

FLOOD IMPACT ASSESSMENT REPORT

Client — JAL Invest Co Pty Ltd
Project Title — 84 Brook Street, Muswellbrook NSW
Project No. — SW23077
Date Issued — 17/05/2023

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A	For Approval	Final	17.05.2023	Paul El-Bayeh

Limitations

The sole purpose of this report and the associated services performed by Capital Engineering Consultants Pty Ltd is to provide an assessment of the public drainage system at the subject site in accordance with the scope of services set out in the contract / quotation between Capital Engineering Consultants Pty Ltd and JAL Invest Co Pty Ltd. That scope of works and services were defined by the requests of the Client, by the time and budgetary constraints imposed by the Client, and by the availability of access to the site.

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1. Introduction

1.1 Overview

A development application has been prepared to be assessed by Muswellbrook Shire Council for a proposed Childcare Center development at No. 84 Brook Street, Muswellbrook, NSW. Council has indicated that the site is affected by Flooding in the 1% AEP Storm Event and will require a detailed Flood Impact Assessment prior to the issue of a Development Consent.

Capital Engineering Consultants (CEC) have been commissioned to assess Council's Floodplain Development requirements and provide a Flood Impact Assessment in compliance with all Council codes, policies and established industry best practices.

1.2 Project Objectives and Scope of Works

CEC have been engaged by the client, to carry out the following scope and objectives to support the proposed construction certificate:

1. Review supplied documents and layouts;
2. Address the requirements of Council's relevant guidelines and DCP;
3. Review MSC's supplied TUFLOW hydrological model of council's existing drainage system;
4. Prepare a detailed site-specific TUFLOW flood model for submission; and
5. Propose flood mitigation measures for implementation.

2. Background Information & Site Description

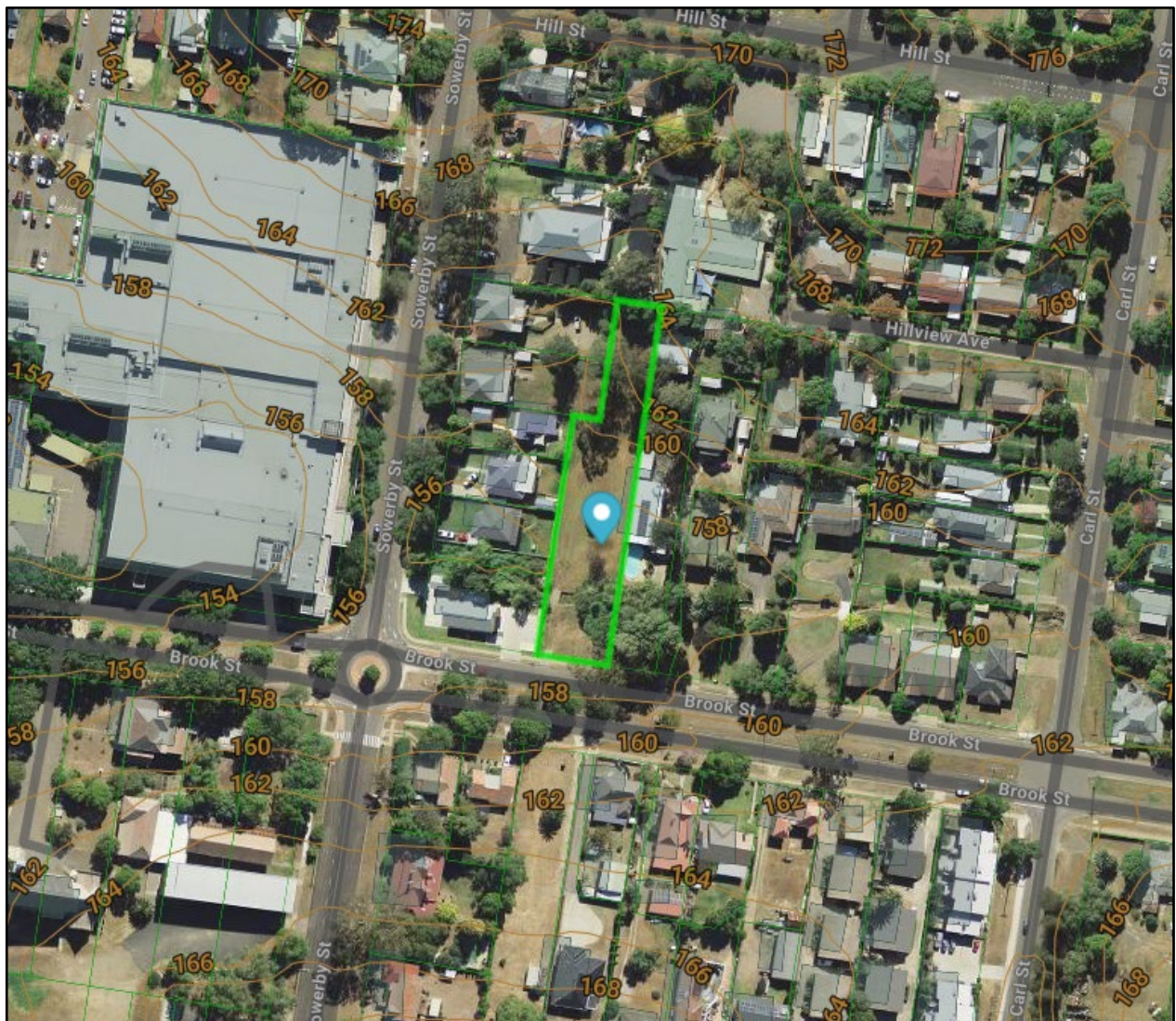
2.1 Site Description and Location

Refer to Table 1 and Figure 1 below for the existing site description summary:

Table 1: Site Description Summary

Summary	Site Description
Address	84 Brook Street, Muswellbrook NSW
Lot/DP	Lot 1 DP795300
Site Area	2502 Sq.m (By Title)
Land Zoning	R1
Catchment Area	Possum Gully Catchment Stormwater Drainage Study (SMEC)

Figure 1: Site Locality Plan



Source: Mecone Mosaic, SixMAPs NSW (2023)

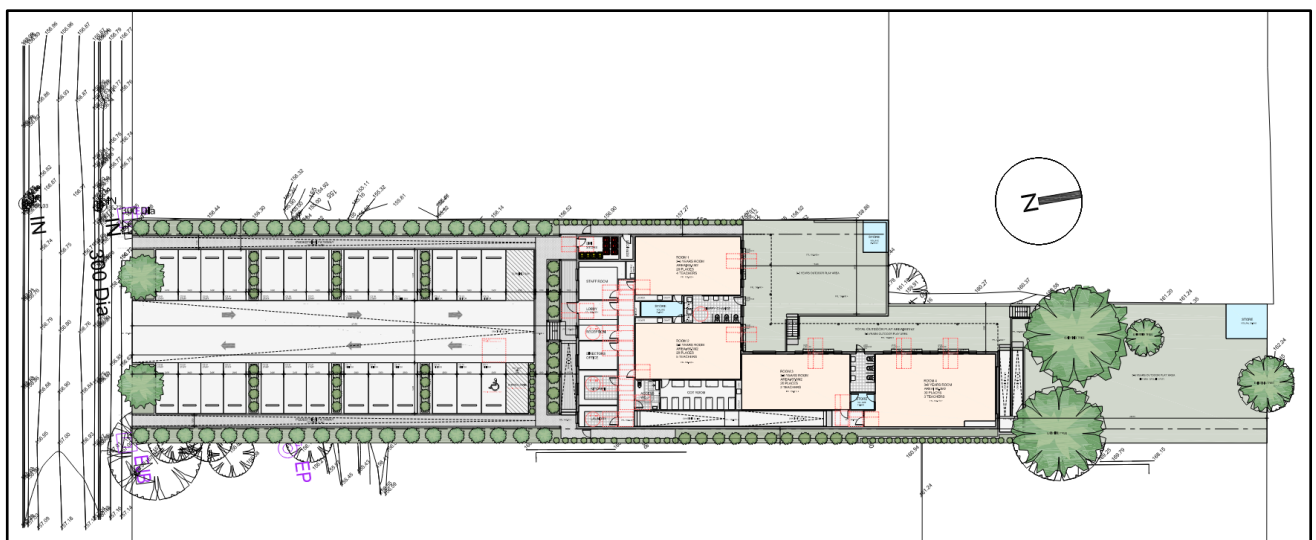
The subject property is located on Brook Street in Muswellbrook. The site is currently vacant. The property adjoins residential lots to the North, East and West. A natural water-course, formally identified as “Possum Gully” traverses through the southern end of the site in a Westerly direction.

2.2 Proposed Development

The architectural plans provided by Janssen Design (Appendix 2) indicate the following design intent as part of the development application:

- Construction of a Childcare Center Development located on the Northern End of the Site; and
- Construction of a Carpark and Associated Civil Works.

Figure 2: Proposed Site & Ground Floor Layout

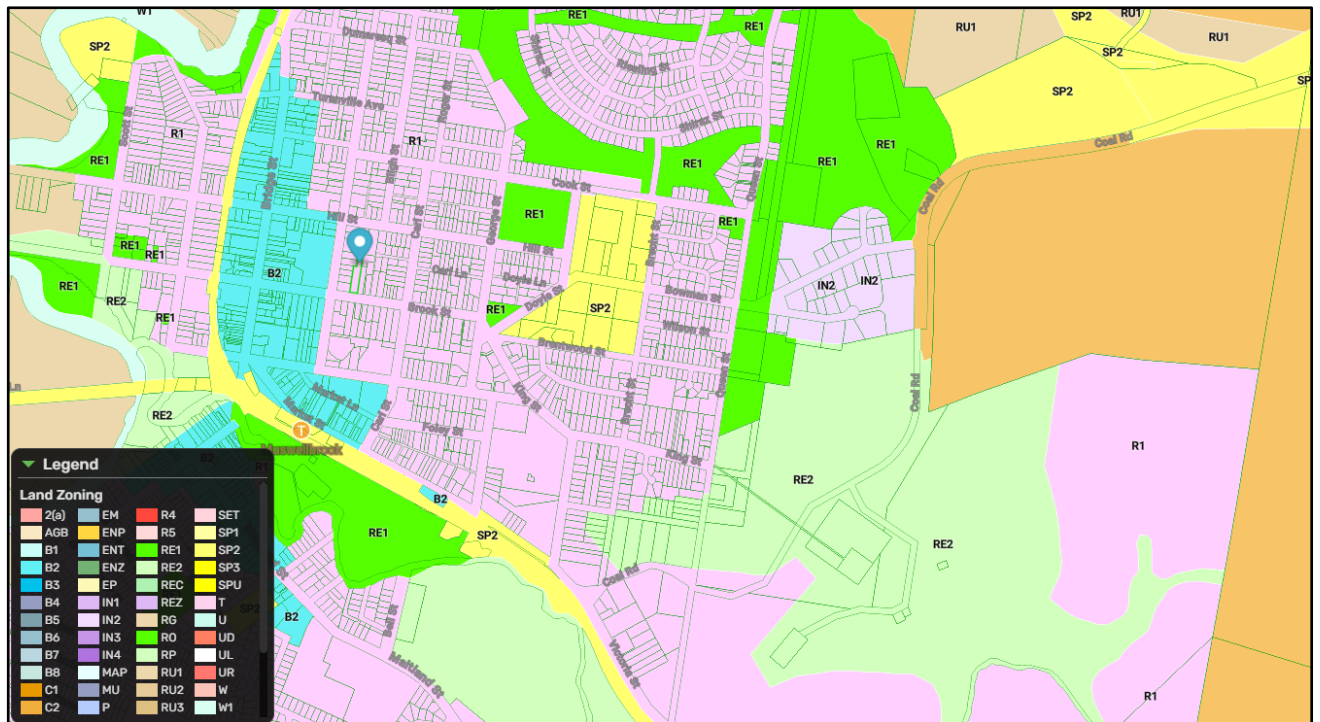


Source: Janssen Designs (2023)

