Mackenzie Architects International

Flood Risk Assessment and Flood Emergency Response Plan (FERP): 3 Gondola Road, North Narrabeen NSW

ENVIRONMENTAL

WATER

WASTEWATER

GEOTECHNICAL

CIVIL

PROJECT MANAGEMENT

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Limitations Statement

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All enquiries regarding this project are to be directed to the Project Manager.

Contents

1 Introduction

1.1 Overview

Martens & Associates Pty Ltd (MA) have prepared this flood risk assessment and flood emergency response plan (FERP) to support a development application (DA) for a proposed shop top housing development at 3 Gondola Road, North Narrabeen NSW (the site). Refer to architectural plans provide by Mackenzie Architects International for the proposed site layout and Attachment A for site survey.

1.2 Project Scope and Objectives

Project scope and objectives are:

1. Review Northern Beaches Council flood mapping, flooding controls and proposed development plans.
2. Consult with architect regarding site design for flooding compliance.
3. Prepare a flood risk management plan including:
    a. Site flooding mechanisms and characteristics.
    b. Flood storage calculations and relevant plans to demonstrate no loss of flood storage.
    c. Flood emergency response plan requirements, including:
        i. Flood warning mechanisms.
        ii. Roles and responsibilities.
        iii. Flood response phases and triggers.
        iv. Evacuation and/or shelter-in-place requirements.
    d. Prepare a compliance assessment in accordance with Northern Beaches Council floodplain development controls including, Pittwater DCP B3.11 Flood Prone Land.

1.3 Relevant Guidelines

This report has been prepared in accordance with the following guidelines and policies:

1. Australian Institute for Disaster Resilience (2012), *Technical flood risk management guideline: Flood hazard.*
2. Commonwealth of Australia (2019), *Australian Rainfall and Runoff – A Guide to Flood Estimation.*
3. Northern Beaches Council (2020), Pittwater 21 Development Control Plan.
4. Northern Beaches Council (2022a), Pittwater Local Environmental Plan 2014.
5. Northern Beaches Council (2022b), Guidelines for development on flood prone land.
6. NSW Department of Infrastructure, Planning and Natural Resources (2005), *Floodplain Development Manual*.

1.4 Definitions

AEP	Annual exceedance probability: the probability of a flood event occurring within a year. A 1% AEP flood has a 1% chance of occurring in any given year.
ARI	Average recurrence interval: the average time between flood events occurring. A 1 in 100 year ARI flood occurs on average once every 100 years.
ARR	Australian Rainfall & Runoff
BOM	Bureau of Meteorology
Council	Northern Beaches Council (NBC)
DA	Development application
FERP	Flood emergency response plan
FFL	Finished floor level
FLI	Flood level indicator
FPL	Flood planning level

FRA	Flood risk assessment
FRAP	Flood risk action plan
IFD	Intensity frequency duration: design rainfall data for frequent and infrequent storm events.
MA	Martens & Associates Pty Ltd
MAI	Mackenzie Architects International
PMF	Probable maximum flood: the most extreme flood event possible for a certain location, with an approximate ARI of 100,000 to 10,000,000 years.

2 Site Description and Flooding Characteristics

2.1 Location and Site Description

Existing site description summary is provided in Table 1.

Table 1: Existing site description summary. Refer to Attachment A for site survey.

Address	3 Gondola Road, North Narrabeen NSW
Lot / DP	Lot 188 in DP 16719
Site Area	638.7m^2
Local Government Area (LGA)	Northern Beaches Council (NBC)
Current Land Use	Commercial
Current Zoning	B2 – Local Centre
Site Description	The site consists of a two-storey commercial building with a two-level carpark at the rear of the site, one at ground level and a first-floor carpark that is accessible via an elevated ramp. The lot is covered with concrete apart from a small garden area out the front.
Surrounding Land Uses	The site is surrounded by a single storey commercial building to the west, a residential development to the south, Gondola Road to the north with commercial and residential buildings across the road, a grass field to the east, and a residential development to the south.
Site Elevation	The site is relatively flat with an average elevation of approximately 2.0 mAHD. Site elevation ranges between 1.96 mAHD in the north eastern corner and 2.13 mAHD in the south western corner of the site.
Site Grading & Aspect	Approximately < 3%, North / NE aspect
Site Drainage	The site is located at the base of a valley between two adjacent northwest-southeast aligned ridges approximately 50m south of Nareen Creek channel and 120m west of Narrabeen Lagoon. Drainage is via overland flow to the Council stormwater network on Gondola Road.

2.2 Proposed Development

Refer to architectural drawings prepared by Mackenzie Architects International (MAI) for proposed site layout. The proposed development will include:

- Demolition of existing structures on site.
- Construction of a new shop top housing development including:
  - Two levels of residential apartments consisting of 4 units per level, 8 units in total.

- An upper ground podium level consisting of one commercial unit and building services such as, bin/waste rooms, storage rooms, and electrical services.
- A two-level enclosed carpark consisting of a lower ground level and basement level.
- A carpark access ramp on the west side of the building connecting Gondola Road to the upper ground level and descending down to the lower and basement carparks via the rear of the building.
- A communal roof top area including an indoor area, covered BBQ area, and an open space with gardens.

2.3 Flood Data

2.3.1 Previous Local Flood Studies

A review of previous flood investigations was undertaken to assess likely local flood behaviour and characteristics for the site and local catchment. Review identified one previous flood study which would be relevant to this report.

BMT WBM (2013) conducted a flood assessment for this catchment on behalf of NBC, and summarised the assessment in the report *Narrabeen Lagoon Flood Study Final Report,* hereafter referred to as the BMT WBM flood study. As part of their study, BMT WBM used RAFTS for hydrologic modelling and TUFLOW for hydraulic modelling. The study included details of model inputs and results, and was relied upon for determining site flood characteristics for the flood risk assessment and FERP. Flood maps including peak flood levels and extents for the 1% AEP (with and without climate change) and PMF events are provided in Attachment B.

2.3.2 Council Data

In addition, a comprehensive flood information report has been acquired from NBC and is provided in Attachment C. The report provides flood data for the site based on the BMT WBM flood study, and includes, flood levels, depths, velocities, ground surface spot heights, hydraulic categories, hazards and flood maps. A summary of key data has been provided in table 2.

Table 2: Council flood information report summary.

Element	Site Details
1% AEP Flood Level	3.03 mAHD
1% AEP (CC) Flood Level [1]	3.90 mAHD
PMF Flood Level	4.89 mAHD
Flood Planning Level (FPL) [2]	4.40 mAHD
Flood Life Hazard Category	H5
1% AEP Flood Risk Precinct	High Risk Precinct
PMF Flood Risk Precinct	High Risk Precinct
1% AEP Hydraulic Category	Flood storage
PMF Hydraulic Category	Flood Storage

Notes

1. CC = Climate Change, includes additional 30% rainfall intensity and 0.9 m sea level rise.
2. FPL = Flood Planning level (1% AEP (CC) flood level plus 0.5m freeboard).

