DAY DESIGN PTY LTD
CONSULTING ACOUSTICAL ENGINEERS

SUITE 17, 808 FOREST ROAD, PEAKHURST ABN 73 107 291 494
ACOUSTICS@DAYDESIGN.COM.AU WWW.DAYDESIGN.COM.AU P. 02 9046 3800

Environmental Noise Impact Assessment

Proposed Child Care Centre

118 Maitland Street, Muswellbrook, NSW

REPORT No
7927-1.1R

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Prepared For:
Ms Jacky Angelovska
C/- ArtMade Architects
Suite 507, 50 Holt Street
Surry Hills, NSW

Attn: Mr Mina Saad

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1.0 EXECUTIVE SUMMARY

A new child care centre (The Centre) is proposed to be constructed at 118 Maitland Street, Muswellbrook, NSW (the Site). The Site is located on land zoned *R1: General Residential* under the Muswellbrook Local Environmental Plan (LEP) 2009.

The Site is bounded by a creek to the north-east, residential premises to the south-east and north-west and Maitland Street to the south-west. Residential properties are located on the opposite side of Maitland Street to the south-west. The Muswellbrook Golf Club is to the north-east of the Site on the opposite side of the creek. The Site and nearby receptors are shown in Figure 1.

The proposal will involve the demolition of the current residence and construction of a new two-storey child care centre building. The Centre will comprise of two outdoor play areas, five indoor play rooms, cot room, office, lobby, kitchen, amenities on the ground floor, an outdoor play area, staff room, amenities and an indoor play room on the first floor and a basement level car park with capacity for 20 vehicles.

The architectural drawings relied on for this assessment are prepared by ArtMade Architects, Project Number 23714, dated 12 March 2024, and attached in Appendix C.

The Centre will have a total capacity for 92 children, comprising of:

- 0-2 years old – 12 children;
- 2-3 years old – 20 children; and
- 3-5 years old – 60 children.

The proposed hours of operation for the Centre are:

- Monday to Friday: 7.00 am – 6.00 pm.

Nearby premises may be affected by the following noise sources at the Centre:

- Children playing both outside and inside;
- Car park and on-road traffic; and
- Mechanical plant.

Muswellbrook Shire Council (Council) requires an acoustic assessment to demonstrate that the noise impact from the Centre will not adversely affect the acoustic amenity of nearby noise sensitive receivers. Council also requires an acoustic assessment of the potential intrusive noise the Centre may be exposed to, such as road traffic noise from Maitland Street.

Acceptable noise limits have been derived from the Association of Australasian Acoustical Consultants' (AAAC) '*Guideline for Child Care Centres Acoustic Assessment*' and the Environmental Protection Authority's (EPA) *Road Noise Policy* (RNP).

Calculations show that, provided the recommendations in Section 8.0 are implemented, the levels of noise emission from the Centre and of intrusive noise at the Centre will meet the acoustic requirements established in Section 5.5, and will therefore be acceptable.

2.0 CONSULTING BRIEF

Day Design Pty Ltd was engaged by ArtMade Architects on behalf of Ms Jacky Angelovska to assess the potential environmental noise impact from a proposed Child Care Centre to be constructed at 118 Maitland Street, Muswellbrook, NSW. This commission involves the following:

Scope of Work:

- Inspect the site and environs
- Measure the background noise levels at critical locations and times
- Establish acceptable noise level criterion
- Prepare a site plan identifying the development and nearby noise sensitive locations
- Quantify noise emissions from the proposed Child Care Centre
- Quantify traffic (road) noise intrusion to the site
- Calculate the level of noise emission, taking into account building envelope transmission loss, screen walls and distance attenuation
- Provide recommendations for noise control
- Prepare an Environmental Noise Impact Assessment Report.

3.0 SITE AND DEVELOPMENT DESCRIPTION

3.1 Site Description

The Centre is proposed to be constructed at 118 Maitland Street, Muswellbrook, NSW. The Site is located on land zoned *R1: General Residential* under the Muswellbrook LEP 2009.

The Site currently consists of a single-storey residential dwelling. Site access is via Maitland Street.

The Site is bounded by a creek (*Muscle Creek*) to the north-east, residential premises to the south-east and north-west and Maitland Street to the south-west. Residential properties are located on the opposite side of Maitland Street to the south-west. The Muswellbrook Golf Club is to the north-east of the Site on the opposite side of *Muscle Creek*. The Site and nearby receptors are shown in Figure 1.

The nearest noise sensitive receptors to the site are also shown in Figure 1, and are presented below in Table 1.

Table 1 Noise Sensitive Receptors

Receiver, Type & Location	Address	Direction from site
R1 – Recreation – *RL 146.93* *1.5 m above ground level – 3 m from boundary*	*Muswellbrook Golf Club*	North-East
R2a – Residence – *RL 150.00* *1.5 m above ground level – 3 m from boundary*	120 Maitland Street (single storey)	South-East
R2b – Residence – *RL 151.67* *1.5 m above ground level – 3 m from boundary*		
R2b – Residence – *RL 151.66* *1.5 m above ground level – 3 m from boundary*		
R3 – Residence – *RL 151.73* *1.5 m above ground level – 3 m from boundary*	125 Maitland Street (single storey)	West
R4a – Residence – *RL 151.75* *1.5 m above ground level – 3 m from boundary*	116 Maitland Street (single storey)	North-West
R4b – Residence – *RL 151.59* *1.5 m above ground level – 3 m from boundary*		
R4c – Residence – *RL 150.25* *1.5 m above ground level – 3 m from boundary*		

As the noise sources on the Site are at varying distances from the receptors, specific distances between each noise source and receptor are used in all calculations. All distances are based upon the architectural drawings.

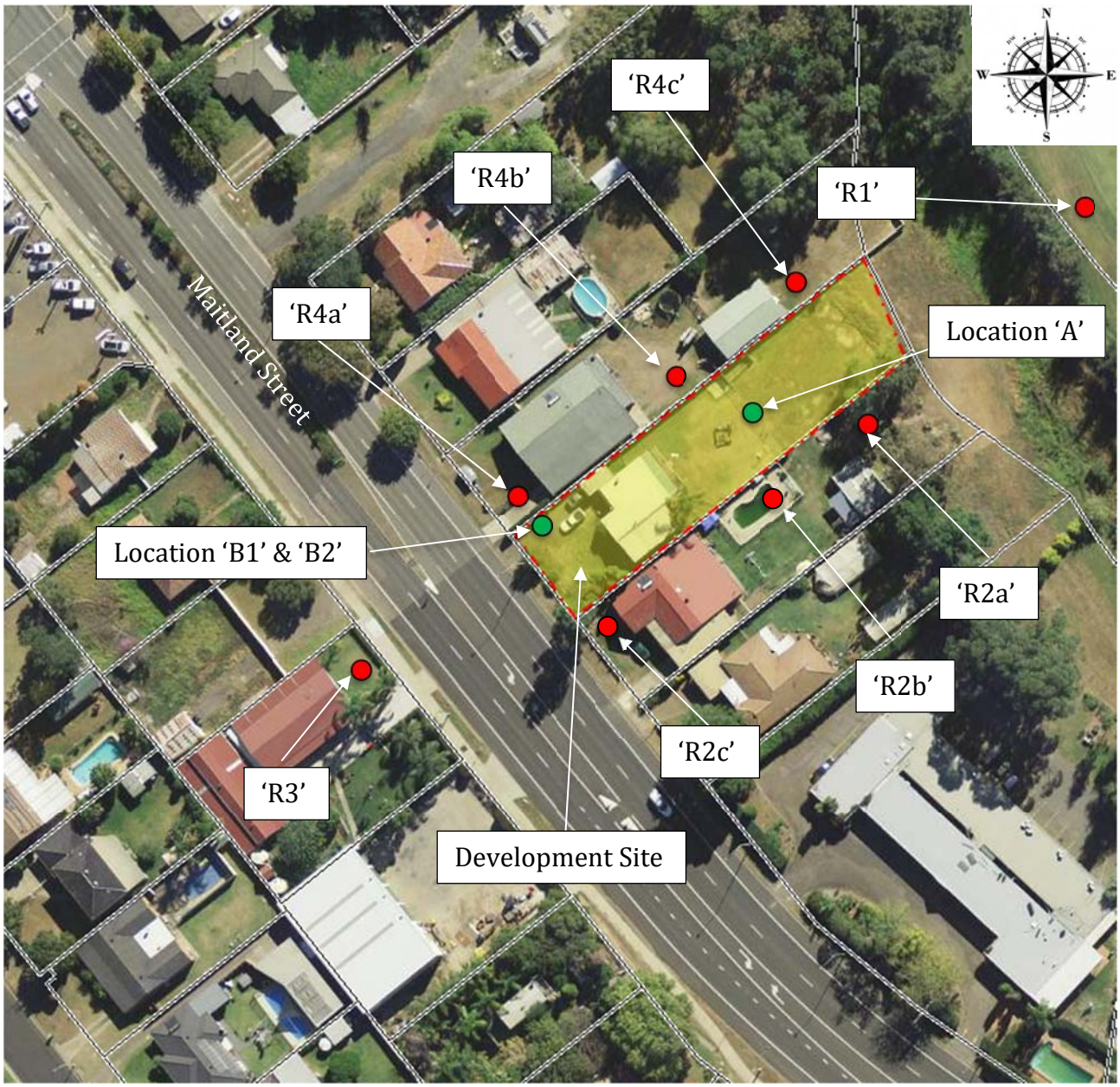


Figure 1 – Location Plan – 118 Maitland Street, Muswellbrook, NSW

3.2 Development Description

The proposal will involve the demolition of the current residence and construction of a new two-storey child care centre building for up to 92 children.

The Centre will comprise of two outdoor play areas, five indoor play rooms, cot room, office, lobby, kitchen, amenities on the ground floor, an outdoor play area, staff room, amenities and an indoor play room on the first floor and a basement level car park with capacity for 20 vehicles with driveway access via Maitland Street.

The proposed layout of the Centre can be seen in the architectural drawings prepared by ArtMade Architects, Project Number 23714, dated 12 March 2024, and attached in Appendix C.

The proposed hours of operation for the Centre are:

- Monday to Friday: 7.00 am – 6.00 pm.

The Centre will have a total capacity for 92 children, comprising of:

- 0-2 years old – 12 children;
- 2-3 years old – 20 children; and
- 3-5 years old – 60 children.

4.0 MEASURED NOISE LEVELS

Noise survey instrumentation used in this assessment is listed in Appendix A. A Glossary of Acoustical Terms is included as Datasheet AC108.

4.1 Measured Background Noise Levels

In order to assess the severity of a possible environmental noise problem in a residential area it is necessary to measure the ambient background noise level at the times and locations of worst possible annoyance. The lower the background noise level, the more perceptible the intrusive noise becomes and the more potentially annoying.

The background noise level should be measured at a location most representative of the potentially affected receptors, in the absence of any noise sources that may be associated with the proposed development.

As specified in Section 3.1 "Background Noise Monitoring" of the AAAC's *'Guideline for Child Care Centre Acoustic Assessment'*, where a consultant is unable to measure the background noise level at the most affected residential receiver location, the consultant *'shall select another suitable and equivalent location. This measured representative noise environment should be used to establish relevant criteria for all sensitive receivers.'*

During our site inspection it was determined that the potentially *most affected sensitive receiver locations* are 'R2a', 'R2b', 'R4b' and 'R4c' to the south-east and north-west, respectively, of the proposed Centre. Therefore, suitable and equivalent location - Location 'A' (see below and Figure 1) - was selected to represent *the most affected sensitive receivers*. This measured representative noise environment has been used to establish the relevant criteria for all other sensitive receivers.

An environmental noise monitor was placed in the rear yard of 118 Maitland Street, Muswellbrook, NSW (Location 'A'), from Thursday 15 to Wednesday 28 February, 2024, to determine the Rating Background Level (RBL). Location 'A' is located at a height of approximately 1.5 metres above ground level.

As the Centre is not proposed to operate on weekends, ambient noise levels measured on Saturday 17, Sunday 18, Saturday 24 and Sunday 25 February, 2024, have been excluded from the assessment period.

The results of the background noise survey at Location 'A' are shown in the attached Appendix B, and below in Table 2.

Table 2 Ambient Background Levels – 118 Maitland Street, Muswellbrook, NSW

Noise Measurement Location	Time Period	L_{90} Rating Background Level
Location 'A'	Early Morning (6:30 am – 7 am)	**45**
	Day (7 am to 6 pm)	**43**

Meteorological conditions during the measurement surveys typically consisted of clear skies with temperatures ranging from 15°C to 39°C.

Noise level measurements adversely affected by weather conditions have been removed from calculations, where required[1], ie Thursday 15, Friday 23 and Tuesday 27 February, 2024 – all other days provided sufficient data to determine the RBL.

Noise level measurements are otherwise considered reliable and representative of the background noise levels at all nearby receptor locations.

In addition to the long-term ambient noise level measurements, and in accordance with Fact Sheet A: Determining existing noise levels, Table A1 of the NSW Environment Protection Authority's *NSW Noise Policy for Industry,* short-term ambient noise level measurements were also conducted at Location 'A' from 01.30 pm to 01.45 pm on Thursday 15 February 2024, with a Type 1 noise logger (see Appendix A) to verify the acoustic environment.

The measured $L_{90,\,15\ minute}$ noise levels at Location 'A' was as follows:

- Thursday 15 February 01.30 pm to 01.45 pm 48 dBA.

The measured $L_{90,\,15\ minute}$ noise levels at Location 'A' detailed above is considered to be typical for the area, therefore verifying the acoustic environment.

The background noise at Location 'A' is mainly influenced by local fauna (insects and birds), distant constant road traffic noise on Maitland Street to the south-west, and some neighbourhood noises (pets, people talking and occasional yard work). The background noise level at Location 'A' is considered to be representative of the noise levels at the nearby residential receptors 'R2a' to 'R4c'.

[1] *Section B1.3 of the EPA's NSW Noise Policy for Industry, under 'Exception' states, 're-monitoring may not be required, where monitoring contains weather-affected data, if it can be ascertained that the affected samples are not within the expected 'quieter' times of an assessment period (day/evening/night); that is, those time periods where the lowest 10th percentile background noise level might occur.'*

4.2 Measured Road Traffic Noise Levels

The proposed development is affected by road traffic noise from Maitland Street which carries moderately high traffic volumes.

The weekday $L_{Aeq,\ 1\ hour}$ traffic noise levels measured at Location 'A' from Thursday 15 to Wednesday 28 February, 2024 are shown below in Table 3.

Table 3 Measured $L_{Aeq,\ 1\ hour}$ Road Traffic Sound Pressure Levels – Location 'A'

Time	$L_{Aeq,\ 1\ hour}$ Road Traffic Noise (dBA)									
	Thurs 15/2	Fri 16/2	Mon 19/2	Tues 20/2	Wed 21/2	Thurs 22/2	Fri 23/2	Mon 26/2	Tues 27/2	Wed 28/2
7 – 8 am	-	52	*70*	54	54	51	52	53	51	51
8 – 9 am	-	54	55	51	52	50	53	50	53	51
9 – 10 am	-	54	52	*58*	54	53	54	49	54	50
10 – 11 am	-	56	53	52	50	52	54	52	52	43
11 – 12 pm	-	55	52	51	51	51	52	52	52	-
12 – 1 pm	-	52	52	52	54	51	52	57	52	-
1 – 2 pm	54	53	51	54	55	50	52	*61*	54	-
2 – 3 pm	55	52	52	52	53	49	55	48	52	-
3 – 4 pm	56	52	55	51	52	46	50	47	52	-
4 – 5 pm	*58*	54	54	53	52	47	51	49	54	-
5 – 6 pm	*60*	55	53	52	55	56	*69*	54	56	-

We are of the opinion that noise levels shown in italics **are not the result of local traffic noise, and have therefore been excluded from this assessment. It is likely that the noise measured during this period originated closer to the monitor position than Maitland Street, and is likely attributed to the residents living on the Site or in the surrounding premises, pets associated with the Site or surrounding premises and/or local fauna.*

Based on the long-term measurements at Location 'A', and the calculation method show in Appendix B, Section B3 of the NSW Road Noise Policy for the 'overall $L_{Aeq,\ (1\ hour)}$', the calculated day time traffic noise level is 54 dBA at Location 'A'. These levels are used in the calculation of traffic noise intrusion for the existing site within Section 7.0 of this report.

To determine the day time (free field) road traffic noise levels at the front of the Site, long-term ambient noise level measurements were also conducted at Location 'B1'.

The weekday $L_{Aeq,\ 1\ hour}$ (free field) traffic noise levels measured at Location 'B1' from Thursday 15 to Wednesday 28 February, 2024 are shown below in Table 4.

Table 4 Measured $L_{Aeq,\ 1\ hour}$ (Free Field) Road Traffic SPLs – Location 'B1'

Time	$L_{Aeq,\ 1\ hour}$ Road Traffic Noise (dBA)									
	Thurs 15/2	Fri 16/2	Mon 19/2	Tues 20/2	Wed 21/2	Thurs 22/2	Fri 23/2	Mon 26/2	Tues 27/2	Wed 28/2
7 – 8 am	-	65	72	66	65	65	64	65	65	65
8 – 9 am	-	66	69	66	65	65	65	65	65	65
9 – 10 am	-	66	67	66	70	65	66	64	67	65
10 – 11 am	-	66	67	67	66	65	64	65	66	61
11 – 12 pm	-	65	66	67	66	65	65	66	66	-
12 – 1 pm	-	66	67	68	66	67	65	64	67	-
1 – 2 pm	62	66	65	70	65	66	65	65	66	-
2 – 3 pm	65	66	64	67	65	65	66	64	65	-
3 – 4 pm	65	66	65	67	65	65	67	65	66	-
4 – 5 pm	66	65	65	66	66	65	64	65	66	-
5 – 6 pm	66	65	67	65	68	65	71	66	65	-

Based on the long term measurements from Location 'B1', and the calculation method shown in Appendix B, Section B3, bullet point 3 - median level of the daily $L_{Aeq\ 1\ hour}$ noise levels exceeded for 10% of the time for each day - on page 48 of the NSW Road Noise Policy for the 'overall $L_{Aeq,\ (1\ hour)}$', the calculated day time (free field) traffic noise level is **66 dBA** at Location 'B1'.

To determine the day time (free field) road traffic noise levels at the front of the Site at first floor level, short-term ambient noise level measurements were conducted at Location 'B2' (see Figure 1) from 01.45 pm to 02.00 pm on Thursday 15 February 2024, with a Type 1 hand held real-time precision integrating sound level meter (SLM) (see Appendix A).

The measured noise levels were then normalised to the long-term measurements taken at Location 'B1' to determine the difference (if any) in the L_{Aeq} ambient noise levels between the ground and first floor levels.

Location 'B1' is at 1.5 metres above ground level with Location at 1.5 metres above first floor level (approximately 4.5 metres above ground level).

The measured $L_{eq,\ 1\ hour}$ noise levels at Locations 'B1' and 'B2' were as follows:

Location 'B1'	**Location 'B2'**
65.3 dBA	67.8 dBA

Traffic flow during the measurement was intermittent and of a moderately high level, with vehicles travelling both north-west and south-east on Maitland Street.

The difference between the measured $L_{eq,\ 1\ hour}$ road traffic noise levels at Location 'B1' and Location 'B2' is 2.5 dB.

We are of the opinion that the noise levels above and in Tables 3 and 4 are typical for this area.

Notwithstanding the above, and to ensure a conservative assessment, we have adopted free field road traffic noise levels for each location as follows:

- Location 'A' 54.1 dBA;
- Location 'B1' 66.4 dBA;
- Location 'B2' 68.9 dBA;

We are of the opinion that the noise levels at Locations 'A', 'B1' and 'B2' are typical for this area

The road traffic SPLs measured at Locations 'A', 'B1' and 'B2' are used in the calculation of traffic noise intrusion for the proposed Centre within Section 7.0 of this report.

5.0 ACOUSTIC CRITERIA

This Section presents the noise guidelines applicable to this proposal and establishes the project noise trigger levels.

5.1 Muswellbrook Shire Council - Development Control Plan

Muswellbrook Shire Council in its Muswellbrook Shire Development Control Plan (DCP) 2009, Section 18 – Child Care Centres, under heading 12.4 – Visual and Acoustic Privacy, outlines the following requirements in relation to acoustics:

12.4 VISUAL AND ACOUSTIC PRIVACY

Good management of privacy issues ensures the Child Care Centres are well integrated within the local context.

While Child Care Centres are beneficial within a community, there can be noise issues arising from the operation of the Centre, which can be addressed by considering the location and orientation of outdoor space, driveways, parking and access. In residential areas the location of windows and doors can influence noise impacts on nearby homes.

12.4.2 Acoustic privacy

Objectives

a) Noise levels (measured at any point on the boundary of the site between the proposed Centre and adjoining property) do not exceed 5 dB(A) above the L_{90} background level during the hours of operation.

Controls

(i) Locate noisy areas such as outdoor space, vehicle access and pathways away from windows of adjoining dwellings.

*(ii) Appropriate noise reduction measures are utilised. **

(iii) Demonstrate compliance with operating noise levels by providing a report on noise levels prepared by a suitably qualified consultant.

5.2 NSW Department of Planning and Environment

5.2.1 State Environmental Planning Policy (Transport and Infrastructure) 2021

The NSW Department of Planning and Environment (DoPE) published the State Environmental Planning Policy (SEPP) (Transport and Infrastructure) 2021 on 1 March 2022. The SEPP (Transport and Infrastructure) 2021 consolidates the previous SEPP (Educational Establishments and Child Care Facilities) 2017, along with other related SEPPs.

Chapter 3 of the SEPP, 'Educational establishments and child care facilities', aims to establish consistent State-wide assessment requirements and design considerations for educational establishments and early education and care facilities to improve the quality of infrastructure delivered and to minimise impacts on surrounding areas. Section 3.27 of Chapter 3 of the SEPP states the following with regard to Local Council Development Control Plans that contain specific requirements, standards or controls related to Child Care Centres:

'3.27: Centre-based child care facility—development control plans

(1) A provision of a development control plan that specifies a requirement, standard or control in relation to any of the following matters (including by reference to ages, age ratios, groupings, numbers or the like, of children) does not apply to development for the purpose of a centre-based child care facility—

(a) operational or management plans or arrangements (including hours of operation),

(b) demonstrated need or demand for child care services,

(c) proximity of facility to other early childhood education and care facilities,

(d) any matter relating to development for the purpose of a centre-based child care facility contained in:

(i) the design principles set out in Part 2 of the Child Care Planning Guideline, or

(ii) the matters for consideration set out in Part 3 or the regulatory requirements set out in Part 4 of that Guideline (other than those concerning building height, side and rear setbacks or car parking rates).