2.3 Catchment Description

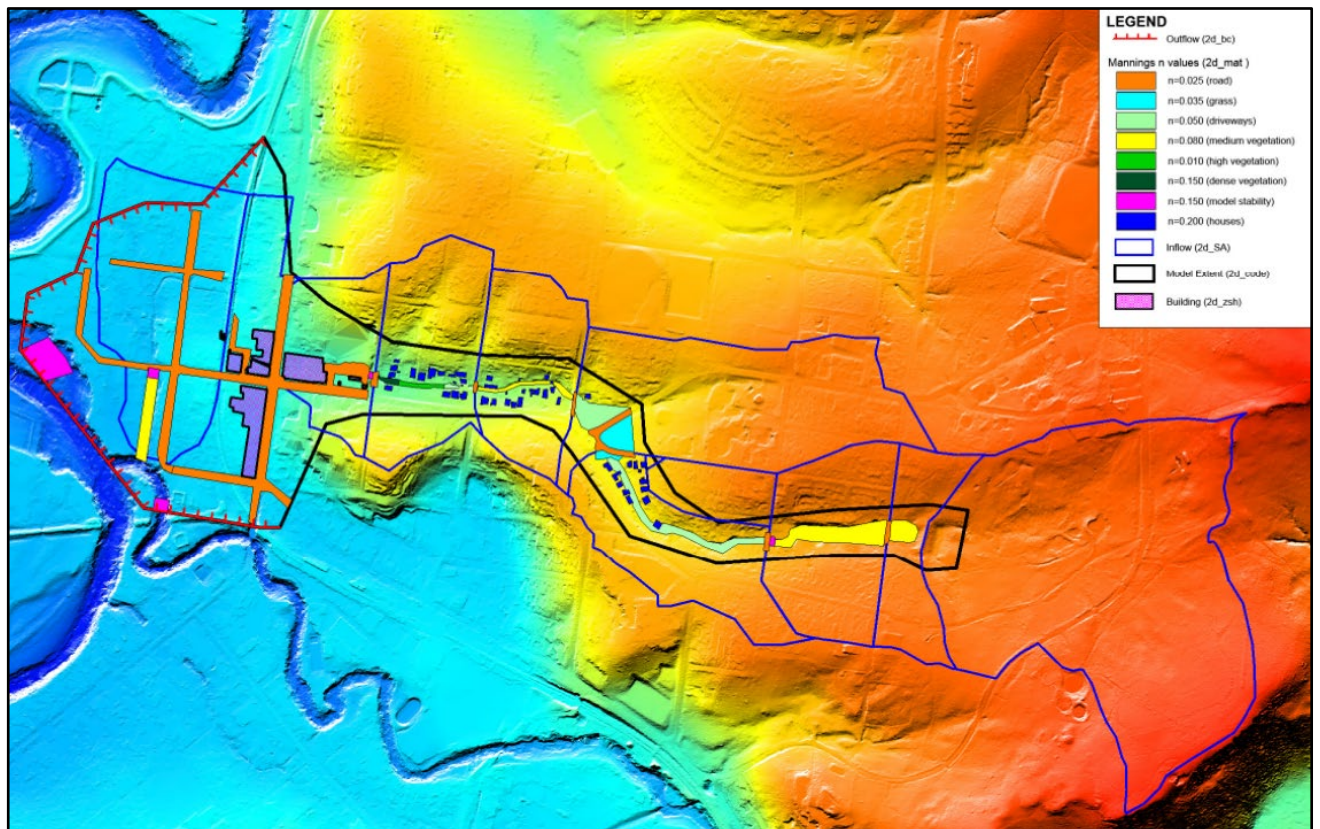
The catchment contributing to the site has been generally characterized as low density residential and rural lots.

Figure 3: Land Zoning Map



Source: Mecone Mosaic (2023)

Figure 4: Sub-Catchments & Contour Plan



Source: Possum Gully Flood Study (SMEC, 2015)

2.4 Council's Requirements

The following Council requirements as outlined in Section 13 – Flood Prone Land of the Muswellbrook Shire Development Control Plan 2009 (MSDCP) have been considered for this assessment:

A range of non residential uses are permitted in the flood affected areas. These are listed in the Muswellbrook Local Environmental Plan as amended:

- a) Floor levels for non residential uses, excluding habitable areas, may be permitted below flood level provided the development is in accordance with the principles outlined in Section 13.1.*
- b) The floor level of all habitable areas of proposed development shall be at least 0.5m above the 1% AEP flood level except in the case of change of use of an existing building.*
- c) The development will not result in increased flood hazard or flood damage to other properties or increase afflux by more than 0.1 metres.*
- d) The construction methods and materials for that part of the development below the 1% AEP flood level shall conform with the flood proofing code, Section 13.8.*
- e) The proposed development can withstand the force of flowing floodwaters, including debris and buoyancy forces.*
- f) Provision shall be made for the safe storage and/or timely removal of goods, materials, plant and equipment in the event of a flood.*
- g) A report be provided by a suitable qualified consulting engineer stating that the requirements outlined in (d) and (e) above have been incorporated in the design of the development.*

An evacuation plan for users of the development is prepared (to the satisfaction of Council) and maintained throughout the life of the development.

3. Hydrology Modelling

3.1 Overview

Tuflow (Version 10-AF 2020) was used for the local catchment simulation as detailed in ARR 1987. Using intensity frequency duration from the Bureau of Meteorology, design rainfalls were applied to the hydrological model to determine the design runoff hydrographs.

3.2 Hydrology Setup

The Tuflow Model used for analysis was supplied by Muswellbrook Shire Council on the 3rd of March 2023. Modifications were applied to the model as detailed in Section(s) 3.3 below.

3.3 Blockage

In order to provide the most conservative flood levels and hazards across the site and surrounding areas, all existing pits, pipes and culverts were assumed to be fully blocked. These factors have been directly applied to all pits & nodes within the hydrological model (0 = no blockage, 1 = full blockage):

Table 2: Pit Inlet Blockage Factors

Structure/Node Type	Typical Blockage Factor	Adopted Blockage Factor
On-grade Pit (Grate + Lintel)	0.2	1.0
Sag- Pit (Grate + Lintel)	0.5	1.0
On Grade (Grate Only)	0.35	1.0
Sag- Pit (Grate Only)	0.75	1.0
Sealed Junction Pit	N/A	1.0
Field Inlet Pit (Sag)	N/A	1.0

The adopted strategy provides conservative flood levels across the site for the purposes of flood planning and observation of flooding behavior.

4. Hydraulic Modelling

4.1 Overview

Two-dimensional (2D) hydraulic modelling was carried out to determine the flood behavior in the study area. TufLOW (Version 10-AF 2020) was used to model the hydraulic flooding behavior.

A minimum 2D Grid Size of 1.0m x 1.0m was adopted for modelling purposes to provide accurate flooding behavior within the subject site and immediately upstream and downstream. The terrain was derived using both the detailed site survey and LiDAR survey data:

The following Manning's 'n' factors were adopted for both the pre and post development modelling scenarios in accordance with current accepted Engineering practice

Table 3: Manning's 'n' Factors for 2D Modelling

Land Use Zone	Manning's 'n' Factor
Waterbody	0.015
Roadways	0.025
Short Grass, Some Weeds	0.035
Long Grass, Heavy Weeds	0.045
Light Vegetation Including Trees	0.06
Dense Vegetation Including Trees / Urban	0.08
Buildings	0.2
Stability Roughness And Highly Dense	0.15
Reduced Manning's With Driveways	0.05
Thick Vegetation Including Trees	0.1
Concrete Channel	0.013
Shotcrete Channel	0.018

4.2 Blockages

The area of the proposed open-type piers within the site were modelled as complete blockages to prevent the passage of flood-waters. In order to reduce the change of erroneous results, the car-park concrete lid was purposely omitted from the model. Minute details, such as staircases, have purposely been omitted from the model to minimise the potential for errors in the 2D grid.

4.3 In-Ground Pit and Pipe Network

As detailed in Section 3.3, in-ground pit and pipe assets have been purposely omitted from the flood model to provide conservative flood estimates. Similarly, this provides a modelling approach which is not sensitive to unintended blockages or obstructions which is appropriate given the intended usage of the site.

5. Modelling Results

5.1 Overview

Design flood modelling was undertaken in TUFLOW for the 1% AEP and PMF Storm Design flood events. Detailed mapping outputs are provided in Appendix 3, 4 and 5 respectively.

5.2 Flood Impacts

As there is no proposed diversion of flood-waters, the flood behavior and hence, the flood impacts on upstream and receiving properties is minimal in terms of depth, velocity and hazard. It is noted that the maximum external afflux upstream of the site is limited to 100mm in accordance with Council's guidelines.

Whilst there is a minor afflux within the site due to the addition of the suspended driveway area, this afflux does not pose any additional flood risk as it is located beneath the suspended driveway structure.

5.3 Floor Levels & Freeboard

The Flood Planning Level (FPL) varies because of the gradient across the site. A freeboard of 500mm has been adopted for habitable areas in accordance with accepted Engineering Practice. The table below summarises the flood levels along the upstream boundary of the site immediately adjacent to the suspended car-parking area.

Table 4: Peak Flood Levels and Adopted Flood Planning Level

Flood Planning Area	Modelled Peak Flood Level	Freeboard (mm)	Minimum Finished Floor Level (FPL)
Habitable Areas	R.L. 156.61	500	R.L. 157.11
Non-Habitable Areas	R.L. 156.61	150	R.L. 156.76

5.4 Evacuation

The peak 1% AEP Flood Level measured at the upstream boundary adjacent to the proposed development is **R.L. 156.61m** which is 1820mm lower than the proposed Ground Floor Level of **R.L. 158.43m**. There is no identified flooding within the footpath or road reserve within the vicinity of the proposed Ground Floor and Carparking Extents, indicating that it is both flood-free and safe for all occupants to evacuate the site via the proposed entrances.

The peak PMF Flood Level measured at the upstream boundary adjacent to the proposed development is **R.L. 158.35m** which is 80mm lower than the proposed Ground Floor Level of **R.L. 158.43m**. As such, occupants may safely shelter-in-place within the proposed structure during a catastrophic flood event.

Due to the depth and velocity of flooding, evacuation on foot or via motor vehicle motor vehicle would not be possible in a safe manner. As such, it is not recommended to evacuate the development via *unless* under strict direction from Emergency Services Personnel.

It is recommended that a **shelter-in-place** strategy and management plan is adopted for the site, specifically for practicality reasons due to the proposed use as a Childcare Center to prevent the need to relocate children outside of the established premises.

5.5 Mitigation Measures

The following mitigation measures are recommended to flood-proof the development and mitigate any affects to neighboring or downstream properties:

- Adopting a minimum floor level of RL 158.43 for all habitable areas (**Reason:** to provide min. 500mm of Freeboard to the proposed development and provide a safe refuge at or above the PMF Level to suit the intended Child Care Center usage);
- Fencing, sign-marking & restricting access to the flow path area using flood-type fencing and gating approved by Muswellbrook Shire Council; (**Reason:** to ensure safety of occupants and provision of flood storage for the development)
- Adopting a Shelter-in-place Management Plan to suit the final usage of the development;
- Ensuring that all external power-points, air-conditioning units & hot-water systems are located at least 500mm above the adjacent 1% AEP Flood Level; and

A detailed Flood Mitigation Plan is provided in **Appendix 6** to provide further clarity on the intended works.

6. Flood Risk Management Plan

6.1 Overview

This section of the report outlines and discusses the measures to mitigate the flooding impacts on the proposed development and its users. These measures are specific to the site and compliment the floodplain risk management plan prepared by Council, which addresses issues such as evacuation from the precinct during flood events.

The purpose of this plan is:

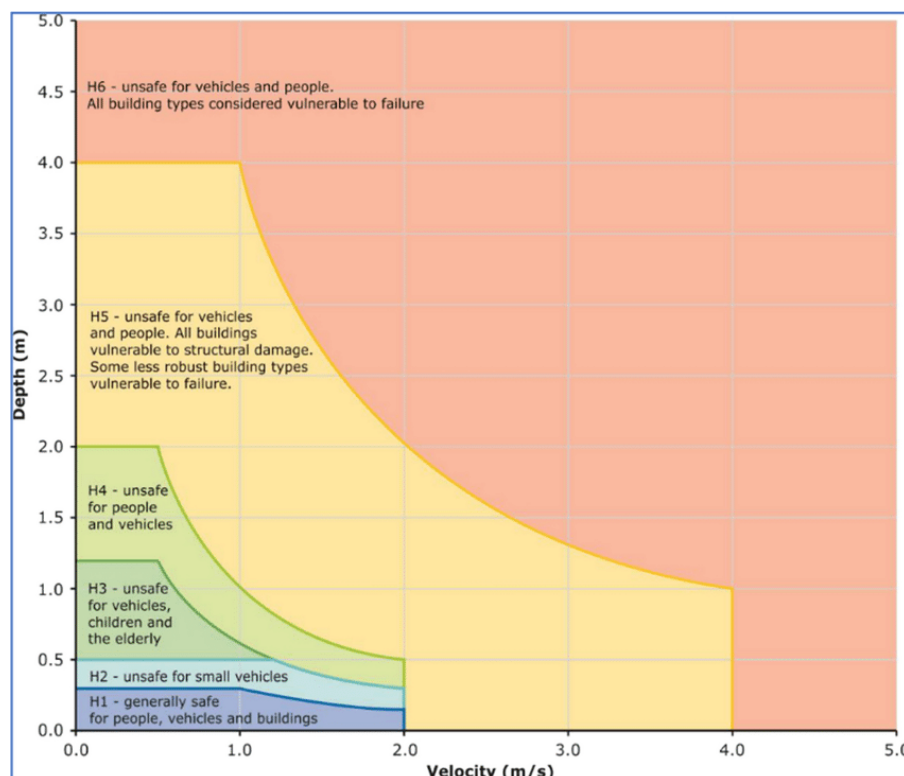
- To address existing, future and continuing flood risks on the site;
- To establish a program for the implementation of the plan; and
- To allow the stakeholders of the site to adopt this plan.