2.4 Flooding Behaviour

Based on the BMT WBM flood study and Councils flood information report, we note the following for flooding at the site.

2.4.1 Catchment Description

We note the following regarding the catchment upstream of the site:

- The site is located within the Nareen Creek catchment within the wider Narrabeen Lagoon catchment.
- The Nareen Creek catchment is primarily urbanised with residential and some commercial land use. There are some bushland/wetland areas such as Narroy Park along the creek. The catchment has an area of approximately 160 ha.
- The Narrabeen Lagoon catchment is comprised of bushland and urban areas. Garigal National Park encompasses a large portion of the catchment's western region. Urban areas are located primarily along the catchments perimeter from north to east to south, including the suburbs of Warriewood, Elanora Heights, North Narrabeen, Narrabeen, Cromer, Beacon Hill, and Oxford Falls.
- The wider catchment's total area is approximately 5,500 ha and is shown in figure 1-1 of the Narrabeen Lagoon Flood Study (BMT WBM, 2013).

2.4.2 Site Flood Characteristics and Mechanisms

The following flood mechanisms and characteristics have been determined based on the average site level of approximately 2.05 mAHD:

- The site is affected by local catchment flooding including overbank flows from Nareen Creek and overland flows at the site. Local catchment flooding poses an increased risk of flash flooding due to the catchments small size (BMT WBM, 2013).

- The site is also affected by flood overbank flows from Narrabeen Lagoon. This is the dominant flood mechanism contributing to peak flood levels at the site. (BMT WBM, 2013).

- Constriction of the Narrbeen Lagoon floodway at the lagoon entrance downstream of the site, combined with intermittent closing & opening of the lagoon entrance, causes flood waters to back up onto the site and prolong the duration of inundation.

- The 1% AEP critical storm duration event for the Narrabeen Lagoon catchment is 9 hours, and produces a maximum water level of 3.03 mAHD, a maximum depth of 0.98m, and maximum velocity of 0.19 m/s at the site.

- The PMF critical storm duration event for the lagoon catchment is 5 hours, and produces a maximum water level of 4.89 mAHD, a maximum depth of 2.84m, and a maximum velocity of 0.48 m/s at the site.

- The 1% AEP with climate change event produces a maximum water level of 3.90 mAHD and a maximum depth of 1.85m at the site. Velocities and durations were not provided in either the BMT WBM study or Council flood report, but are expected to lie somewhere between the 1% AEP and PMF event.

- The development represents an intensification of development for the site and requires the consideration of climate change impacts. Thus, the FPL for this site is based on the 1% AEP with climate change flood level (3.90 mAHD) plus 0.5 m freeboard, equal to 4.40 mAHD.

- Flood water velocities are low at the site, less than 0.5 m/s for both the PMF and 1% AEP events. As such, flood water depth acts as the limiting factor for determining flood life hazard at the site.

3 Flood Risk Management

3.1 Overview

This section provides a flood risk assessment for the proposed development by addressing the controls set out in the Pittwater Council DCP part B3.11 'Flood Prone Land' and B3.12 'Climate Change', and in accordance with NBC guidelines for development on flood prone land.

3.2 Flood Design Details

Elements of the proposed development were iteratively and holistically designed to ensure project objectives, and compliance with council's flood planning controls were met. For detailed drawings of the proposed development including building levels, refer to the architectural plans provided by Mackenzie Architects International. A summary of prescriptive control levels and proposed floor levels is provided in Table 3.

Table 3: Building levels and prescriptive planning control levels.

Floor	Level (mAHD)	Prescriptive Flood/Level	Level (mAHD)
Residential levels	≥ 8.0	PMF (SIP) [2]	4.89
Upper ground level (FPL)	4.40	FPL	4.40
External ground level (approx.)	2.00	-	-
Lower ground level	1.00	FPL	4.40
Basement level	-2.00	FPL	4.40

Notes

1. CC = Climate Change, includes additional 30% rainfall intensity and 0.9 m sea level rise.
2. SIP = Shelter-in-place emergency response strategy. Habitable levels required to be above the PMF level (Pittwater 21 DCP B3.11 control E1).

The upper ground level and higher residential levels are above the FPL (1% AEP with climate change flood level plus 0.5 m freeboard). The residential floors (first level and above) are greater than the PMF level required for shelter in place flood emergence response. The lower ground and basement levels are below the FPL. General flood hazard mitigation strategies for these levels are described in the following sections.

3.2.1 Flood Proofing of Lower Ground Level and Basement Level

The lower ground level and basement level are located below the flood planning level of 4.40 mAHD with levels of 1.00 mAHD and -2.00 mAHD respectively. To achieve compliance with Pittwater 21 DCP part B3.11

controls A1(c), C1, D5, and D6, the proposed development will be flood proofed up to the flood planning level.

Building levels below the FPL are enclosed with all potential water entry points, such as ventilation, stairwells, elevator shafts, driveway crests and others to be located above the flood planning level. The lower floors can only be accessed from the upper ground floor with no openings to the lower floors below the FPL.

Flood water ingress via the carpark access ramp is prevented for flood waters below the FPL by using a raised driveway. The driveway ramp provides an inclined connection between Gondola Road (RL 2.0 mAHD) and the upper ground floor (RL 4.40 mAHD) before descending down to the lower ground floor and basement level via the rear of the building. This design ensures that flood water must rise to a level of 4.40 mAHD before it can enter the basement, making the basement level flood free up to the 1% AEP with climate change event plus 0.5 m freeboard (4.40 mAHD).

3.2.2 Upper Ground (Podium) Level

This level is at the FPL, we make the following comments:

- Occupants in the external ground area (approximately 2.00 mAHD) can readily access the building via the set of external stairs and platform lift at the front of the building or via the raised driveway.
- For flood levels up to the FPL (4.40 mAHD), occupants can shelter-in-place in the commercial unit and hallway areas on this level.
- For flooding levels above the FPL and approaching the PMF level, occupants can move up to refuge areas on higher levels to shelter-in-place.
    - Occupants on the lower and basement levels can access the upper ground floor via internals stairs near the centre rear of the building, and front east side of the building, or via the car ramp.
    - From the Upper ground floor occupants can access refuge areas on higher levels using the eastern flood and fire stairs.

3.2.3 Residentials Level 1 and 2 and Roof Top Level.

Residential levels and roof top levels are above the PMF flood level. Occupants can access these levels via the eastern stairway. Residence and visitors can shelter-in-place in their apartments. Commercial tenants and visitors may take refuge on the rooftop, which is protected from

inclement weather by a vergola as well as having an indoor area and amenities.

3.2.4 Flood Storage and Impact

In accordance with the applicable DCP B3.11 controls, A2, C4, and D6, the proposed development has been designed such that there is no net loss of flood storage at the site and there is no change to flood conveyance or flood impacts at the site or surrounding sites.