(2) This section applies regardless of when the development control plan was made."

5.2.2 NSW DoPE – Child Care Planning Guideline

The NSW DoPE published the Child Care Planning Guideline (CCPG) in August 2017 as a supplement to the SEPP (Educational Establishments and Child Care Facilities) 2017. The CCPG was then updated in September 2021.

The SEPP determines that "*the consent authority must take into consideration this Guideline* (CCPG) *when assessing a development application (DA) for a centre-based child care facility.*" The SEPP also determines the Guideline "*will take precedence over a Development Control Plan (DCP), with some exceptions, where the two overlap in relation to a child care facility."*

The Guideline was introduced to *'assist industry to deliver early childhood education facilities that are of the highest standards'* and *'to align NSW planning controls with the National Quality Framework for early education and care, creating more certainty for developers and operators seeking service approval'.*

Section 2, *Design quality principles*, outlines the following in relation to acoustic performance:

"Principle 6 - Amenity

Good design positively influences internal and external amenity for children, staff and neighbours. Achieving good amenity contributes to positive learning environments and the well-being of children and staff.

Good amenity combines appropriate and efficient indoor and outdoor learning spaces, access to sunlight, natural ventilation, outlook, visual and acoustic privacy, storage, service areas and ease of access for all age groups and degrees of mobility.

Well-designed child care facilities provide comfortable, diverse and attractive spaces to learn, play and socialise."

Section 3, *Matters for Consideration*, Subsection 3.5 Visual and acoustic Privacy, contains the following for consideration:

Objective: To minimise the impact of child care facilities on the acoustic privacy of neighbouring residential developments.

C22

A new development, or development that includes alterations to more than 50 percent of the existing floor area, and is located adjacent to residential accommodation should:

- *provide an acoustic fence along any boundary where the adjoining property contains a residential use. An acoustic fence is one that is a solid, gap free fence*
- *ensure that mechanical plant or equipment is screened by solid, gap free material and constructed to reduce noise levels eg acoustic fence, building or enclosure.*

C23

A suitably qualified acoustic professional should prepare an acoustic report which will cover the following matters:

- *Identify an appropriate noise level for a child care facility located in residential and other zones*
- *Determine an appropriate background noise level for outdoor play area during times they are proposed to be in use*
- *Determine the appropriate height of any acoustic fence to enable the noise criteria to be met.*

Subsection 3.6 Noise and air pollution, contains the following for consideration:

'Considerations

Objective: To ensure that outside levels on the facility are minimized to acceptable levels.

C24

Adopt design solutions to minimise the impacts of noise, such as:

- *creating physical separation between buildings and the noise source*
- *orienting the facility perpendicular to the noise source and where possible buffered by other uses*
- *using landscaping to reduce the perception of noise*
- *limiting the number and size of openings facing noise sources*
- *using double or acoustic glazing, acoustic louvres or enclosed balconies (wintergardens)*
- *using materials with mass and/or sound insulation or absorption properties, such as solid balcony balustrades, external screens and soffits*
- *locating cot rooms, sleeping areas and play areas away from external noise sources.'*

C25

An acoustic report should identify appropriate noise levels for sleeping areas and other non-play areas and examine impacts and noise attenuation measures where a child care facility is proposed in any of the following locations:

- *on industrial zoned land*
- *where the ANEF contour is between 20 and 25, consistent with AS2021:2000*
- *along a railway or mass transit corridor, as defined by State Environmental Planning Policy (Infrastructure) 2007*
- *on a major road or busy road*
- *other land that is impacted by substantial external noise.*

5.3 AAAC – Guideline for Child Care Centres Acoustic Assessment

The Association of Australasian Acoustical Consultants (AAAC) published the *Guideline for Child Care Centre Acoustic Assessment* (Guideline), in September 2020 to assist both AAAC members and local Councils to assess the noise impact from proposed child care centres both accurately and fairly (see www.aaac.org.au).

Section 3 of the AAAC Guideline states the following in relation to noise generation from child care centres, while Section 5.0 states the following in relation to noise impact on children:

'3.2 Criteria - Residential Receptors

3.2.1 Outdoor Play Area

The noise impact from children at play in a child care centre differs from the domestic situation in that it is a business carried out for commercial gain, the number of children can be far greater than in a domestic situation and the age range of the children at the centre does not significantly vary over time as it would in a domestic situation. However, the noise from children is vastly different, in both character and duration, from industrial, commercial or even domestic machine noise. The sound from children at play, in some circumstances, can be pleasant, with noise emission generally only audible during the times the children play outside. Night time, weekend or public holiday activity is not typical and child care centres have considerable social and community benefit.

***Base Criteria** – With the development of child care centres in residential areas, the background noise level within these areas can at certain times, be low. Thus, a base criterion of a contributed $L_{eq,15min}$ 45 dB(A) for the assessment of outdoor play is recommended in locations where the background noise level is less than 40 dB(A).*

***Background Greater Than 40 dB(A)** – The contributed $L_{eq,15min}$ noise level emitted from an outdoor play and internal activity areas shall not exceed the background noise level by more than 5 or 10 dB at the assessment location, depending on the usage of the outdoor play area. AAAC members regard that a total time limit of approximately 2 hours outdoor play per morning and afternoon period should allow an emergence above the background of 10 dB (ie background +10 dB if outdoor play is limited to 2 hours in the morning and 2 hours in the afternoon).*

***Up to 4 hours (total) per day** – If outdoor play is limited to no more than 2 hours in the morning and 2 hours in the afternoon, the contributed $L_{eq,15min}$ noise level emitted from the outdoor play shall not exceed the background noise level by more than 10 dB at the assessment location.*

***More than 4 hours (total) per day** – If outdoor play is not limited to no more than 2 hours in the morning and 2 hours in the afternoon, the contributed $L_{eq,\ 15min}$ noise level emitted from the outdoor play area shall not exceed the background noise level by more than 5 dB at the assessment location.*

The assessment location is defined as the most affected point on or within any residential receiver property boundary. Examples of this location may be:

- *1.5 m above ground level;*
- *On a balcony at 1.5 m above floor level;*
- *Outside a window on the ground or higher floors.*

3.2.2 Indoor Play Area, Mechanical Plant, Pick up and Drop off

The cumulative $L_{eq,\ 15\ minute}$ noise emission level resulting from the use and operation of the child care centre, with the exception of noise emission from outdoor play discussed above, shall not exceed the background noise level by more than 5 dB at the assessment location as defined above. This includes the noise emission resulting from:

- *Indoor play;*
- *Mechanical plant;*
- *Drop off and pick up;*
- *Other activities/operations (not including outdoor play).*

3.2.3 Sleep Disturbance

The noise impact of staff arrivals, setup, cleaning or other on-site activities prior to 7 am or during night-time hours should be assessed at nearby residential premises. The L_{Amax} noise level emitted from vehicles arriving and parking, depending on the requirements of the state or territory where the centre is located shall not exceed the background noise level by more than 15 dB outside the nearest habitable room window.

3.4 Other Sensitive Receivers

Where appropriate, assessment should include consideration of noise emission to other sensitive uses including schools, hospitals, places of worship and parks (active and passive). Depending on the requirements of the state or territory where the centre is located, in the absence of applicable noise criteria for such a sensitive use, the cumulative $L_{eq,15min}$ noise level emitted from the use and operation of the child care centre shall not exceed 65 dB(A), from all activities (including outdoor play), when assessed at the most affected point on or within the sensitive property boundary, and shall not exceed 45 dB(A) internally, with windows or doors of the sensitive receiver open.

Section 5 of the AAAC Guideline states the following in relation to external noise impacts on children within Child Care Centres:

'5.0 External Noise Impact on Children

For proposals that are located within 60 metres of an arterial road, railway line, industry or within close proximity to an airport, a noise intrusion assessment should be submitted with the development application.

5.1 Road, Rail Traffic and Industry

The $L_{Aeq,1hr}$ noise level from road traffic, rail or industry at any location within the outdoor play or activity area during the hours when the Centre is operating should not exceed 55 dB(A).

The $L_{Aeq,1hr}$ noise level from road traffic, rail or industry at any location within the indoor activity or sleeping areas of the Centre during the hours when the centre is operating shall be capable (ie with doors and/or windows closed) of achieving 40 dB(A) within indoor activity areas and 35 dB(A) in sleeping areas.'

5.4 NSW Environment Protection Authority – NSW Road Noise Policy

The NSW Road Noise Policy (RNP), in Section 2.3.1, sets out road traffic noise assessment criteria for residential land uses in Table 3. The information in that table is extracted below in Table 5.

Table 5 Road Traffic Noise Assessment Criterion - Residential

Road Category	Type of project/land use	Assessment Criteria – dB(A) Day (7 am – 10 pm)
Freeway/ arterial/ sub-arterial	3. Existing residences affected by **additional traffic** on existing freeways/arterial/sub-arterial roads generated by land use developments	$L_{Aeq,\ (15\ hour)}$ 60 (external)

5.5 Project Noise Trigger Levels

In line with the requirements of Section 3.1 of the AAAC's *Guideline* where depending on which nearby residential receptor is considered to be '*the most affected sensitive receiver*' the '*measured representative noise environment* (at this location) *should be used to establish relevant criteria for all sensitive receivers'*– see Section 4.1 of this report for the measured and representative RBLs at ground floor level - the RBL adopted at the location representative of the ground floor receptors, Location 'A', will be used to *establish relevant criteria for all sensitive receivers*.

Based on the measured background noise levels and the relevant planning instruments and legislation, the Project Noise Trigger Levels at each receptor location are as follows:

5.5.1 Noise Emission Criteria

5.5.1.1 Residential Receptors

For Residential Receptors 'R2a' to 'R4c' – based on the measured background noise levels at Location 'A':

- (43 + 5 =) **48 dBA** $L_{eq,\ 15\ minute}$ for outdoor play of more than 4 hours per day; **or**
- (43 + 10 =) **53 dBA** $L_{eq,\ 15\ minute}$ for outdoor play of up to 4 hours (total) per day;
- (43 + 5 =) **48 dBA** $L_{eq,\ 15\ minute}$ for all other noise sources including car park, mechanical plant and indoor play areas.

The assessment location is defined as the most affected point on or within any residential receiver property boundary. Examples of this location may be:

- 1.5 m above ground level;
- On a balcony at 1.5 m above floor level;
- Outside a window on the ground or higher floors.

5.5.1.2 Sleep Disturbance

Consideration has been given to sleep disturbance caused by noise generated from staff arriving prior to 7 am, and parking within the basement level car park.

The following criterion is applied at the residential receptors potentially most affected by the use of the ground level car park, 'R2c', 'R3' and 'R4a' during the early morning shoulder period of 6.30 am to 7 am. Compliance at the most affected receptor will ensure compliance at all other potentially affected receptor locations:

For residential façade 'R2c', 'R3' & 'R4a'– based on the adopted background noise levels at Location 'A':

- (44 + 15 =) **59 dBA** L_{Amax} at the closest affected habitable room window of the residential premises between 6.30 am and 7 am.

5.5.1.3 On-Road Traffic Noise Criterion

The following criterion will be applied at 1 metre from the most affected residential façades of 'R2c', 'R3' and 'R4a', for on – road traffic noise. Compliance at the most affected receptors will ensure compliance at all other potentially affected receptor locations further away from Maitland Street:

- **60 dBA** (external) $L_{Aeq,\ 15\ hour}$ between 7 am and 6 pm.

5.5.1.4 Active Recreation Receivers

For active recreation receptor 'R1':

- **65 dBA** $L_{Aeq,\ 15\ minute}$ for all activities and noise sources, including outdoor play, car park, mechanical plant and indoor paly areas.

5.5.2 Noise Intrusion Criteria

Road Traffic Noise Intrusion - in accordance with the AAAC Guideline:

- Internal traffic levels within sleeping areas (Cot Rooms) of the Centre should not exceed $L_{Aeq,\ 1\ hour}$ 35 dBA during operating hours.
- Internal traffic noise levels within indoor activity areas of the Centre should not exceed $L_{Aeq,\ 1\ hour}$ 40 dBA during operating hours.
- External traffic noise levels in any outdoor play or activity area of the Centre should not exceed $L_{Aeq,\ 1\ hour}$ 55 dBA during operating hours.

6.0 CHILD CARE CENTRE NOISE EMISSION

The main sources of noise from the Centre will be as follows:

- Children playing both outside and inside;
- Cars entering and exiting the car park; and
- Mechanical plant serving the Centre.

Noise modelling is based on the architectural drawings attached in Appendix C.

6.1 Indoor and Outdoor Play Areas

The AAAC has presented a range of A-weighted sound power levels per child in Table 1 of its *'Guideline for Child Care Centre Acoustic Assessment'.* The sound power levels of each group are presented in Table 6 and have been adopted to assess noise emissions from children in this assessment.

The sound power levels for each group are presented in Table 6 and used in this assessment.

Table 6 L_{eq} Sound Power Levels - Children Engaging in Active Play

Number and Age of Children	Sound Power Levels (dB) at Octave Band Centre Frequencies (Hz)								
	dBA	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
10 children, 0 to 2 years	**78**	54	60	66	72	74	71	67	64
10 children, 2 to 3 years	**85**	61	67	73	79	81	78	74	70
10 children, 3 to 5 years	**87**	64	70	75	81	83	80	76	72

In the notes to Table 1 of the AAAC's *Guideline*, where passive/quiet activities are engaged in by children, the noise generated by children is generally 6 dB lower than active play.

6.2 Car Park Noise Emission

Based on the RTA's 'Guide to Traffic Generating Developments' prediction of 0.8 peak (morning 7 am-9 am) vehicle trips per child for Child Care Centres (Long-day care), we have assumed, as a worst case scenario, a flow of cars equivalent to 74 cars in 1 hour arriving or leaving the Centre in the morning peak. This is equivalent to 18 vehicle trips in a 15-minute period.

For the assessment of sleep disturbance we have assumed two staff members will arrive at the Centre prior to 7 am and park in the designated staff parking spaces in the basement level car park, shown in the attached Appendix D.

For the assessment of on road traffic noise, based on the RTA's 'Guide to Traffic Generating Developments' prediction of 0.8 morning peak (7 am - 9 am), 0.3 early afternoon peak (2.30 pm - 4 pm) and 0.7 afternoon peak (4 pm - 6 pm) vehicle trips per child for Child Care Centres (Long-day care), we have assumed, as a worst case scenario, a flow of cars equivalent to (147 + 41 + 129 =)317 cars in 11 hours (7 am to 6 pm) arriving or leaving the Centre during any given day.

For the assessment of vehicular activity associated with the basement level car park area, we have assumed vehicles will travel at a speed of 10 km/h on the Site. For noise generated by on-road traffic, we have assumed vehicles will travel at a speed of 50 km/h as they approach or leave the Site. We have assumed 50% of vehicles will arrive or leave the Site from the north-west via Maitland Street, with the remaining 50% of vehicles arriving or leaving from south-east via Maitland Street.

The Sound Exposure Level[2] (SEL) and $L_{AF,\,max}$ sound power level and spectra of vehicle noise is shown below in Table 7 and is based on previous measurements by Day Design.

Table 7 SEL & L_{Amax} Sound Power Levels – Car Park Noise

Description	Sound Power Levels (dB) at Octave Band Centre Frequencies (Hz)								
	dBA	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
SEL level of car drive by at approximately 10 km/h up an incline	**82**	90	87	80	78	77	72	70	64
SEL level of car drive by at approximately 10 km/h down an incline	**79**	85	82	77	74	75	71	68	62
SEL of car drive-by at approximately 50 km/h	**93**	95	93	90	89	91	83	73	66
L_{Amax} of car entering car park	**92**	98	92	90	88	88	83	80	76

[2] *SEL is the total sound energy of a single noise event condensed into a one second duration.*

6.3 Mechanical Plant

The mechanical plant, including air conditioning condensers, kitchen exhaust fan, lift motor and car park exhaust fan have not been selected at this stage. Therefore, a preliminary noise assessment will be based on typical units for the size of the development, with sound power levels from typical units being used.

The air conditioning condensers are assumed to be located in three locations on the roof of the Centre – one above the first floor Foyer on the western side of the Centre, one above Playroom 4 and one above Playroom 5 in the middle of the Centre - see Appendix D for location.

We have assumed that the kitchen exhaust fan will be ducted through the façades of the development, the car park exhaust fan will be located in the basement and be ducted to the riser adjacent to the lift shaft, exhausting at the roof level and the lift motor will be located within a pit at the bottom of the proposed lift shaft.

Sound power levels used in the calculation of the noise contribution from the mechanical plant are shown in Table 8.

Table 8 $L_{eq,\ 15\ minute}$ Sound Power Levels – Mechanical Plant

Description	Sound Power Levels (dB) at Octave Band Centre Frequencies (Hz)								
	dBA	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
Car park exhaust fan[3]	**75**	69	64	68	71	70	69	66	58
Small kitchen exhaust fan[4]	**60**	61	67	62	54	54	50	45	39
Hydraulic lift motor[5]	**63**	59	61	55	59	58	56	52	48
Medium (double fan) outdoor condenser unit[6]	**69**	55	55	61	67	64	62	59	45

We recommend a detailed analysis be carried out once the mechanical plant is selected and locations are finalised, prior to the issue of a Construction Certificate.

[3] *Spectral sound power level based on Fantech AP0568BP14/10 –In-Line Axial Fan.*
[4] *Spectral sound power level based on Fantech CPD01254FSC.*
[5] *Spectral sound power level based on a residential lift system previously measured by Day Design.*
[6] *Spectral sound power level based on Daikin RZQ140LV1 outdoor condenser unit.*

6.4 Predicted Noise Levels

Knowing the sound power level of a noise source (See Table 6 to Table 8), the sound pressure level (as measured with a sound level meter) can be calculated at a remote location using suitable formulae to account for distance losses, sound barriers, etc.

Where applicable, calculations include reductions for the acoustic screening provided by fences and the proposed Centre itself. Based upon the architectural drawings attached as Appendix C, the following solid boundary heights are assumed for the Centre:

- 1.8-metre-high acoustic fence along the north-western and south-eastern boundary of the Site from the Centre's front setback to Maitland Street to the south-western boundary of Outdoor Play Area 2 (OPA 2);
- 2.3-metre-high acoustic fence along the north-western boundary of the Site from the south-western boundary of OPA 2 to the north-eastern boundary of the Site;
- 2.2-metre-high acoustic fence along the south-eastern boundary of the Site from the south-western boundary of OPA 2 to the north-eastern boundary of the Site;
- 1.39-metre-high acoustic balustrade/barrier on the north-western, north-eastern and south-eastern boundary of OPA 3 (OPA 3);
- 1.8-metre-high acoustic fence along the entire north-eastern boundary of the Site; and
- 1.2 metre fence along the north-western and south-eastern boundary of the Site from the Centre's front setback to Maitland Street to the south-western boundary.

We have assumed that all fences listed above are free of visible air gaps to provide an impervious sound barrier.

Noise emission calculations also include reductions provided by the following time period correction, where relevant:

- Time period correction of (*10 x log [1/900] =*) – 29.5 dB for SEL noise levels associated with the use of car parks in a 15 minute period - $L_{eq,\ 15\ minute}$ calculations only; and
- Time period correction of (*10 x log [1/3600] =*) – 47.3 dB for SEL noise levels associated with the use of car parks in a 1 hour period - $L_{eq,\ 15\ hour}$ calculations only.

Calculations of noise emission from the indoor play area include reductions for operable glazing in the façade. For the purposes of our calculations, we have assumed all operable glazing to be of a standard construction (6.38 mm laminated glass) and to be open (10% of the floor area).

Notwithstanding the above, based on the architectural drawings and the recommendation in Section 8.2.2 of this Report, we have assumed the following windows are of fixed frame construction (or if operable closed during the use of the indoor play area) with standard 6.38 mm thick laminated glass installed (min R_w 32):

- Cot Room north-west facing windows;
- Playroom 2 south-east facing windows;
- Playroom 4 south-east facing windows;
- Playroom 5 north-west facing windows;
- Playroom 6 south-west facing windows.

Based upon a review of World Health Organization (WHO) data for average children heights, the notes to Table 1 of the *AAAC's Guideline* recommends a source height of 1.0 metre above ground level for all children.

As a worst-case scenario, noise emission has been modelled with all children engaged in simultaneous outdoor play, as discussed in Section 6.4.1.

Table 9 to Table 13 show the predicted noise levels at the receivers from the proposed activities, during the early morning and day periods.

6.4.1 Outdoor Play Area Noise Levels

The following formula, which is well known to acoustic professionals, was used to calculate noise levels at the receptor locations:

$$L_p = L_w + 10\log(n/10) - 20\log(d) - 8 - B$$

Where: L_p = Sound Pressure Level at receptor

L_w = Sound Power Level for group of 10 children

n = number of children

d = distance from children playing to receptor

B = acoustic reduction due to barrier

The noise prediction was therefore determined by spacing the 92 children across the Centre's outdoor play areas as follows:

15 x Child Groups comprising:

OPA 1 – 12 x 0-2 year olds & 14 x 2-3 year olds (26 Total) -

- 2 groups of 7 children (Groups 1 & 3) with each consisting of 3 x 0-2 year olds and 4 x 2-3 year olds; and
- 2 groups of 6 children (Groups 2 & 4) with each consisting of 3 x 0-2 year olds and 3 x 2-3 year olds.

OPA 2 – 6 x 2-3 year olds & 50 x 3-5 year olds (56 Total) -

- 6 groups of 3 children (Groups 5, 6, 7, 10, 11 & 12) with each consisting of 1 x 2-3 year old and 6 x 3-5 year olds; and
- 2 groups of 7 children (Groups 8 & 9) with each consisting of 7 x 3-5 year olds.

OPA 3 – 10 x 3-5 year olds (10 Total) -

- 2 groups of 3 children (Groups 13 & 15) with each consisting of 3 x 3-5 year olds; and
- 1 group of 4 children (Group 14) consisting of 4 x 3-5 year olds.

The approximate locations of the noise sources (children) used for the assessment of the outdoor play area are shown in the attached Appendix D. All noise sources in each outdoor play area shown in Appendix D are assessed as being outside at the same time to achieve the overall worst case predicted noise levels at each of the receiver locations.