6.2 Australian Rainfall & Run-off 2019 (ARR2019)

6.2.1 General Flood Hazard Curves

When dealing with specific floodplain management or emergency management analysis there may be a clear need to use specific thresholds. However, particularly in a preliminary assessment of risks or as part of a constraints analysis such as might be applied as part of a strategic floodplain management assessment, there is also an acknowledged need for a combined set of hazard vulnerability curves, which can be used as a general classification of flood hazard on a floodplain. A suggested set of curves based on the referenced thresholds presented above is provided in the figure below:

Figure 5: Combined Flood Hazard Curves (ARR2019)



The combined flood hazard curves presented in Figure 7 set hazard thresholds that relate to the vulnerability of the community when interacting with floodwaters. The combined curves are divided into hazard classifications that relate to specific vulnerability thresholds as described in the table below.

Table 5: Combined Hazard Curves – Vulnerability Thresholds

Hazard Vulnerability Classification	Modelled Peak Flood Level
H1	Generally safe for vehicles, people and buildings.
H2	Unsafe for small vehicles
H3	Unsafe for vehicles, children and the elderly.
H4	Unsafe for vehicles and people.
H5	Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.
H6	Unsafe for vehicles and people. All building types considered vulnerable to failure.

Table 6: Combined Hazard Curves – Vulnerability Thresholds Classified Limits

Hazard Vulnerability Classification	Classification Limit (D and V in combination)	Limiting Still Water Depth (D)	Limiting Velocity (V)
H1	$D \cdot V < 0.3$	0.3	2.0
H2	$D \cdot V < 0.6$	0.5	2.0
H3	$D \cdot V < 0.6$	1.2	2.0
H4	$D \cdot V < 1.0$	2.0	2.0
H5	$D \cdot V < 4.0$	4.0	4.0
H6	$D \cdot V > 4.0$	-	-

Importantly, the vulnerability thresholds identified in the flood hazard curves described above can be applied to the best description of flood behavior available for a subject site. In this regard, the hazard curves can be applied equally to flood behavior estimates from measured data, simpler 1D numerical modelling approaches, through to complex 2D model estimates with the level of accuracy and uncertainty of the flood hazard estimate linked to the method used to derive the flood behavior estimate.

6.2.2 Isolation, Effective Warning Time, Rate of Rise and Time of Day

The effective warning time available to respond to a flood event, the rate of rise of floodwaters, the time of day a flood occurs, and isolation from safety by floodwaters and impassable terrain are all factors that may increase the potential for people to be exposed to hazardous flood situations. These factors are important considerations that influence the vulnerability of communities to flooding and are important considerations in managing flood risk.

6.2.2.1 Isolation

As outlined in AEM Handbook 7 (AEMI, 2014), flooding can isolate parts of the landscape and cut-off evacuation routes to flood-free land. This can result in dangerous situations, because people may see the need to cross floodwaters to access services, employment or family members. Many flood fatalities result from the interactions of people, often in vehicles, with floodwaters. Any situation that increases people's need to cross floodwaters increases the likelihood of an injury or fatality.

AEM Handbook 7 recommends that the floodplain be classified by precinct or community based on flood emergency response categories. This classification is separate to the quantification of hazard outlined in this guideline and is addressed in the complementary Technical Flood Risk Management Guideline on Flood Emergency Response Classification of the Floodplain.

6.2.2.2 Effective Warning Time

As outlined in of AEM Handbook 7, effective warning time is the time available for people to undertake appropriate actions, such as lifting or transporting belongings and evacuating. Lack of effective warning time can increase the potential for the exposure of people to hazardous flood situations. In contrast, having plenty of effective warning time provides the opportunity to reduce the exposure of people and their property to hazardous flood situations.

6.2.2.3 Rate of Rise

Rate of rise of floodwaters is discussed in AEM Handbook 7. A rapid rate of rise can lead to people evacuating being overtaken or cut off by rising floodwaters. It is often associated with high velocities but it can be an issue if access routes are affected by flooding.

6.2.2.4 Time of Day

The time of day influences where people are and what they are doing. This can influence their ability to receive any flood warnings and respond to a flood threat. Inability to receive and respond to a warning can increase the potential for people to be exposed to hazardous flood situations

6.3 Existing, Future and Continuing Risks

As outlined earlier in the report, the site is located within flood prone land. The site is affected by the overland flooding. The flood study shows flooding entering the car-parking area via the Eastern boundary from Possum Gully. It should be noted that the proposed development is consistent with Council's land use objectives.

The continuing flood risk on the site is insignificant as ample freeboard has been provided to both the 1% AEP and PMF Flood Events, with the ground floor levels and above being completely flood-free. As

such, the proposed development does not result in an unacceptable increase in risk to human life during an extreme flood event exceeding the 1% AEP.

Triggers for a likely flood emergency may come in the form of:-

- The Bureau of Meteorology issuing a flood warning;
- The Bureau of Meteorology issuing a Severe Weather Warning or a Severe Thunderstorm Warning indicating a likelihood of a flash flooding;
- The State Emergency Service issuing a Flood Bulletin;
- Rising floodwaters; and
- Heavy rainfall.

These triggers do not mean that the business should cease immediately but are important for the assigned warden/deputy to:-

- Keep watch on the flood levels along Possum Gully and the surrounding areas in the vicinity of the site;
- Inform the site users of these triggers; and
- Listen to the local media for update and advice.

It is recommended that flood compatible materials are used on the ground floor levels where subject to high flows to minimise the cost of the damage during rare flood events (i.e. PMF). The structural engineer should certify the building structure is able to withstand the shear forces of the floodwaters up to the flood level in a 100-year ARI plus 0.5m and up to the PMF level.

The development does not increase the potential flood affectation on other properties. Perimeter fencing is to be constructed in a manner that does not affect the direction and the velocity of the floodwaters. It is recommended to install fencing that allows the flow to pass through without obstruction. A structural engineer's certificate is required to confirm that the proposed fence and footings can withstand the shear forces of floodwaters.

The additional economic and social costs, which may arise from damage to property as a result of flooding, can be fully managed by the stakeholders of the site. During a 1% AEP flood event and PMF events, the ground floor level provides shelter to humans free from flooding up to and including the PMF flood event. Evacuation from the development can occur after the flood levels have recessed to levels where Brook Street can be reused to exit the area.

A risk management policy should be adopted and implemented by the operators of the development, which increases the awareness of the stakeholders and the users of the site to the flooding issues and outlines the procedures of control and evacuation from the site in flooding events. The NSW SES Community Flood Safe Guides should be printed and made available within the premises.

6.4 Preparation for a Flood Emergency

In preparation for a flood emergency, the following should be done:-

- Ensure all occupants and visitors are aware of the flooding situation and that isolation and confinement to ground floor of the building is a real possibility;
- Encourage occupants and visitors to participate in the development, implementation and review of future flood risk management plans;
- Keep an up-to-date list of emergency contact numbers in a prominent location;
- Incorporate flood awareness;
- Assess the capability of the Site to provide short term catering for the persons evacuated to ground floor;
- Identify those systems which can be shut down in the event of a flood emergency;
- Establish the ground floor as the meeting point when a flood emergency is called; and
- Prepare coloured notices of reasonable size that inform persons within the site of the procedures if a flooding above the 100-year ARI flood event occurs and a flood emergency is called as outlined in the following section.

6.5 Actions in the likelihood or during a Flood

The following actions should be listed on the notice to be displayed on site at key locations.

- Occupants to monitor the likelihood of a flood, heavy rainfall and/or if a flood is occurring;
- If the flash flooding occurs much faster and it is not safe to evacuate, i.e. the flood levels are rising too quickly in Possum Gully and there is a possibility of the outdoor car-parking area becoming inundated, vacate and clear the car-park and elevate everyone with their personal items to the ground floor. Site evacuation should not occur if the flood levels are approaching the carpark level or are entering the site from Brook Street. Flood depth of 150mm or higher could potentially destabilise small vehicles;
- Try as much as practical to seal doors and openings for bin rooms etc. to minimise the damage to property and equipment;
- Move any hazardous material (if any) to the ground floor in a suitable area which is not accessible by children (e.g. an outdoor store) to avoid it getting washed by the floodwaters;
- Contact the emergency services on 000 and the SES on 132500 alerting them to the situation;

- Continue to monitor the local radio stations, generally the ABC, to keep updated on any flooding;
- Shut down computers and all non-essential equipment;
- Maintain a watch on the flood levels in Possum Gully and Brook Street;
- Maintain contact with the emergency services;
- Do not permit anyone to leave the site by foot or vehicle;
- Keep everyone to the confines of the Ground Floor Level at all times;
- Have all personnel maintain a calm outlook;
- In the event of a medical emergency, contact the emergency services by phone 000 and advise them of the need for assisting and follow their instructions;
- Further shut down all system not required; and
- Always maintain an ongoing count of persons and report any missing.

Table 7: Flood Warning Actions (Water levels taken in Aldgate St Road Reserve)

Flood Level (m AHD)	Approx. Depth (mm)	Flood Warning Trigger Action
≥155.75	≥500mm	<ul style="list-style-type: none"> • Monitor the flood level and time the rate of rise of the flood level
<156.25	<1000mm	<ul style="list-style-type: none"> • Warn occupants of possible need to shelter-in-place • Monitor the flood level and the time the rate of rise of the flood level
<156.75	<1500mm	<ul style="list-style-type: none"> • Close driveway and evacuate visitors from above-ground car-parking level to ground floor level • Implement shelter-in-place protocol for Childcare Center staff and occupants
>157.00	>1750mm	<ul style="list-style-type: none"> • Continue monitoring • Continue sheltering in-place for Childcare Center • All other occupants await instructions from Emergency Services for evacuation (if deemed safe and necessary by response personnel) and remain at or above the ground floor level

6.6 Other Sources of Flood Information

6.6.1 Observation of local rainfall or flood water

An important indication of likely imminent flood activity would be intense local rainfall.

6.6.2 The Bureau of Meteorology

The Bureau of Meteorology does not prepare flood predictions for the Possum Gully Catchment Area but does issue Severe Thunderstorm Warnings and Severe Weather Warnings.

Severe Thunderstorm Warnings are issued together with maps indicating the current location and predicted path of thunderstorms. Severe Weather Warnings are for severe weather not related to thunderstorms, cyclones or fire, such as “east coast lows” or other causes of intense rainfall or storm surge. These warnings are available at <http://www.bom.gov.au/nsw/warnings/>.

6.6.3 The NSW SES

The local SES unit is Muswellbrook Shire. The applicable region operates a Facebook page for informing members of the public (<https://www.facebook.com/NSWSESMBK>).

The SES issues Local Flood Advices. These are issued on the basis of localised valley watch information for locations for which the BoM does not issue Flood Warnings. They normally predict which class of flooding (minor, moderate or major) will occur, and must not contradict any Flood Warnings provided by the BoM for gauges on the same river. Local Flood Advices are to be clearly identified as being issued by the SES. For the subject area, no Flood Warning Plan has been prepared to date by the NSW SES.

7. Discussion

This section of the report provides a review of the results and discusses Council's requirements as stated in the DCP.

1. The proposed development does not have any adverse impacts on the flooding elsewhere in the floodplain.
2. Occupants at an elevated risk (i.e. children) are isolated from any flood risk exposure.
3. The proposed floor levels comply with the Flood Planning Level (FPL). Reference is made to the architectural plans for details.
4. Adequate provision for on-site refuge is possible up to and including the PMF Storm Event for the intended usages of the development;
5. The requirements of the DCP are implemented.

In our opinion, the proposed buildings footprints do not displace floodwaters in such a manner to impact on the flooding behavior in terms of loss of flood storage, increase in velocity and risk.

8. Conclusion

A detailed investigation on the flooding behavior has been undertaken in the vicinity of the proposed development at 84 Brook Street, Muswellbrook NSW. Using a combined 1D/2D model, the study determined the flood behavior for the 1% AEP Storm Event.

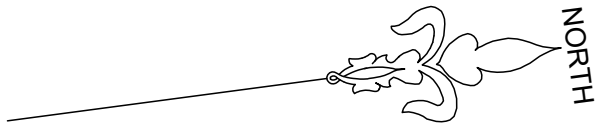
The primary flood characteristics reported for the design events considered include depths, levels, velocities and impact. The impact of the proposed development was assessed and was found to be inconsequential.