Design includes a permitter wall with openings around the bicycle/storage area at natural ground level at the front of the building. Openings are provided by a large open entranceway and a perforated brick wall with openings larger than 75 mm x 75 mm in accordance with DCP control F1. This open design provides additional passage and storage of flood waters up to the 1% AEP flood with climate change level (3.90 mAHD).

MA has prepared a Flood Storage Assessment based on the site survey and architectural plans. The flood storage calculations shown in table 4, demonstrate there is no net decrease in floodplain volume for any flood event up to the 1% AEP (with climate change) event, minimising any adverse flood impacts on surrounding properties.

Table 4: Building levels and prescriptive planning control levels.

Site 'built' Footprints		**Area (m^2)**	
Total site area		638.7	
Existing 'built' footprint [2]		519.2	
Proposed 'built' footprint [2]		517.4	
Levels and Depths	**1% AEP**	**1% AEP (CC) [1]**	**PMF**
Average external ground level (mAHD)	2.05	-	-
Flood level (mAHD)	3.03	3.90	4.89
Flood Depth (m)	0.98	1.85	2.84
Flood Storage	**1% AEP**	**1% AEP (CC) [1]**	**PMF**
Existing (m^3)	117.1	221.1	339.4
Proposed (m^3)	118.9	224.4	344.5
Storage change (m^3)	+ 1.8	+ 3.3	+ 5.1

Notes

1. CC = Climate Change, includes additional 30% rainfall intensity and 0.9 m sea level rise.
2. Site 'built' footprints are the building footprints at natural ground level. Footprints are shown in figures D1 and D2 in Attachment D.

The Site area is 638.7 m^2. The current building's ground level footprint is approximately 519.2 m^2 giving the site a current 1% AEP flood storage volume of 117.1 m^3. The proposed building has a ground level footprint of approximately 517.4 m^2 giving a 1% AEP flood storage volume of 118.9 m^3. Building footprint areas are shown in figures D1 and D2 in Attachment D.

3.2.5 Other Flood Hazard Mitigation Works

A summary of design elements to be implemented at detailed design stage to ensure compliance with Council's DCP is provided below:

- All structural elements below the FPL are to be constructed from flood compatible materials.
- All structures are to be designed to ensure structural integrity from flood forces and buoyancy forces by a suitably qualified structural engineer.
- All electrical equipment, wiring, fuel lines or any other service pipes below the FPL are to be waterproofed.
- The storage of toxic or potentially polluting goods, materials or other products is to be above the FPL.

3.3 Flood Durations and Hazard Assessment

This section assesses flood hazards and critical storm durations for the site to assess viable flood emergency response strategies.

The site is likely affected by the combination of shorter duration flooding from the local Nareen Creek catchment and longer duration flooding from Narrabeen Lagoon. While Lagoon flooding is the dominate contributor to water levels at the site, short-term local catchment flooding may provide little warning time for occupants to evacuate. It is likely that shelter-in-place on the first storey and above will be a viable emergency strategy and will be the preferred option over evacuation.

Flood velocities at the site are low, less than 0.5 m/s for the 1% AEP (with and without climate change) and PMF flood events. As such, flood water depths provide a limiting factor when determining life hazard categories at the site. A summary of calculated life hazard categories for the site are shown in table 5, based on ARR 2019 flood general flood hazard curves and the *Technical Flood Risk Management Guideline: Flood Hazard, Australian Institute for Disaster Resilience* (2012), in accordance with Pittwater 21 DCP B3.11 control E1.

Table 5: Calculated life flood hazards at the site.

Flood Event	Water Level (mAHD)	Water Depth (m)	Water Velocity (m/s)	Flood Life Hazard Category
1% AEP	3.03	0.98	0.19	H3
1% AEP (CC) [1]	3.90	1.85	-	H4 [2]
PMF	4.89	2.84	0.48	H5 [3]

Notes

1. CC = Climate Change, includes additional 30% rainfall intensity and 0.9 m sea level rise.
2. 1% AEP (CC) life hazard determined from limiting water depth. This assumed reasonable as both the 1% AEP and PMF life hazards are a result of limiting water depth.
3. PMF life hazard value also provided by Council in the flood information report, found in Attachment C.

The site is affected by a life hazard category of H3 or higher for all three flood events, and as such, a flood emergency assessment is required as stated in DCP B3.11 control E1.

3.3.1 Storm Durations and Shelter-in-Place Times:

Figure 7-7 of the BMT WBM study shows flood levels in Narrabeen Lagoon for the 1% AEP event for the 2-hour, 9-hour, and 18-hour critical durations, and is shown below in figure 1.

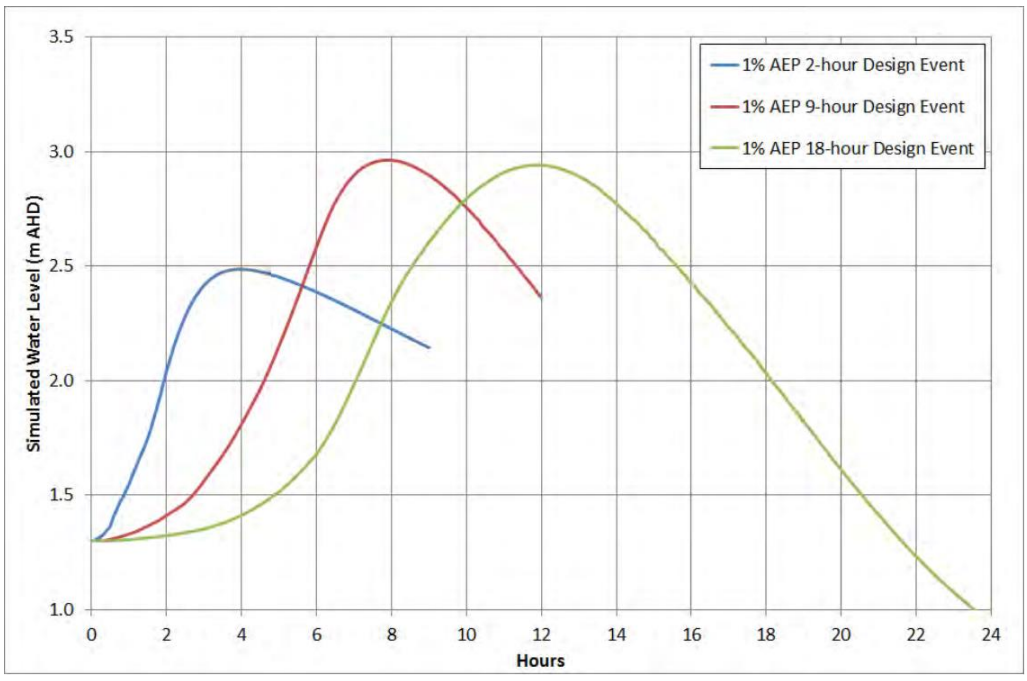

Figure 1: Simulated water level response in Narrabeen Lagoon (BMT WBM, 2013).

