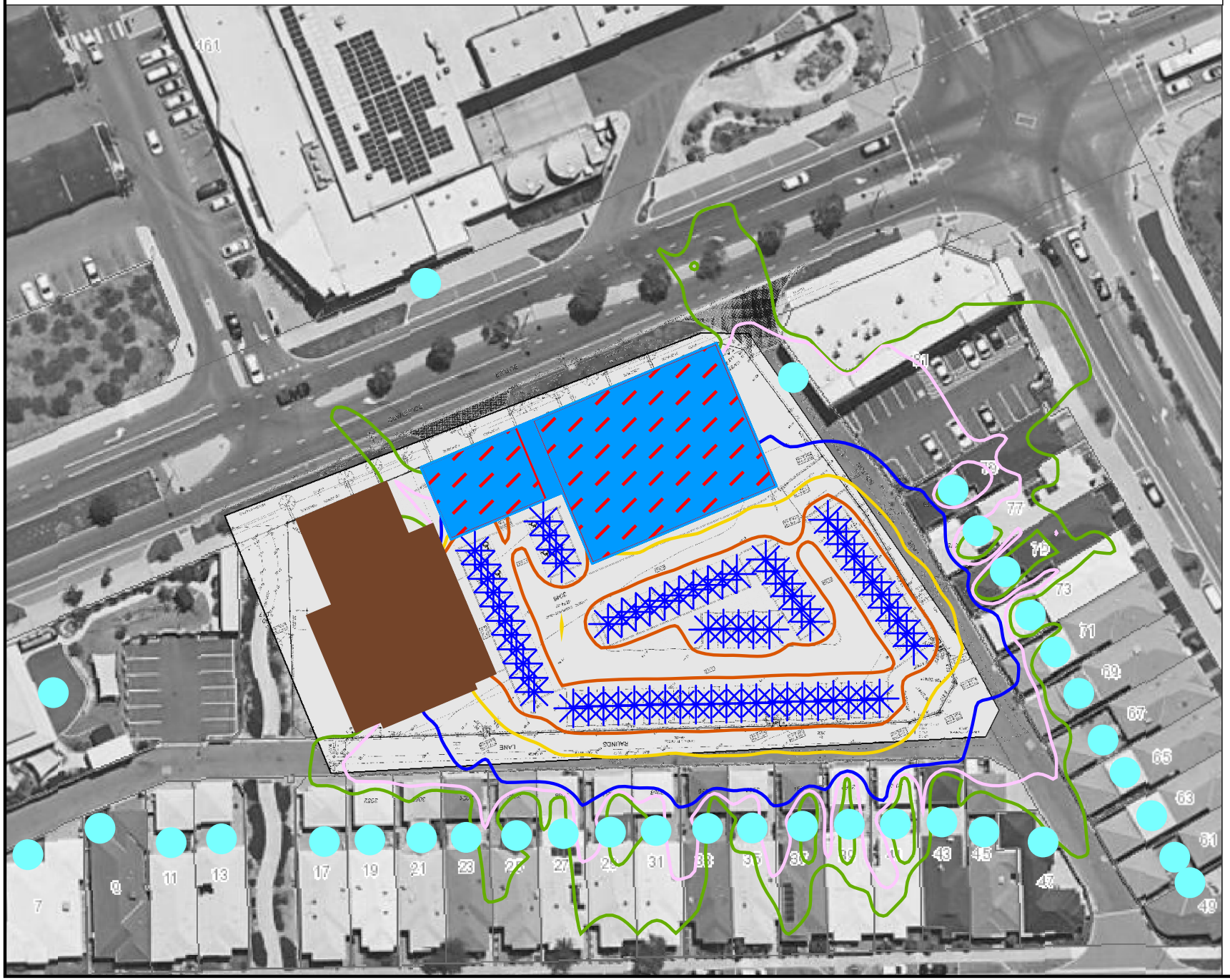
Location	Car Door Noise[1]	Night Assigned Level	Calculated Exceedence
1 Tredegar St (Childcare Centre)	28 + 10 = 38	59	*Complies*
7 Tredegar St	23 + 10 = 33	59	*Complies*
9 Tredegar St	21 + 10 = 31	59	*Complies*
11 Tredegar St	33 + 10 = 43	59	*Complies*
13 Tredegar St	38 + 10 = 48	59	*Complies*
17 Tredegar St	37 + 10 = 47	59	*Complies*
19 Tredegar St	33 + 10 = 43	59	*Complies*
21 Tredegar St	35 + 10 = 45	59	*Complies*
23 Tredegar St	38 + 10 = 48	59	*Complies*
25 Tredegar St	36 + 10 = 46	59	*Complies*
27 Tredegar St	47 + 10 = 57	59	*Complies*
29 Tredegar St	39 + 10 = 49	59	*Complies*
31 Tredegar St	41 + 10 = 51	59	*Complies*
33 Tredegar St	46 + 10 = 56	59	*Complies*
35 Tredegar St	40 + 10 = 50	59	*Complies*
37 Tredegar St	38 + 10 = 48	59	*Complies*
39 Tredegar St	37 + 10 = 47	59	*Complies*
41 Tredegar St	38 + 10 = 48	59	*Complies*
43 Tredegar St	36 + 10 = 46	59	*Complies*

Location	Car Door Noise[1]	Night Assigned Level	Calculated Exceedence
45 Tredegar St	35 + 10 = 45	59	*Complies*
47 Tredegar St	41 + 10 = 51	59	*Complies*
49 Exmouth Dr	29 + 10 = 39	59	*Complies*
51 Exmouth Dr	27 + 10 = 37	59	*Complies*
61 Exmouth Dr	30 + 10 = 40	59	*Complies*
63 Exmouth Dr	30 + 10 = 40	59	*Complies*
65 Exmouth Dr	32 + 10 = 42	59	*Complies*
67 Exmouth Dr	32 + 10 = 42	59	*Complies*
69 Exmouth Dr	36 + 10 = 46	59	*Complies*
71 Exmouth Dr	35 + 10 = 45	59	*Complies*
73 Exmouth Dr	36 + 10 = 46	59	*Complies*
75 Exmouth Dr	37 + 10 = 47	59	*Complies*
77 Exmouth Dr	42 + 10 = 52	59	*Complies*
79 Exmouth Dr	42 + 10 = 52	59	*Complies*
81 Exmouth Dr (Commercial)	52 + 10 = 62	80	*Complies*
Woolworths Butler (Commercial)	27 + 10 = 37	80	*Complies*

1. Includes + 10 dB adjustment for impulsiveness.

The surrounding receivers all comply with the assigned noise levels during all time periods.