The study addresses Council's requirements as per the DCP. In our opinion, Council should allow the development in its current proposal

Appendix 1

Detailed Site Survey

Cadence Consulting Surveyors



DP232742

DP548054

LOT 1
DP795300

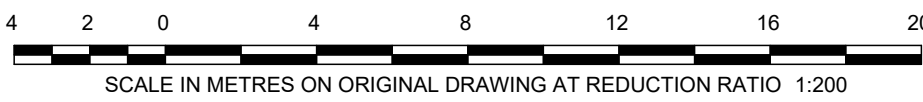
LOT 1
DP1210371

LOT 86
DP1104667

LOT 456
DP601491

NOTES:

1. PLAN NOTES SHOULD NOT BE ALTERED OR DELETED.
2. HARD COPY SHOULD ONLY BE PRODUCED OR REPRODUCED AT THE SCALE STATED IN THE TITLE BLOCK
3. THIS PLAN IS SUITABLE FOR PLANNING AND DESIGN AT THE SCALE STATED. THE PLAN MAY NOT BE SUITABLE FOR ANY OTHER PURPOSE OR FOR USE AT ANY OTHER SCALE.
4. THE LOCATION AND DEPTH OF ALL UNDERGROUND SERVICES, WHETHER SHOWN ON THE PLAN OR NOT SHOULD BE PRECISELY DETERMINED BEFORE CONSTRUCTION WORK COMMENCES & APPROPRIATE MEASURES TAKEN TO PROTECT THESE SERVICES FROM DAMAGE.
5. THE TITLE BOUNDARIES HAVE NOT BEEN FULLY INVESTIGATED AND ARE SHOWN ON THE PLAN AS THEY ARE IN THE TITLE DIAGRAM. IF DIMENSIONS ARE CRITICAL FOR DESIGN, OR SETTING OUT OF NEW STRUCTURES OR IN FINANCIAL DECISIONS THEN WE RECOMMEND A REDEFINITION SURVEY BE CARRIED OUT AND A PLAN OF REDEFINITION BE PREPARED.
6. SERVICES SHOWN HAVE BEEN LOCATED BY SURFACE FEATURES ONLY AND HAVE NOT BEEN FULLY INVESTIGATED. CONTACT THE RELEVANT AUTHORITY FOR EXACT LOCATION OF UNDERGROUND SERVICES PRIOR TO ANY DESIGN OR EXCAVATION.
7. ALL SPOT LEVELS HAVE NOT BEEN DISPLAYED FOR PLAN CLARITY. HEIGHTS NOT SHOWN CAN BE FOUND ON LAYER "HEIGHT OFF".
8. ALL 3d STRINGS ARE NOT DISPLAYED AND CAN BE FOUND IN MODEL SPACE WITH THE PREFIX 3d IN THE LAYER NAME.



UNIT 3, 73a ELIZABETH STREET,
TIGHE'S HILL, NSW 2297
P.O. BOX 2367, DANGAR NSW 2309
PH 02 4925 0500 FAX 02 4927 8850

CADENCE
CONSULTING
SURVEYORS

PLAN OF:

DETAIL SURVEY OVER
LOT 1 DP795300
84 BROOK STREET
MUSWELLBROOK

- BUILDING
- AWNNG/EAVES
- FENCE
- GUARD RAIL
- BOTTOM OF BANK
- TOP OF BANK
- VEGETATION

- JUNCTION BOX
- POWERPOLE
- COMMS PIT
- WATER METER
- INVERT OF PIPE
- TREE

ORIGIN OF LEVELS: PM34494 RL150.125
ORIGIN OF COORDS: PM34523
CONTOUR INTERVAL: 0.5m
SURVEY COMPLETED: 30/03 + 22/11/2022
SURVEYED BY: S.B. + J.B.
SURVEY FILE: 1928SB220330.GSI
2011JB221121.GSI

SCALE: 1:200 (A1) 1:400 (A3)
JOB REF: CCS-1928
DWG FILE:
1928_DWG_DETAIL-1B
SHEET 1 OF 1

REV	AMENDMENTS	DATE	DWN	CHK	PM
A	FIRST ISSUE	31/03/22	M.T.	M.D.	M.D.
B	ADDED DETAIL	22/11/22	M.T.	M.D.	M.D.

EXCAVATOR/CONTRACTOR/BUILDER
MUST CONTACT
DIAL BEFORE YOU
DIG
BEFORE
COMMENCING WORK
ON SITE



Appendix 2

Architectural Plans

Janssen Designs

84 Brook Street, Muswellbrook

Proposed Child Care Centre

DRAWING SCHEDULE:

- A000 - COVER PAGE
- A001 - CALCULATIONS PAGE / LEP MAPS
- A002 - SITE CONTEXT PLAN
- A003 - SITE ANALYSIS PLAN
- A004 - SITE PLAN
- A005 - BASEMENT PLAN
- A006 - GROUND FLOOR PLAN
- A007 - FIRST FLOOR PLAN
- A008 - ROOF PLAN
- A009 - SOUTH & EAST ELEVATIONS
- A010 - NORTH & WEST ELEVATIONS
- A011 - SECTION
- A012 - MAXIMUM BUILDING HEIGHT DIAGRAM
- A013 - PERSPECTIVES 1 & 2
- A014 - PERSPECTIVES 3 & 4
- A015 - PERSPECTIVES 5 & 6 - LODGES ROAD
- A016 - PERSPECTIVES 7,8 & 9 - OPA & INTERNAL CORRIDOR
- A017 - ACOUSTIC DETAILS - GROUND FLOOR
- A018 - ACOUSTIC DETAILS - FIRST FLOOR
- A019 - SHADOW DIAGRAMS - 9AM & 12 NOON
- A020 - SHADOW DIAGRAMS - 3PM
- A021 - COVERED OUTDOOR AREA DIAGRAM & OPA CALCULATION - GROUND FLOOR
- A022 - COVERED OUTDOOR AREA DIAGRAM & OPA CALCULATION - FIRST FLOOR
- A023 - EMERGENCY EVACUATION PLAN - GROUND FLOOR
- A024 - EMERGENCY EVACUATION PLAN - FIRST FLOOR
- A025 - COLOUR AND FINISHES SCHEDULE

3.7.5.5 REQUIREMENTS FOR SMOKE ALARMS

- (A) SMOKE ALARMS MUST BE INSTALLED IN -
- (I) CLASS 1A BUILDINGS IN ACCORDANCE WITH 3.7.2.3; AND
- (II) CLASS 1B BUILDINGS IN ACCORDANCE WITH 3.7.2.4.
- (B) SMOKE ALARMS MUST COMPLY WITH AS 3786.
- (C) SMOKE ALARMS MUST BE CONNECTED TO THE CONSUMER MAINS POWER WHERE CONSUMER POWER IS SUPPLIED TO THE BUILDING.

3.8.5.2 VENTILATION REQUIREMENTS

VENTILATION MUST BE PROVIDED TO A HABITABLE ROOM, SANITARY COMPARTMENT, BATHROOM, SHOWER ROOM, LAUNDRY AND ANY OTHER ROOM OCCUPIED BY A PERSON FOR ANY PURPOSE BY ANY OF THE FOLLOWING MEANS:

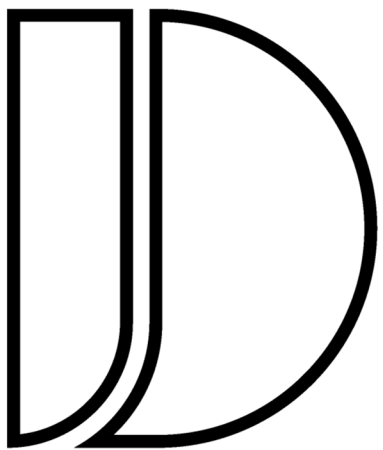
- (A) PERMANENT OPENINGS, WINDOWS, DOORS OR OTHER DEVICES WHICH CAN BE OPENED -
- (I) WITH AN AGGREGATE OPENING OR OPENABLE SIZE NOT LESS THAN 5% OF THE FLOOR AREA OF THE ROOM REQUIRED TO BE VENTILATED; AND
- (II) OPEN TO -
- (A) A SUITABLY SIZED COURT, OR SPACE OPEN TO THE SKY; OR
- (B) AN OPEN VERANDAH, CARPORT, OR THE LIKE; OR
- (C) AN ADJOINING ROOM IN ACCORDANCE WITH (B).

- (B) NATURAL VENTILATION TO A ROOM MAY COME THROUGH A WINDOW, OPENING, VENTILATING DOOR OR OTHER DEVICE FROM AN ADJOINING ROOM (INCLUDING AN ENCLOSED VERANDAH) IF -
- (I) THE ROOM TO BE VENTILATED OR THE ADJOINING ROOM IS NOT A SANITARY COMPARTMENT; AND
- (II) THE WINDOW, OPENING, DOOR OR OTHER DEVICE HAS A VENTILATING AREA OF NOT LESS THAN 5% OF THE FLOOR AREA OF THE ROOM TO BE VENTILATED; AND
- (III) THE ADJOINING ROOM HAS A WINDOW, OPENING, DOOR OR OTHER DEVICE WITH A VENTILATING AREA OF NOT LESS THAN 5% OF THE COMBINED FLOOR AREAS OF BOTH ROOMS; AND
- (IV) THE VENTILATING AREAS SPECIFIED MAY BE REDUCED AS APPROPRIATE IF DIRECT NATURAL VENTILATION IS PROVIDED FROM ANOTHER SOURCE.

GENERAL NOTES

1. CONTRACTOR MUST VERIFY ALL DIMENSIONS ON SITE BEFORE COMMENCING WORK OR PREPARING SHOP DRAWINGS. DO NOT SCALE FROM DRAWINGS.
2. ALL BUILDING WORKS SHALL BE IN ACCORDANCE WITH THE RELEVANT NATIONAL CONSTRUCTION CODE (NCC), BUILDING CODE OF AUSTRALIA (BCA), RELEVANT AUSTRALIAN STANDARDS (AS), INCLUDING AMENDMENTS AND THE REQUIREMENTS OF COUNCIL AND PRIVATE CERTIFIERS (PC) AND OTHER AUTHORITIES HAVING JURISDICTION.
3. THE ARCHITECTURAL DRAWINGS ARE TO BE READ IN CONJUNCTION WITH ALL RELEVANT CONSULTANT DRAWINGS AND REPORTS FOR COORDINATION AND INFORMATION.
4. THRESHOLDS AND DOORWAYS ARE FLUSH FOR WHEELCHAIR ACCESS IN ACCORDANCE WITH AS1428.1 DESIGN FOR ACCESS AND MOBILITY. REFER TO ACCESS CONSULTANT REPORT FOR DISPENSATIONS AND POTENTIAL PERFORMANCE SOLUTION PROPOSED.
5. DRAWINGS ARE NOT COORDINATED BY JANSSEN DESIGNS. CONDITIONS AND DOCUMENTS NEED TO BE COORDINATED AND CHECKED TO CONFIRM THEY SATISFY THE AUSTRALIAN STANDARDS, SPECIALIST DISABILITY ACCOMMODATION, DESIGN FOR DISABILITY ACCOMMODATION, DEVELOPMENT APPLICATION REQUIREMENTS, THE NCC, BCA CODES AND CONTROLS THAT APPLY TO THIS PROJECT. A COORDINATED CONSTRUCTION SET MAY VARY FROM THE PRODUCED DRAWINGS. JANSSEN DESIGNS DOES NOT ACCEPT ANY LIABILITY, DIRECT OR INDIRECT, FOR ANY LOSS LIABILITY OR LOSS SUFFERED OR INCURRED BY ANY PERSON OR THIRD PARTY PLACING ANY RELIANCE ON THE SERVICES OR DOCUMENTS OR ADVICE ARISING IN CONNECTION WITH THE SERVICE.
6. ALL STRUCTURAL ELEMENTS ARE SHOWN INDICATIVELY AND ARE TO BE CONFIRMED WITH THE DESIGN, DETAIL AND SPECIFICATION OF THE STRUCTURAL ENGINEER.
7. ALL STRUCTURAL FRAMING, LOADING, BEARING, RETAINING AND FIXING OF ELEMENTS ARE TO THE DESIGN, DETAIL AND SPECIFICATION OF THE STRUCTURAL ENGINEER.

8. ALL SERVICES ELEMENTS INCLUDING HYDRAULICS, ELECTRICAL, MECHANICAL, FIRE AND COMMUNICATION SERVICES SHOWN ARE INDICATIVE ONLY. REFER TO SERVICES CONSULTANT SEPARATE DOCUMENTATION AND SPECIFICATION FOR DETAILED DESIGN.
9. ANY DISCREPANCIES BETWEEN ARCHITECTURAL CONSULTANT DOCUMENTATION ARE TO BE REPORTED TO THE ARCHITECT IMMEDIATELY FOR CLARIFICATION.
10. ALL CONCRETE AND METALWORK ITEMS, SUCH AS SHOP DRAWINGS, TO BE ORGANISED AND REVIEWED BY THE CLIENT.
11. ALL SITE AND BUILDING GRID SET-OUT IS TO BE CONDUCTED AND VERIFIED BY A REGISTERED SURVEYOR BEFORE COMMENCEMENT OF CONSTRUCTION WITH ANY DISCREPANCIES NOTIFIED TO THE CLIENT FOR CLARIFICATION.
12. INTERIOR LIGHTING SYSTEMS THROUGHOUT IS TO COMPLY WITH AS 1680 (AS REQUIRED BY BCA C3.8.4.3 CLASS 1 & 10 BUILDINGS AND CF4.1, F4.2, F4.3, F4.4 FOR CLASS 2 TO 9 BUILDINGS)
13. ALL SANITARY COMPARTMENTS ARE TO BE CONSTRUCTED TO COMPLY WITH BCA PART 3 C3.8.3.3 FOR CLASS 1 & 10 BUILDINGS AND CF2.5B FOR CLASS 2 TO 9 BUILDINGS.
14. ALL BALUSTRADES (IF REQUIRED) HEIGHTS AND DESIGN SHALL BE IN ACCORDANCE WITH AS 1170 PART 1 (AS REQUIRED BY BCA PART 3 C3.9.2.3 FOR CLASS 1 & 10 BUILDINGS AND BCA PART D CL D2.16 FOR CLASS 2 TO 9 BUILDINGS)
15. ALL ALUMINIUM FRAMED GLAZING TO COMPLY WITH AS 1288,AS 2208.
16. TERMITE CONTROL KORDON TERMITE BARRIER IS TO BE USED AS A BUILDING PERIMETER AND SERVICE PENETRATION TERMITE PROTECTION SYSTEM (AS 3660.1 - 2000). IT IS TO BE INSTALLED BY A MANUFACTURER'S ACCREDITED INSTALLER. AS PER THE MANUFACTURER'S INSTALLATION INSTRUCTIONS. THE BUILDER IS TO PROVIDE ALL RELEVANT SLAB OR CONSTRUCTION DETAILS TO THE ACCREDITED INSTALLER FOR PRICING ETC. THE BUILDER IS TO TREAT THE BUILDINGS TERMITE PROTECTION AS PART OF THE BUILDING PROCESS AND THEREFORE INCLUDED IN THE CONSTRUCTION PROGRAM.