Evacuation along Gondola Road travelling west will be possible for the site for water levels below approximately 2.40 mAHD. The evacuation

warning times from the start of the storm event and shelter in place times have been determined based on this and can be seen in table 6 below.

Table 6: shelter in place times 1% AEP critical storm durations.

1% AEP Critical Duration Event	Warning Time / Shelter-in-Place start time (hrs)	Shelter-In-Place End Time (hrs)	Shelter in place duration (hrs)
1% AEP 2-hour	3	5.5	2.5
1% AEP 9-hour	5.5	12	6.5
1% AEP 18-hour	8	16	8

The Critical duration for the PMF is 5 hours (BMT WBM, 2013) and is expected to give little warning time (< 3 hours). The BMT WBM study did not model PMF events longer than 6 hours, however the Shelter-in-place time for the PMF event is expected to be shorter than the 1% AEP event.

3.3.2 Summary

Shelter-in-Place durations are longest for the 1% AEP and 1% AEP with climate change events with maximum shelter in place times not expected to be longer than 8 hours. This is considered reasonable as the building is water proofed above these events, allowing occupants to take refuge on the upper ground floor.

Site occupants will have between 3 and 8 hours from the start of a flood event to prepare for an emergency response before flood water levels rise to the site's external ground level. The site will likely be inundated by > 500 mm of flood waters for an extended period of time (between 2.5 and 8 hours).

4 Flood Emergency Response Plan

4.1 Overview

This FERP makes recommendations to ensure that in the event of a flood at the site, risk to personal safety and the environment is appropriately managed. The plan provides strategic level advice and assumes that detailed design of various site controls will be undertaken prior to issue of a construction certificate and implemented as part of the site's construction and on-going operation

This FERP has been prepared in accordance with control E1 of the Pittwater 21 DCP part B3.11 'Flood Prone Land', which requires a flood emergency assessment for sites which are affected by a life hazard category of H3 or higher. As stated by NBC (2022a), the site is within the high-risk flood precinct for both the 1% AEP and PMF events. The Site has a life hazard category of H3 - H5 and is likely to have little warning time in the event of a flood. As such, the primary emergency response selected for this site is shelter-in-place on the first and second floors which are above the PMF level.

4.2 Flood Warning Mechanisms

Monitoring weather forecasts and conditions near the site will help to manage the flood risk. A number of methods to monitor the risk of flooding are detailed in the following sections.

4.2.1 Bureau of Meteorology

The Bureau of Meteorology (BoM) generates a number of information sources useful for monitoring the weather forecast and conditions near the site:

1. Rainfall maps (http://www.bom.gov.au/jsp/watl/rainfall/pme.jsp) can be used to estimate the daily rainfall expected to occur over the next 24, 48, 72, and 96 hours as well as the total rainfall for the next 4 and 8 days.

2. Occasionally BoM issues Weather Warnings for NSW via their website (http://www.bom.gov.au/nsw/warnings/). These warnings provide both general warnings across NSW and warnings for more specific locations. There are two types of warnings that may indicate that flooding is imminent on the site: Severe Weather Warnings and Severe Thunderstorm Warnings. Specifically, these warnings should be monitored for references to flash flooding in the Sydney metropolitan area. Warnings are generally issued with up to 60 minutes notice however for very

large events (i.e. east coast lows), warnings may be issued with 24 hours' notice or more.

3. The radar service operated by BoM shows current rainfall location and intensity for the Sydney area (http://www.bom.gov.au/products/IDR713.loop.shtml).

4.2.2 Observing Site Flood Levels

Water level recording equipment is currently installed in Narrabeen Lagoon entrance at Ocean Street Bridge and is managed by Manly Hydraulics Laboratory (MHL), which publishes the automatically collected water levels. Recent data is shown on the MHL website (https://www.mhl.nsw.gov.au/Station-213408D) with the latest information approximately 5 minutes behind the current time. These recordings are updated every 15 minutes. Site management can monitor the website to be informed of any rise in the water levels in the Narrabeen Lagoon.

It is recommended a flood level indicator (FLI) be installed near the driveway entrance to the site, visible from the lobby. During heavy rainfall events, site occupants can visually monitor how deep flood waters are on the site to decide whether to shelter-in-place.

4.2.3 Other Warnings

Site management may also be alerted to flood warnings via the following mechanisms:

- SES emergency alert telephone warning system.
- Media warnings (TV, radio, internet etc.).
- Police and / or SES door knocking.
- Weather apps (e.g. 'Early Warning Network').

If site management or visitors / residents receive a flood warning via any of the mechanisms described above, they should undertake the shelter-in-place procedure immediately (refer Section 4.80).

4.3 Flood Engineering Control Features

The following features of the proposed site design reduce the risk of site occupants coming in contact with flood waters:

1. The proposed development's upper ground floor has a finished floor level (FFL) of 4.40 mAHD which is 1.37 m above the peak 1%

AEP flood level and 0.5m above the 1% AEP with climate change level at the site.

2. The proposed development second storey FFL is at 8.00 mAHD which is 3.11 m above the peak PMF level, hence all habitable floor levels are not affected by flood events up to and including the PMF.

3. The proposed developments lower ground and basement levels are flood proofed by use of a raised driveway (refer to part 3.2). The driveway crest prevents flood water entering the lower levels by rising up to the upper ground floor from street level before descending down to the lower levels. This prevents flood waters below 4.40 mAHD from entering the building.

4. Signage within the building will notify occupants not to leave the building if flood waters are present on the site.

4.4 Roles and Responsibilities

4.4.1 Site Management

The managers of the site have the responsibility to implement and maintain the requirements of this FERP. Specifically, they are to ensure that:

- The flood related signage is installed, maintained, and legible at all times.
- Management and staff are subscribed to flood and weather warnings systems/services and are trained in the application of the FERP and interpretation of rainfall and weather warning information published by BOM.
- Monitor weather forecasts and flood warnings daily.
- Ensure any alerts received from the flood warnings, media alerts, Early Warning Network app, BoM, or otherwise are issued directly via phone call or text message to all residents.
- A suitable number of flood kits are kept on the premises which are to include a first aid kit, portable radio and spare batteries, megaphone, torch and spare batteries, hi-vis vests.
- Advise all occupants that flooding is possible.
- Ensure residents are well informed about flood risks and emergency procedures.

- Check that residents have and are maintaining their own flood emergency kits.
- The FERP is kept up to date.
- The FERP is reviewed a minimum of every 5 years or following flood events which trigger an emergency response.
- The site is cleaned and checked following a flood event.
- Sufficient financial resources are provided for the above.
- Keep hard copies of the FERP on site and accessible to all residents and staff.
- Implement the procedures in this FERP in the event of a flood.
- Liaise with residents and emergency services in the event of a flood.