The $L_{eq,\ 15\ minute}$ noise levels at all receptor locations for children engaged in outdoor play are calculated to be as shown in Table 9.

Table 9 Predicted $L_{eq,\ 15\ minute}$ Noise Levels – Active Outdoor Play, More Than 4 Hours

Receptor Location	Predicted Noise Level (dBA)	Noise Criteria (dBA)	Compliance (Yes/No)
R1 – *Muswellbrook Golf Club*	50	65	Yes
R2a – 120 Maitland Street	53	48	**No (+5 dB)**
R2b – 120 Maitland Street	49	48	**No (+1 dB)**
R2c – 120 Maitland Street	36	48	Yes
R3 – 125 Maitland Street	28	48	Yes
R4a – 116 Maitland Street	37	48	Yes
R4b – 116 Maitland Street	51	48	**No (+3 dB)**
R4c – 116 Maitland Street	53	48	**No (+5 dB)**

The predicted cumulative L_{eq} levels of noise from children playing actively outdoors for more than 4 hours per day are summarised in Table 9 at the receivers. The predicted levels of noise at receiver locations 'R1', 'R2c' to 'R4a' comply with the criteria in Section 5.5 of this report. However, the predicted levels of noise at receiver location 'R2a', 'R2b', 'R4b' and 'R4c' exceed the noise criteria in Section 5.5 of this report, and will require noise controls as recommended in Section 8.0.

The $L_{eq,\ 15\ minute}$ noise levels at all receptor locations for children engaged in active outdoor play for up to 4 hours (total) per day are calculated to be as shown in Table 10.

Table 10 Predicted $L_{eq,\ 15\ minute}$ Noise Levels - Active Outdoor Play, Up to 4 Hours

Receptor Location	Predicted Noise Level (dBA)	Noise Criteria (dBA)	Compliance (Yes/No)
R1 – *Muswellbrook Golf Club*	50	65	Yes
R2a – 120 Maitland Street	53	53	Yes
R2b – 120 Maitland Street	49	53	Yes
R2c – 120 Maitland Street	36	53	Yes
R3 – 125 Maitland Street	28	53	Yes
R4a – 116 Maitland Street	37	53	Yes
R4b – 116 Maitland Street	51	53	Yes
R4c – 116 Maitland Street	53	53	Yes

The predicted cumulative L_{eq} levels of noise from children playing actively outdoors for up to 4 hours (total) per day are summarised in Table 10 at the receivers. The predicted levels of noise at receiver locations 'R1' to 'R4c' comply with the criteria in Section 5.5 of this report. Notwithstanding, recommendations are provided in Section 8.0 to ensure the acoustic amenity of the neighbouring receivers is maintained at all times.

6.4.2 Cumulative Noise Level - Indoor Play Area, Car Park and Mechanical Plant

The predicted worst case cumulative $L_{eq,\ 15minute}$ noise levels at all receiver locations are calculated to be as shown in Table 11. Doors to the indoor play areas are modelled as being partially open (10% of the floor area).

Table 11 Predicted Cumulative $L_{eq,\ 15\ minute}$ Noise Levels – Indoor Play, Mechanical Plant & Use of Car Park

Receiver Location	Predicted Noise Level (dBA)	Noise Criteria (dBA)	Compliance (Yes/No)
R1 – *Muswellbrook Golf Club*			
- Indoor play area	40		
- Use of Car park	<20		
- Mechanical plant	<20		
Cumulative Noise Level	40	65	Yes
R2a – 120 Maitland Street			
- Indoor play area	36		
- Use of Car park	<20		
- Mechanical plant	27		
Cumulative Noise Level	36	48	Yes
R2b – 120 Maitland Street			
- Indoor play area	44		
- Use of Car park	<20		
- Mechanical plant	28		
Cumulative Noise Level	44	48	Yes
R2c – 120 Maitland Street			
- Indoor play area	33		
- Use of Car park	34		
- Mechanical plant	25		
Cumulative Noise Level	37	48	Yes
R3 – 125 Maitland Street			
- Indoor play area	<20		
- Use of Car park	24		
- Mechanical plant	27		
Cumulative Noise Level	29	48	Yes

Table 11 Predicted Cumulative $L_{eq,\ 15\ minute}$ Noise Levels – Indoor Play, Mechanical Plant & Use of Car Park – Continued

Receiver Location	Predicted Noise Level (dBA)	Noise Criteria (dBA)	Compliance (Yes/No)
R4a – 116 Maitland Street			
- Indoor play area	34		
- Use of Car park	27		
- Mechanical plant	25		
Cumulative Noise Level	35	48	Yes
R4b – 116 Maitland Street			
- Indoor play area	47		
- Use of Car park	<20		
- Mechanical plant	40		
Cumulative Noise Level	48	48	Yes
R4c – 116 Maitland Street			
- Indoor play area	37		
- Use of Car park	<20		
- Mechanical plant	24		
Cumulative Noise Level	37	48	Yes

The predicted cumulative L_{eq} levels of noise from the Centre are summarised in Table 11 at the receivers. The predicted levels of noise at receiver locations 'R1' to 'R4c', comply with the criteria in Section 5.5 of this report, and will therefore be acceptable.

6.4.3 Sleep Disturbance

The external $L_{AF,\,max}$ noise levels at the potentially most affected residential receiver locations, from the noise associated with staff arriving at the Centre in their vehicle and parking in the basement level car park between 6.30 am and 7 am are calculated to be as shown below in Table 12.

Table 12 Predicted $L_{AF,\,max}$ Noise Levels – Sleep Disturbance

Receptor Location and Description	Predicted Noise Level (dBA)	Noise Criterion (dBA)	Compliance (Yes/No)
R2c – 120 Maitland Street			
- Car Pulling into Driveway	56	59	Yes
R3 – 125 Maitland Street			
- Car Pulling into Driveway	51	59	Yes
R4a – 116 Maitland Street			
- Car Pulling into Driveway	53	59	Yes

As seen in Table 12, the predicted level of noise emission from staff arriving prior to 7 am will comply with the sleep disturbance criteria established in Section 5.5.1.2 at receptor locations 'R2c', 'R3' and 'R4a', and is therefore considered acceptable. Compliance at the most affected nearby residential receivers will ensure compliance at all other receiver locations.

6.4.4 On-Road Traffic

We have assumed that the distribution of road traffic on the local roads associated with the Centre will be as follows:

- Vehicles entering/exiting to/from the north-west on Maitland Street 50%;
- Vehicles entering/exiting to/from the south-east on Maitland Street 50%.

The external $L_{eq,\ 1\ hour}$ noise levels at the most affected residential receiver locations 'R2c', 'R3' and 'R4a' from noise associated with on–road traffic throughout the day are calculated to be as shown below in Table 13.

Table 13 Predicted $L_{eq,\ 15\ hour}$ Noise Levels – On – Road Traffic

Receiver Location	Predicted Noise Level (dBA)	Noise Criterion (dBA)	Compliance (Yes/No)
R2c – Front (South-Western) Façade, 120 Maitland Street	49	60	Yes
R3 – Front (North-Eastern) Façade, 125 Maitland Street	48	60	Yes
R4a – Front (South-Western) Façade, 116 Maitland Street	48	60	Yes

The predicted external noise levels from on–road traffic are within the noise criterion in Section 5.5.1.3, and are therefore acceptable.

7.0 NOISE INTRUSION – ROAD TRAFFIC NOISE

7.1 External Road Traffic Noise Levels – Outdoor Play Areas

Based on the road traffic noise levels measured and adopted in Section 4.2 of this report, and the assumed sound barrier walls detailed in Section 6.4, the calculated equivalent $L_{Aeq,\ 1\ hour\ (traffic)}$ level in the OPAs is shown below in Table 14.

Table 14 Predicted $L_{eq,\ 1\ hour}$ Noise Levels – Noise within Outdoor Play Areas

Outdoor Location	Predicted Noise Level (dBA)	Noise Criterion (dBA)	Compliance (Yes/No)
OPA 1	46	55	Yes
OPA 2	46	55	Yes
OPA 3	44	55	Yes

The calculated levels of road traffic noise intruding to the OPAs complies with the AAAC external noise limit for child care centres of $L_{eq,\ 1\ hour}$ 55 dBA, and is therefore acceptable.

7.2 Road Traffic Noise Intrusion Assessment – Indoor Playrooms & Cot Room

The internal $L_{eq,\ 1\ hour}$ road traffic noise level within the proposed indoor play areas and cot room has been calculated to be as shown in Table 15 with the external windows and doors open/closed.

Generally, the noise level reduction through an open window from outside to inside is recognised as being 10 dB.

Calculations also assume that standard construction has been used throughout and the assumed glazing thicknesses (as detailed in Section 6.4, i.e. 6.38 mm laminated glass) has been used for windows and glazed doors. Standard construction will achieve a minimum noise level reduction from outside to inside of 25 dB.

Table 15 Calculated $L_{eq,\ 1\ hour}$ Road Traffic Noise Levels – Indoor Play Rooms

Receptor Location	Calculated Noise Level $L_{eq,\ 1\ hour}$ (dBA)		Noise Criterion (dBA)	Compliance (Yes/No)
	Open	***Closed[1]***		
'Playroom 1'	36	21	40	Yes/Yes
'Playroom 2'	37[2]	30	40	Yes/Yes
'Playroom 3'	36	21	40	Yes/Yes
'Playroom 4'	36[2]	21	40	Yes/Yes
'Playroom 5'	36[2]	21	40	Yes/Yes
'Playroom 6'	47[2]	46	40	No/No
'Cot Room'	n/a	30	35	-/Yes

[1]All windows and doors closed.

[2]Includes noise through closed windows, i.e. windows assumed to be closed during the use of the rooms (see Section 6.4).

Provided the building construction outlined in Section 6.4 is satisfactorily implemented (external glazing and sound barrier walls), it can be seen that the calculated internal levels of road traffic noise are below the noise criteria established in Section 5.5.2 in Playroom 1 to 5, and is therefore acceptable.

However, it can be seen that, based on the building construction outlined in Section 6.4, the calculated internal levels of road traffic noise exceeds the noise criterion established in 5.5.2 with the external windows closed in Playroom 6. Therefore, noise controls are required as recommended in Section 8.0.

8.0 NOISE CONTROL RECOMMENDATIONS

8.1 Recommended Sound Barrier Walls – Construction, Heights & Locations

The proposed sound barrier walls specified within this report may be constructed from 3 rail 'solid capped and lapped' timber, 10 mm thick solid polycarbonate (not hollow), 6.38 mm thick laminated glass or masonry. The construction shall be free of visible air gaps to provide an impervious sound barrier.

If required, and to achieve the required vertical heights recommended in this section, a transparent material such as 10 mm thick UV resistant solid polycarbonate (not hollow) may be constructed as a separate upper portion of the fence (on top of a new or existing fence). The upper portion should be cantilevered inwards at 45 degrees, as shown in Appendix E. The construction shall be free of visible air gaps to provide an impervious sound barrier.

Barrier heights and locations recommended below are shown in the attached Appendix D.

We recommend the following barrier heights and locations:

- 1.8-metre-high acoustic fence along the north-western and south-eastern boundary of the Site from the Centre's front setback to Maitland Street to the south-western boundary of OPA 2;
- 2.3-metre-high acoustic fence along the north-western boundary of the Site from the south-western boundary of OPA 2 to the north-eastern boundary of the Site;
- 2.2-metre-high acoustic fence along the south-eastern boundary of the Site from the south-western boundary of OPA 2 to the north-eastern boundary of the Site;
- 1.39-metre-high acoustic balustrade/barrier on the north-western, north-eastern and south-eastern boundary of OPA 3;
- 1.8-metre-high acoustic fence along the entire north-eastern boundary of the Site; and
- 1.2 metre fence along the north-western and south-eastern boundary of the Site from the Centre's front setback to Maitland Street to the south-western boundary.

8.2 Management Plan

We recommend the Centre's management implement a Noise Management Plan that should include, but not be limited to, the following:

8.2.1 General Noise Management Strategies

- Ensuring all staff and parents are provided with a copy of the Centre's Noise Management Plan and its implications for them during their time at the Centre.
- The name and contact details of the Centre's Manager should be clearly displayed at the front of the building to ensure neighbours can contact that person at any time the Centre is operating.
- Ensuring a sufficient number of educators are provided to supervise children's outside play to discourage unnecessarily loud activities.
- Carers/staff should be educated to control the level of their voice while outdoors.
- Facilitating children's small group play when outside, and encouraging educators to engage in children's play and facilitate friendships between children.
- Crying children should be comforted as quickly as possible and moved indoors.
- Should a commercial contract be required for waste collection, we recommend waste collection take place during normal business hours, i.e. Monday to Friday between 7 am and 6 pm.
- Any maintenance proposed on the Site should take place during day time hours only, ie 7 am to 6 pm.
- While cleaners are on the Site they should be instructed to not make an unreasonable level of noise. Normal conversations would be acceptable, however shouting would not.
- While staff meetings are taking place on the Site, staff should be instructed to not make an unreasonable level of noise. Normal conversations would be acceptable, however shouting would not.
- Children should be permitted to play in the outdoor areas of the Centre for a maximum of 4 hours total per day – ie 2 hours in the morning and 2 hours in the afternoon.
- All children are permitted to engage in active outdoor play at the same time.

8.2.2 Indoor Activity Area & Cot Room Window/Door Closure

Once the sound barrier walls in Section 8.1 have been incorporated into the construction, the intrusive noise level (road) to the OPAs and some indoor play rooms will reduce due to the acoustic shielding provided by the sound barrier walls.

The following window/door closures are required to meet the noise criteria detailed in Section 5.5.

- Windows in the north-western façade of the *'Cot Room'* should be closed during the use of the room to meet the noise intrusion criterion within the room (Section 5.5.2).
- Windows in the south-eastern façade of *'Playroom 2'* should be closed during the use of the room to meet the noise emission criterion (Section 5.5.1.1) at the residential receiver 'R2b' and also meet the noise intrusion criterion within the room (Section 5.5.2).

  The north-eastern and north-western doors to *'Playroom 2'* may remain open during operating hours to provide natural ventilation.
- Windows in the south-eastern façade of *'Playroom 4'* should be closed during the use of the room to meet the noise emission criterion (Section 5.5.1.1) at the residential receiver 'R2a'.

  The north-eastern and north-western doors to *'Playroom 4'* may remain open during operating hours to provide natural ventilation.
- Windows in the north-western façade of *'Playroom 5'* should be closed during the use of the room to meet the noise emission criterion (Section 5.5.1.1) at the residential receiver 'R4b'.

  The north-eastern, south-eastern and south-western doors to *'Playroom 5'* may remain open during operating hours to provide natural ventilation.
- Windows in the south-western façade of *'Playroom 6'* should be closed during the use of the room to meet the noise intrusion criterion within the room (Section 5.5.2).

  The north-western doors and south-eastern windows to *'Playroom 6'* may remain open during operating hours to provide natural ventilation.

As these windows are required to be closed, alternative ventilation may need to be provided. Rooms are to be ventilated to the standards set out in clause F600 of the Building Code of Australia and Australian Standard AS1668.2. An air conditioning system with fresh air supply.

8.3 Recommended Building Construction

8.3.1 Glazing and Glazed Doors

Table 16 specifies minimum sound reduction index (R_w) ratings required for the windows and/or doors, however an alternative glazing specification may be used if the R_w is achieved or exceeded. The R_w ratings for the glazing detailed in Table 16 are shown in the attached Appendix D.

Table 16 Schedule of Glazed Windows

Room Description	Min R_W	Typical Glazing Specification
Cot Room - All external glazing	32	6.38 mm laminated glass in a sliding/hinged/fixed frame with acoustic seals
Playroom 1 - All external glazing in the north-eastern façade	32	6.38 mm laminated glass in a sliding/hinged/fixed frame with acoustic seals
Playroom 2 - All external glazing in the north-eastern & south-eastern façades	32	6.38 mm laminated glass in a sliding/hinged/fixed frame with acoustic seals
Playroom 3 - All external glazing in the north-western & south-western façades	32	6.38 mm laminated glass in a sliding/hinged/fixed frame with acoustic seals
Playroom 4 - All external glazing in the north-eastern & south-eastern façades	32	6.38 mm laminated glass in a sliding/hinged/fixed frame with acoustic seals
Playroom 5 - All external glazing in the north-eastern, south-western & north-western façades	32	6.38 mm laminated glass in a sliding/hinged/fixed frame with acoustic seals
Playrooms 6 - All external glazing in the north-eastern façade	32	6.38 mm laminated glass in a sliding/hinged/fixed frame with acoustic seals
Playrooms 6 - All external glazing in the south-western façade	38	10.38 mm laminated glass in a sliding/hinged/fixed frame with acoustic seals
All Playrooms – External glazing not specified above	30	5 mm glass in a sliding/hinged/fixed frame with acoustic seals

Any glazing not specified in Table 16 above may be of standard construction.

Unless otherwise specified, window frames may be either sliding/awning, or hinged casement style and be of robust sound-barrier construction having interlocking stiles and neoprene (Q-lon or similar) or vinyl finned seals to minimise sound leakage.

This schedule of construction is typical and for general guidance to the architect in preparing final construction drawings and specifications. Other constructions that provide the same or better Sound Transmission Loss performance may also be acceptable.

It is most important that any sound leakage paths around the windows be sealed off. We recommend that prior to the fitting of the architraves around the windows, the space between the frames and the wall structure be sealed off with silicone or polyurethane mastic and backing rods installed behind. The window architraves can then be fitted.

8.3.2 Walls, Roofs and Ceilings

External walls may be of standard masonry or stud wall construction with minimum 90 mm thick glasswool insulation installed within the wall cavities.

Roofs may be of standard metal deck or concrete tile construction with 10 mm thick standard plasterboard ceilings installed. Roof cavities should have minimum 90 mm thick glasswool insulation installed within.

8.4 Mechanical Plant & Equipment – Construction Certificate

The specifications for the mechanical plant have not yet been selected for this development. For typical mechanical plant and equipment with sound power levels not exceeding those listed in Table 8, it is reasonable and feasible to acoustically treat the associated plant area (absorptive lining, etc) or equipment itself so that noise will not impact the neighbouring properties.

Once mechanical plant has been selected, a detailed acoustic assessment should be made, prior to the issue of a Construction Certificate. We recommend that the mechanical services engineers select mechanical plant equipment with the lowest sound power levels to reduce the amount of acoustic treatment necessary to achieve the noise criteria at nearby residential receivers.

The cumulative noise emissions from the mechanical plant system, and use of the indoor play areas and car park is not to exceed the project noise trigger levels specified in Section 5.5.

We offer to provide detailed noise controls when specifications of the mechanical plant equipment have been finalised.

Rooms are to be ventilated to the standards set out in clause F6D6 of the 2022 Building Code of Australia and Australian Standards AS1668.2.

8.5 Construction Disclaimer

Recommendations made in this report are intended to resolve acoustical problems only. We make no claims of expertise in other areas of building construction and therefore the recommended noise controls should be implemented into the building design in consultation with other specialists to ensure they meet the structural, fire, thermal or other aspects of building construction.

We encourage clients to check with us before using materials or equipment that are alternative to those specified in our Acoustical Report.

The integrity of acoustic structures is very dependent on installation techniques. Therefore the use of contractors that are experienced in acoustic construction is encouraged.

9.0 PREDICTED NOISE LEVELS - AFTER NOISE CONTROLS

Once the noise control recommendations in Section 8.0 are incorporated into the design, the calculated outdoor play area sound pressure level at the potentially most affected receivers will be as shown below.

The intrusive external $L_{eq,\ 15minute}$ noise levels at all receptor locations 'R1' to 'R4c' from the outdoor play areas after noise controls have been incorporated into the design during active outdoor play, are calculated to be as shown in Table 17.

Table 17 Predicted $L_{eq,\ 15\ minute}$ Noise Levels – Active Outdoor Play – After Noise Controls

Receptor Location	Predicted Noise Level (dBA)	Noise Criteria (dBA)	Compliance (Yes/No)
R1 – *Muswellbrook Golf Club*	50	65	Yes
R2a – 120 Maitland Street	53	53	Yes
R2b – 120 Maitland Street	49	53	Yes
R2c – 120 Maitland Street	36	53	Yes
R3 – 125 Maitland Street	28	53	Yes
R4a – 116 Maitland Street	37	53	Yes
R4b – 116 Maitland Street	51	53	Yes
R4c – 116 Maitland Street	53	53	Yes

The predicted L_{eq} levels of noise from the outdoor play areas are summarised in Table 17 at the potentially most affected receivers. Once noise controls are incorporated as recommended in Section 8.0, the predicted levels of noise at all receiver location comply with the criteria in Section 5.5 of this report, and will therefore be acceptable.

10.0 CONCLUSION

Day Design Pty Ltd was engaged by ArtMade Architects on behalf of Ms Jacky Angelovska to assess the potential environmental noise impact from a proposed Child Care Centre to be constructed at 118 Maitland Street, Muswellbrook, NSW.

Calculations and measurements show that, provided the noise control recommendations made in Section 8.0 of this report are implemented, the intrusive noise levels will meet the noise level requirements of the NSW Department of Planning and Environment's *Child Care Planning Guideline* and the Association of Australasian Acoustical Consultants' *Guideline for Child Care Centres Acoustic Assessment*, and be considered acceptable.

Calculations also show that, provided the noise control recommendations made in Section 8.0 of this report are implemented, the level of noise emitted by the proposed Child Care Centre at 118 Maitland Street, Muswellbrook, NSW, will meet the acceptable noise level requirements of the Association of Australasian Acoustical Consultants' *Guideline for Child Care Centres Acoustic Assessmen*t and the Environmental Protection Authority's *NSW Road Noise Policy,* as detailed in Section 5.0 of this report, and is considered acceptable.

Adam Shearer, BCT(Audio), MDesSc(Audio & Acoustics), MAAS
Senior Acoustical Consultant
for and on behalf of Day Design Pty Ltd

AAAC MEMBERSHIP

Day Design Pty Ltd is a member company of the Association of Australasian Acoustical Consultants, and the work herein reported has been performed in accordance with the terms of membership.