Figure 4-2 Car Door Noise, dB L_{Amax}



Predicted Noise level

	= 44
	= 49
	= 54
	= 59
	= 64

Legend

- Receiver
- Outdoor Patron Noise
- Indoor area source
- Gym Building
- Car/Mech Source
- Swim School Building

N

0 5 10 20 30 m

Project No: 22067353
Consultant: MN
Date: 14/07/2022
Algorithm: ISO 9613
SoundPLAN Version: 8.2

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5 RECOMMENDATIONS

To comply with the *Environmental Protection (Noise) Regulations 1997,* noise controls are required to the following:

- Exceedances of the assigned levels are predicted due to the rooftop plant noise from the swim school. Plant specifications have been sourced from file data. This should be verified at detailed design stage once plant locations and selections are designed by the project's mechanical services contractor. Acoustic screening, attenuators or relocation may be required for some rooftop plant items;
- Glazing of the swim school and gym buildings are to be fixed (non-openable) and a minimum of 10mm thick to ensure noise from internal activities do not adversely impact residents;
- The roof/ceiling systems are to achieve a minimum acoustic performance of R_w 36 dB for the swim school and R_w 45 dB for the gym.

Some best practice recommendations have been included below – to be implemented in the design and operation where practicable.

- Amplified vocals (e.g. Instructors) and music within the gym and swim school is to be volume limited such that it is inaudible at the nearest residences. Once the volume is determined, this shall not be adjusted with the volume controller to be within a locked cabinet. There shall be no sub woofers as part of this system;
- Staff are to monitor the behaviour of members both in their use of the equipment (e.g. Dropping weights) and any excessive noise leaving the premises – particular outside of day time hours;
- The swim school may wish to consider internal acoustic absorption strategies as these are known to be reverberant environments. Such strategies generally involve absorptive ceiling tiles and when employed will also reduce the overall noise levels emitted externally.
- Speakers are to be isolated from the building structure;
- Members are not to provide their own music, other than via headphones;
- Mechanical plant to be maintained to ensure noise levels do not increase over time;
- Mechanical plant to be installed using vibration isolation mounts;
- Gym floor to incorporate impact isolation such that noise from dropping of weights is compliant at adjoining properties. Impact isolation systems should be designed by suitably qualified flooring specialists such as Embelton Engineering taking into account the type of weight and equipment systems proposed. No equipment shall be fixed to the walls or roof of the building. This is to be the responsibility of the gym operator.

6 CONCLUSION

The potential noise impacts resulting from the proposed swimming school and gym at proposed at Lot 3046 (#160) Butler Boulevard, Butler have been assessed in accordance with the *Environmental Protection (Noise) Regulations 1997*.

As demonstrated by way of noise modelling, compliance with the assigned levels is considered practicably achievable incorporating the *Section 5* noise control recommendations.

Appendix A

Site Plans

SERVICE RECORD

SERVICE \ STATUS	LOCATED	AVAILABLE	NO SERVICE	CONFIRM
WATER		✓		✓
SEWERAGE		✓		✓
GAS		✓		✓
TELSTRA	✓			
POWER U/G	✓			
O/H				

NOTE:
SERVICES MARKED CONFIRM REQUIRE BUILDER/CLIENT TO CONFIRM POSITION ON SITE.

LEGEND

POWER
- POWER DOME
- LAMP POST

SEWERAGE
- SEWER MAIN

ROAD
- SEMI-MOUNTABLE KERB SMK
- FLUSH KERB FK

WATER
- WATER METER
- HYDRANT
- WATER MAIN

GAS
- GAS MAIN

COMMUNICATIONS
- COMMS PIT
- COMMS LINE

VEGETATION
- TREE

FEATURE
- BRICK PAVING
- WOODEN BOLLARD
- STAINLESS STEEL BOLLARD
- RETIC CONTROL VALVE

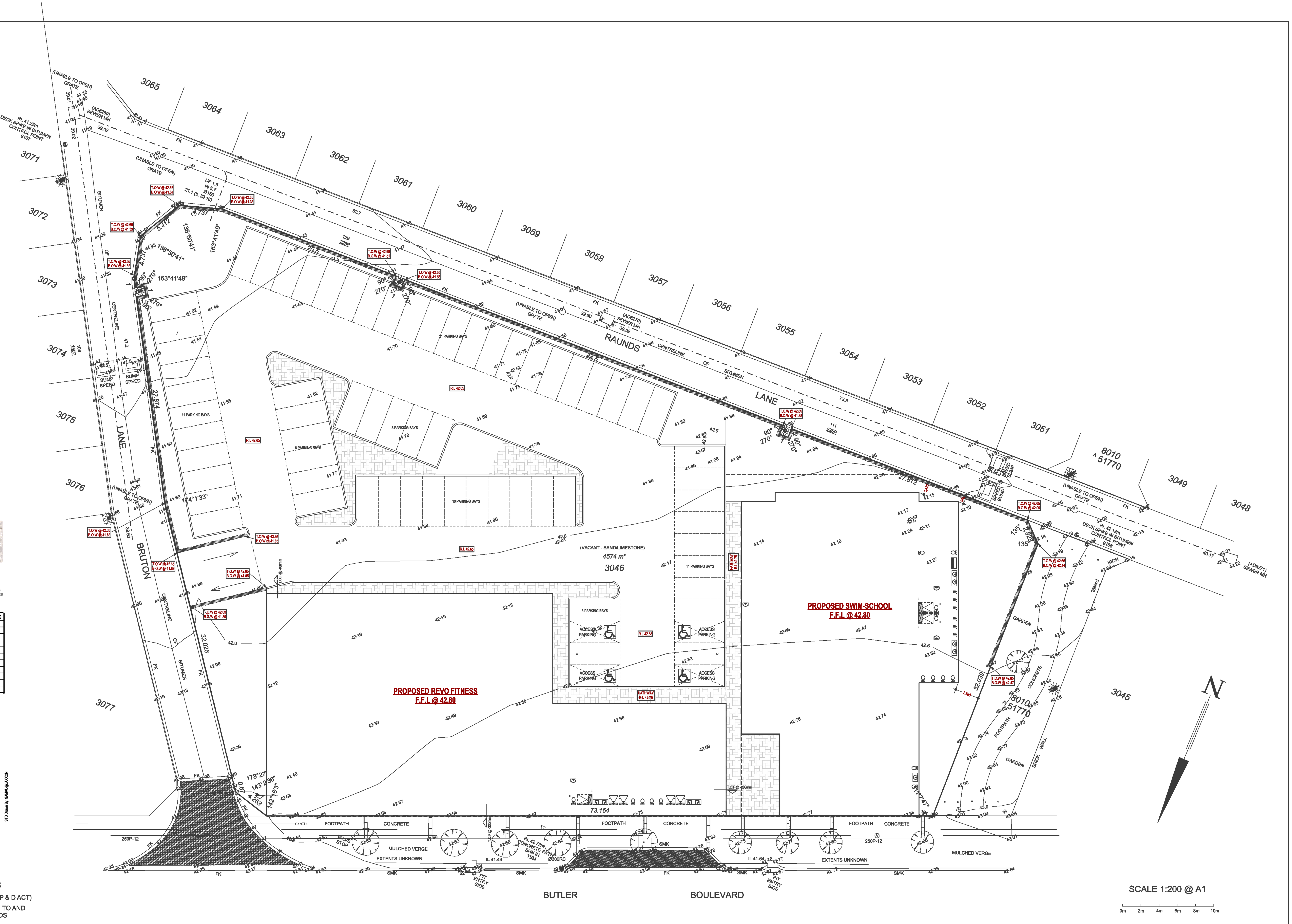
SURVEY MARK
- CONCRETE NAIL
- NAIL & PLATE
- PEG
- DECK SPIKE
- SPRINGHEAD NAIL (SHN)