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Nominated Architect: Jake Janssen NSW ARB 11575

AMENDMENTS			DRAWING TITLE:		CLIENT DETAILS:	
ISSUE	DESCRIPTION	DATE	Project Title: Proposed Child Care Centre		JAL Invest Co Pty Ltd	
			Cover Page			
			ADDRESS:		LOCAL GOVERNMENT AREA:	
			84 Brook Street, Muswellbrook		Muswellbrook Council	
Date: 20.7.2022		Scale: 1:100	Issue For: DA	Issue: A	Project #: 10186	

COMPLIANCE TABLE

TOTAL SITE AREA	2,495.00m2 (BY CALC)
MAX. REQUIRED FLOOR SPACE RATIO	0.5:1 1,247.50m2
PROPOSED FLOOR SPACE RATIO	555m2 22.2:1 - COMPLIES

CHILDCARE

NUMBER OF CHILDREN:

- 0-2 YEARS - 20 PLACES
- 2-3 YEARS - 20 PLACES
- 3-6 YEARS - 50 PLACES

TOTAL - 90 PLACES

NUMBER OF TEACHERS:

- 0-2 YEARS - 5 TEACHERS @ 1:4 RATIO
- 2-3 YEARS - 4 TEACHERS @ 1:5 RATIO
- 3-6 YEARS - 5 TEACHERS @ 1:10 RATIO

INDOOR PLAY AREA:

- 0-2 YEARS - 66.3m2 @ 3.25m2 / KID
- 2-3 YEARS - 69.4m2 @ 3.25m2 / KID
- 3-6 YEARS - 166.1m2 @ 3.25m2 / KID

OUTDOOR PLAY AREA:

TOTAL AREA - 641m2 @ 7m2 / KID

PARKING

MINIMUM REQUIRED	1 CARSPACE PER STAFF - 14
1 X DIRECTOR	1 CARSPACE
1 X COOK	1 CARSPACE
1 X LOADING BAY	1 CARSPACE
TOTAL PARKING SPACES PROPOSED	1 CARSPACE PER 10 CHILDREN - 9
VISITOR SPACES	26 CARSPACES - COMPLIES
STAFF SPACES	9 CARSPACES
	17 CARSPACES

ZONE - R1 GENERAL RESIDENTIAL



FLOOR SPACE RATIO - 0.5:1



MAXIMUM BUILDING HEIGHT - 8.5M

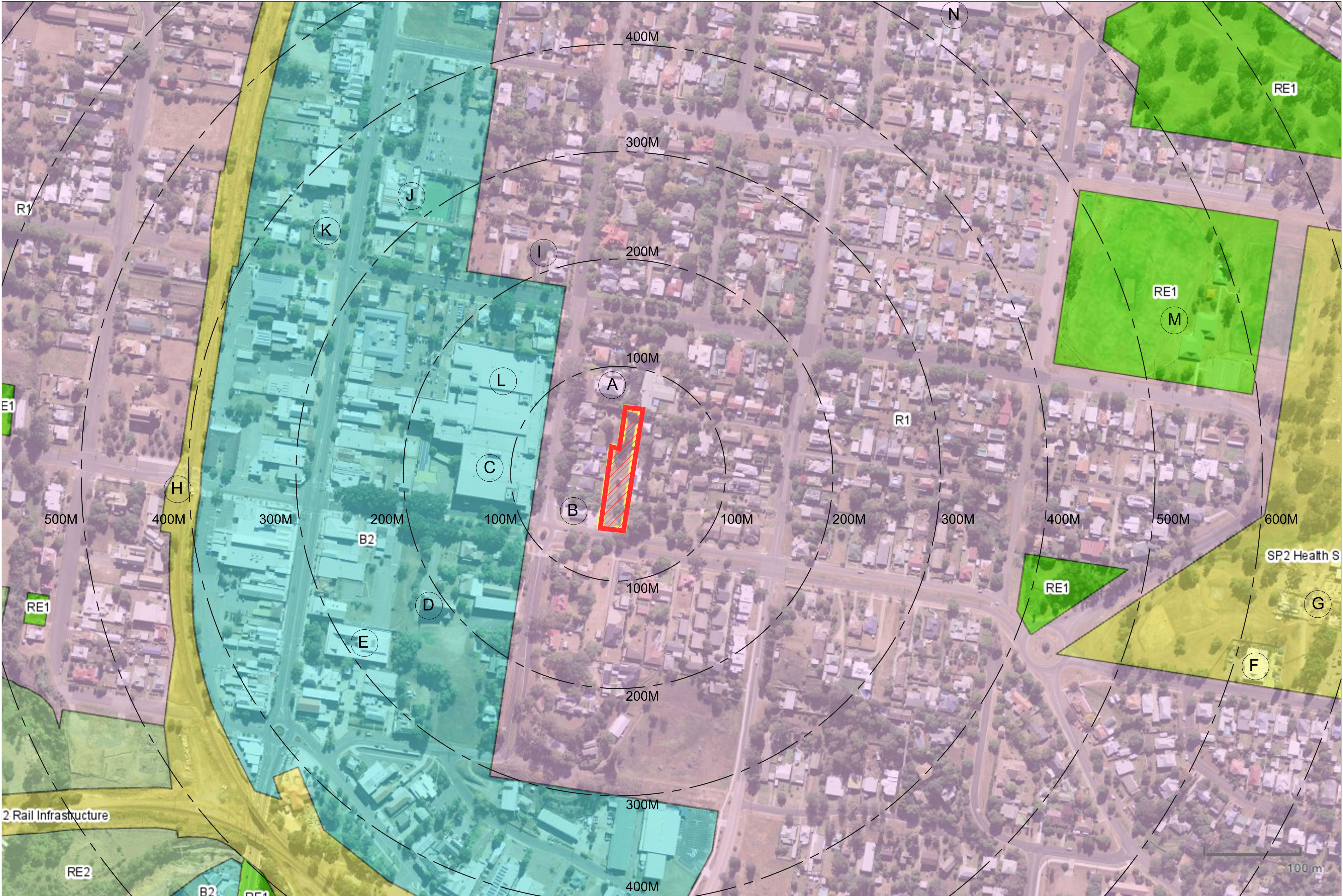


HERITAGE - RESIDENTIAL AREA CONSERVATION AREA | LOCAL SIGNIFICANCE



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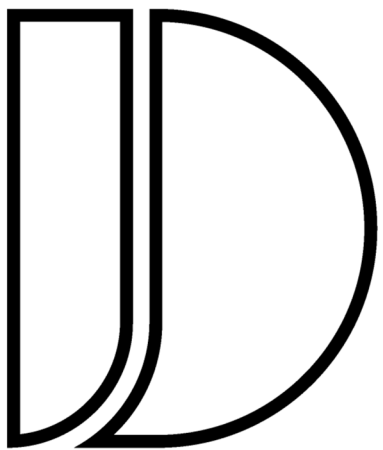
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LANDMARKS

- A - MUSWELLBROOK PRESCHOOL KINDERGARTEN
- B - HUNTER MEDICAL PRACTISE
- C - WOOLWORTHS
- D - ST JAMES MUSWELLBROOK CHURCH
- E - MUSWELLBROOK COURTHOUSE
- F - GOODSTART EARLY LEARNING MUSWELLBROOK
- G - MUSWELLBROOK HOSPITAL
- H - NEW ENGLAND HIGHWAY
- I - PACIFIC BROOK CHRISTIAN SCHOOL
- J - MUSWELLBROOK BOWLING CLUB
- K - SHELL COLE EXPRESS
- L - BIG W
- M - STAN THEISS CENTRE
- N - MUSWELLBROOK PUBLIC SCHOOL

SITE CONTEXT PLAN -
N.T.S.



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Nominated Architect: Jake Janssen NSW ARB 11575

AMENDMENTS		
ISSUE	DESCRIPTION	DATE

Project Title:
Proposed Child Care
Centre

DRAWING TITLE:
Site Context Plan

ADDRESS:
84 Brook Street,
Muswellbrook

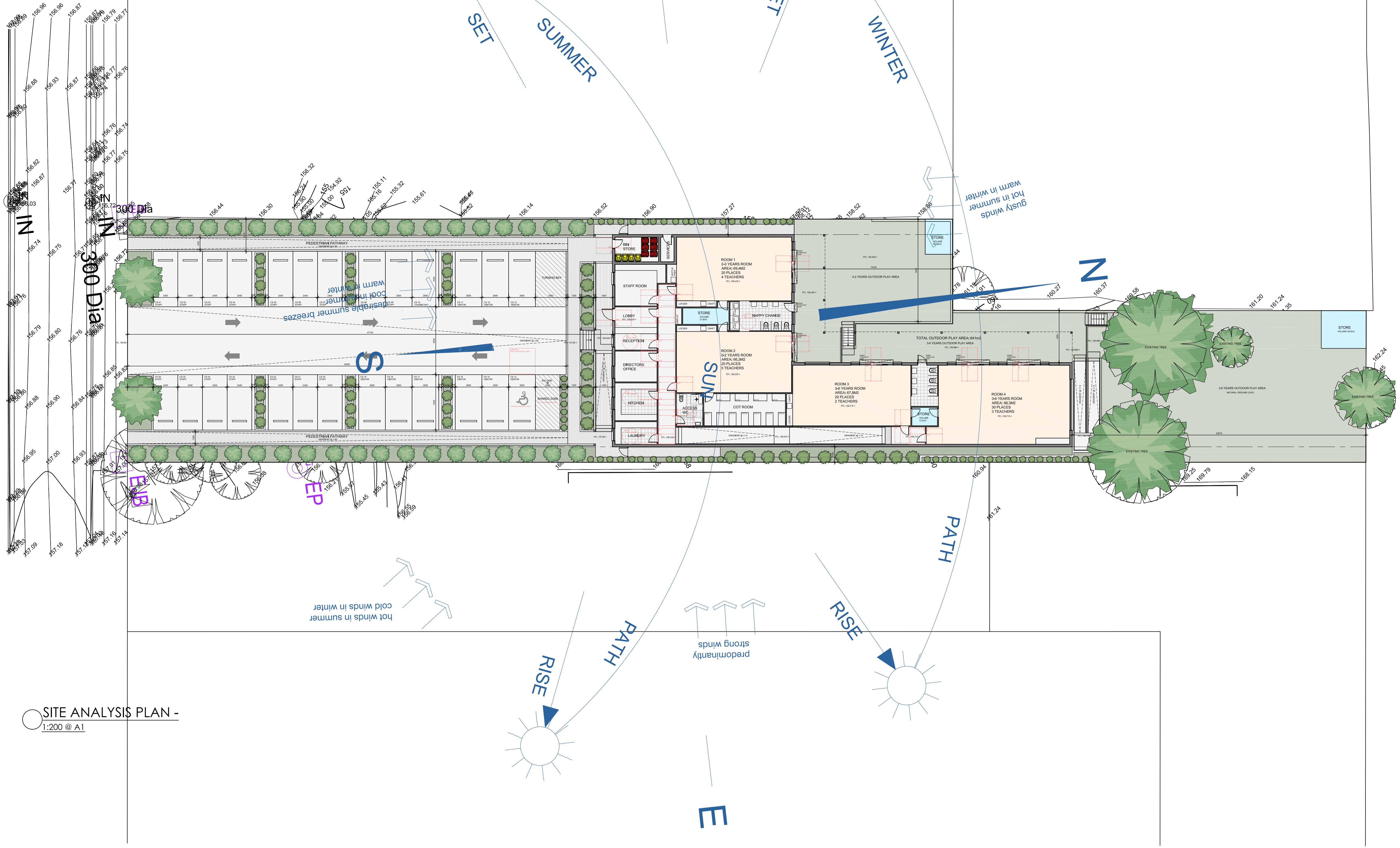
CLIENT DETAILS:
JAL Invest Co Pty Ltd

LOCAL GOVERNMENT AREA:
Muswellbrook Council

Issue For:	Issue:	Date:	Scale:	Drawing #:	Project #:
DA	A	20.7.2022	1:100	A000	10186

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DO NOT SCALE OFF ARCHITECTURAL DRAWINGS



KEY:

- CARPOT
- NUMBER OF STOREYS
- OVERLOOKING
- PEDESTRAINS & VEHICLE ACCESS POINTS
- VIEWS
- SITE
- CONTOURS
- PRIVATE OPEN SPACE
- EXISTING TREES