Site Management will be legally responsible to ensure that these tasks are occurring.

4.4.2 Occupants

All persons within the premises are to follow the directions of site management, the and signage related to flooding during a flood event on site.

4.4.3 Residents

Residents including management of the upper ground floor commercial premises, have the responsibility to follow directions from site management as stated above and to also keep their flood kits properly stocked and maintained.

4.5 Flood Response Phases and Triggers

4.5.1 Overview

There are four flood response phases for flooding on the site:

- **Prepared** – will apply at all times when the other phases do not apply.
- **Alert** – this is triggered when heavy rainfall is forecast or a severe weather warning is issued indicating potential flooding at the site.

- **Respond** – this occurs when a flood response is triggered by one of several means indicating a flood is occurring or is likely to occur at the premises.

- **Recover** – this occurs following a flood response operation of any scale and lasts until operations have returned to normal, after which the 'Prepare' phase applies.

4.5.2 Prepared

During the Prepared phase, weather forecasts and warnings are checked daily and the flood emergency response plan arrangements are maintained including:

- Flood related signage is Installed and maintained. Signs are kept legible signs and are place in appropriate areas of the building such as, at building and car park exits, advising not to enter the car park if it is flooding.

- Warning alert services are subscribed so that BOM severe weather warnings direct are received direct by mobile phone.

- All of the equipment necessary to implement the FERP is supplied and maintained.

- Relevant persons are training in the interpretation of the rainfall, flood information and warning information published by BoM.

- This FERP is kept up to date and reviewed every five years or following a flood.

4.5.3 Alert

The alert phase is triggered by any of the following:

- Heavy rainfall is forecast (≥ 100 mm in the next 24 hours).

- BoM issues a severe weather warning for the Sydney metropolitan area with a chance of flash flooding.

In the alert phase, the rain forecast and warnings are monitored every 2 hours until BoM advise that heavy rainfall has passed.

4.5.4 Respond

The respond phase is triggered by any of the following:

- BoM issues a severe weather warning for the Sydney metropolitan area with a chance of flash flooding on the site.

- SES issues an evacuation order which covers the site.

In the respond phase, management will:

- Ensure that residents are notified to shelter-in-place on the first and second floors.
- Ensure that non-residence that are unable to evacuate, shelter-in-place on the upper ground floor, and are moved the sheltered rooftop area if water levels continue to rise.
- Liaise with residents to determine how many occupants are currently on site.
- Notify the SES and site management that there are residents sheltering-in-place.
- Confirm if flood waters have receded, liaise with SES and police regarding safety of accessing the site.

If site occupants have sheltered-in-place, once emergency services advise that the flood has receded, occupants may need to evacuate and the site depending on the level of damage to the building and the accessibility of the immediate surrounding area. If structural damage is suspected, the site will be locked down until cleaning and any repairs can be made.

Normal site usage should be able to resume once the site has been checked to ensure that utilities are restored and no structural damage has occurred. These checks need to be undertaken by professionals qualified to do so. Although landscaping areas would need cleaning that would not prevent use of the premises if the building is in working order.

4.5.5 Recover

The recovery phase occurs once the flood situation has ended. If flood waters reached the interior of the building, the site should be thoroughly cleaned and repaired if necessary. In any case the building should be fully inspected to ensure all structural elements, systems and equipment are in working order and remove any debris from the site.

In any flood event affecting the site, a debrief should be held with site management and all Flood Wardens, and the FERP should be reviewed.

4.6 Shelter-in-Place Details

The first floor level of the proposed development is to be constructed at 8.0 mAHD which is located above the PMF level of 4.89 mAHD. This would enable shelter-in-place as a flood emergency response for people on site.

The shelter-in-place duration would be around 3 - 8 hours based on the 1% AEP event (refer to section 3.3). Longer duration events produce lower peak water levels, hence longer shelter in place times are not expected for this site.

The following is to be provided to enable safe shelter-in-place:

1. PMF refuge is to be available on the second storey and above of the development.

2. Reliable access to the second storey via internal stairs will available (refer to architectural plans).

3. Proposed building will be designed to resist flood forces (water and debris) and any buoyancy forces up to the PMF level. Site flood velocities are moderate and site hazards are high up to and including the PMF event, hence flood forces are expected to be appreciable.

4. Management should maintain several emergency kits including torch with spare batteries, portable radio with spare batteries, first aid kit, high visibility vest, non-slip foot ware and megaphone in communal areas with proper signage.

5. Adequate space on the upper storeys will be available. Adopting an area of 2 m^2 / person there is space for 390 people on the roof and residential floors. This is considered adequate as it is considerably more than the expected occupancy of the building.

6. Any persons sheltering-in-place will not leave the site until directed by on-site management or emergency services.

5 Flooding Compliance Assessment

This compliance assessment was conducted in accordance with Northern Beaches Council flood planning policies and guidelines provided in the; *Pittwater Local Environmental Plan (2014)*, *Pittwater 21 Development Control Plan*, Council's *Flood Prone Land Design Standard*, and Council's *Guidelines for development on flood prone land*. We note the following based on these policies:

1. A High Flood Risk Precinct is defined as flood prone land within the 1% AEP planning area (areas below the 1% AEP flood level plus 0.5m Freeboard), that is subject to high hydraulic hazard or is within the floodway.

2. A Medium Flood Risk Precinct is all flood prone land with the 1% AEP planning area that is not within the High Flood Risk Precinct.

3. A Low Flood Risk Precinct is defined as flood prone land (areas within the extent of the PMF) that are not within the High or Medium Flood Risk Precincts.

4. The site is classified as a 'high flood risk precinct' by NBC.

5. The proposed development represents an 'intensification of development' for the site and is required by NBC to use a higher FPL that considers the impact of climate change. This FPL is equal to the 1% AEP plus climate change level, plus 0.5m freeboard, which is equal to 4.40 mAHD. Climate change levels were determined using the 1% AEP event with a 30% increase in rainfall and a 0.9m increase in sea level.

6. The site lies below the 1% AEP flood and is identified as a 'flood storage' hydraulic category for both the 1% AEP and PMF events by NBC (2022).

7. The site is affected by a life hazard category of H3 – H5, thus, a flood emergency assessment is required as part of this report (see sections 3 & 4).

Compliance of the proposed development with NBC flood planning policies and guidelines relating to flood risk management is outlined in Table 7. NBC requires compliance with the Pittwater LEP (2014) and the Pittwater 21 DCP for the proposed development. Flood specific controls are provided in part B3.11 'Flood Prone Land'. We note that:

- The proposed development is classified as 'shop top housing' which is defined as "one or more dwellings above a ground floor retail premises" in the Pittwater LEP Dictionary (2014).

- Shop top housing is classified as a residential land use group according to B3.11, Table 1.

This assessment demonstrates that the proposed development complies with Council's flood requirements.