LAXXON Construction Design

REV	VO #	DRN	DATE	CHK
		DUC	10-06-2022	

CLIENT:
DERRICK D'SOUZA
(SWIM CENTRE & REVO FITNESS)
ADDRESS:
LOT 3046
BUTLER BOULEVARD,
BUTLER

SHEET N° 6 OF 8
JOB N° 10156
REVISION - DATE 10-06-2022



COVENANT (SEC 150 OF THE P & D ACT)
NO ROAD VEHICLE ACCESS TO AND FROM ADJACENT ROADS

SITE PLAN
1:200

WARNING
Level between Control Points/TBM's before adopting their elevation.

NOTE
This PLAN is current at the Date of Survey (03/03/2022).
The cadastral boundary position has been determined from cadastral survey marks. A full repeg is recommended prior to any construction work. Check Landgate's Strata Plan & Certificate of Title for any Encumbrances Including Depth Limits, Easements, Caveats, Covenants etc. All SERVICES require verification from the relevant AUTHORITY - suggest contacting "Dial Before You Dig" for underground services & a site inspection.

PO BOX 429 MIDLAND 6936
PH: 08 9250 2261
www.scanlansurveys.com.au
reception@scanlansurveys.com.au

DRAWN BY:	LF	16/03/2022
CHECKED BY:	RS	16/03/2022
APPROVED BY:	JS	16/03/2022
DRAWING FILE: 8151182.DWG		

REVISION	DESCRIPTION	BY	DATE
	ISSUED TO CLIENT	JS	17/03/2022

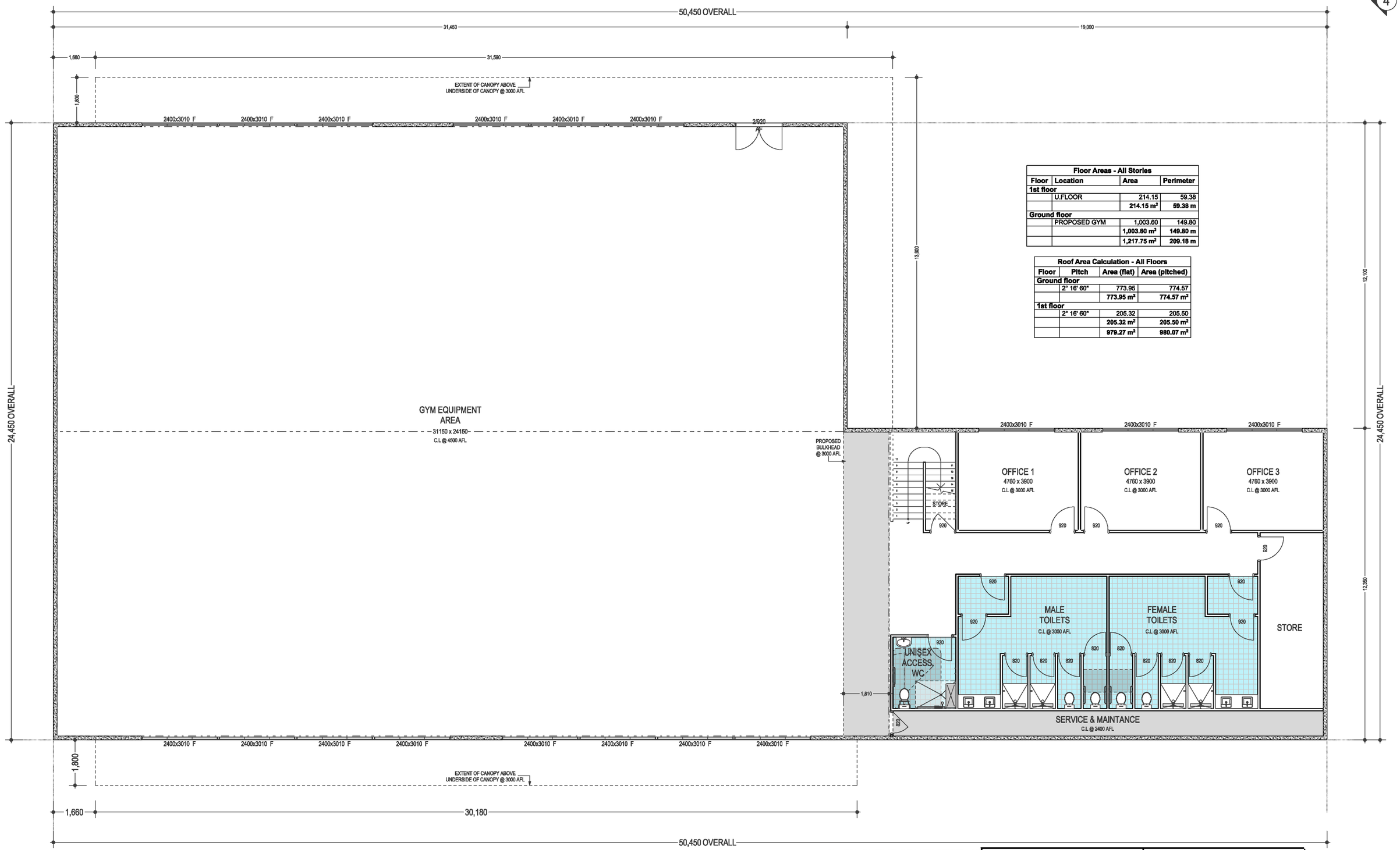
CONTOUR AND FEATURE SURVEY

PROJECT:
LOT 3046 ON DP 400719
160 BUTLER BOULEVARD,
BUTLER

CLIENT: [redacted]