SITE ANALYSIS PLAN -
1:200 @ A1



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Nominated Architect: Jake Janssen NSW ARB 11575

AMENDMENTS		
ISSUE	DESCRIPTION	DATE

Project Title:
Proposed Child Care Centre

DRAWING TITLE:
Site Analysis Plan

ADDRESS:
84 Brook Street,
Muswellbrook

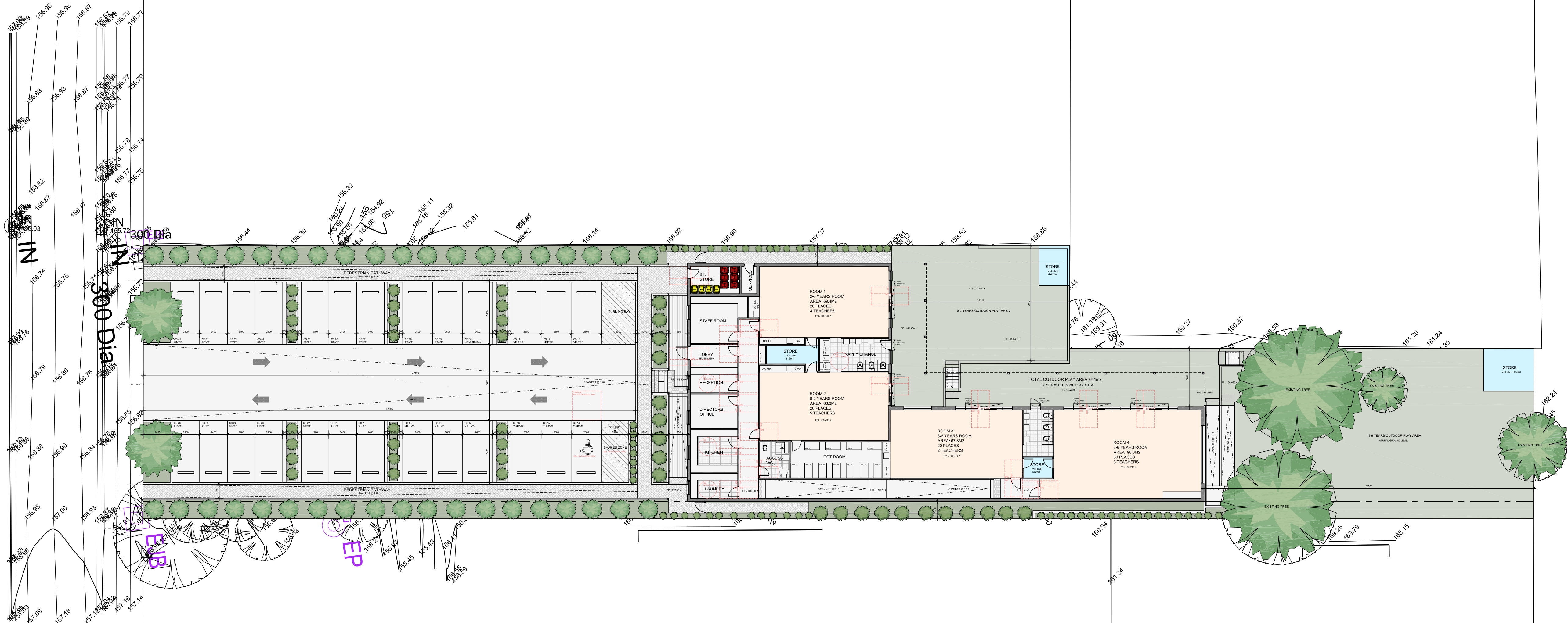
CLIENT DETAILS:
JAL Invest Co Pty Ltd

LOCAL GOVERNMENT AREA:
Muswellbrook Council

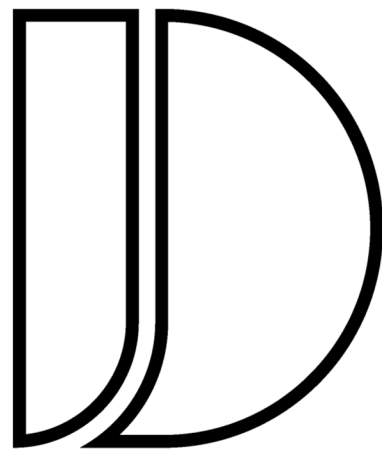
Issue For: DA	Issue: A
Date: 20.7.2022	Scale: 1:100
Drawing #: A000	Project #: 10186

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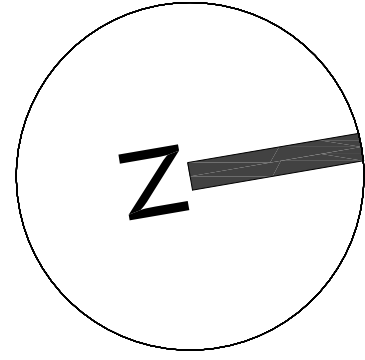


SITE PLAN -
1:200 @ A1



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AMENDMENTS		
ISSUE	DESCRIPTION	DATE

Project Title:
Proposed Child Care
Centre

DRAWING TITLE:
Site Plan

ADDRESS:
84 Brook Street,
Muswellbrook

CLIENT DETAILS:

JAL Invest Co Pty Ltd

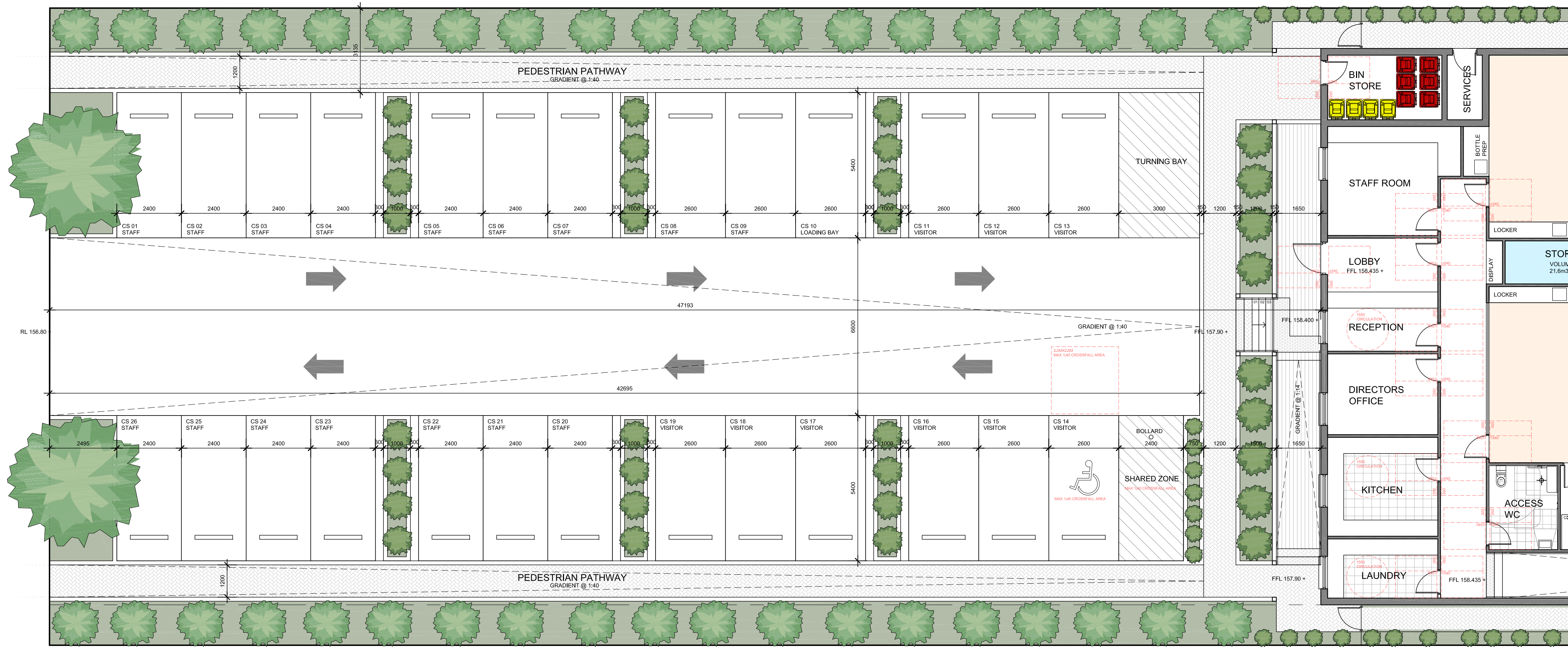
LOCAL GOVERNMENT AREA:

Muswellbrook Council

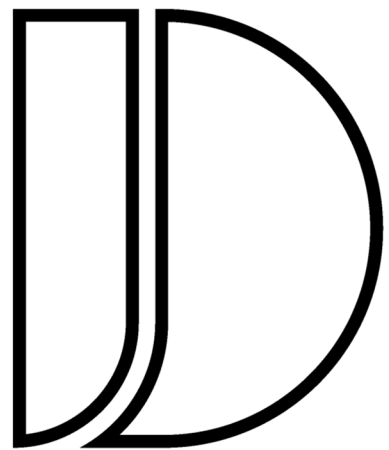
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DO NOT SCALE OFF ARCHITECTURAL DRAWINGS



GROUND FLOOR PLAN A -
1:100 @ A1



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Nominated Architect: Jake Janssen NSW ARB 11575

AMENDMENTS		
ISSUE	DESCRIPTION	DATE

Project Title:
Proposed Child Care
Centre

DRAWING TITLE:
Ground Floor Plan A

ADDRESS:
84 Brook Street,
Muswellbrook

CLIENT DETAILS:

JAL Invest Co Pty Ltd

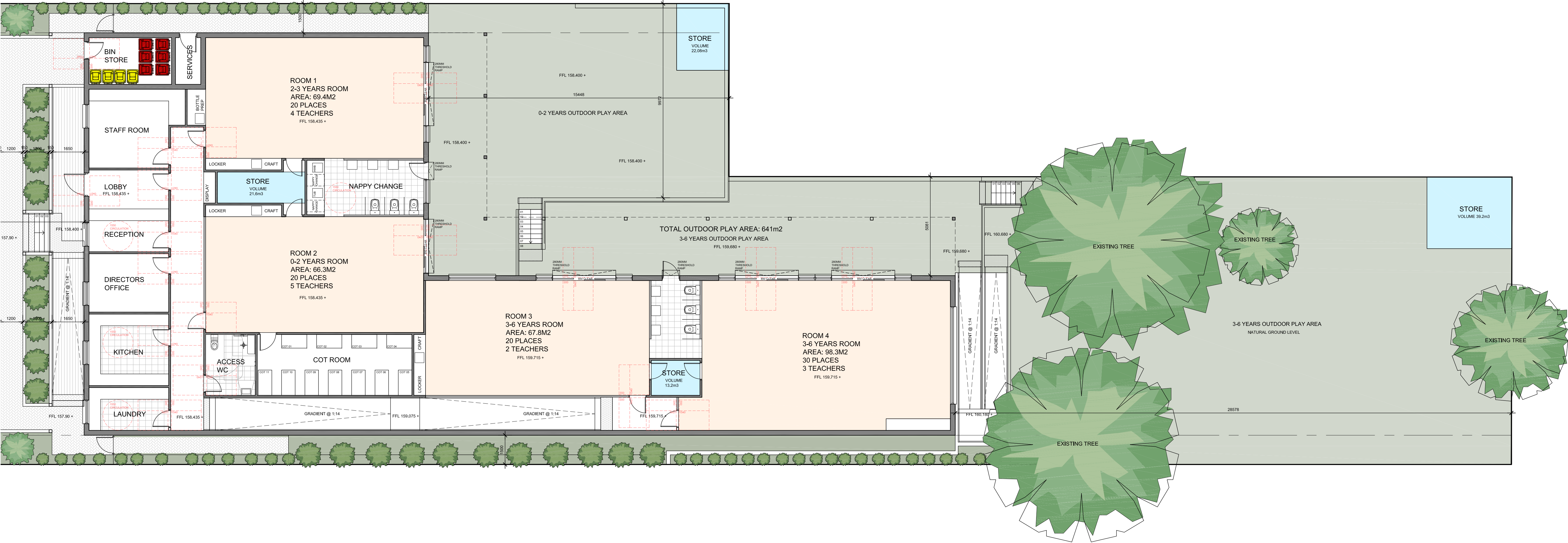
LOCAL GOVERNMENT AREA:

Muswellbrook Council

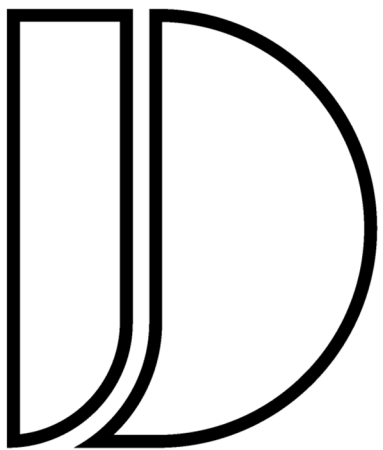
Issue For:	Issue:	Date:	Scale:	Drawing #:	Project #:
DA	A	20.7.2022	1:100	A000	10186

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DO NOT SCALE OFF ARCHITECTURAL DRAWINGS