APPENDICES

Appendix A – Instrumentation
Appendix B – Ambient Noise Survey
Appendix C – Architectural Drawings
Appendix D – Approximate Nosie Source Locations and Noise Control Recommendations Mark-up
Appendix E – Sound Barrier Wall Construction Methods
AC108-1 to 4 – Glossary of Acoustical Terms

NOISE SURVEY INSTRUMENTATION

Noise level measurements and analysis in this report were made with instrumentation as follows:

Table A1 Noise Survey Instrumentation

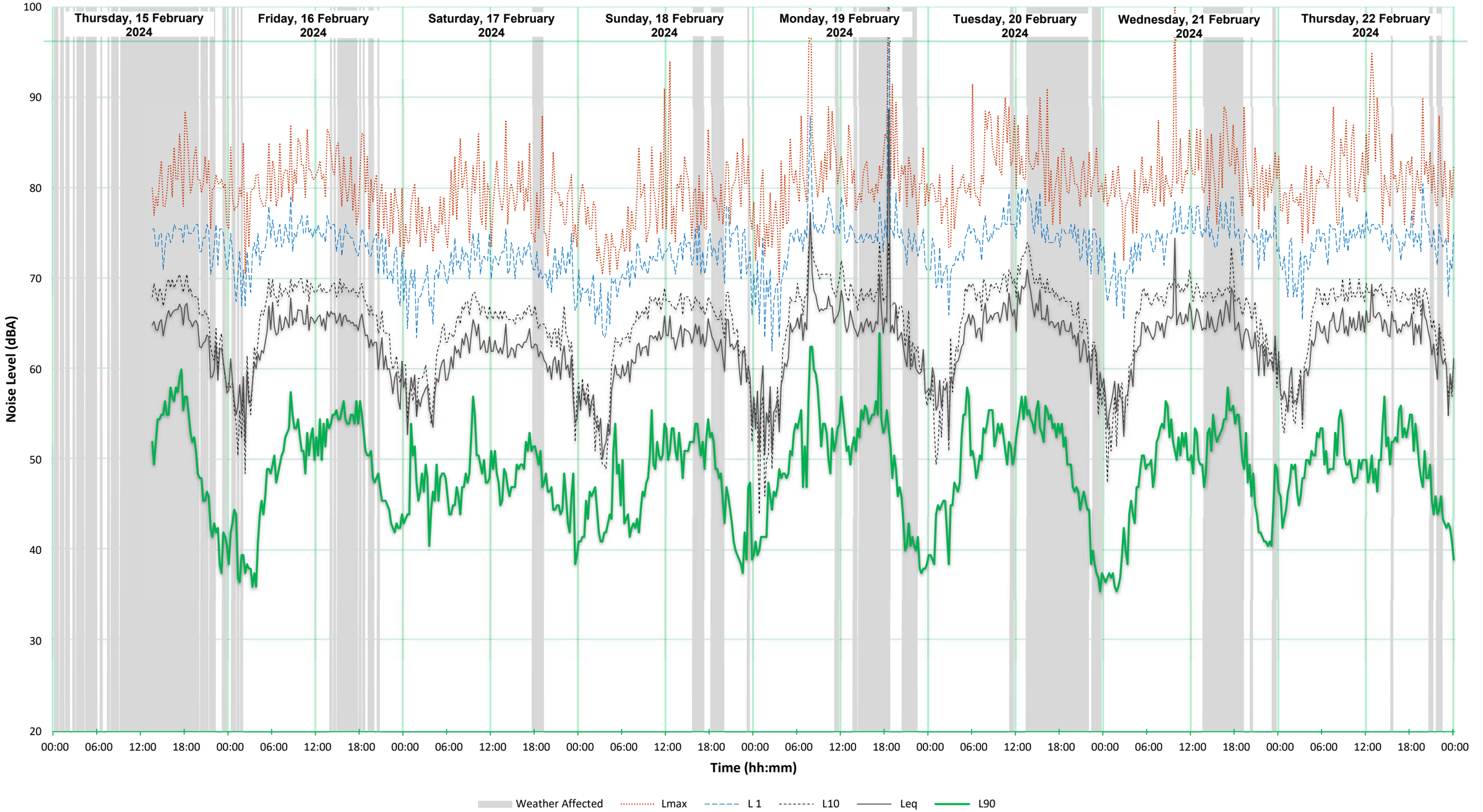
Description	Model No	Serial No
Infobyte Noise Logger (Type 1) Condenser Microphone 0.5" diameter	iM4 MK 250	105 12605
Infobyte Noise Logger (Type 1) Condenser Microphone 0.5" diameter	iM4 MK 250	120 15361
Modular Precision Sound Analyser Condenser Microphone 0.5" diameter	B&K 2270 B&K 4189	301 1809 309 9836
Acoustical Calibrator	B&K 4231	302 6019

An environmental noise logger is used to continuously monitor ambient noise levels and provide information on the statistical distribution of noise during an extended period of time. The Infobyte Noise Monitors iM4 #105 and #120 are Type 1 precision environmental noise monitors meeting all the applicable requirements of AS1259 for an integrating-averaging sound level meter.

The B&K 2270 Sound Analyser is a real-time precision integrating sound level meters with octave and third octave filters, that sample noise at a rate of 10 samples per second and provides L_{eq} and L_{90}, L_{10} noise levels using both Fast and Slow response and L_{peak} noise levels on Impulse response time settings. The meters are frequency weighted to provide dBA, dBC or Linear sound pressure level readings as required.

All instrument systems had been laboratory calibrated using instrumentation traceable to Australian National Standards and certified within the last two years thus conforming to Australian Standards. The measurement system was also field calibrated prior to and after noise surveys. Calibration drift was found to be less than 0.5 dB for attended measurements and within 1 dB for long-term measurements. No adjustments for instrument drift during the measurement period were warranted.

Located at Front Yard, 118 Maitland St, Muswellbrook, NSW



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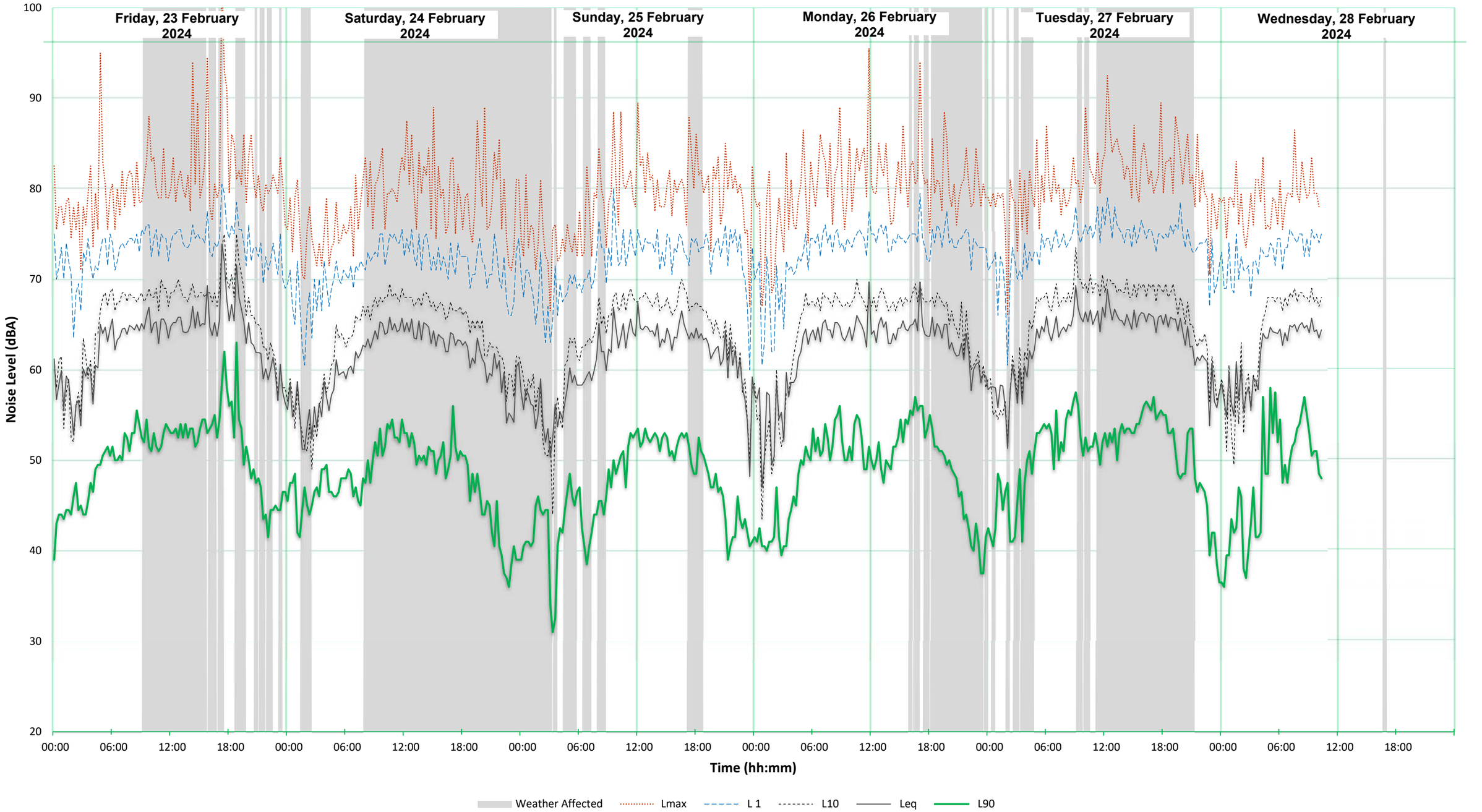

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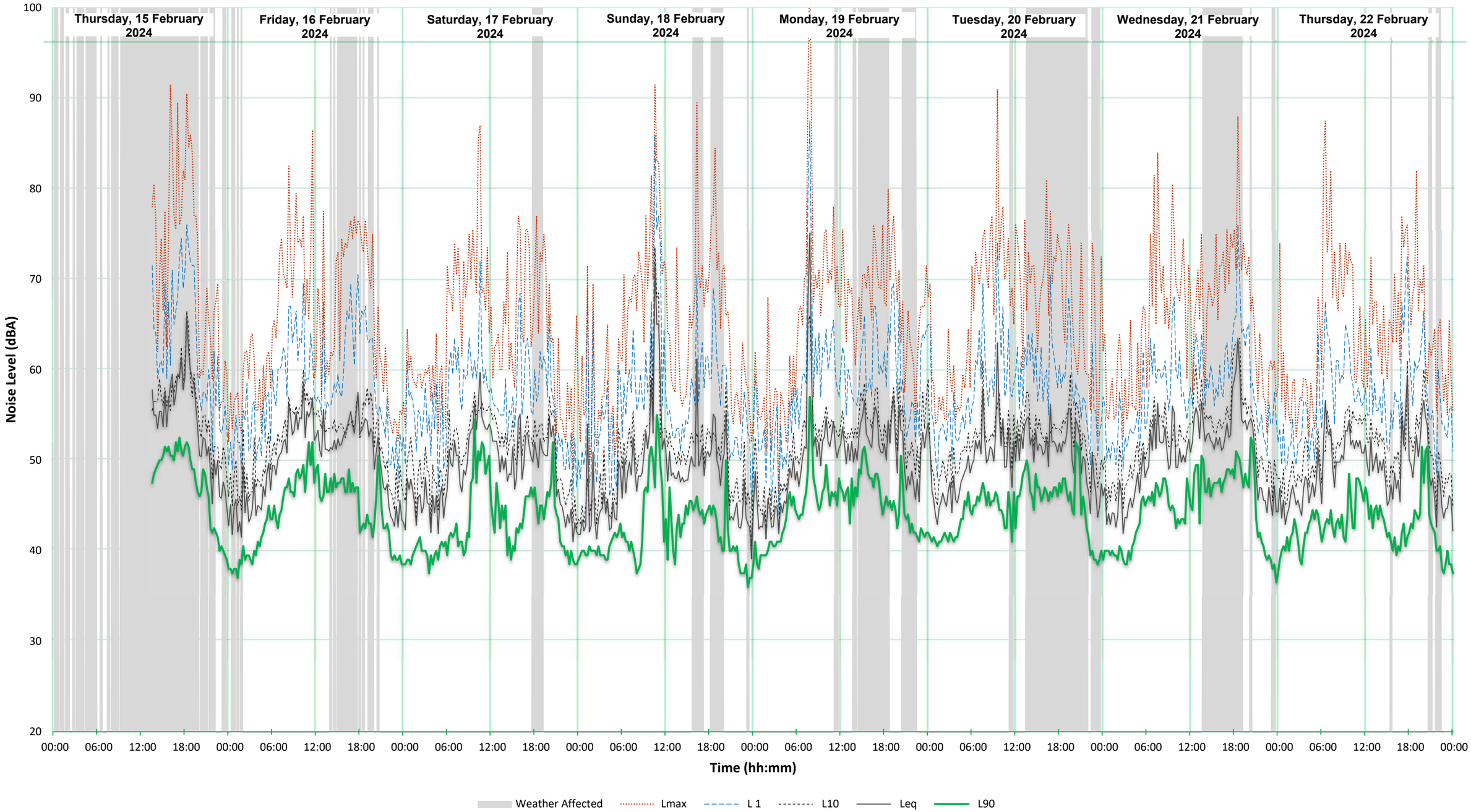

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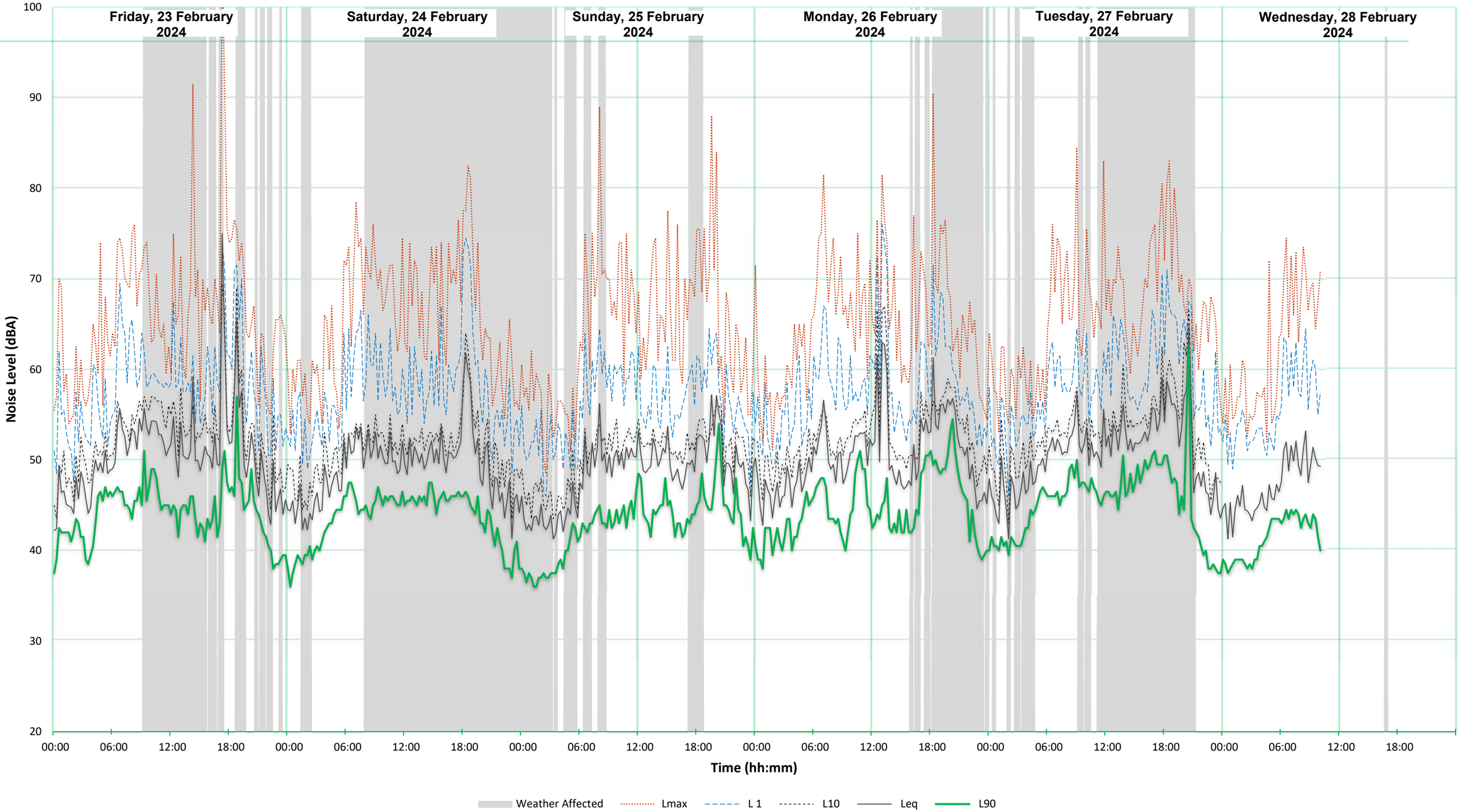

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DA02.01	SITE PLAN / DEMOLITION	A	12.03.2024
DA03.01	BASEMENT FLOOR PLAN	A	12.03.2024
DA03.02	GROUND FLOOR PLAN	A	12.03.2024
DA03.03	FIRST FLOOR PLAN	A	12.03.2024
DA03.04	AREA CALCULATIONS	A	12.03.2024
DA04.01	EXTERNAL ELEVATIONS	A	12.03.2024
DA05.01	SECTIONS & EXTERNAL FINISHES	A	12.03.2024
DA06.01	SHADOW DIAGRAMS	A	12.03.2024
DA06.02	VIEW FROM THE SUN	A	12.03.2024
DA06.03	OUTDOOR SOLAR ACCESS	A	12.03.2024

118 MAITLAND STREET
MUSWELLBROOK 2333

CHILDCARE CENTRE

DEVELOPMENT APPLICATION

ISSUE	DATE	DESCRIPTION
A	12.03.2024	FOR DEVELOPMENT APPLICATION

ASSOCIATED CONSULTANTS

PLANNING	AVENUE PLANNING
TRAFFIC	STANBURY TRAFFIC
QS	QPC&C
ACOUSTICS	DAY DESIGN
LANDSCAPE	GREENSCAPE DESIGN
GEOTECH & PSI	BROADCREST CONSULTING PTY LTD
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ARCHITECT

ArtMade Architects

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|P: 02 8760 9300 |hello@artmade.com.au | www.artmade.com.au

PROJECT

CHILDCARE CENTRE

PROJECT ADDRESS

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MUSWELLBROOK 2333

SHEET NAME

COVER PAGE

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Sheet Size	Scale	L.G.A.
A1		MUSWELLBROOK

Drawn By	Checked By	Date
TA/MS1	MS/SS	12.03.2024

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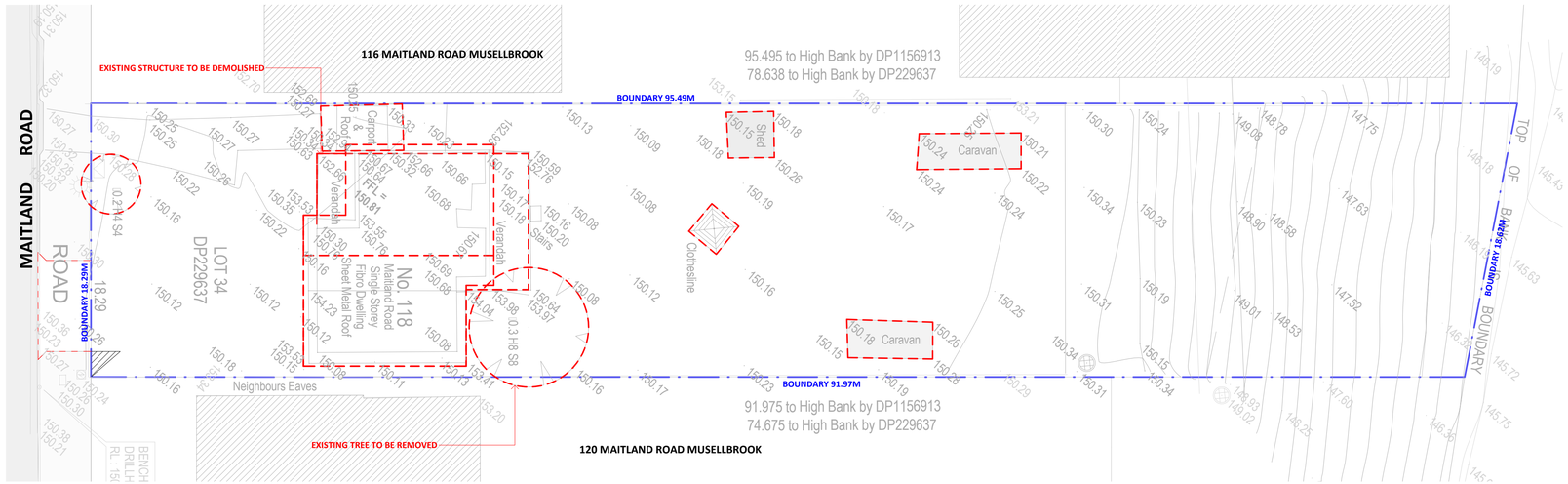
7927-1 Appendix C



1 DEMOLITION PLAN
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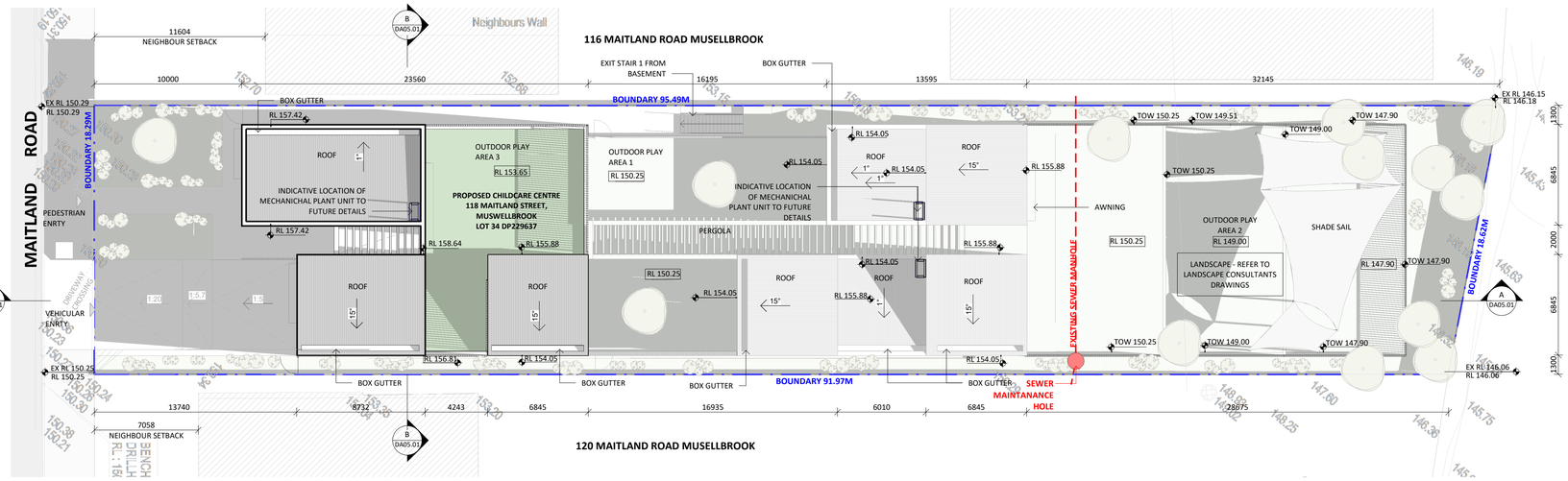

2 SITE PLAN
1 : 200

0 1 2 4 6 8 10
1 : 200

ABBREVIATIONS

ENG.	- ENGINEER
ESL	- EXISTING SLAB LEVEL
EXT	- EXTERIOR
FFL	- FINISH FLOOR LEVEL
F.	- FIXED
FSL	- FINISH SURFACE LEVEL
GL	- GROUND LINE
GLZ	- GLAZING
EX.GL	- EXISTING GROUND LINE
REQ.	- REQUIREMENTS
XX.XX	- PROPOSED LEVEL
XX.XX	- EXISTING LEVEL
XX.XX	- SPOT LEVEL (PLAN)
XX.XX	- SPOT LEVEL (ELEVATION)

LANDSCAPE LEGEND

- EXISTING TREE / TREE TO BE RETAINED
- TREE TO BE REMOVED
- NEW TREE
- LANDSCAPING / BUFFER
- TURF/ ARTIFICIAL TURF
- EXTERNAL FLOOR FINISH
- LINE OF STRUCTURAL ROOT ZONE (SRZ)
- LINE OF TREE EXCLUSION ZONE (TEZ)
- LINE OF TREE PROTECTION ZONE (TPZ)

NOTE: REFER TO ARBORIST REPORT FOR FURTHER DETAILS

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- REFER TO LANDSCAPE DRAWINGS FOR LANDSCAPE DESIGN.
- KITCHEN AREA TO BE ACCORDANCE WITH NSW AS4674, FOOD ACT 2003, FOOD REGULATION 2015 AND FOOD STANDARD CODES 3.2.2 AND 3.2.3.