DEPOSITED PLAN: 400719 C/T: 2839/945

HORIZONTAL DATUM: LOCAL PLANE
VERTICAL DATUM: AHD (SEWER M/H AD6269 - RL 41.17m)
DRAWING: 8151/18/2
REVISION:



Floor Areas - All Stories			
Floor	**Location**	**Area**	**Perimeter**
1st floor			
	U.FLOOR	214.15	59.38
		214.15 m²	**59.38 m**
Ground floor			
	PROPOSED GYM	1,003.60	149.80
		1,003.60 m²	**149.80 m**
		1,217.75 m²	**209.18 m**

Roof Area Calculation - All Floors			
Floor	**Pitch**	**Area (flat)**	**Area (pitched)**
Ground floor			
	2° 16' 60"	773.95	774.57
		773.95 m²	**774.57 m²**
1st floor			
	2° 16' 60"	205.32	205.50
		205.32 m²	**205.50 m²**
		979.27 m²	**980.07 m²**

GROUND FLOOR PLAN
1:100

CLIENT:
[redacted]

ADDRESS:
LOT 3046
BUTLER BOULEVARD,
BUTLER

LAXXON Construction Design

SWIM CENTRE & REVO FITNESS
PROPOSAL

REV	VO #	DRN	DATE	CHK
		SAu	23-05-2022	
1	REVISED	DUC	01-06-2022	
2	REVISED	DUC	10-06-2022	

Sub-contractors to verify all dimensions on site.

PLANNING DRAWINGS
THIS IS ONE OF THE DRAWINGS REFERRED TO IN THE CONTRACT.

DATED:...../...../.....

OWNER WITNESS
OWNER WITNESS
BUILDER WITNESS

JOB N° 10156
REVISION 2 DATE 10-06-2022
SHEET N° 3 OF 8
DRAWN BY: SAMA@LAXXON

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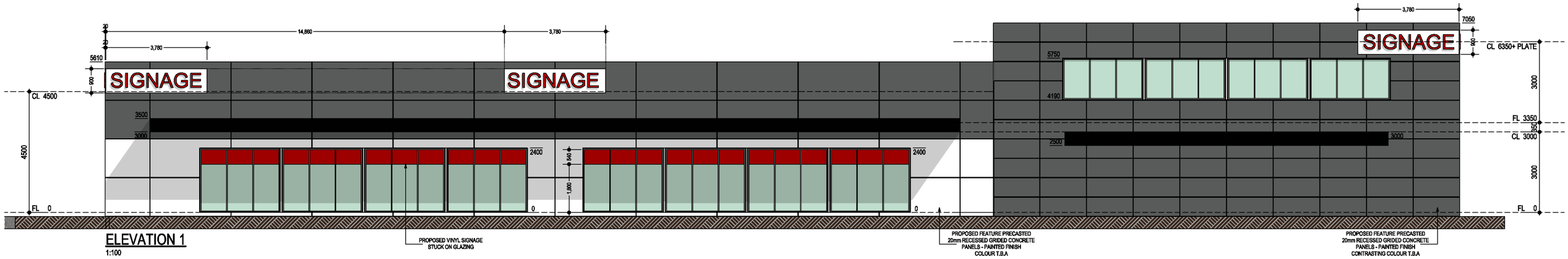
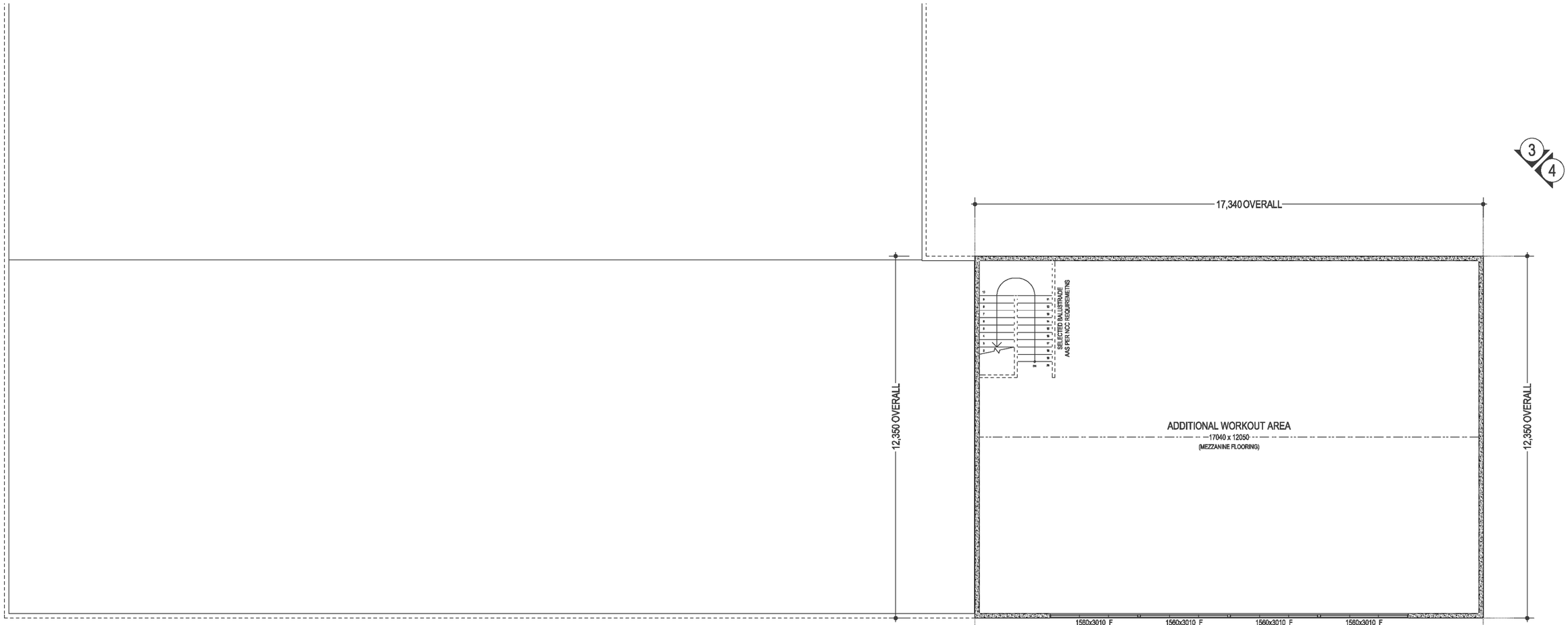