Figure 2: Development Control Matrix from Pittwater 21 DCP (2014) **part** B3.11 'Flood Prone Land' with prescriptive controls highlighted.

		High Flood Risk Precinct				
		Vulnerable & Critical Use	Residential Use	Business & Industrial Use	Recreational & Environmental Use	Subdivision & Civil Works
A	Flood effects caused by Development	A1 A2	A1 A2	A1 A2	A1 A2	A1 A2
B	Building Components & Structural	B1 B2 B3	B1 B2 B3	B1 B2 B3	B1 B2 B3	
C	Floor Levels	C2 C3	C1 C3 C4 C6	C1 C3 C4 C6 C7	C3	C5
D	Car Parking	D1 D2 D3 D4 D7	D1 D2 D3 D4 D5 D6	D1 D2 D3 D4 D5 D6	D1 D2 D3 D4 D5 D6	D1
E	Emergency Response	E1 E2	E1	E1	E1	E3
F	Fencing	F1	F1	F1	F1	F1
G	Storage of Goods	G1	G1	G1	G1	
H	Pools	H1	H1	H1	H1	H1

Table 7: Compliance with Northern Beaches Council, Pittwater 21 DCP (2014) part B3.11 Flood Prone Land, development control matrix prescriptive controls.

Pittwater 21 DCP B3.11 Flood Prone Land Requirement	Compliance
A. FLOOD EFFECTS CAUSED BY DEVELOPMENT	
A1 Development shall not be approved unless it can be demonstrated in a Flood Management Report that it has been designed and can be constructed so that in all events up to the 1% AEP event: a. There are no adverse impacts on flood levels or velocities caused by alterations to the flood conveyance; and b. There are no adverse impacts on surrounding properties; and c. It is sited to minimise exposure to flood hazard. Major developments and developments likely to have a significant impact on the PMF flood regime will need to demonstrate that there are no adverse impacts in the Probable Maximum Flood.	(1) The proposed development will not materially affect flood levels velocities or conveyance, and will cause no adverse flood impacts on the site and surrounding properties due to the following: a. The site is classified as a 'flood storage' hydraulic category by NBC for both the 1% AEP and PMF events and is located outside the floodway. b. The proposed developments footprint is approximately equal in size to the existing structure and is negligibly different in shape. c. There is no net loss of flood storage on the site due to the proposed development (refer to section 3.2.4). (2) The proposed development minimises exposure to flood hazards by flood proofing all levels up to the upper ground level which is equal to the flood planning level of 4.40 mAHD, and by constructing all habitable floor levels above the PMF level (refer to section 3.2). (3) There are no material changes to offsite PMF levels, and there are no properties which become flood affected in the PMF as a result of the proposed development.
A2 Development shall not be approved unless it can be demonstrated in a Flood Management Report that in all events up to the 1% AEP event there is no net loss of flood storage. Consideration may be given for exempting the volume of standard piers from flood storage calculations. If Compensatory Works are proposed to balance the loss of flood storage from the development, the Flood Management Report shall include detailed calculations to demonstrate how this is achieved.	(4) As discussed at (1)c. There is no net loss of flood storage caused by the proposed development for all flood events with flood levels less than or equal to the FPL. (Refer to section 3.2.4 for flood storage calculations).
B. BUILDING COMPONENTS AND STRUCTURAL SOUNDNESS	
B1 All buildings shall be designed and constructed with flood compatible materials in accordance with "Reducing Vulnerability of Buildings to Flood Damage: Guidance on Building in Flood Prone Areas", Hawkesbury-Nepean Floodplain Management Steering Committee (2006).	(5) All structural elements, external and internal finishes up to the FPL of 4.40 mAHD are to be constructed from flood compatible building components. Building materials shall be design considering the forces of the floodwater, debris, buoyancy and inundation. Details will be provided at detailed design stage.

Pittwater 21 DCP B3.11 Flood Prone Land Requirement		Compliance	
B2	All new development must be designed and constructed to ensure structural integrity up to the Flood Planning Level, taking into account the forces of floodwater, wave action, flowing water with debris, buoyancy and immersion. Where shelter-in-place refuge is required, the structural integrity for the refuge is to be up to the Probable Maximum Flood level. Structural certification shall be provided confirming the above.	(6)	All structures are to be constructed from flood compatible building components and buildings shall be designed considering the forces of the floodwater, debris, buoyancy and inundation up to the PMF level of 4.89 mAHD. Details will be provided at detailed design stage.
B3	All new electrical equipment, power points, wiring, fuel lines, sewerage systems or any other service pipes and connections must be waterproofed and/or located above the Flood Planning Level. All existing electrical equipment and power points located below the Flood Planning Level within the subject structure must have residual current devices installed that turn off all electricity supply to the property when flood waters are detected.	(7)	All electrical services, power points, fittings, and equipment are to be placed above the FPL and / or waterproofed.
C. FLOOR LEVELS			
C1	New floor levels within the development shall be at or above the Flood Planning Level.	(8)	The proposed (commercial) upper ground floor has a level of 4.40 mAHD which is equal to the FPL. The upper ground floor and above residential floors are thus compliant with Councils minimum floor level requirement.
		(9)	The proposed development's basement and lower ground floors are flood proofed up to the FPL by the carpark access ramp. The ramp first ascends up to the upper ground floor from street level before descending down to lower floors, requiring flood water to rise up to the FPL of 4.40 mAHD before it can enter the lower floors. The lower floors can only be accessed from the upper ground floor with no openings to the lower floors below the FPL (refer to section 3.2).
C3	All new development must be designed and constructed so as not to impede the floodway or flood conveyance on the site, as well as ensuring no net loss of flood storage in all events up to the 1% AEP event. For suspended pier/pile footings: a) The underfloor area of the dwelling below the 1% AEP flood level is to be designed and constructed to allow clear passage of floodwaters, taking into account the potential for small openings to block; and b) At least 50% of the perimeter of the underfloor area is of an open design from the natural ground level up to the 1% AEP flood level; and c) No solid areas of the perimeter of the underfloor area would be permitted in a floodway	(10)	As discussed at (1), the proposed development causes no net loss of flood storage and no adverse change to flood conveyance on the site (refer to section 3.2 for more details).
		(11)	As discussed at (1), the proposed development does not produce adverse flood effects on the site or surrounding properties. The site is classified as flood storage for the 1% AEP and PMF events by NBC and thus development does not affect the floodway.