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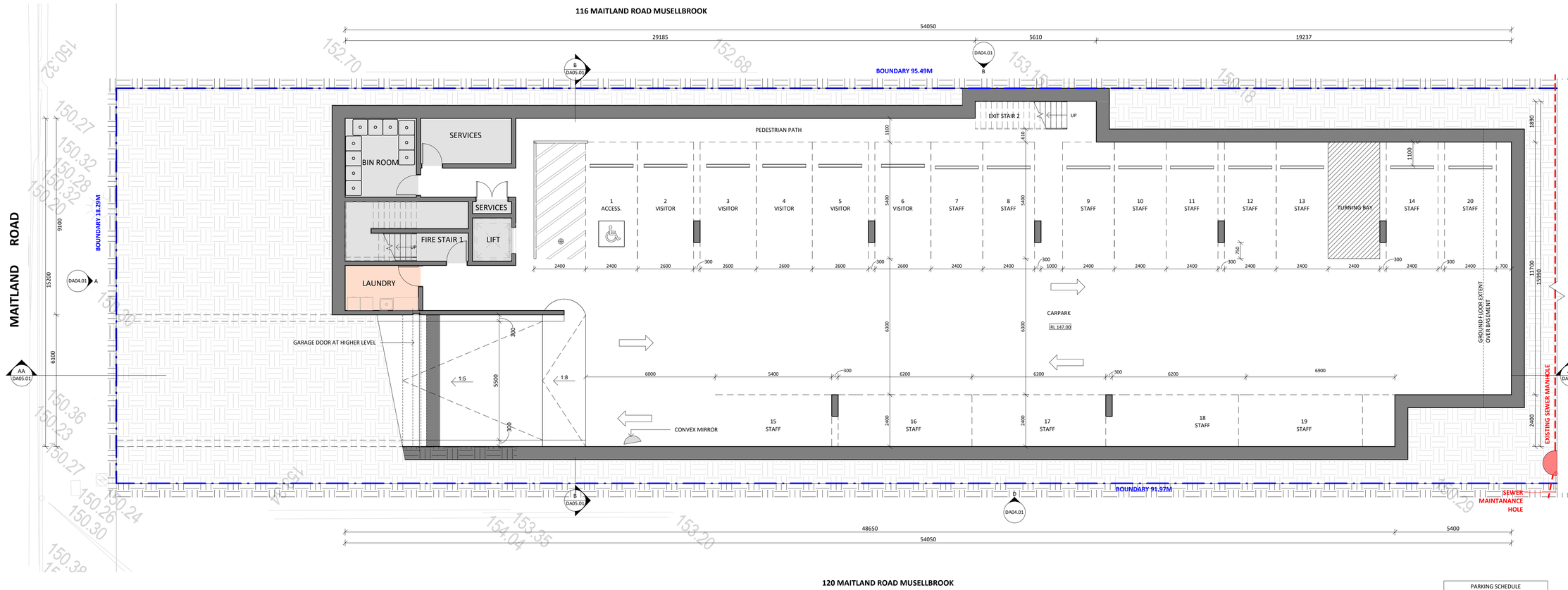

1 BASEMENT FLOOR PLAN
1 : 100

PARKING SCHEDULE	
PARKING	NO. SPACES
ACCESS.	1
STAFF	14
VISITOR	5
TOTAL	20

0 1 2 3 4 5
1 : 100

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BASEMENT FLOOR PLAN

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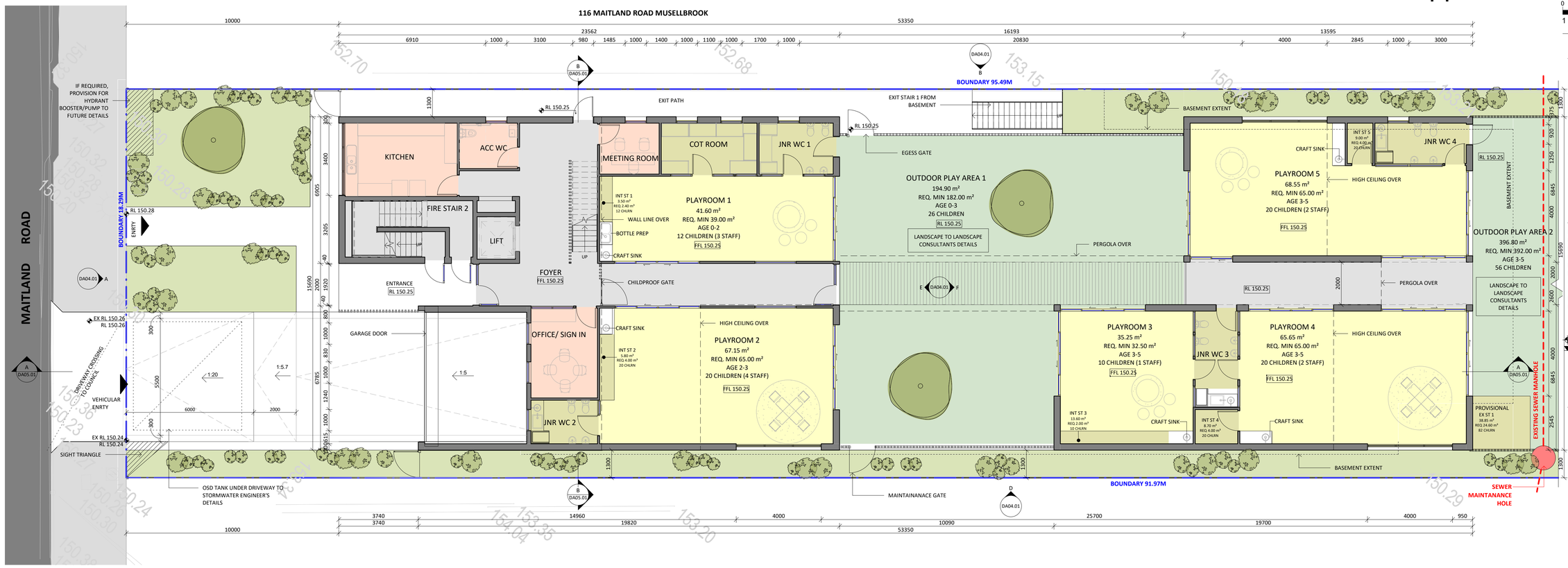

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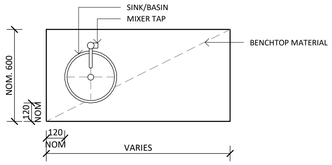
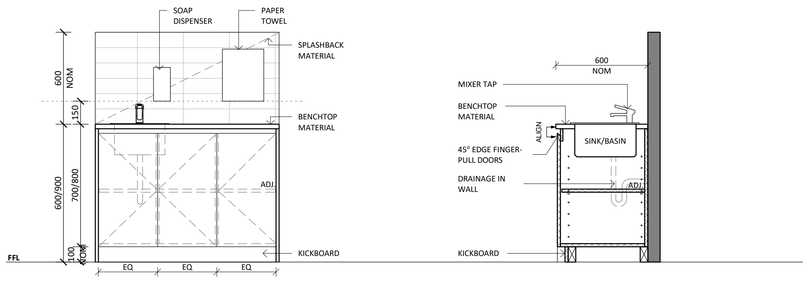


TYPICAL CRAFT SINK - PLAN

NOTE: SIMILAR CRAFT SINK. IMAGE FOR JOINERY REFERENCE ONLY



TYPICAL CRAFT SINK - ELEVATION

NOTE: PROVIDE MAGNETIC CHILDPROOF LOCKS TO ALL CABINETS IN INDOOR PLAY AREA (CRAFT SINKS & BOTTLE PREP.)

TYPICAL CRAFT SINK - SECTION

2 TYP CRAFT SINK DETAILS
1 : 20

1 : 100

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XX.XX	- SPOT LEVEL (PLAN)
XX.XX	- SPOT LEVEL (ELEVATION)

LANDSCAPE LEGEND

- EXISTING TREE / TREE TO BE RETAINED
- TREE TO BE REMOVED
- NEW TREE
- LANDSCAPING / BUFFER
- TURF/ ARTIFICIAL TURF
- EXTERNAL FLOOR FINISH
- LINE OF STRUCTURAL ROOT ZONE (SRZ)
- LINE OF TREE EXCLUSION ZONE (TEZ)
- LINE OF TREE PROTECTION ZONE (TPZ)

NOTE: REFER TO ARBORIST REPORT FOR FURTHER DETAILS

OUTDOOR PLAY AREA SCHEDULE				
AREA	AGE	NO. CHLDRN	UNENCUMBERED	
			REQ AREA	AREA
OUTDOOR PLAY AREA 1	AGE 0-3	26	182 m²	194.90 m²
OUTDOOR PLAY AREA 2	AGE 3-5	56	392 m²	396.80 m²
OUTDOOR PLAY AREA 3	AGE 3-5	10	70 m²	117.30 m²
TOTAL		92	644 m²	709.00 m²

EXTERNAL STORAGE SCHEDULE			
NAME	NO. CHLDRN	REQ VOL	VOL
EX ST 1	82	24.60 m³	38.85 m³
EX ST 2	10	3.00 m³	10.65 m³
TOTAL	92	27.60 m³	49.50 m³

INDOOR PLAYROOM SCHEDULE					
ROOM	AGE	NO. CHLDRN	NO. STAFF	UNENCUMBERED	
				REQ AREA	AREA
PLAYROOM 1	AGE 0-2	12	3	39 m²	41.60 m²
PLAYROOM 2	AGE 2-3	20	4	65 m²	67.15 m²
PLAYROOM 3	AGE 3-5	10	1	32.5 m²	35.25 m²
PLAYROOM 4	AGE 3-5	20	2	65 m²	65.65 m²
PLAYROOM 5	AGE 3-5	20	2	65 m²	68.55 m²
PLAYROOM 6	AGE 3-5	10	1	32.5 m²	37.65 m²
TOTAL		92	13	299 m²	315.90 m²

INTERNAL STORAGE SCHEDULE			
NAME	NO. CHLDRN	REQ VOL	VOL
INT ST 1	12	2.40 m³	3.50 m³
INT ST 2	20	4.00 m³	5.80 m³
INT ST 3	10	2.00 m³	13.60 m³
INT ST 4	20	4.00 m³	8.70 m³
INT ST 5	20	4.00 m³	9.00 m³
INT ST 6	10	2.00 m³	7.05 m³
TOTAL	92	18.40 m³	47.60 m³

ISSUE	DATE	DESCRIPTION
A	12.03.2024	FOR DEVELOPMENT APPLICATION

ASSOCIATED CONSULTANTS

PLANNING	AVENUE PLANNING
TRAFFIC	STANBURY TRAFFIC
QS	QPC&C
ACOUSTICS	DAY DESIGN
LANDSCAPE	GREENSCAPE DESIGN
GEOTECH & PSI	BROADCREST CONSULTING PTY LTD
CIVIL AND FLOOD	ACOR CONSULTING

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J. ANGELOVSKA AND L ABAUNADER

ARCHITECT

ArtMade Architects

|507/50 Holt St, Surry Hills NSW 2010
|P: 02 8760 9300 | hello@artmade.com.au | www.artmade.com.au

PROJECT

CHILDCARE CENTRE

PROJECT ADDRESS

118 MAITLAND STREET
MUSWELLBROOK 2333

SHEET NAME

GROUND FLOOR PLAN

ISSUED FOR DEVELOPMENT APPLICATION

Project number	Sheet No.	Issue	Phase
23714	DA03.02	A	DA

Sheet Size	Scale	L.G.A.
A1	As indicated	MUSWELLBROOK

Drawn By	Checked By	Date
TA/MS1	MS/SS	12.03.2024

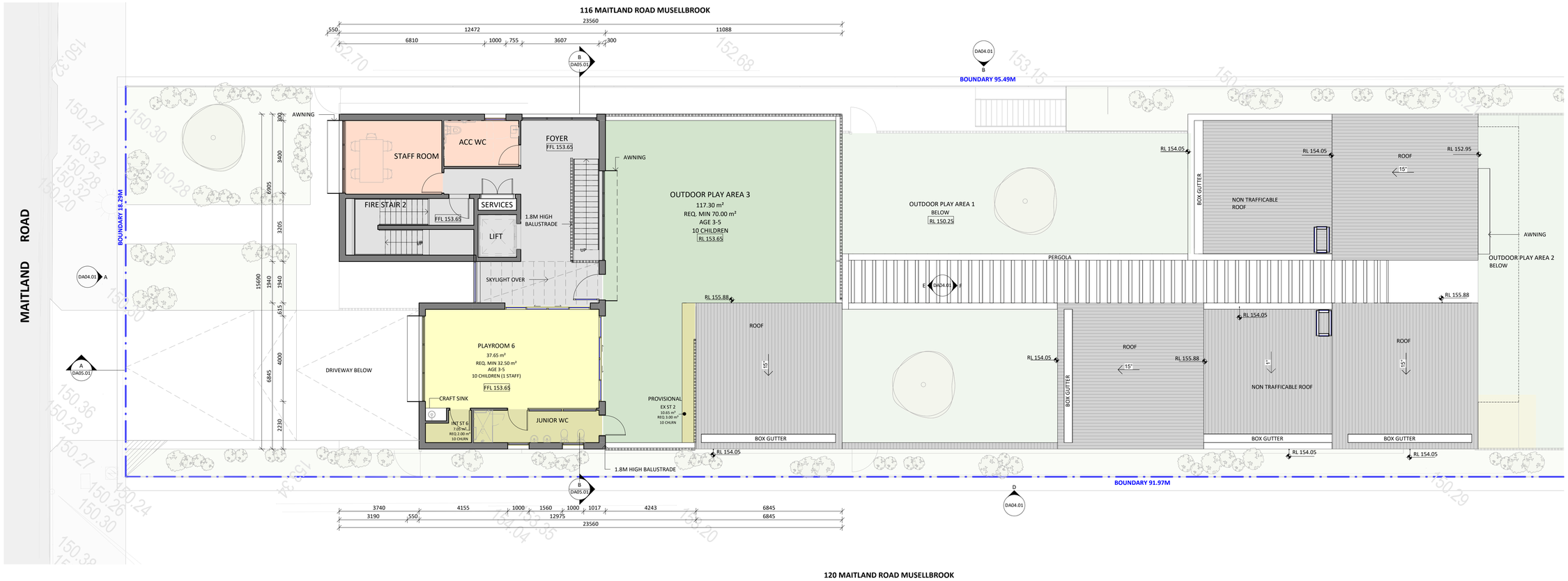
NOT FOR CONSTRUCTION

7927-1 Appendix C

1 : 100

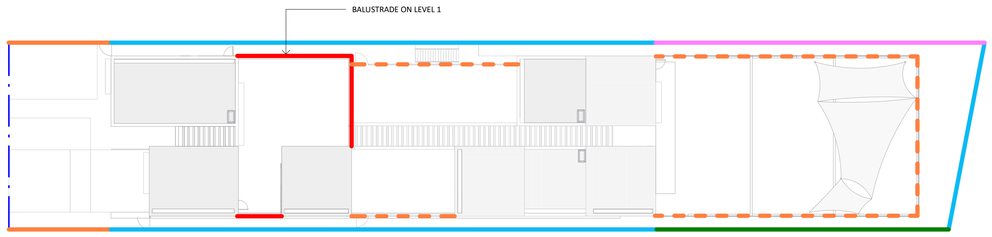
MAITLAND ROAD

116 MAITLAND ROAD MUSELLBROOK



120 MAITLAND ROAD MUSELLBROOK

1 FIRST FLOOR PLAN
1 : 100

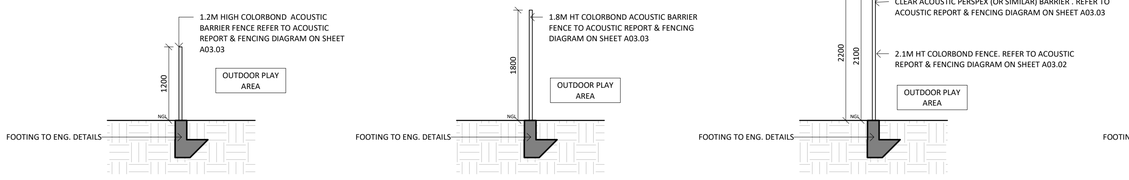


2 FENCE DIAGRAM (SITE PLAN VIEW)
1 : 300

FENCE LEGEND

- 1.2M HIGH ACOUSTIC BOUNDARY FENCE REFERT TO TYPE 1
- 1.8M HT COLORBOND BOUNDARY FENCE REFER TO TYPE 2
- 2.2 M HT ACOUSTIC FENCE REFER TO TYPE 3
- 2.3 M HT ACOUSTIC FENCE REFER TO TYPE 4
- 1.2M HT BARRIERF ROM FFL - REFER TO TYPE 5
- 1.8M HT BALUSTRADE FROM FFL - REFER TO TYPE 6

NOTE:
- ALL ACOUSTIC BARRIERS IN ACCORDANCE WITH ACOUSTIC REPORT. REFER TO SHEET A05.01 FOR FENCE DETAILS.