ELEVATION 1
1:100



UPPER FLOOR PLAN
1:100

Floor Areas - All Stories			
Floor	**Location**	**Area**	**Perimeter**
1st floor			
	U.FLOOR	214.15	59.38
		214.15 m²	**59.38 m**
Ground floor			
	PROPOSED GYM	1,003.60	149.80
		1,003.60 m²	**149.80 m**
		1,217.75 m²	**209.18 m**

Roof Area Calculation - All Floors			
Floor	**Pitch**	**Area (flat)**	**Area (pitched)**
Ground floor			
	2° 16' 60"	773.95	774.57
		773.95 m²	**774.57 m²**
1st floor			
	2° 16' 60"	205.32	205.50
		205.32 m²	**205.50 m²**
		979.27 m²	**980.07 m²**

CLIENT:
[redacted]

ADDRESS:
LOT 3046
BUTLER BOULEVARD,
BUTLER

LAXXON Construction Design

SWIM CENTRE & REVO FITNESS
PROPOSAL

REV	VO #	DRN	DATE	CHK
		SAu	23-05-2022	
1	REVISED	DUC	01-06-2022	
2	REVISED	DUC	10-06-2022	

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DATED:...../...../.....

OWNER WITNESS
OWNER WITNESS
BUILDER WITNESS

JOB N° 10156
REVISION 2
DATE 10-06-2022
SHEET N° 4 OF 8

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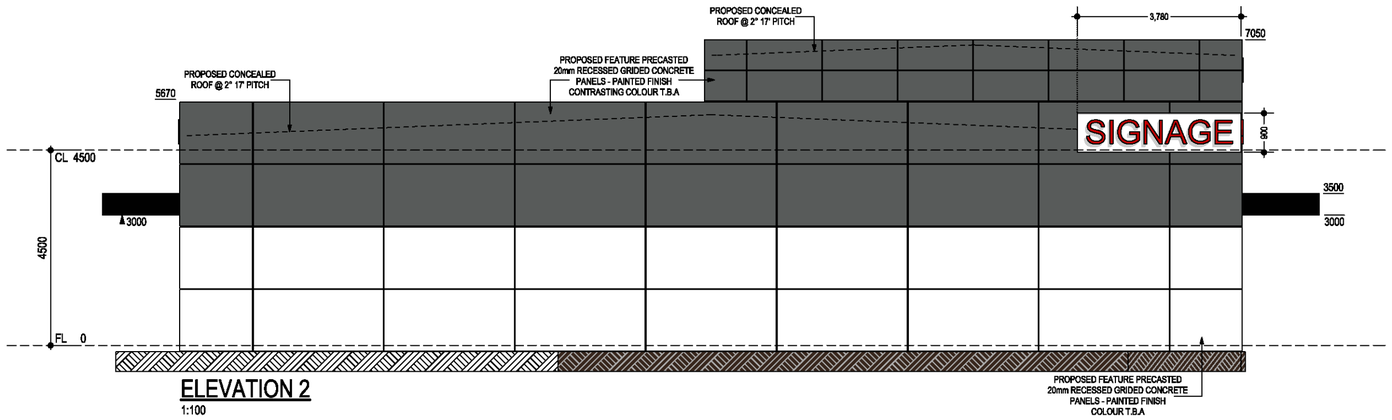

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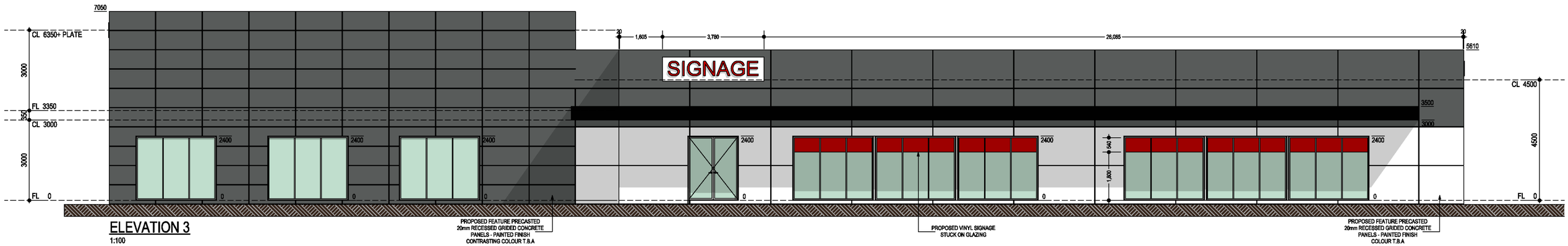
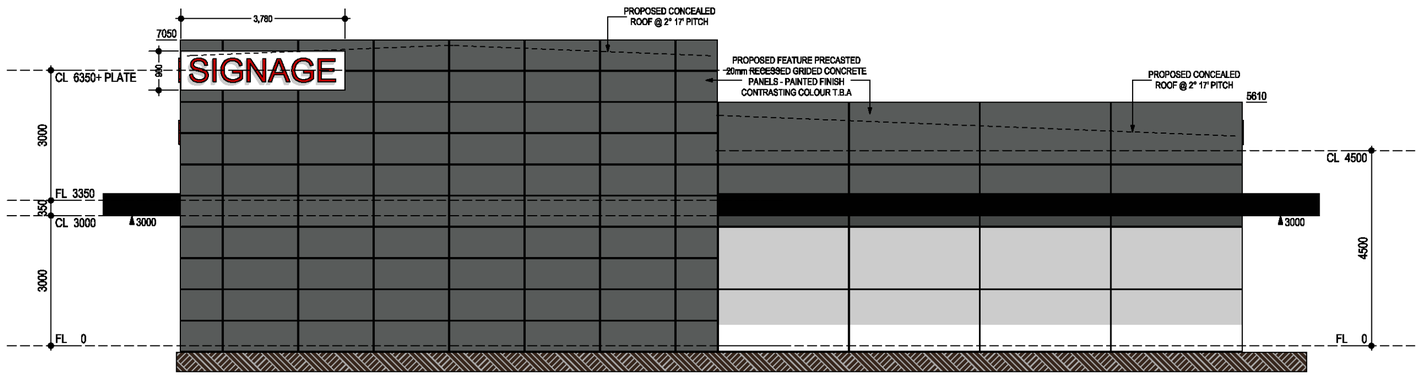


ELEVATION 3
1:100



ELEVATION 4
1:100

CLIENT:

[redacted]

ADDRESS:

LOT 3046
BUTLER BOULEVARD,
BUTLER

SWIM CENTRE & REVO FITNESS
PROPOSAL

REV	VO #	DRN	DATE	CHK
		SAu	23-05-2022	
1	REVISED	DUC	01-06-2022	
2	REVISED	DUC	10-06-2022	

Sub-contractors to verify all dimensions on site.