Pittwater 21 DCP B3.11 Flood Prone Land Requirement			Compliance
C4	A one-off addition or alteration below the Flood Planning Level of less than 30 square metres (in total, including walls) may be considered only where: a) it is an extension to an existing room; and b) the Flood Planning Level is incompatible with the floor levels of the existing room; and c) out of the 30 square metres, not more than 10 square metres is below the 1% AEP flood level. This control will not be permitted if this provision has previously been utilised since the making of this Plan. The structure must be floodproofed to the Flood Planning Level, and the Flood Management Report must demonstrate that there is no net loss of flood storage in all events up to the 1% AEP event.	(12)	NA
C6	Consideration may be given to the retention of an existing floor level below the Flood Planning Level when undertaking a first floor addition provided that: a) it is not located within a floodway; and b) the original foundations are sufficient to support the proposed final structure above them. The Flood Management Report must include photos and the structural certification required as per Control B2 must consider whether the existing foundations are adequate or should be replaced; and c) none of the structural supports/framing of existing external walls of are to be removed unless the building is to be extended in that location; and d) the ground floor is floodproofed.	(13)	NA
D.	**CAR PARKING**		
D1	Open carpark areas and carports shall not be located within a floodway.	(14)	NA
D2	The lowest floor level of open carparks and carports shall be constructed no lower than the natural ground levels, unless it can be shown that the carpark or carport is free draining with a grade greater than 1% and that flood depths are not increased.	(15)	NA
D3	Carports must be of open design, with at least 2 sides completely open such that flow is not obstructed up to the 1% AEP flood level. Otherwise, it will be considered to be enclosed. When undertaking a like-for-like replacement and the existing garage/carport is located on the street boundary and ramping is infeasible, consideration may be given for dry floodproofing up to the 1% AEP flood level.	(16)	NA
D4	Where there is more than 300mm depth of flooding in a car park or carport during a 1% AEP flood event, vehicle barriers or restraints are to be provided to prevent floating vehicles leaving the site. Protection must be provided for all events up to the 1% AEP flood event	(17)	NA

Pittwater 21 DCP B3.11 Flood Prone Land Requirement		Compliance	
D5	Enclosed Garages must be located at or above the 1% AEP level	(18)	NA
D6	All enclosed car parks (including basement carparks) must be protected from inundation up to the Flood Planning Level. All access, ventilation, driveway crests and any other potential water entry points to any enclosed car parking shall be above the Flood Planning Level. Where a driveway is required to be raised it must be demonstrated that there is no net loss to available flood storage in any event up to the 1% AEP flood event and no impact on flood conveyance through the site. Council will not accept any options that rely on electrical, mechanical or manual exclusion of the floodwaters from entering the enclosed carpark	(19) (20) (21)	As discussed at (9), all levels of the proposed development that are below the FPL are flood proofed, with all water entry points at or above the FPL. As discussed at (1), there is no net loss of flood storage or impact on flood conveyance on the site due to the proposed development including the driveway and access ramp. The physical structure of the proposed building and raised car ramp provide constant flood proofing for the lower levels. No mechanical, electrical, manual or temporary flood barries are used.

Pittwater 21 DCP B3.11 Flood Prone Land Requirement	Compliance
E. EMERGENCY RESPONSE	
E1 If the property is affected by a Flood Life Hazard Category of H3 or higher, then Control E1 applies and a Flood Emergency Assessment must be included in the Flood Management Report. If the property is affected by a Flood Life Hazard Category of H6, then development is not permitted unless it can be demonstrated to the satisfaction of the consent authority that the risk level on the property is or can be reduced to a level below H6 or its equivalent. If the property is flood affected but the Flood Life Hazard Category has not been mapped by Council, then calculations for its determination must be shown in the Flood Management Report, in accordance with the "Technical Flood Risk Management Guideline: Flood Hazard", Australian Institute for Disaster Resilience (2012). Where flood-free evacuation above the Probable Maximum Flood level is not possible, new development must provide a shelter-in-place refuge where: a) The floor level is at or above the Probable Maximum Flood level; and b) The floor space provides at least 2m2 per person where the flood duration is long (6 or more hours) in the Probable Maximum Flood event, or 1m2 per person for less than 6 hours; c) It is intrinsically accessible to all people on the site, plainly evident, and self-directing, with sufficient capacity of access routes for all occupants without reliance on an elevator; and d) It must contain as a minimum: sufficient clean water for all occupants; portable radio with spare batteries; torch with spare batteries; and a first aid kiT Class 10 classified buildings and structures (as defined in the Building Codes of Australia) are excluded from this control. In the case of change of use or internal alterations to an existing building, a variation to this control may be considered if justified appropriately by a suitably qualified professional. Note that in the event of a flood, occupants would be required to evacuate if ordered by Emergency Services personnel regardless of the availability of a shelter-in-place refuge.	(22) Refer to section 4 for Flood Emergency Response Plan. (23) The site is affected by Flood Life Hazard Category of H3 - H5 (refer to section 3.3). A Shelter in Place response has been determined as the primary response for the site (refer to section 4). (24) Inundation during floods is expected to be 3 to 8 hours with little warning time as the site is located in the low-lying region of the Narrabeen Lagoon and Nareen Creek catchments. (25) Upper ground floor level is 4.40 mAHD and can provide refuge for the 1% AEP and 1% AEP with climate change flood events. (26) Minimum habitable floor level of the proposed development is at 8.0 mAHD which is above the PMF level of 4.89 mAHD. (27) The proposed development provides 387.66 m^2 of sheltered floor space on each of the two residential levels plus another 14.66 m^2 of sheltered floor space on the rooftop level enabling safe occupation for all occupants and visitors including ground floor occupants up to and including the PMF event. (28) Upper floors and apartments are sensibly laid out and are easily and intrinsically accessibly via stairways from lower floors. (29) A suitable number of flood kits are to be kept on each floor of the premises by building management and in apartments by occupants. Flood kits are to include a first aid kit, portable radio and spare batteries, torch and spare batteries, hi-vis vests and water bottles. (30) Refer to sections 3 and 4 for more details.

Pittwater 21 DCP B3.11 Flood Prone Land Requirement		Compliance	
F. FENCING			
F1	Fencing, (including pool fencing, boundary fencing, balcony balustrades and accessway balustrades) shall be designed so as not to impede the flow of flood waters and not to increase flood affectation on surrounding land. At least 50% of the fence must be of an open design from the natural ground level up to the 1% AEP flood level. Less than 50% of the perimeter fence would be permitted to be solid. Openings should be a minimum of 75 mm x 75mm.	(31)	The fence walls at the front of the site, at the site boundaries with no. 5, and no. 1 Gondola Rd are to be made from perforated brick. Fence walls will be more than 50% open, and will be comprised of openings greater than 75mm x 75 mm.
G. STORAGE OF GOODS			
G1	Hazardous or potentially polluting materials shall not be stored below the Flood Planning Level unless adequately protected from floodwaters in accordance with industry standards.	(32)	Hazardous or potentially polluting materials are not expected to be stored on site.
H. POOLS			
H1	Pools located within the 1% AEP flood extent are to be in-ground, with coping flush with natural ground level. Where it is not possible to have pool coping flush with natural ground level, it must be demonstrated that the development will result in no net loss of flood storage and no impact on flood conveyance on or from the site. All electrical equipment associated with the pool (including pool pumps) is to be waterproofed and/or located at or above the Flood Planning Level. All chemicals associated with the pool are to be stored at or above the Flood Planning Level.	(33)	NA

6 Conclusion

A review of relevant flood information indicates that the site is impacted by short duration local catchment flooding and longer duration lagoon flooding. Flood levels rise rapidly at the site for the 1% AEP and PMF events, giving little warning time, and inundating the site for extended periods of time. The site is located outside of the floodway for all flood events and is classified as a flood storage hydraulic category.