FENCE DETAILS

ABBREVIATIONS

ENG.	- ENGINEER
ESL	- EXISTING SLAB LEVEL
EXT	- EXTERIOR
FFL	- FINISH FLOOR LEVEL
F.	- FIXED
FSL	- FINISH SURFACE LEVEL
GL	- GROUND LINE
GLZ	- GLAZING
EX.GL	- EXISTING GROUND LINE
REQ.	- REQUIREMENTS
XX.XX	- PROPOSED LEVEL
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- REFER TO LANDSCAPE DRAWINGS FOR LANDSCAPE DESIGN.
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ISSUE	DATE	DESCRIPTION
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ASSOCIATED CONSULTANTS

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TRAFFIC	STANBURY TRAFFIC
QS	QPC&C
ACOUSTICS	DAY DESIGN
LANDSCAPE	GREENSCAPE DESIGN
GEOTECH & PSI	BROADCREST CONSULTING PTY LTD
CIVIL AND FLOOD	ACOR CONSULTING

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J. ANGELOVSKA AND L ABAUNADER

ARCHITECT

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PROJECT

CHILDCARE CENTRE

PROJECT ADDRESS

118 MAITLAND STREET
MUSWELLBROOK 2333

SHEET NAME

FIRST FLOOR PLAN

ISSUED FOR DEVELOPMENT APPLICATION

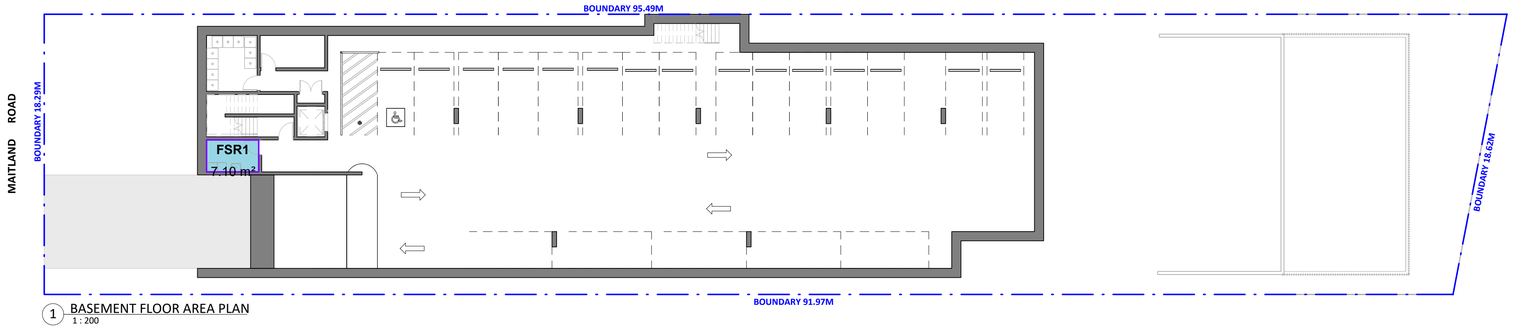
Project number	Sheet No.	Issue	Phase
23714	DA03.03	A	DA

Sheet Size	Scale	L.G.A.
A1	As indicated	MUSWELLBROOK

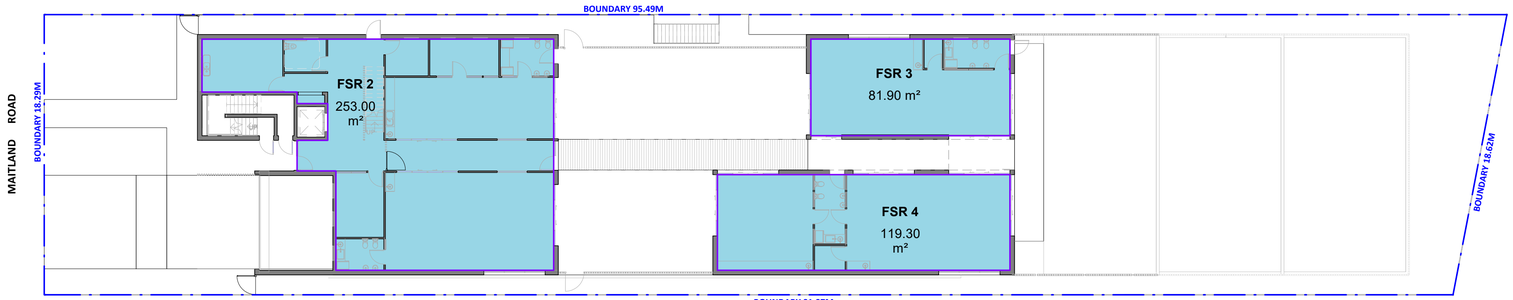
Drawn By	Checked By	Date
TA/MS1	MS/SS	12.03.2024

NOT FOR CONSTRUCTION

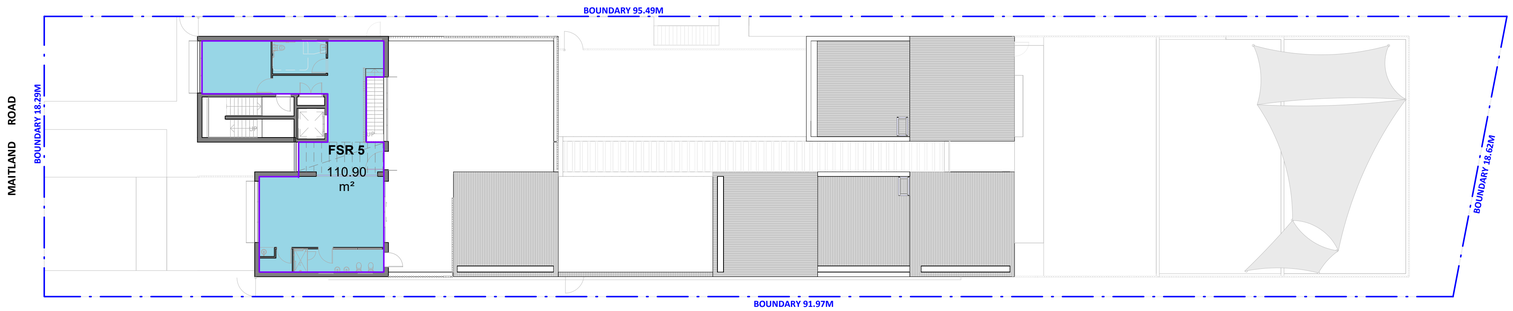
7927-1 Appendix C



1 BASEMENT FLOOR AREA PLAN
1 : 200



2 GROUND FLOOR AREA PLAN
1 : 200



3 FIRST FLOOR AREA PLAN
1 : 200

0 1 2 4 6 8 10
1 : 200

DCP - FSR (SITE AREA 1714.4²)	
PERMITTED AREA	MIN FSR
857.20 m²	0.5

PROPOSED - FSR			
Name	Area	Level	FSR
FSR1	7.10 m²	BASEMENT LEVEL	0.004135
FSR 2	253.00 m²	GROUND FLOOR LEVEL	0.147567
FSR 3	81.90 m²	GROUND FLOOR LEVEL	0.047772
FSR 4	119.30 m²	GROUND FLOOR LEVEL	0.069575
FSR 5	110.90 m²	FIRST FLOOR LEVEL	0.064687
TOTAL	572.15 m²		0.333735

ISSUE	DATE	DESCRIPTION
A	12.03.2024	FOR DEVELOPMENT APPLICATION

ASSOCIATED CONSULTANTS

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TRAFFIC	STANBURY TRAFFIC
QS	QPC&C
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GEOTECH & PSI	BROADCREST CONSULTING PTY LTD
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PROJECT

CHILDCARE CENTRE

PROJECT ADDRESS

118 MAITLAND STREET
MUSWELLBROOK 2333

SHEET NAME

AREA CALCULATIONS

ISSUED FOR DEVELOPMENT APPLICATION

Project number	Sheet No.	Issue	Phase
23714	DA03.04	A	DA

Sheet Size	Scale	L.G.A.
A1	1 : 200	MUSWELLBROOK

Drawn By	Checked By	Date
TA/MS1	MS/SS	12.03.2024

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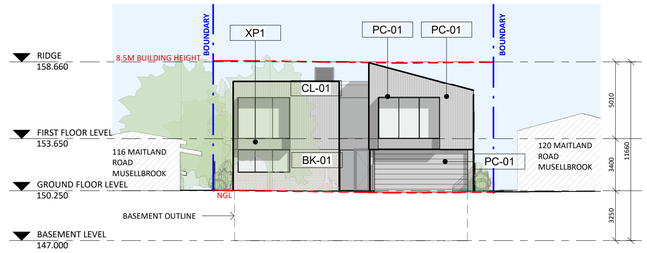
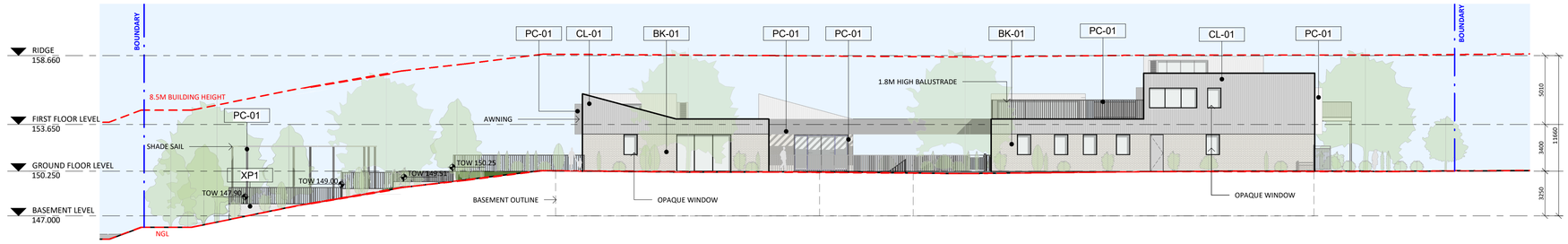
7927-1 Appendix C

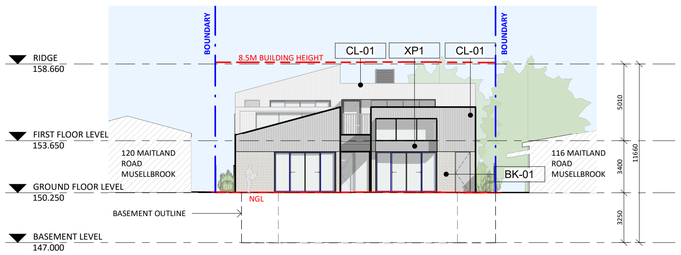
1 : 200



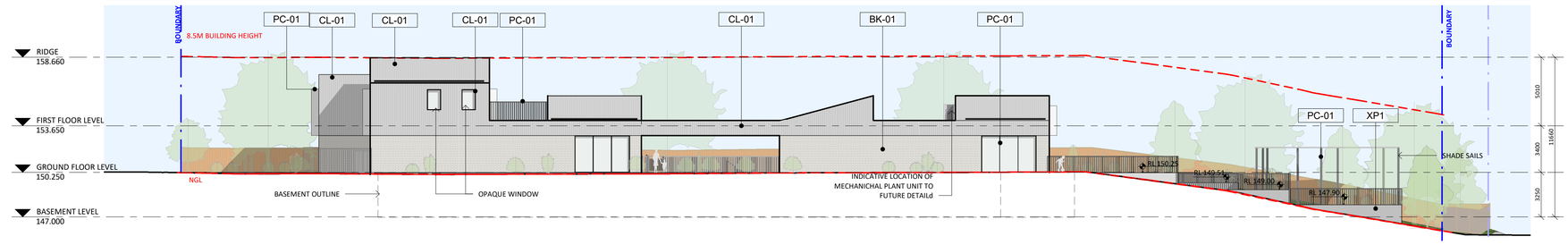
A SOUTH WEST ELEVATION
1 : 200



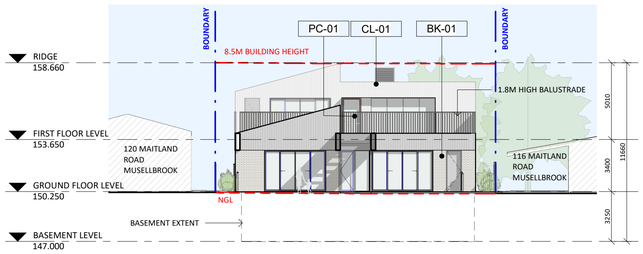
B NORTH WEST ELEVATION
1 : 200



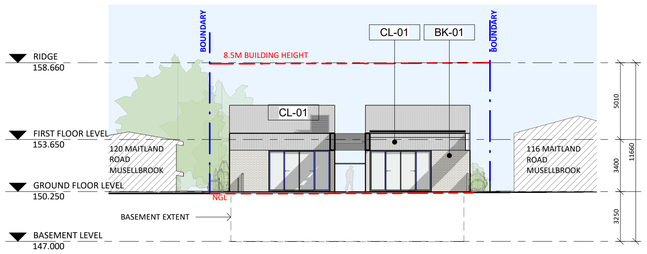
C NORTH EAST ELEVATION
1 : 200



D SOUTH EAST ELEVATION
1 : 200



E NORTH EAST - INTERNAL BUILDING ELEVATION
1 : 200



F SOUTH WEST - INTERNAL BUILDING ELEVATION
1 : 200

EXTERNAL FINISHES

BK-01	BRICK BAGGED DULUX COLOUR: NATURAL WHITE OR SIMILAR
CL-01	WALL, ROOF COLORBOND LONG LINE COLOUR: SHALE GREY OR SIMILAR
PC-01	ALUMINIUM WINDOW & DOOR FRAMES,PERGOLA DURALLOY POWDERCOAT COLOUR: SHALE GREY OR SIMILAR
XP1	EXTERNAL WALLS DULUX COLOUR: SHALE GREY OR SIMILAR

ARTIST'S IMPRESSION

NOT FOR CONSTRUCTION

ISSUE	DATE	DESCRIPTION
A	12.03.2024	FOR DEVELOPMENT APPLICATION

ASSOCIATED CONSULTANTS

PLANNING	AVENUE PLANNING
TRAFFIC	STANBURY TRAFFIC
QS	QPC&C
ACOUSTICS	DAY DESIGN
LANDSCAPE	GREENSCAPE DESIGN
GEOTECH & PSI	BROADCREST CONSULTING PTY LTD
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PROJECT

CHILDCARE CENTRE

PROJECT ADDRESS

118 MAITLAND STREET
MUSWELLBROOK 2333

SHEET NAME

EXTERNAL ELEVATIONS

ISSUED FOR DEVELOPMENT APPLICATION

Project number	Sheet No.	Issue	Phase
23714	DA04.01	A	DA

Sheet Size	Scale	L.G.A.
A1	As indicated	MUSWELLBROOK

Drawn By	Checked By	Date
TA/MS1	MS/SS	12.03.2024

7927-1 Appendix C

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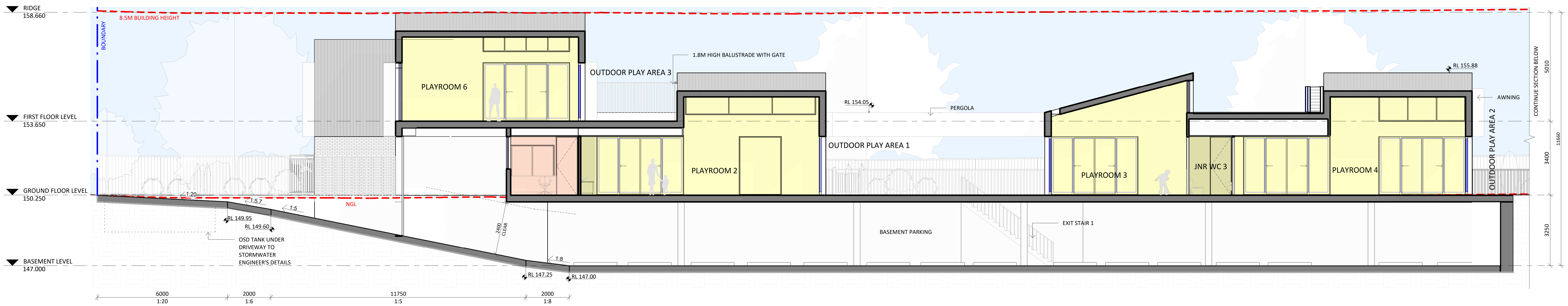
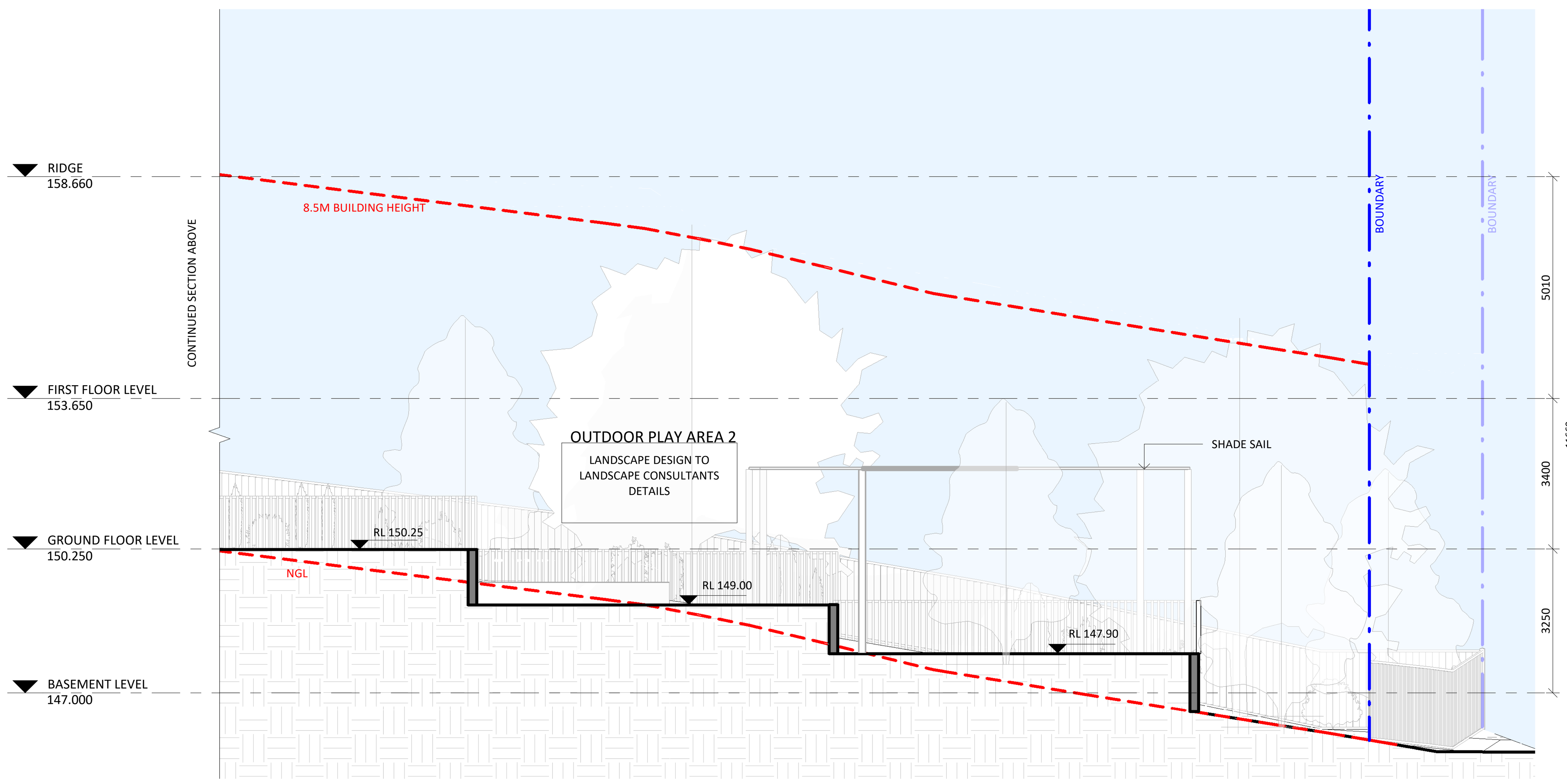
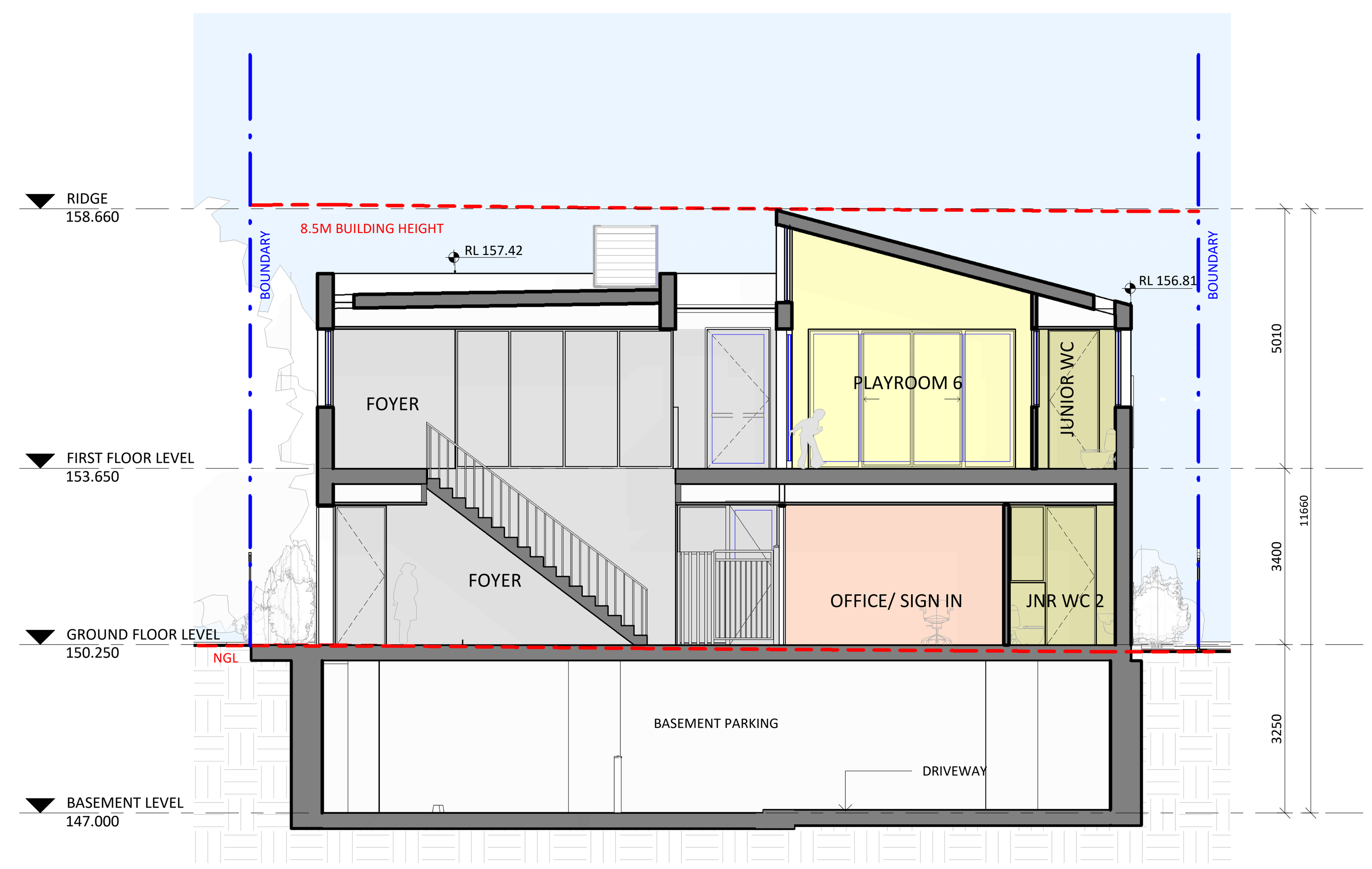
1 : 100