PLANNING DRAWINGS
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DATED:...../...../.....

OWNER WITNESS
OWNER WITNESS
BUILDER WITNESS

JOB N° 10156
REVISION 2 DATE 10-06-2022
SHEET N° 5 OF 8

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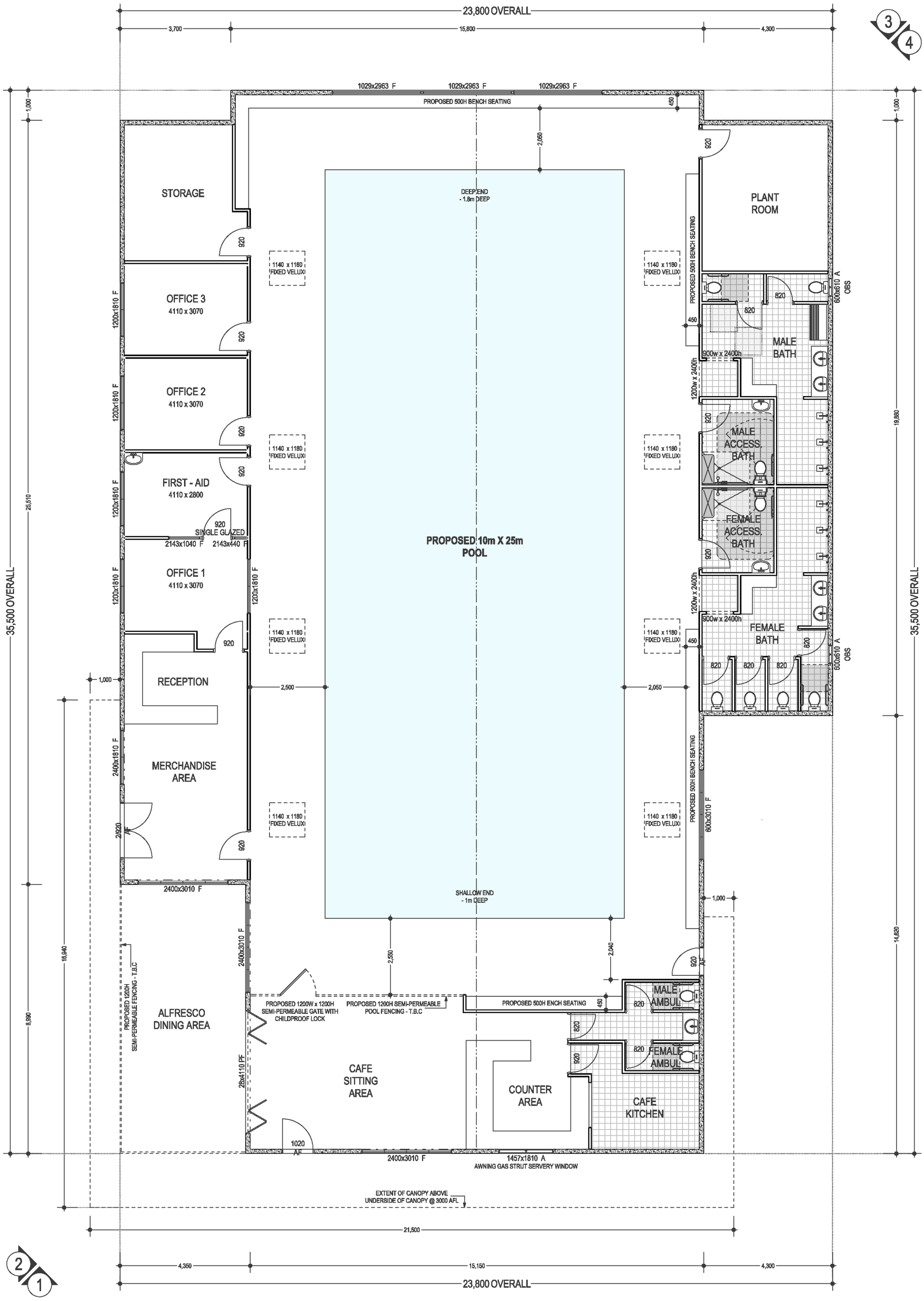
Floor Areas - All Stories			
Floor	Location	Area	Perimeter
Ground floor			
	SWIMMING CENTRE	736.28	118.60
		736.28 m²	118.60 m

Roof Area Calculation - All Floors			
Floor	Pitch	Area (flat)	Area (pitched)
Ground floor			
	10° 11' 60"	718.57	730.12
		718.57 m²	730.12 m²



FLOOR PLAN

1:100

CLIENT:

[redacted]

ADDRESS:

LOT 3046
BUTLER BOULEVARD,
BUTLER

LAXXON Construction Design

SWIM CENTRE & REVO FITNESS PROPOSAL

REV	VO #	DRN	DATE	CHK
1	REVISED	SAu	31-01-2022	
2	REVISED	DUC	03-05-2022	
		DUC	10-06-2022	

Sub-contractors to verify all dimensions on site.

PLANNING DRAWINGS

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DATED:...../...../.....

OWNER WITNESS

OWNER WITNESS

BUILDER WITNESS

JOB N° 10156

REVISION 2 DATE 10-06-2022

SHEET N° 1 OF 8 + 0 ANC

DRAWN BY: SAMAU@LAXXON

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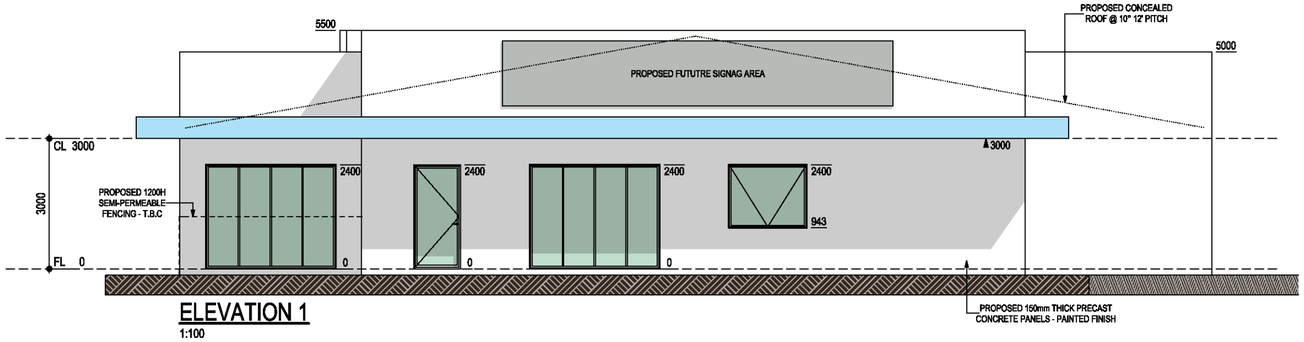