GROUND FLOOR PLAN B -
1:100 @ A1



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Nominated Architect: Jake Janssen NSW ARB 11575

AMENDMENTS		
ISSUE	DESCRIPTION	DATE

Project Title:
Proposed Child Care
Centre

DRAWING TITLE:
Ground Floor Plan B

ADDRESS:
84 Brook Street,
Muswellbrook

CLIENT DETAILS:
JAL Invest Co Pty Ltd

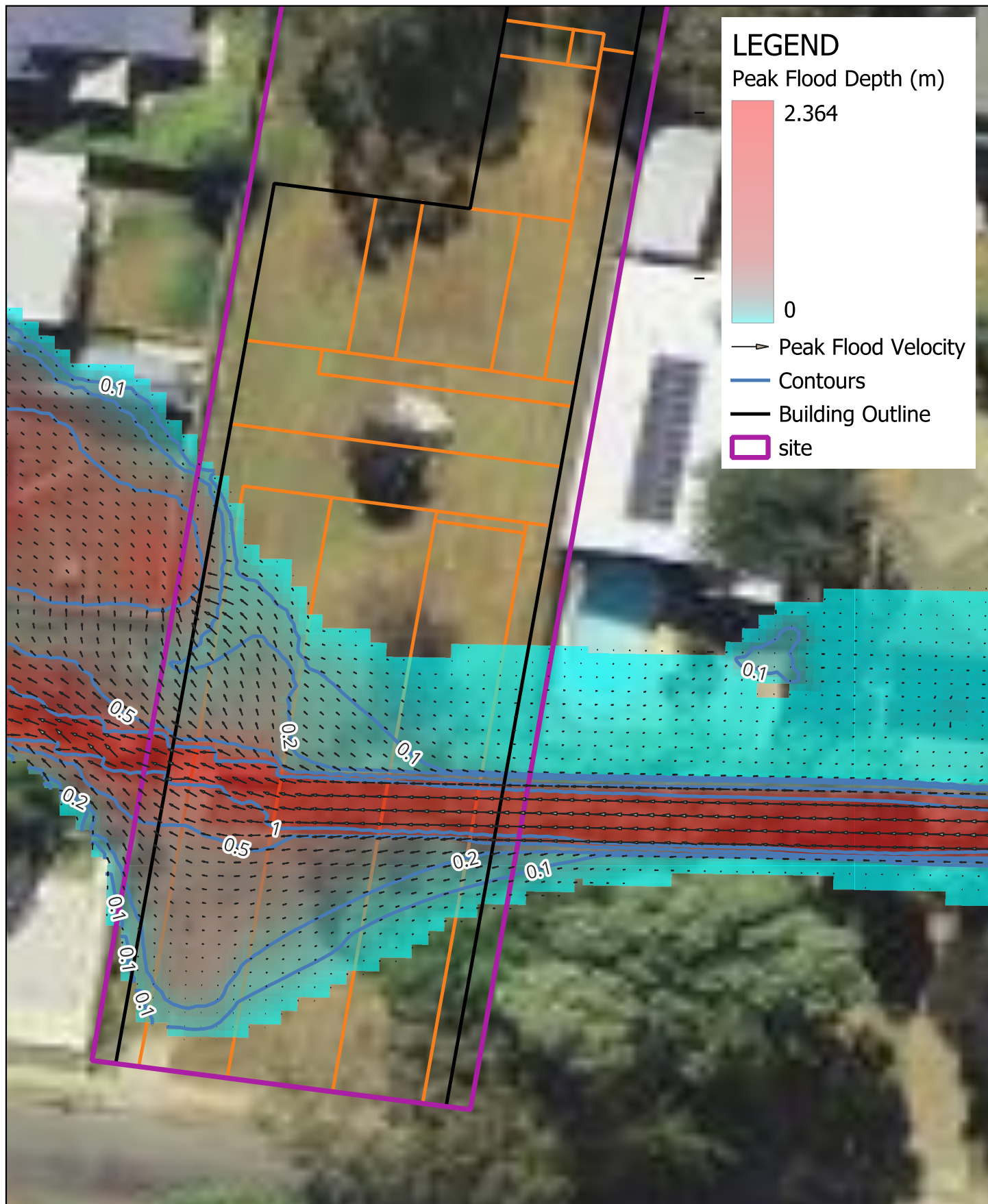
LOCAL GOVERNMENT AREA:
Muswellbrook Council

Issue For: DA	Issue: A
Date: 20.7.2022	Scale: 1:100
Drawing #: A000	Project #: 10186

Appendix 3

Flood Mapping (TUFLOW)

Capital Engineering Consultants



Title
84 Brook Street Flood Impact Assessment
Existing 1% AEP Modelled Pre-development Peak Flood Conditions

CEC endeavours to ensure that the information provided in this map is correct at the time of publication. CEC does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.



C:\Users\CEC\OneDrive\Capital Engineering\SW PROJECTS - Documents\2023\SW23077 - 84 BROOK ST, MUSWELLBROOK\TECHNICAL\TUFLOW\Shohid\Tuflow Model - Mathew\TUFLOW\Tuflow_model.qgz

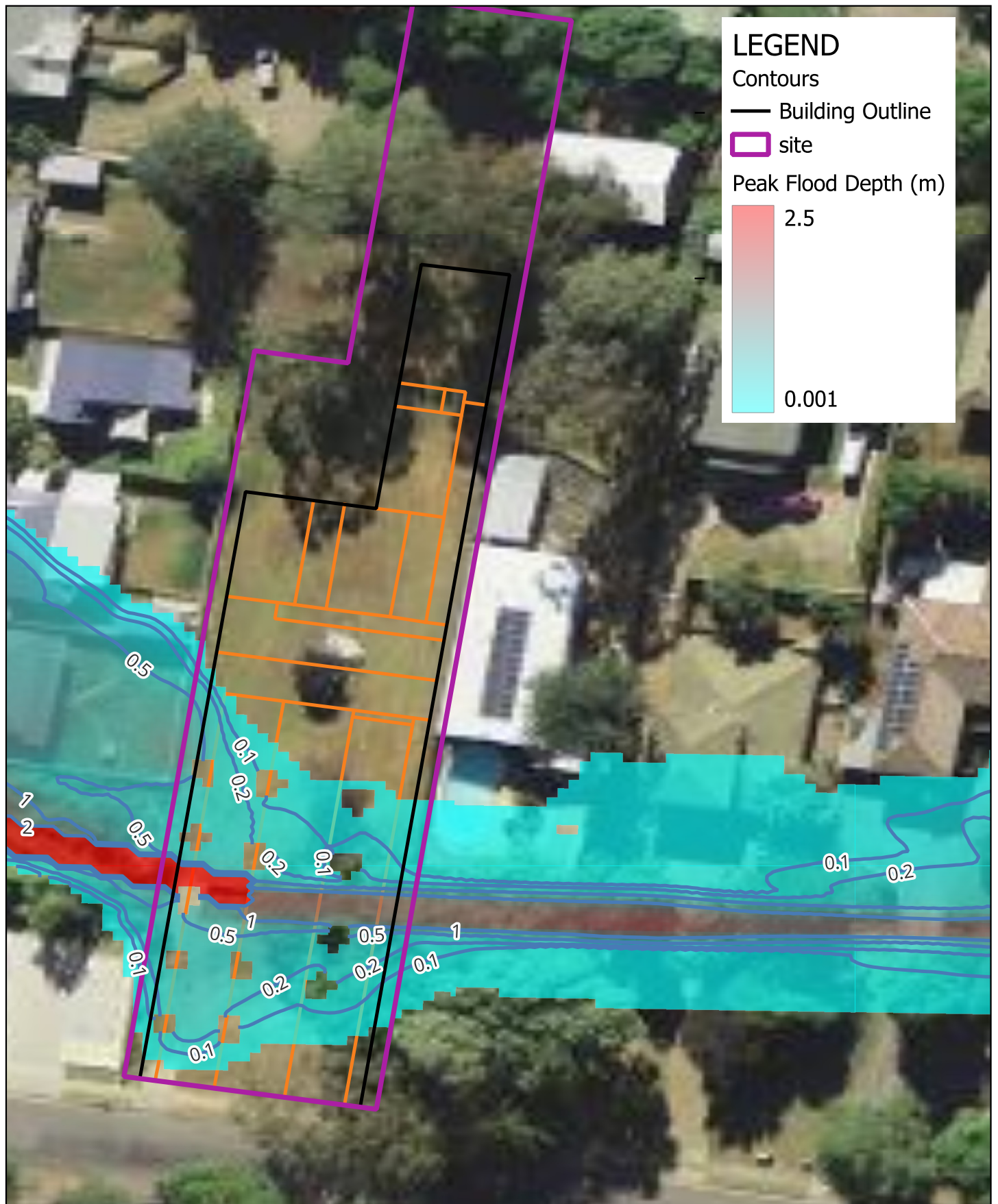
Figure:
3-1

Rev
A

Capital Engineering Consultants

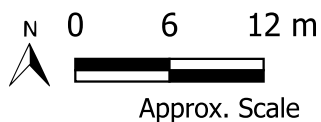
9630 0121

8 Buller Street, North Parramatta



Title
84 Brook Street Flood Impact Assessment
Existing 1% AEP Modelled Post-development Peak Flood Conditions

CEC endeavours to ensure that the information provided in this map is correct at the time of publication. CEC does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.



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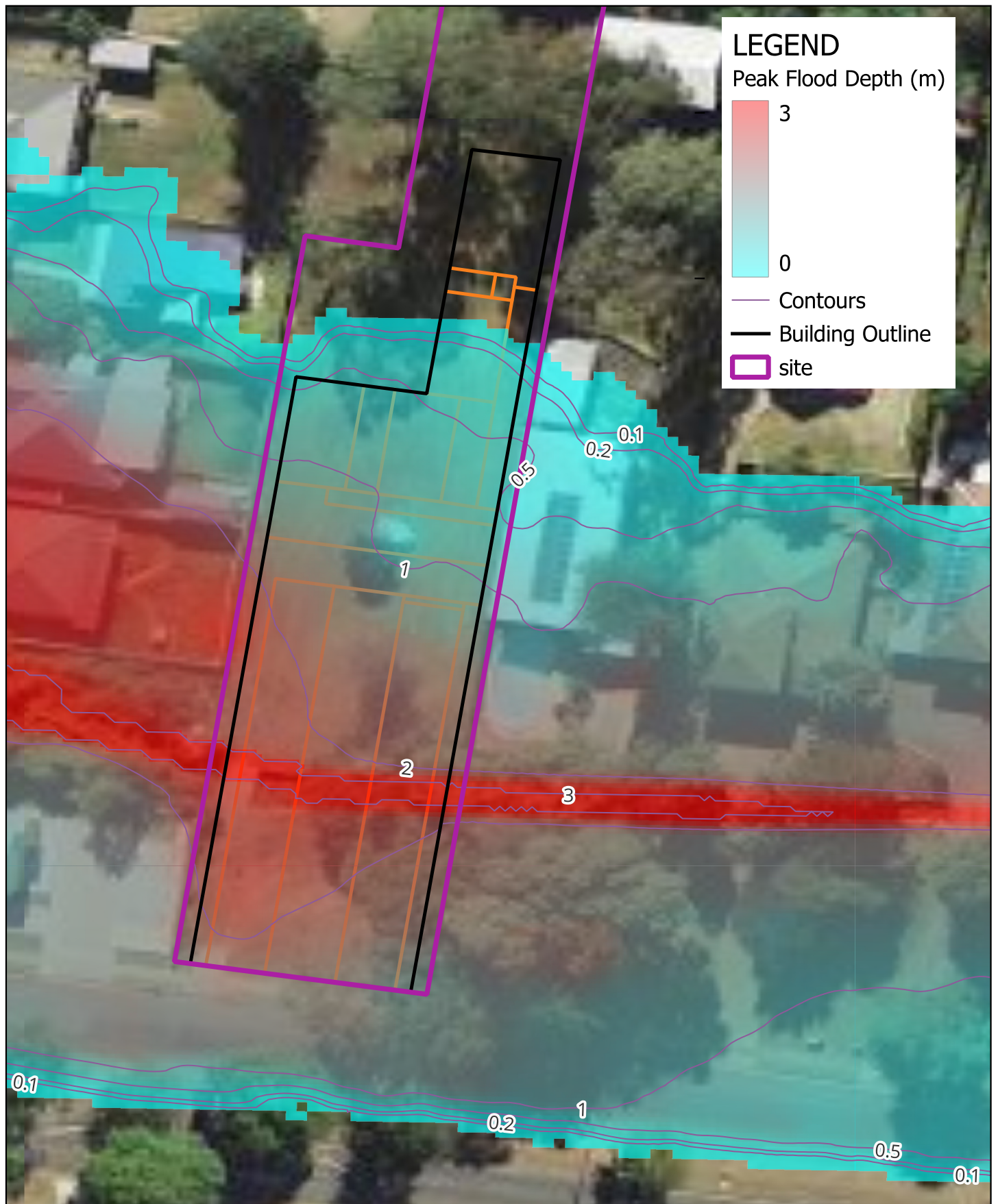
Figure:
3-2

Rev
A

Capital Engineering Consultants

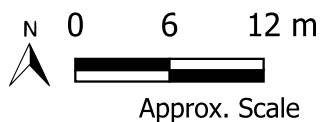
9630 0121

8 Buller Street, North Parramatta



Title
**84 Brook Street Flood Impact Assessment
PMF Modelled Peak Flood Conditions**

CEC endeavours to ensure that the information provided in this map is correct at the time of publication. CEC does not warrant, guarantee or make representations regarding the currency and accuracy of information contained in this map.