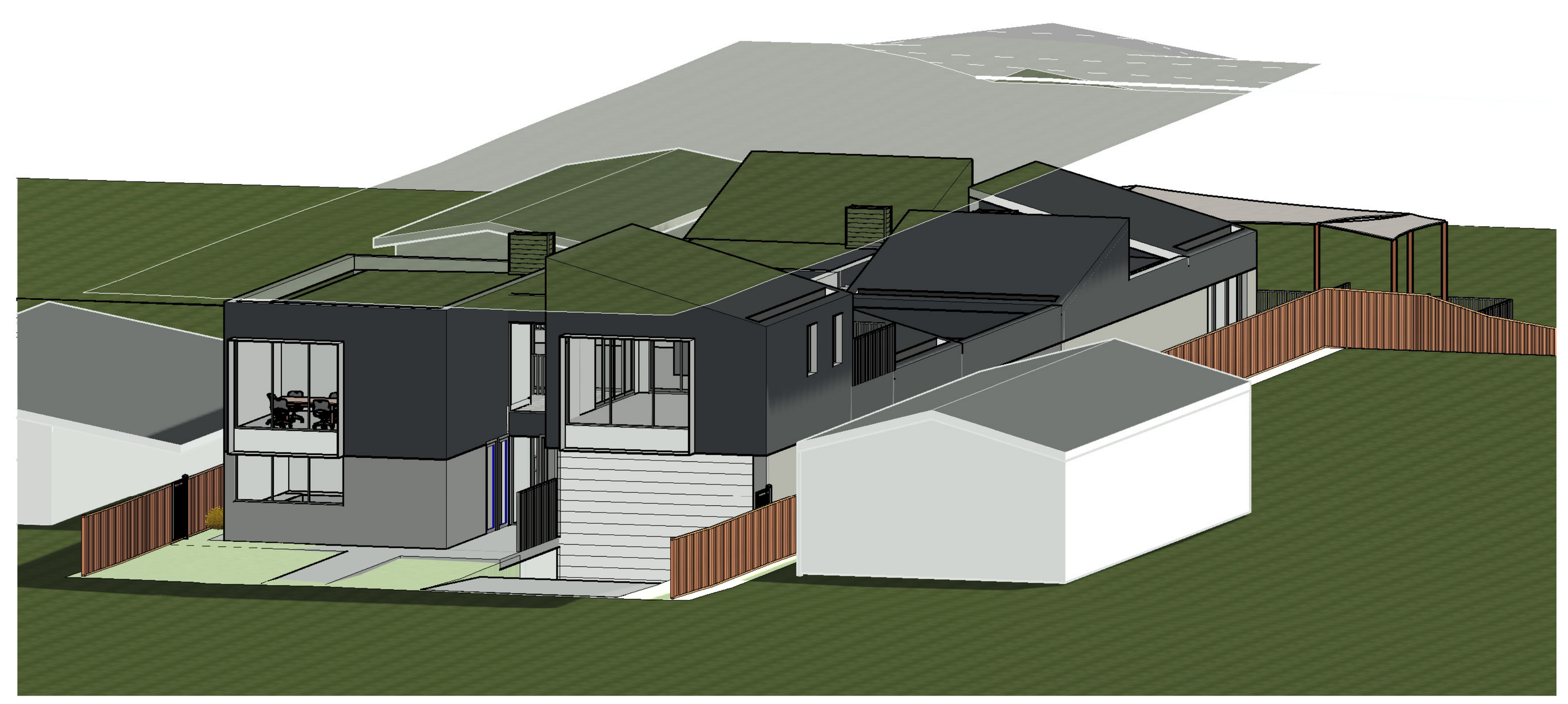
A SECTION A-A
1 : 100



SECTION A-A - CONT



B SECTION B-B
1 : 100



4 8.5M HEIGHT DIAGRAM

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A	12.03.2024	FOR DEVELOPMENT APPLICATION

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SECTIONS & EXTERNAL FINISHES

ISSUED FOR DEVELOPMENT APPLICATION

Project number	Sheet No.	Issue	Phase
23714	DA05.01	A	DA

Sheet Size	Scale	L.G.A.
A1	1 : 100	MUSWELLBROOK

Drawn By	Checked By	Date
TA/MS1	MS/SS	12.03.2024

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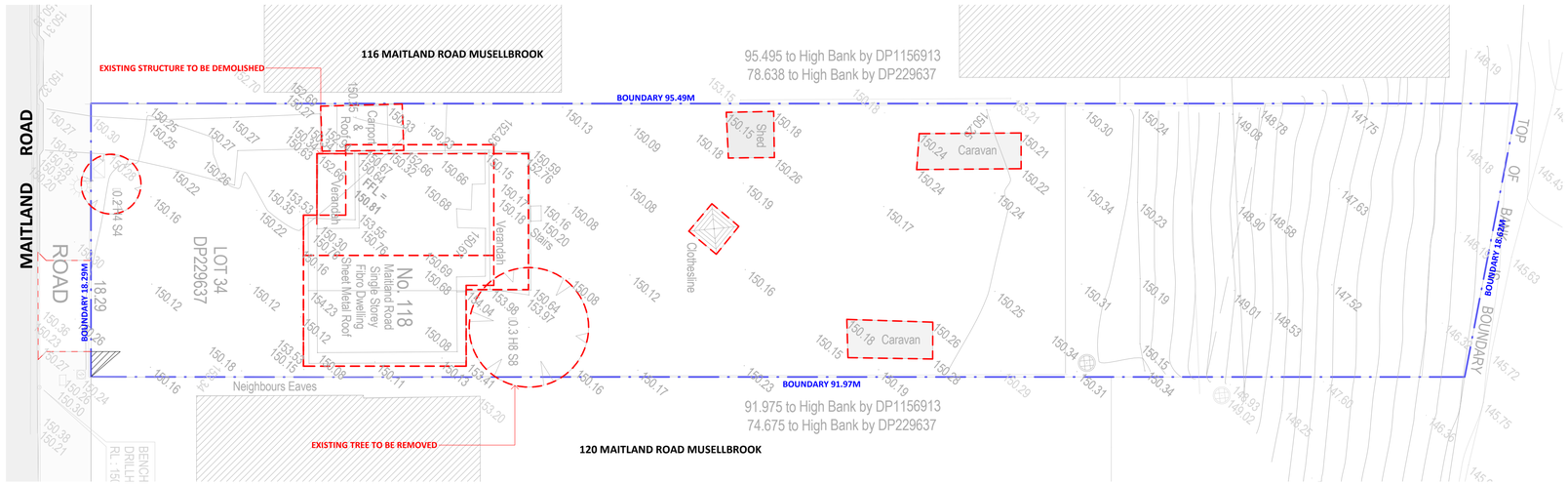
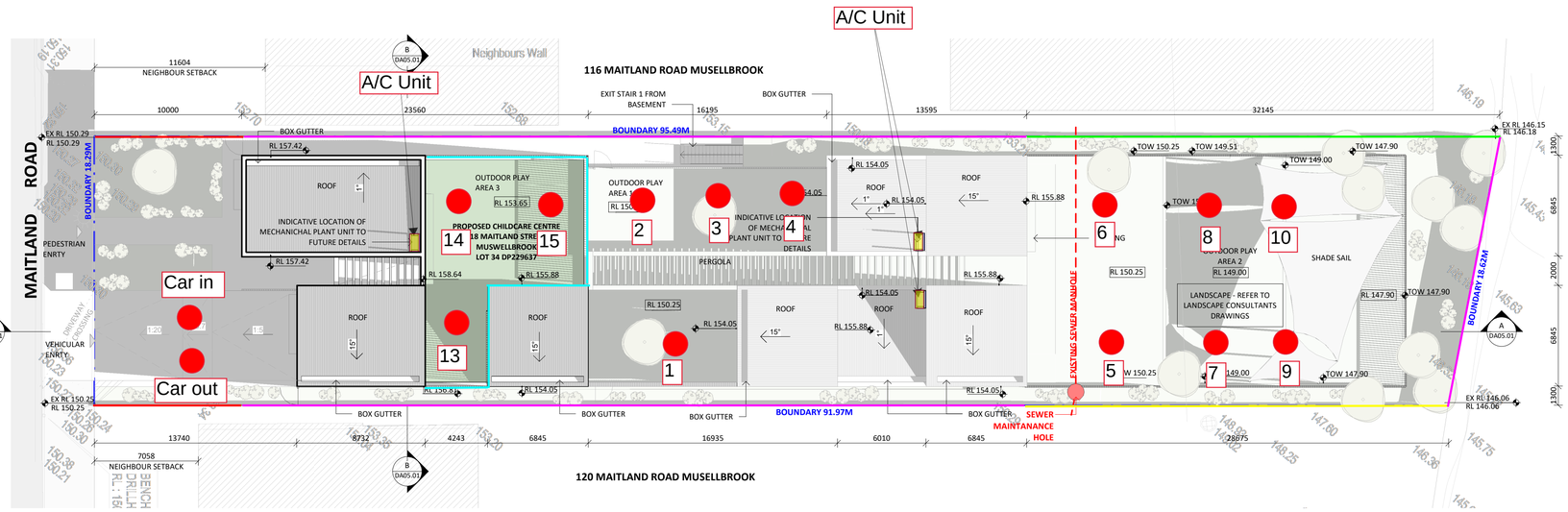
7927-1 Appendix D



1 DEMOLITION PLAN
1 : 200

Acoustic Barrier Height Key:
- 1200 mm
- 1390 mm
- 1800 mm
- 2200 mm
- 2300 mm



2 SITE PLAN
1 : 200

0 1 2 4 6 8 10
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ISSUE	DATE	DESCRIPTION
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ASSOCIATED CONSULTANTS

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CLIENT

J. ANGELOVSKA AND L ABAUNADER

ARCHITECT

ArtMade Architects
|507/50 Holt St, Surry Hills NSW 2010
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PROJECT

CHILDCARE CENTRE

PROJECT ADDRESS

118 MAITLAND STREET
MUSWELLBROOK 2333

SHEET NAME

SITE PLAN / DEMOLITION

ISSUED FOR DEVELOPMENT APPLICATION

Project number	Sheet No.	Issue	Phase
23714	DA02.01	A	DA

Sheet Size	Scale	L.G.A.
A1	As indicated	MUSWELLBROOK

Drawn By	Checked By	Date
TA/MS1	MS/SS	12.03.2024

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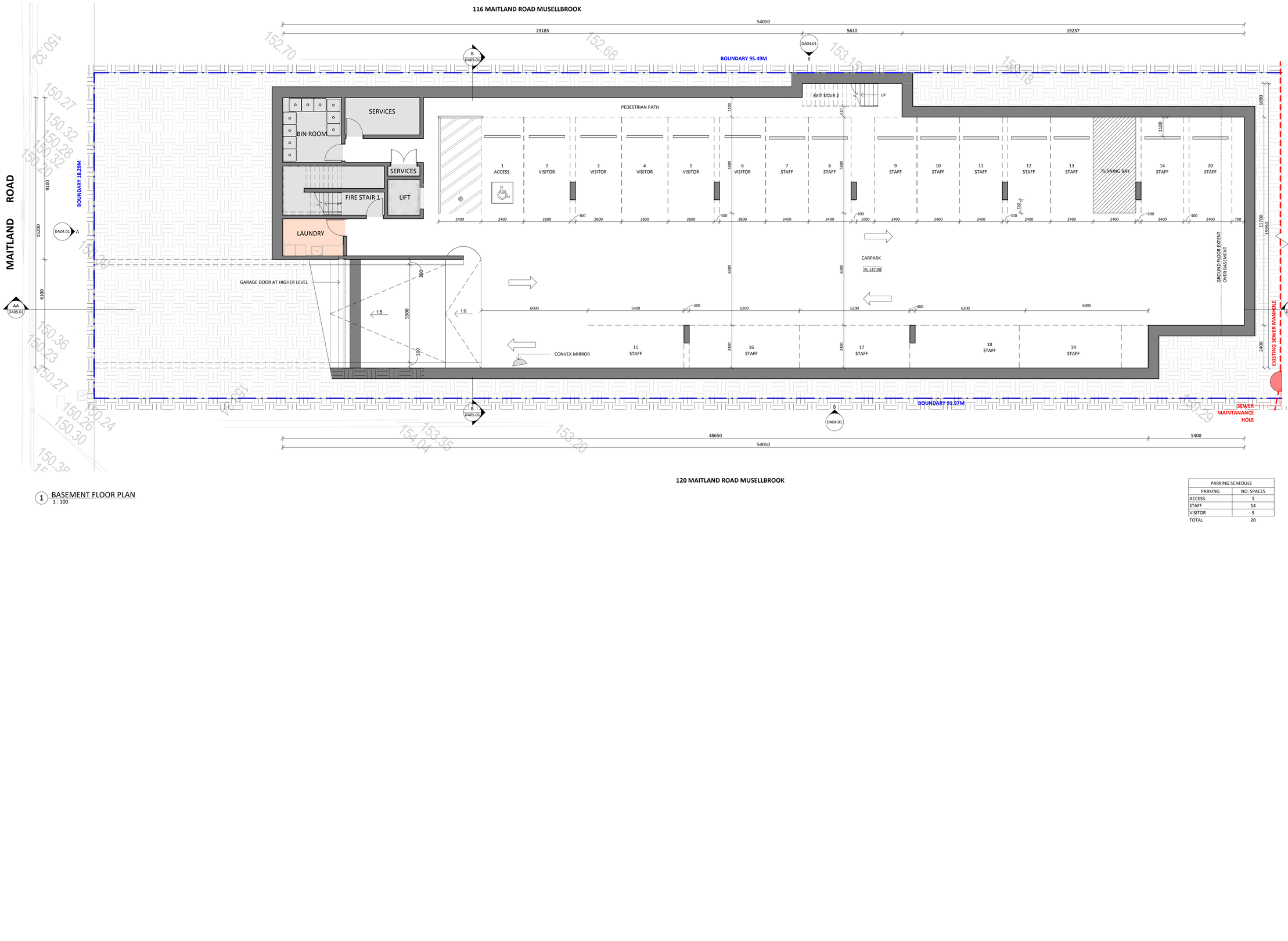
7927-1 Appendix D



1 BASEMENT FLOOR PLAN
1 : 100

PARKING SCHEDULE	
PARKING	NO. SPACES
ACCESS.	1
STAFF	14
VISITOR	5
TOTAL	20

ABBREVIATIONS

ENG.	- ENGINEER
ESL	- EXISTING SLAB LEVEL
EXT	- EXTERIOR
FFL	- FINISH FLOOR LEVEL
F.	- FIXED
FSL	- FINISH SURFACE LEVEL
GL	- GROUND LINE
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REQ.	- REQUIREMENTS
XX.XX	- PROPOSED LEVEL
XX.XX	- EXISTING LEVEL
XX.XX	- SPOT LEVEL (PLAN)
XX.XX	- SPOT LEVEL (ELEVATION)

LANDSCAPE LEGEND

- EXISTING TREE / TREE TO BE RETAINED
- TREE TO BE REMOVED
- NEW TREE
- LANDSCAPING / BUFFER
- TURF/ ARTIFICIAL TURF
- EXTERNAL FLOOR FINISH
- LINE OF STRUCTURAL ROOT ZONE (SRZ)
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- LINE OF TREE PROTECTION ZONE (TPZ)

NOTE: REFER TO ARBORIST REPORT FOR FURTHER DETAILS

GENERAL NOTES

- ALL EXISTING BUILDING ELEMENTS TO BE CHECKED ON SITE U.N.O
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- REFER TO LANDSCAPE DRAWINGS FOR LANDSCAPE DESIGN.
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ISSUE	DATE	DESCRIPTION
A	12.03.2024	FOR DEVELOPMENT APPLICATION

ASSOCIATED CONSULTANTS

PLANNING	AVENUE PLANNING
TRAFFIC	STANBURY TRAFFIC
QS	QPC&C
ACOUSTICS	DAY DESIGN
LANDSCAPE	GREENSCAPE DESIGN
GEOTECH & PSI	BROADCREST CONSULTING PTY LTD
CIVIL AND FLOOD	ACOR CONSULTING

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CHILDCARE CENTRE

PROJECT ADDRESS

118 MAITLAND STREET
MUSWELLBROOK 2333

SHEET NAME

BASEMENT FLOOR PLAN

ISSUED FOR DEVELOPMENT APPLICATION

Project number	Sheet No.	Issue	Phase
23714	DA03.01	A	DA

Sheet Size	Scale	L.G.A.
A1	As indicated	MUSWELLBROOK

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TA/MS1	MS/SS	12.03.2024

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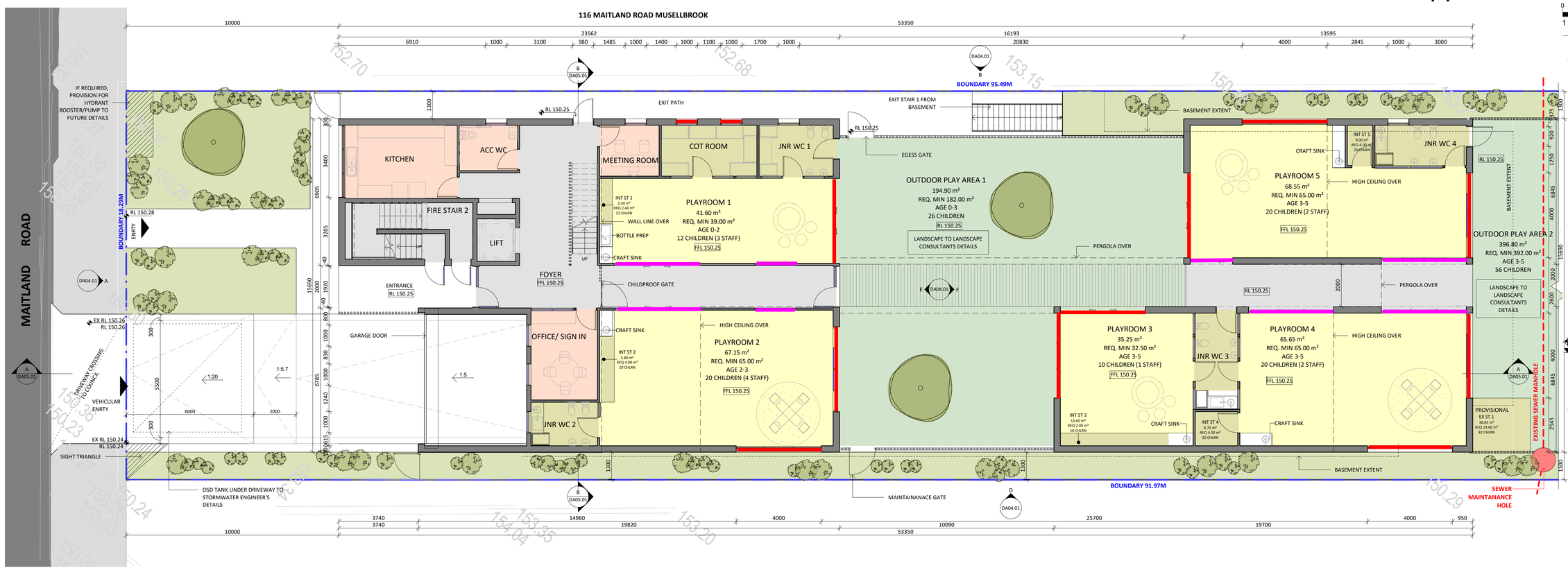
7927-1 Appendix D



0 1 2 3 4 5
1 : 100

GENERAL NOTES

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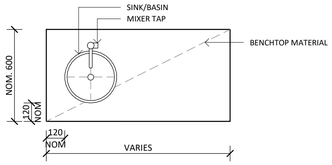
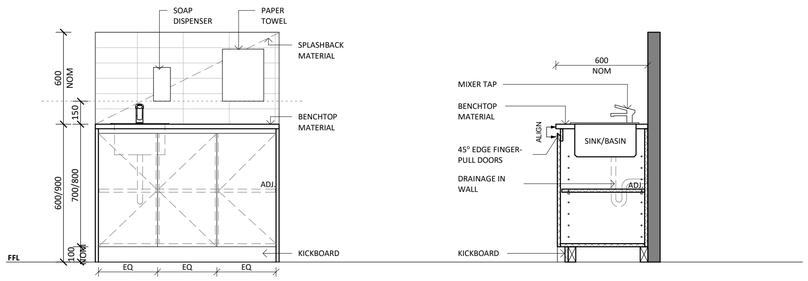
1 GROUND FLOOR PLAN
1 : 100



TYPICAL CRAFT SINK - PLAN

NOTE: SIMILAR CRAFT SINK. IMAGE FOR JOINERY REFERENCE ONLY



TYPICAL CRAFT SINK - ELEVATION

NOTE: PROVIDE MAGNETIC CHILDPROOF LOCKS TO ALL CABINETS IN INDOOR PLAY AREA (CRAFT SINKS & BOTTLE PREP.)