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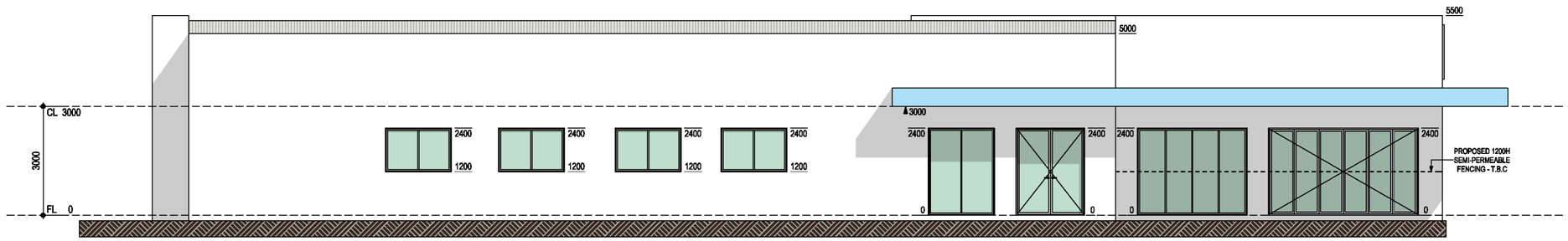

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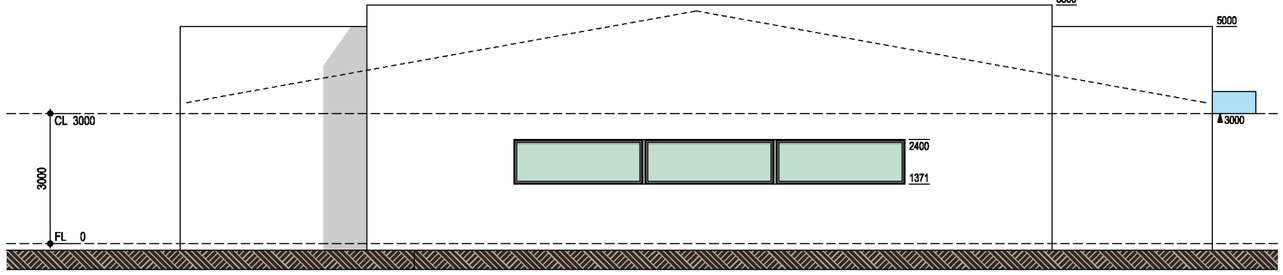

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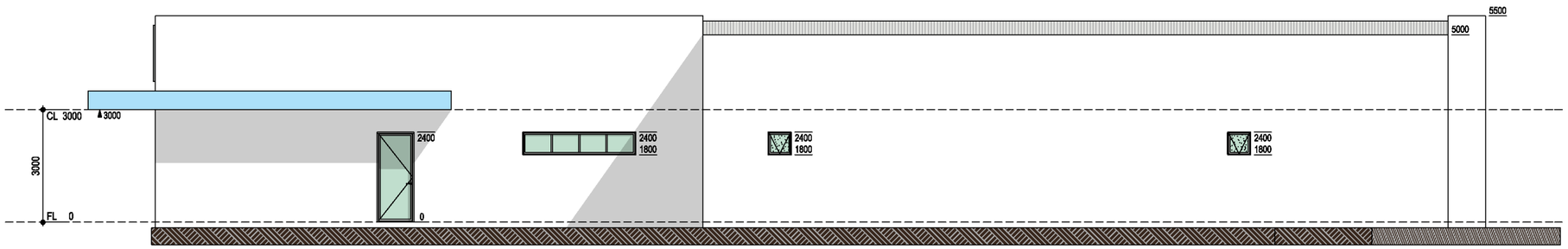

ELEVATION 4
1:100

CLIENT:

[redacted]

ADDRESS:

LOT 3046
BUTLER BOULEVARD,
BUTLER

LAXXON Construction Design

SWIM CENTRE & REVO FITNESS
PROPOSAL

REV	VO #	DRN	DATE	CHK
1	REVISED	SAu	31-01-2022	
2	REVISED	DUC	03-05-2022	
		DUC	10-06-2022	

Sub-contractors to verify all dimensions on site.

PLANNING DRAWINGS
THIS IS ONE OF THE DRAWINGS REFERRED TO IN THE CONTRACT.

DATED:...../...../.....

OWNER WITNESS

OWNER WITNESS

BUILDER WITNESS

JOB N° 10156
REVISION 2 DATE 10-06-2022
SHEET N° 2 OF 8
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DRAWN BY: SAMAN@LAXXON

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Appendix B

Terminology

The following is an explanation of the terminology used throughout this report.

Decibel (dB)
The decibel is the unit that describes the sound pressure and sound power levels of a noise source. It is a logarithmic scale referenced to the threshold of hearing.

A-Weighting
An A-weighted noise level has been filtered in such a way as to represent the way in which the human ear perceives sound. This weighting reflects the fact that the human ear is not as sensitive to lower frequencies as it is to higher frequencies. An A-weighted sound level is described as L_A dB.

Sound Power Level (L_w)
Under normal conditions, a given sound source will radiate the same amount of energy, irrespective of its surroundings, being the sound power level. This is similar to a 1kW electric heater always radiating 1kW of heat. The sound power level of a noise source cannot be directly measured using a sound level meter but is calculated based on measured sound pressure levels at known distances. Noise modelling incorporates source sound power levels as part of the input data.

Sound Pressure Level (L_p)
The sound pressure level of a noise source is dependent upon its surroundings, being influenced by distance, ground absorption, topography, meteorological conditions etc and is what the human ear actually hears. Using the electric heater analogy above, the heat will vary depending upon where the heater is located, just as the sound pressure level will vary depending on the surroundings. Noise modelling predicts the sound pressure level from the sound power levels taking into account ground absorption, barrier effects, distance etc.

L_{ASlow}
This is the noise level in decibels, obtained using the A frequency weighting and the S time weighting as specified in AS1259.1-1990. Unless assessing modulation, all measurements use the slow time weighting characteristic.

L_{AFast}
This is the noise level in decibels, obtained using the A frequency weighting and the F time weighting as specified in AS1259.1-1990. This is used when assessing the presence of modulation only.