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Figure:
3-3

Rev
A

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Engineering
Consultants**

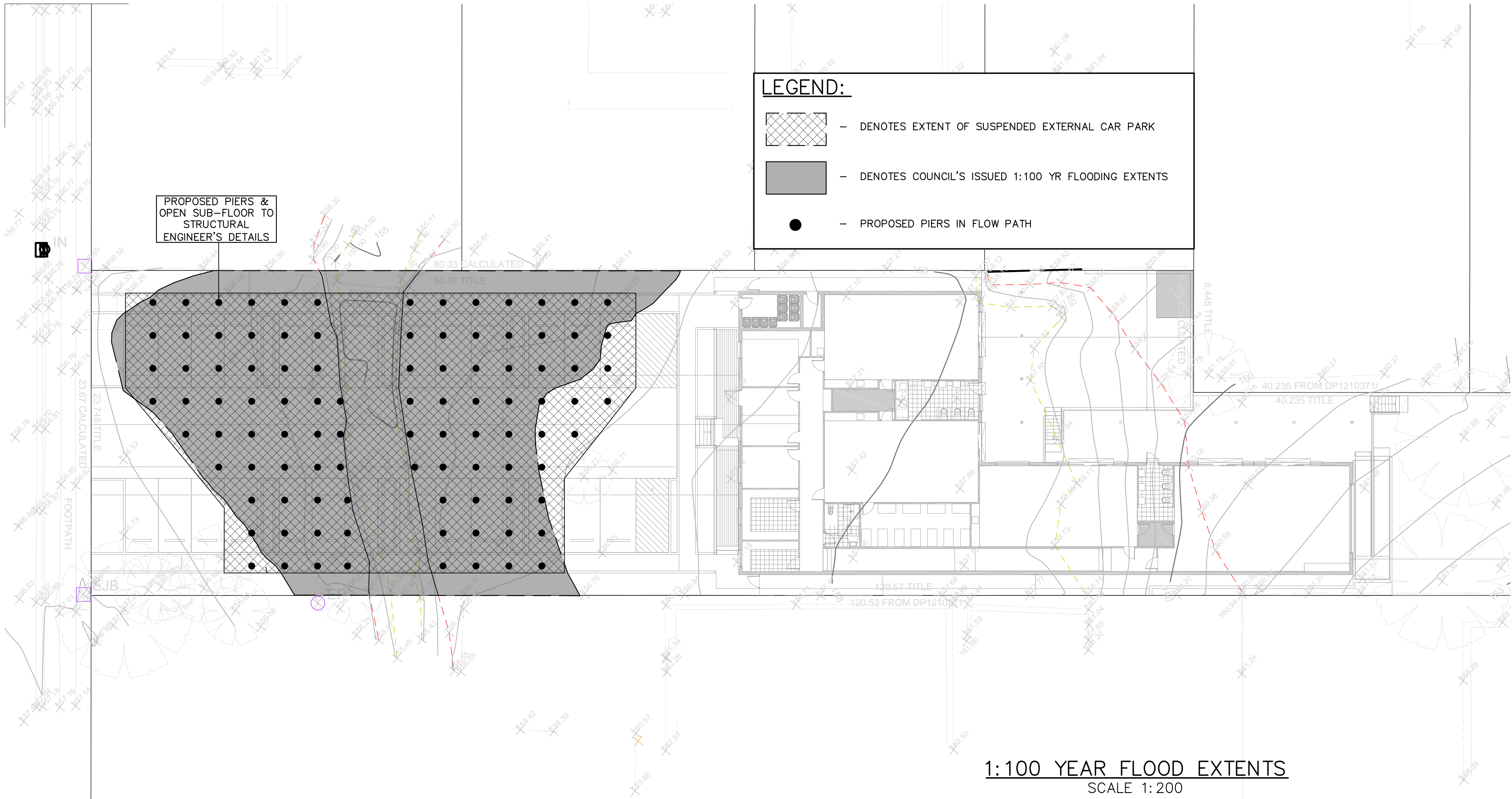
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8 Buller Street, North Parramatta

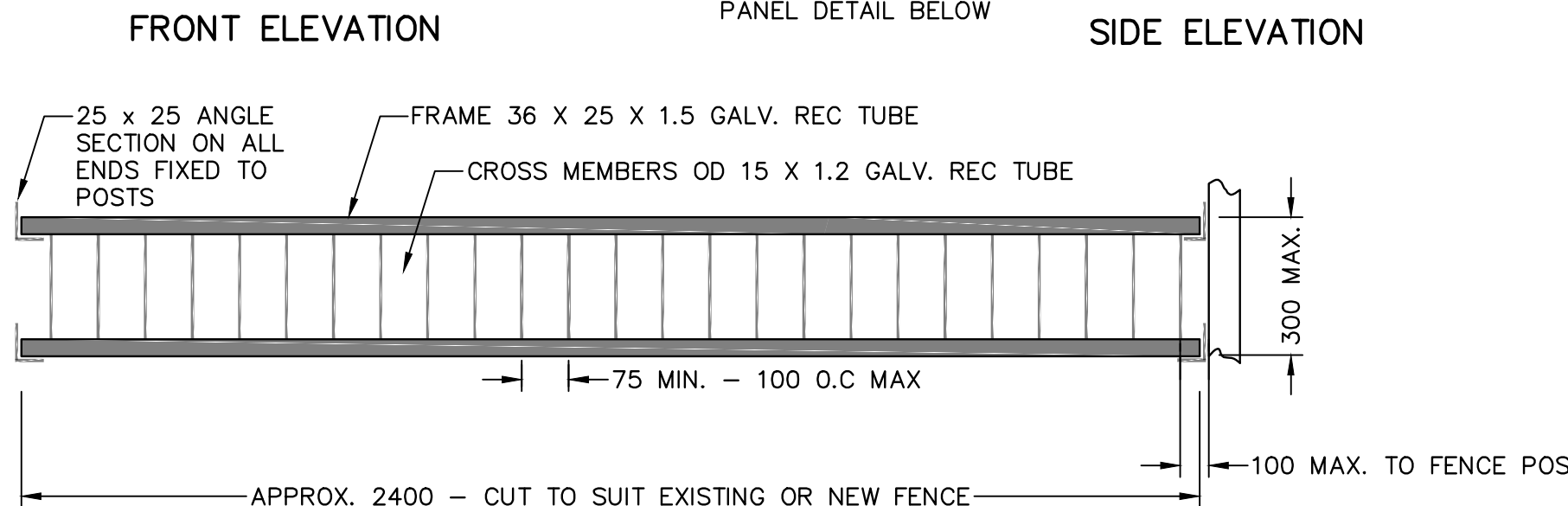
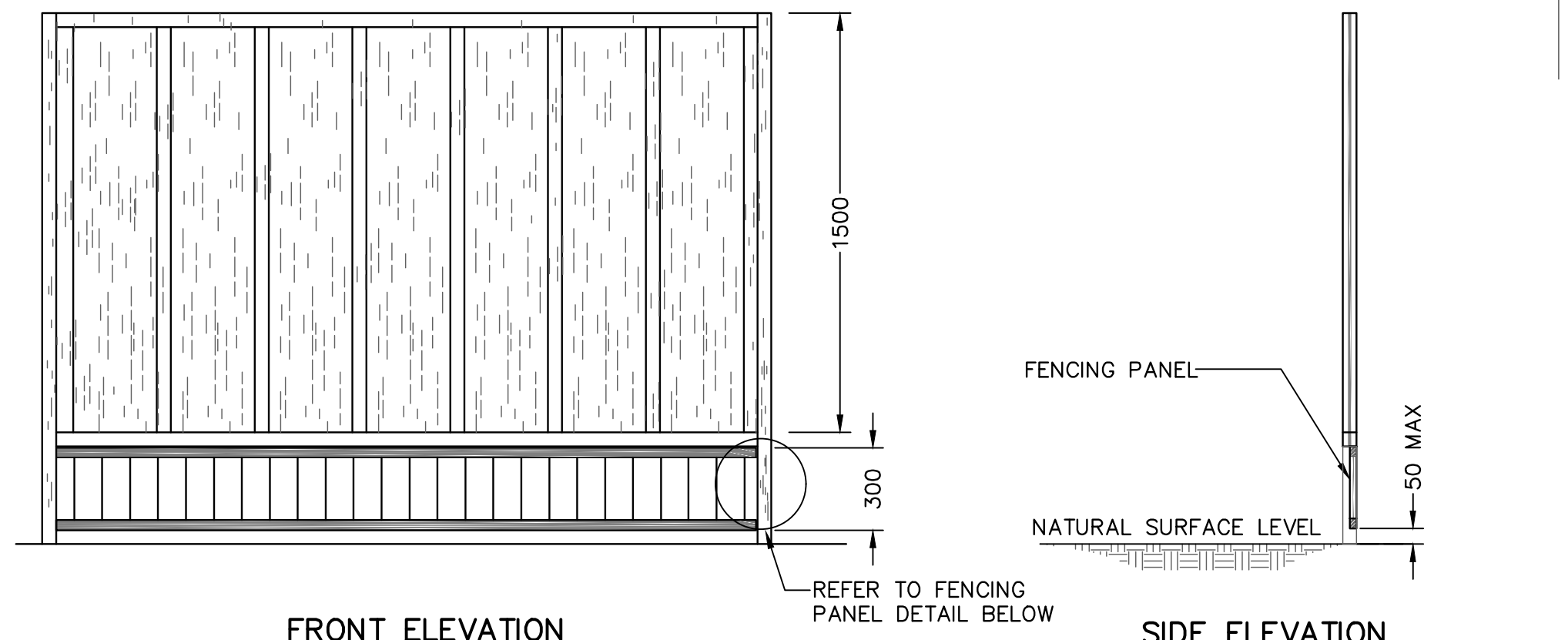
Appendix 4

Flood Mitigation Plan

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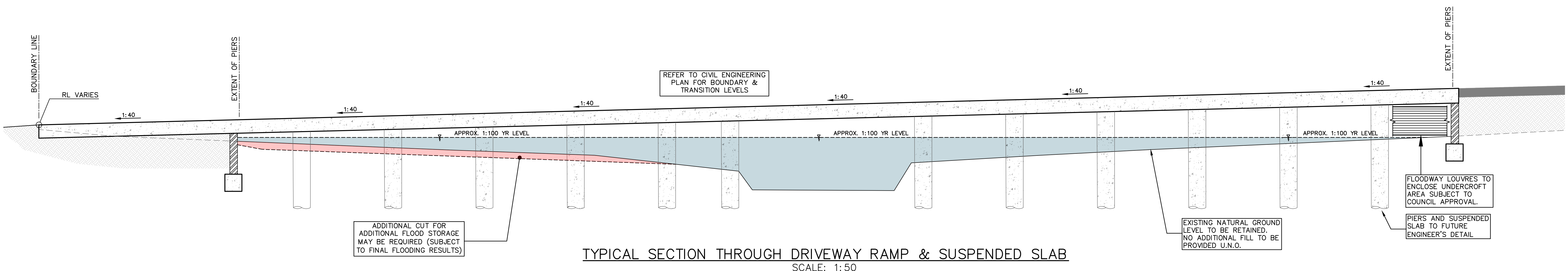


1:100 YEAR FLOOD EXTENTS
SCALE 1:200



FENCING PANEL DETAIL
FENCING PANEL COLOUR - POWDER COATED TO SUIT SITE (BLACK OR DARK GREEN)

OVERLAND FLOW/ FLOOD-TYPE FENCING
SCALE NOT TO SCALE



TYPICAL SECTION THROUGH DRIVEWAY RAMP & SUSPENDED SLAB
SCALE: 1:50

PROPOSED CHILDCARE CENTER 85 BROOK STREET, MUSWELLBROOK

Scale 1:100 @ A1 Date 04/05/2023 Drawn M.W. Design M.W. Approved P.E.



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Rev	Description	By	Chk	Date
A	FOR CO-ORDINATION	M.W.	M.W.	04/05/2023

Architect
JANSSEN
DESIGN
PO BOX 41
KENTHURST NSW 2156
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0423 216 636



FOR COUNCIL / CONSTRUCTION CERTIFICATE ISSUE
APPROVED BY: P. EL-BAYEH
PAUL EL-BAYEH
B.E. (CIVIL), M.E. (STRUCTURE & FOUNDATION)
REASUT, CPENG No. 3132140, NDIS, RPFO
DATE: 04/05/2023
Engineers Australia

FOR COUNCIL APPROVAL ONLY (CONCEPT)

Title
FLOOD MAP (1:100 YR) & PROPOSED MITIGATION MEASURES

DO NOT SCALE DRAWING, USE FIGURED DIMENSIONS ONLY

North

Project Number
SW23077

Drawing Number
FL010

Revision
A



CONTACT DETAILS

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