TYPICAL CRAFT SINK - SECTION

2 TYP CRAFT SINK DETAILS
1 : 20

Glazing R_W Ratings:
30
32
38

OUTDOOR PLAY AREA SCHEDULE

AREA	AGE	NO. CHLDRN	UNENCUMBERED REQ AREA	UNENCUMBERED AREA
OUTDOOR PLAY AREA 1	AGE 0-3	26	182 m²	194.90 m²
OUTDOOR PLAY AREA 2	AGE 3-5	56	392 m²	396.80 m²
OUTDOOR PLAY AREA 3	AGE 3-5	10	70 m²	117.30 m²
TOTAL		92	644 m²	709.00 m²

EXTERNAL STORAGE SCHEDULE

NAME	NO. CHLDRN	REQ VOL	VOL
EX ST 1	82	24.60 m³	38.85 m³
EX ST 2	10	3.00 m³	10.65 m³
TOTAL	92	27.60 m³	49.50 m³

INDOOR PLAYROOM SCHEDULE

ROOM	AGE	NO. CHLDRN	NO. STAFF	UNENCUMBERED REQ AREA	UNENCUMBERED AREA
PLAYROOM 1	AGE 0-2	12	3	39 m²	41.60 m²
PLAYROOM 2	AGE 2-3	20	4	65 m²	67.15 m²
PLAYROOM 3	AGE 3-5	10	1	32.5 m²	35.25 m²
PLAYROOM 4	AGE 3-5	20	2	65 m²	65.65 m²
PLAYROOM 5	AGE 3-5	20	2	65 m²	68.55 m²
PLAYROOM 6	AGE 3-5	10	1	32.5 m²	37.65 m²
TOTAL		92	13	299 m²	315.90 m²

INTERNAL STORAGE SCHEDULE

NAME	NO. CHLDRN	REQ VOL	VOL
INT ST 1	12	2.40 m³	3.50 m³
INT ST 2	20	4.00 m³	5.80 m³
INT ST 3	10	2.00 m³	13.60 m³
INT ST 4	20	4.00 m³	8.70 m³
INT ST 5	20	4.00 m³	9.00 m³
INT ST 6	10	2.00 m³	7.05 m³
TOTAL	92	18.40 m³	47.60 m³

ISSUE	DATE	DESCRIPTION
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ASSOCIATED CONSULTANTS

PLANNING	AVENUE PLANNING
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QS	QPC&C
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PROJECT

CHILDCARE CENTRE

PROJECT ADDRESS

118 MAITLAND STREET
MUSWELLBROOK 2333

SHEET NAME

GROUND FLOOR PLAN

ISSUED FOR DEVELOPMENT APPLICATION

Project number	Sheet No.	Issue	Phase
23714	DA03.02	A	DA

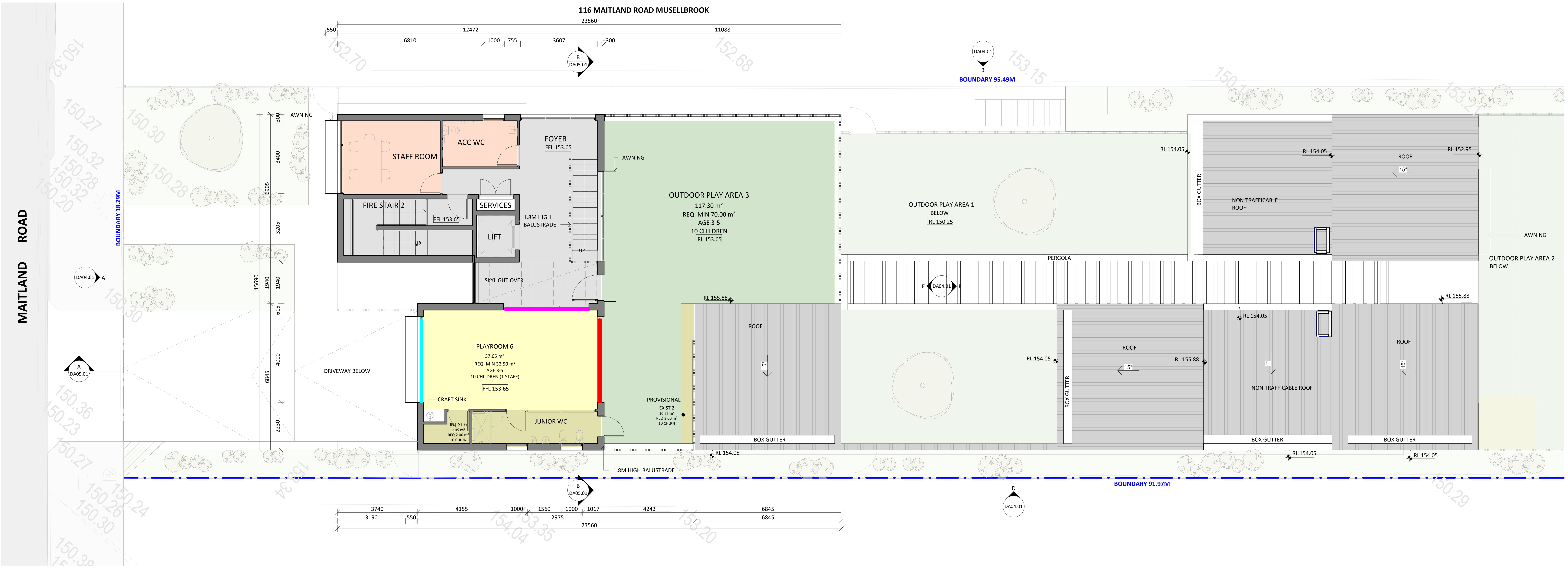
Sheet Size	Scale	L.G.A.
A1	As indicated	MUSWELLBROOK

Drawn By	Checked By	Date
TA/MS1	MS/SS	12.03.2024

NOT FOR CONSTRUCTION

7927-1 Appendix D

116 MAITLAND ROAD MUSELLBROOK



120 MAITLAND ROAD MUSELLBROOK

1 FIRST FLOOR PLAN
1 : 100

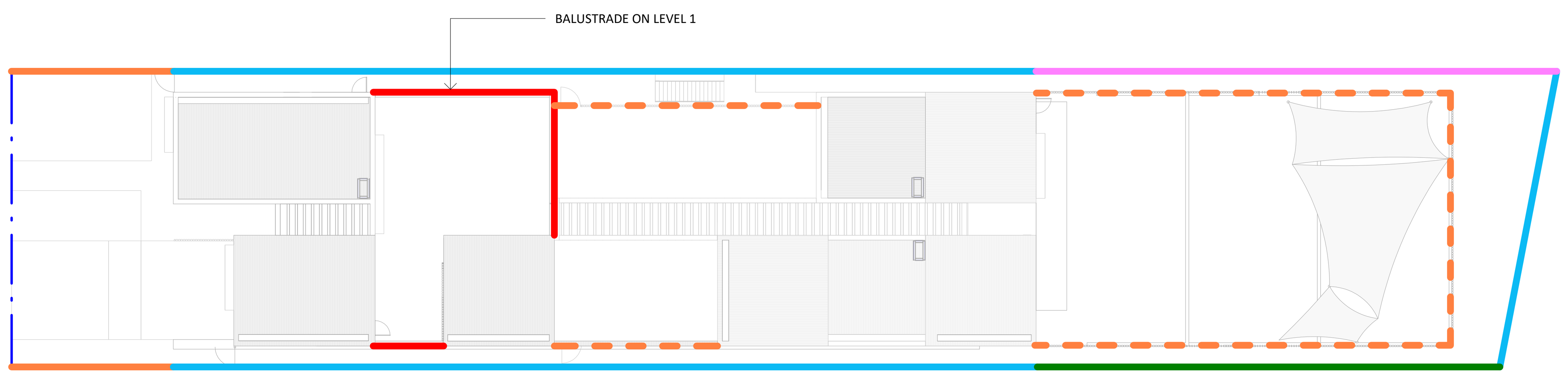
Glazing R_W Ratings:

- 30 (magenta)
- 32 (red)
- 38 (cyan)

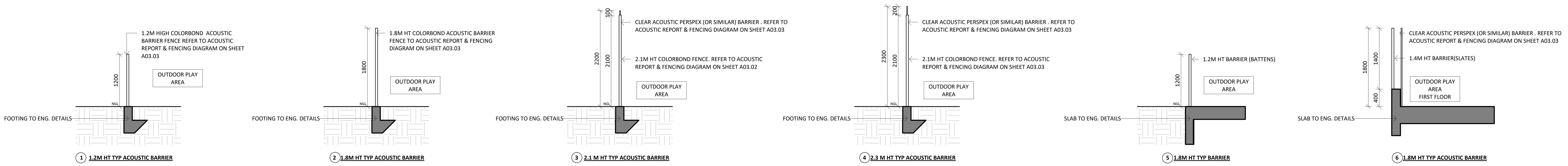
FENCE LEGEND

- 1.2M HIGH ACOUSTIC BOUNDARY FENCE REFERT TO TYPE 1
- 1.8M HT COLORBOND BOUNDARY FENCE REFER TO TYPE 2
- 2.2 M HT ACOUSTIC FENCE REFER TO TYPE 3
- 2.3 M HT ACOUSTIC FENCE REFER TO TYPE 4
- 1.2M HT BARRIERF ROM FFL - REFER TO TYPE 5
- 1.8M HT BALUSTRADE FROM FFL - REFER TO TYPE 6

NOTE:
- ALL ACOUSTIC BARRIERS IN ACCORDANCE WITH ACOUSTIC REPORT.
- REFER TO SHEET A05.01 FOR FENCE DETAILS.



2 FENCE DIAGRAM (SITE PLAN VIEW)
1 : 300



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0 1 2 3 4 5
1 : 100

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118 MAITLAND STREET
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SHEET NAME

FIRST FLOOR PLAN

ISSUED FOR DEVELOPMENT APPLICATION

Project number	Sheet No.	Issue	Phase
23714	DA03.03	A	DA

Sheet Size	Scale	L.G.A.
A1	As indicated	MUSWELLBROOK

Drawn By	Checked By	Date
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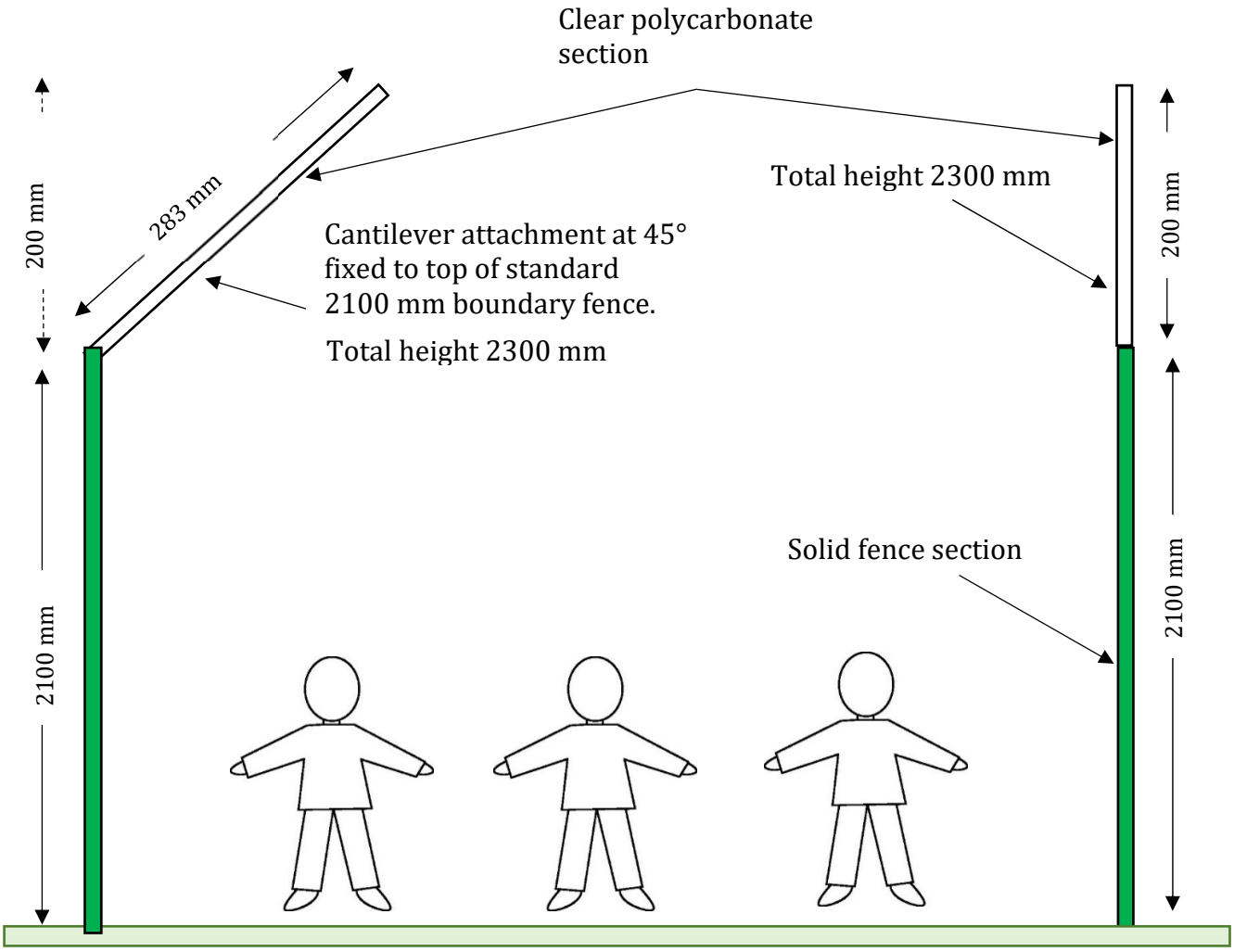
OUTDOOR PLAY AREA



Not To Scale

ACOUSTICAL – Pertaining to the science of sound, including the generation, propagation, effects and control of both noise and vibration.

AMBIENT NOISE – The ambient noise level at a particular location is the overall environmental noise level caused by all noise sources in the area, both near and far, including road traffic, factories, wind in the trees, birds, insects, animals, etc.

AUDIBLE – means that a sound can be heard. However, there are a wide range of audibility grades, varying from "barely audible" to "just audible", "clearly audible" and "prominent". Chapter 83 of the NSW Environment Protection Authority – Environmental Noise Control Manual (1985) states:
"noise from a particular source might be offensive if it is clearly audible, distinct from the prevailing background noise and of a volume or character that a reasonable person would be conscious of the intrusion and find it annoying or disruptive".

It follows that the word "audible" in an environmental noise context means "clearly audible".

BACKGROUND NOISE LEVEL – Silence does not exist in the natural or the built-environment, only varying degrees of noise. The Background Noise Level is the average minimum dBA level of noise measured in the absence of the noise under investigation and any other short-term noises such as those caused by cicadas, lawnmowers, etc. It is quantified by the L_{A90} or the dBA noise level that is exceeded for 90 % of the measurement period (usually 15 minutes).

- **Assessment Background Level (ABL)** is the single figure background level representing each assessment period – day, evening and night (ie three assessment background levels are determined for each 24hr period of the monitoring period). Determination of the assessment background level is by calculating the tenth percentile (the lowest tenth percent value) of the background levels (L_{A90}) for each period (refer: NSW Industrial Noise Policy, 2000).
- **Rating Background Level (RBL)** as specified by the Environment Protection Authority is the overall single figure (L_{A90}) background noise level representing an assessment period (day, evening or night) over a monitoring period of (normally) three to seven days.

  The RBL for an assessment period is the median of the daily lowest tenth percentile of L_{90} background noise levels.

  If the measured background noise level is less than 30 dBA, then the Rating Background Level (RBL) is considered to be 30 dBA.

DECIBEL – The human ear has a vast sound-sensitivity range of over a thousand billion to one. The decibel is a logarithmic unit that allows this same range to be compressed into a somewhat more comprehensible range of 0 to 120 dB. The decibel is ten times the logarithm of the ratio of a sound level to a reference sound level. See also Sound Pressure Level and Sound Power Level.

Decibel noise levels cannot be added arithmetically since they are logarithmic numbers. If one machine is generating a noise level of 50 dBA, and another similar machine is placed beside it, the level will increase to 53 dBA, not 100 dBA. Ten similar machines placed side by side increase the sound level by 10 dBA, and one hundred machines increase the sound level by 20 dBA.

dBA – The human ear is less sensitive to low frequency sound than high frequency sound. We are most sensitive to high frequency sounds, such as a child's scream. Sound level meters have an inbuilt weighting network, termed the dBA scale, that approximates the human loudness response at quiet sound levels (roughly approximates the 40 phon equal loudness contour).

However, the dBA sound level provides a poor indication of loudness for sounds that are dominated by low frequency components (below 250 Hz). If the difference between the "C" weighted and the "A" weighted sound level is 15 dB or more, then the NSW Industrial Noise Policy recommends a 5 dBA penalty be applied to the measured dBA level.

dBC – The dBC scale of a sound level meter is similar to the dBA scale defined above, except that at high sound intensity levels, the human ear frequency response is more linear. The dBC scale approximates the 100 phon equal loudness contour.

EQUIVALENT CONTINUOUS NOISE LEVEL, L_{Aeq} – Many noises, such as road traffic or construction noise, vary continually in level over a period of time. More sophisticated sound level meters have an integrating electronic device inbuilt, which average the A weighted sound pressure levels over a period of time and then display the energy average or L_{Aeq} sound level. Because the decibel scale is a logarithmic ratio the higher noise levels have far more sound energy, and therefore the L_{Aeq} level tends to indicate an average which is strongly influenced by short term, high level noise events. Many studies show that human reaction to level-varying sounds tends to relate closely to the L_{Aeq} noise level.

FREE FIELD – This is a sound field not subject to significant reflection of acoustical energy. A free field over a reflecting plane is usually outdoors with the noise source resting on hard flat ground, and not closer than 6 metres to any large flat object such as a fence or wall; or inside an anechoic chamber.

FREQUENCY – The number of oscillations or cycles of a wave motion per unit time, the SI unit being the Hertz, or one cycle per second.

IMPACT ISOLATION CLASS (IIC) – The American Society for Testing and Materials (ASTM) has specified that the IIC of a floor/ceiling system shall be determined by operating an ISO 140 Standard Tapping Machine on the floor and measuring the noise generated in the room below. The IIC is a number found by fitting a reference curve to the measured octave band levels and then deducting the sound pressure level at 500 Hz from 110 decibels. Thus the higher the IIC, the better the impact sound isolation.

IMPACT SOUND INSULATION ($L_{nT,w}$) – Australian Standard AS ISO 717.2 – 2004 has specified that the Impact Sound Insulation of a floor/ceiling system be quantified by operating an ISO 140 Standard Tapping Machine on the floor and measuring the noise generated in the room below. The Weighted Standardised Impact Sound Pressure Level ($L_{nT,w}$) is the sound pressure level at 500 Hz for a reference curve fitted to the measured octave band levels. Thus the lower $L_{nT,w}$ the better the impact sound insulation.

IMPULSE NOISE – An impulse noise is typified by a sudden rise time and a rapid sound decay, such as a hammer blow, rifle shot or balloon burst.

INTRUSIVE NOISE LEVEL, L_{Aeq} – The level of noise from a factory, place of entertainment, etc. in NSW is assessed on the basis of the average maximum noise level, or the $L_{Aeq\ (15\ min)}$. This is the energy average A weighted noise level measured over any 15 minute period.

LOUDNESS – The degree to which a sound is audible to a listener is termed the loudness. The human ear perceives a 10 dBA noise level increase as a doubling of loudness and a 20 dBA noise increase as a quadrupling of the loudness.

MAXIMUM NOISE LEVEL, L_{Amax} – The rms maximum sound pressure level measured on the "A" scale of a sound level meter during a noise survey is the L_{Amax} noise level. It may be measured using either the Fast or Slow response time of the meter. This should be stated.

NOISE RATING NUMBERS – A set of empirically developed equal loudness curves has been adopted as Australian Standard AS1469-1983. These curves allow the loudness of a noise to be described with a single NR number. The Noise Rating number is that curve which touches the highest level on the measured spectrum of the subject noise. For broadband noise such as fans and engines, the NR number often equals the dBA level minus five.

NOISE – Noise is unwanted sound. Sound is wave motion within matter, be it gaseous, liquid or solid. "Noise includes sound and vibration".

NOISE REDUCTION COEFFICIENT – See: "Sound Absorption Coefficient".

OFFENSIVE NOISE - (Reference: Dictionary of the Protection of the Environment Operations Act 1997). *"Offensive Noise means noise:*

(a) that, by reason of its level, nature, character or quality, or the time at which it is made, or any other circumstances:

(i) is harmful to (or likely to be harmful to) a person who is outside the premise from which it is emitted, or

(ii) interferes unreasonably with (or is likely to interfere unreasonably with) the comfort or repose of a person who is outside the premises from which it is emitted, or

(b) that is of a level, nature, character or quality prescribed by the regulations or that is made at a time, or in other circumstances prescribed by the regulations."

PINK NOISE – Pink noise is a broadband noise with an equal amount of energy in each octave or third octave band width. Because of this, Pink Noise has more energy at the lower frequencies than White Noise and is used widely for Sound Transmission Loss testing.

REVERBERATION TIME, T_{60} – The time in seconds, after a sound signal has ceased, for the sound level inside a room to decay by 60 dB. The first 5 dB decay is often ignored, because of fluctuations that occur while reverberant sound conditions are being established in the room. The decay time for the next 30 dB is measured and the result doubled to determine the T_{60}. The Early Decay Time (EDT) is the slope of the decay curve in the first 10 dB normalised to 60 dB.

SOUND ABSORPTION COEFFICIENT, α – α Sound is absorbed in porous materials by the viscous conversion of sound energy to heat energy as the sound waves pass through it. Sound is similarly absorbed by the flexural bending of internally damped panels. The fraction of incident energy that is absorbed is termed the Sound Absorption Coefficient, α. An absorption coefficient of 0.9 indicates that 90 % of the incident sound energy is absorbed. The average α from 250 to 2000 Hz is termed the Noise Reduction Coefficient (NRC).

SOUND ATTENUATION – If an enclosure is placed around a machine, or a silencer is fitted to a duct, the noise emission is reduced or attenuated. An enclosure that attenuates the noise level by 30 dBA, reduces the sound energy by one thousand times.

SOUND EXPOSURE LEVEL (SEL) – The total sound energy of a single noise event condensed into a one second duration or in other words it is an L_{eq} (1 sec).

SOUND PRESSURE LEVEL, L_p – The level of sound measured on a sound level meter and expressed in decibels, dB, dBA, dBC, etc. $L_p = 20 \times \log (P/P_o)$ ... dB

where P is the rms sound pressure in Pascal and P_o is a reference sound pressure of 20 µPa. L_p varies with distance from a noise source.

SOUND POWER LEVEL, L_w – The Sound Power Level of a noise source is an absolute that does not vary with distance or with a different acoustic environment.

$L_w = L_p + 10 \log A$ ... dB, re: 1pW,
where A is the measurement noise-emission area in square metres in a free field.

SOUND TRANSMISSION CLASS (STC) – An internationally standardised method of rating the sound transmission loss of partition walls to indicate the decibels of noise reduction of a human voice from one side to the other. (Refer: Australian Standard AS1276 – 1979)

SOUND TRANSMISSION LOSS – The amount in decibels by which a random sound is reduced as it passes through a sound barrier. A method for the measurement of airborne Sound Transmission Loss of a building partition is given in Australian Standard AS1191 - 2002.

STATISTICAL EXCEEDENCE SOUND LEVELS, L_{A90}, L_{A10}, L_{A1}, etc – Noise which varies in level over a specific period of time (usually 15 minutes) may be quantified in terms of various statistical descriptors:

The L_{A90} is the dBA level exceeded for 90 % of the time. In NSW the L_{A90} is measured over periods of 15 minutes, and is used to describe the average minimum or background noise level.

The L_{A10} is the dBA level that is exceeded for 10 % of the time. In NSW the L_{A10} measured over a period of 10 to 15 minutes. It was until recently used to describe the average maximum noise level, but has largely been replaced by the L_{Aeq} for describing level-varying noise.

The L_{A1} is the dBA level that is exceeded for 1 % of the time. In NSW the L_{A1} may be used for describing short-term noise levels such as could cause sleep arousal during the night.

STEADY NOISE – Noise, which varies in level by 6 dBA or less, over the period of interest with the time-weighting set to "Fast", is considered to be "steady". (Refer AS 1055.1 1997)

WEIGHTED SOUND REDUCTION INDEX, R_w – This is a single number rating of the airborne sound insulation of a wall, partition or ceiling. The sound reduction is normally measured over a frequency range of 100 to 3,150 Hertz and averaged in accordance with ISO standard weighting curves (Refer AS/NZS 1276.1:1999).

Internal partition wall $R_w + C$ ratings are frequency weighted to simulate insulation from human voice noise. The $R_w + C$ is always similar in value to the STC rating value. External walls, doors and windows may be $R_w + C_{tr}$ rated to simulate insulation from road traffic noise. This is normally a lower number than the STC rating value.

WHITE NOISE – White noise is broadband random noise whose spectral density is constant across its entire frequency range. The sound power is the same for equal bandwidths from low to high frequencies. Because the higher frequency octave bands cover a wider spectrum, white noise has more energy at the higher frequencies and sounds like a hiss.