L_{APeak}
This is the maximum reading in decibels using the A frequency weighting and P time weighting AS1259.1-1990.

L_{Amax}
An L_{Amax} level is the maximum A-weighted noise level during a particular measurement.

L_{A1}
An L_{A1} level is the A-weighted noise level which is exceeded for one percent of the measurement period and is considered to represent the average of the maximum noise levels measured.

L_{A10}
An L_{A10} level is the A-weighted noise level which is exceeded for 10 percent of the measurement period and is considered to represent the "*intrusive*" noise level.

L_{Aeq}
The equivalent steady state A-weighted sound level ("equal energy") in decibels which, in a specified time period, contains the same acoustic energy as the time-varying level during the same period. It is considered to represent the "average" noise level.

L_{A90}
An L_{A90} level is the A-weighted noise level which is exceeded for 90 percent of the measurement period and is considered to represent the "*background*" noise level.

One-Third-Octave Band
Means a band of frequencies spanning one-third of an octave and having a centre frequency between 25 Hz and 20 000 Hz inclusive.

L_{Amax} assigned level
Means an assigned level which, measured as a $L_{A\ Slow}$ value, is not to be exceeded at any time.

L_{A1} assigned level
Means an assigned level which, measured as a $L_{A\ Slow}$ value, is not to be exceeded for more than 1% of the representative assessment period.

L_{A10} assigned level
Means an assigned level which, measured as a $L_{A\ Slow}$ value, is not to be exceeded for more than 10% of the representative assessment period.

Tonal Noise
A tonal noise source can be described as a source that has a distinctive noise emission in one or more frequencies. An example would be whining or droning. The quantitative definition of tonality is:

the presence in the noise emission of tonal characteristics where the difference between -

(a) the A-weighted sound pressure level in any one-third octave band; and

(b) the arithmetic average of the A-weighted sound pressure levels in the 2 adjacent one-third octave bands,

is greater than 3 dB when the sound pressure levels are determined as $L_{Aeq,T}$ levels where the time period T is greater than 10% of the representative assessment period, or greater than 8 dB at any time when the sound pressure levels are determined as $L_{A\ Slow}$ levels.

This is relatively common in most noise sources.

Modulating Noise
A modulating source is regular, cyclic and audible and is present for at least 10% of the measurement period. The quantitative definition of modulation is:

a variation in the emission of noise that —

(a) is more than 3 dB $L_{A\ Fast}$ or is more than 3 dB $L_{A\ Fast}$ in any one-third octave band;

(b) is present for at least 10% of the representative.

Impulsive Noise
An impulsive noise source has a short-term banging, clunking or explosive sound. The quantitative definition of impulsiveness is:

a variation in the emission of a noise where the difference between $L_{A\ peak}$ and $L_{A\ Max\ slow}$ is more than 15 dB when determined for a single representative event;

Major Road
Is a road with an estimated average daily traffic count of more than 15,000 vehicles.

Secondary / Minor Road
Is a road with an estimated average daily traffic count of between 6,000 and 15,000 vehicles.

Influencing Factor (IF)

$$= \frac{1}{10}(\%\,\text{Type A}_{100} + \%\,\text{Type A}_{450}) + \frac{1}{20}(\%\,\text{Type B}_{100} + \%\,\text{Type B}_{450})$$

where:

$\%\,\text{Type A}_{100}$ = the percentage of industrial land within a 100m radius of the premises receiving the noise

$\%\,\text{Type A}_{450}$ = the percentage of industrial land within a 450m radius of the premises receiving the noise

$\%\,\text{Type B}_{100}$ = the percentage of commercial land within a 100m radius of the premises receiving the noise

$\%\,\text{Type B}_{450}$ = the percentage of commercial land within a 450m radius of the premises receiving the noise

+ Traffic Factor (maximum of 6 dB)

= 2 for each secondary road within 100m

= 2 for each major road within 450m

= 6 for each major road within 100m

Representative Assessment Period
Means a period of time not less than 15 minutes, and not exceeding four hours, determined by an inspector or authorised person to be appropriate for the assessment of a noise emission, having regard to the type and nature of the noise emission.

Background Noise
Background noise or residual noise is the noise level from sources other than the source of concern. When measuring environmental noise, residual sound is often a problem. One reason is that regulations often require that the noise from different types of sources be dealt with separately. This separation, e.g. of traffic noise from industrial noise, is often difficult to accomplish in practice. Another reason is that the measurements are normally carried out outdoors. Wind-induced noise, directly on the microphone and indirectly on trees, buildings, etc., may also affect the result. The character of these noise sources can make it difficult or even impossible to carry out any corrections.

Ambient Noise
Means the level of noise from all sources, including background noise from near and far and the source of interest.

Specific Noise
Relates to the component of the ambient noise that is of interest. This can be referred to as the noise of concern or the noise of interest.

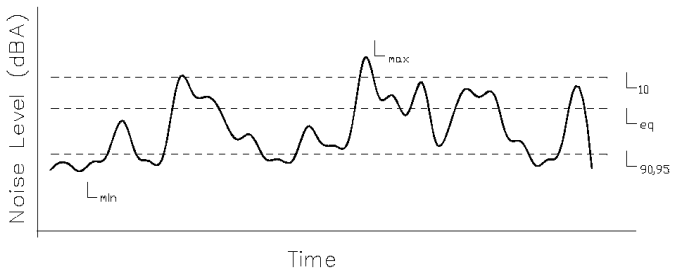
Peak Component Particle Velocity (PCPV)
The maximum instantaneous velocity in mm/s of a particle at a point during a given time interval and in one of the three orthogonal directions (x, y or z) measured as a peak response. Peak velocity is normally used for the assessment of structural damage from vibration.

Peak Particle Velocity (PPV)
The maximum instantaneous velocity in mm/s of a particle at a point during a given time interval and is the vector sum of the PCPV for the x, y and z directions measured as a peak response. Peak velocity is normally used for the assessment of structural damage from vibration.

RMS Component Particle Velocity (PCPV)
The maximum instantaneous velocity in mm/s of a particle at a point during a given time interval and in one of the three orthogonal directions (x, y or z) measured as a root mean square (rms) response. RMS velocity is normally used for the assessment of human annoyance from vibration.

Peak Particle Velocity (PPV)
The maximum instantaneous velocity in mm/s of a particle at a point during a given time interval and is the vector sum of the PCPV for the x, y and z directions measured as a root mean square (rms) response. RMS velocity is normally used for the assessment of human annoyance from vibration.

Chart of Noise Level Descriptors



Typical Noise Levels