Hazards during flood events are high, with the site being classified as a high-risk flood precinct for both the 1% AEP and PMF events. The site is affected by a flood life hazard category of H3 for the 1% AEP event and H5 for the PMF event.

A FERP has been prepared to ensure that the site can operate safely in the floodplain environment. The proposed development incorporates several flood mitigation measures which allow for shelter-in-place to be used as an appropriate emergency response. With the implementation of the FERP procedures the risk to life is reduced to acceptable levels.

A Flood Risk Assessment, Flood Storage Assessment and a compliance assessment have been provided and demonstrate that the proposed development is compatible with the existing floodplain environment and achieves Council's flood planning requirements. We note that:

1. The proposed development would have acceptable offsite flood impacts.

2. Compliance with Council flood planning level requirements for building and car park levels are achieved.

3. The proposed development satisfies flood hazard and flood storage controls set out in Council's DCP.

Proposed flood characteristics will be largely consistent with existing conditions, and differences due to the proposed development are negligible.

7 References

Australian Institute for Disaster Resilience (2012), *Technical flood risk management guideline: Flood hazard.*

Ball J, Babister M, Nathan R, Weeks W, Weinmann E, Retallick M, Testoni I, (Editors) (2019), *Australian Rainfall and Runoff: A Guide to Flood Estimation*, Commonwealth of Australia.

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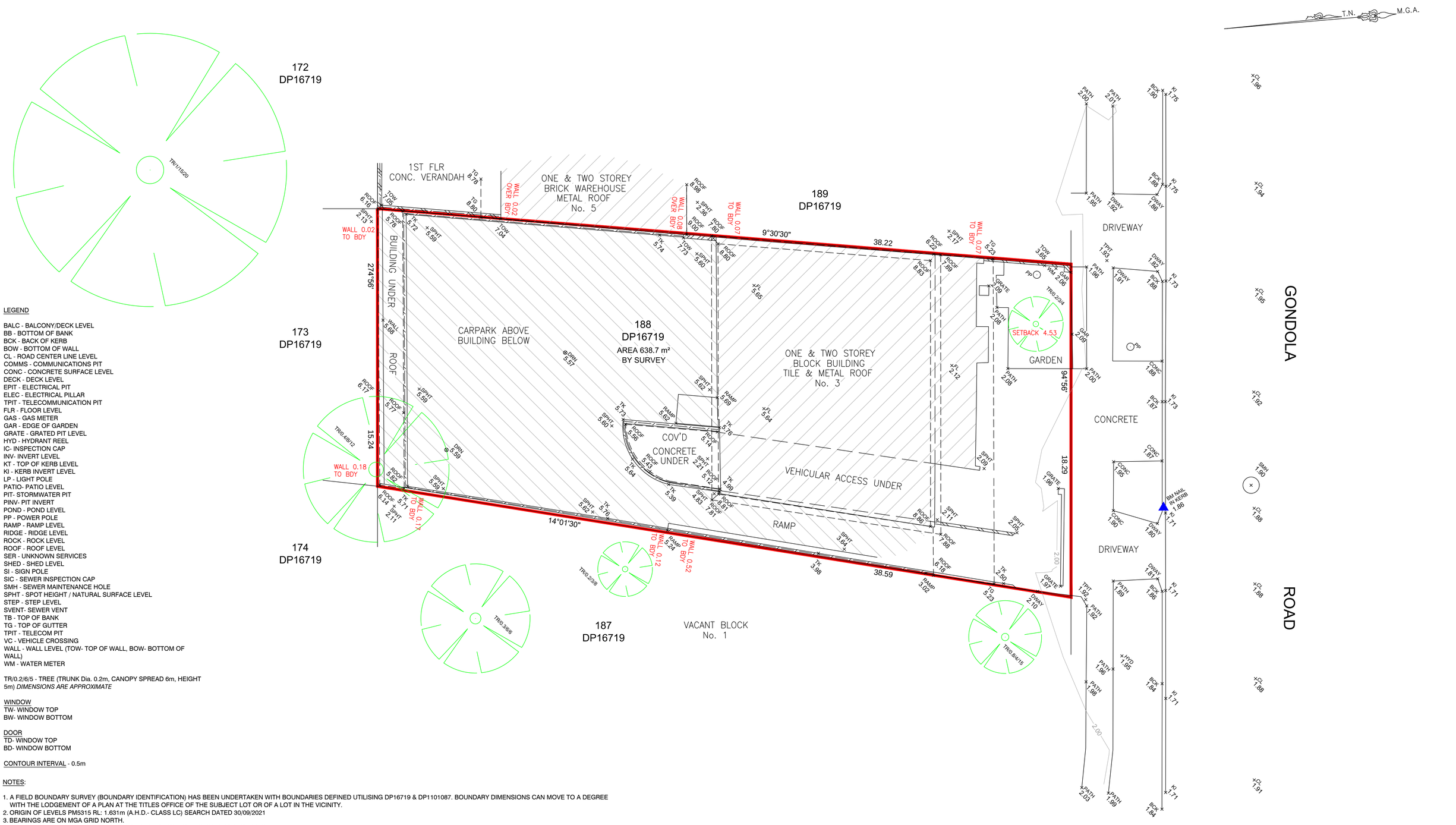
Northern Beaches Council (2020) Pittwater 21 Development Control Plan

Northern Beaches Council (2022a) Pittwater Local Environmental Plan 2014

Northern Beaches Council (2022b), Guidelines for development on flood prone land, https://www.northernbeaches.nsw.gov.au/planning-and-development/building-and-renovations/development-applications/guidelines-development-flood-prone-land.

NSW Department of Infrastructure, Planning and Natural Resources (2005), *Floodplain Development Manual*.

8 Attachment A: Site Survey



LEGEND

BALC - BALCONY/DECK LEVEL
BB - BOTTOM OF BANK
BCK - BACK OF KERB
BOW - BOTTOM OF WALL
CL - ROAD CENTER LINE LEVEL
COMMS - COMMUNICATIONS PIT
CONC - CONCRETE SURFACE LEVEL
DECK - DECK LEVEL
EPIT - ELECTRICAL PIT
ELEC - ELECTRICAL PILLAR
TPIT - TELECOMMUNICATION PIT
FLR - FLOOR LEVEL
GAS - GAS METER
GAR - EDGE OF GARDEN
GRATE - GRATED PIT LEVEL
HYD - HYDRANT REEL
IC- INSPECTION CAP
INV- INVERT LEVEL
KT - TOP OF KERB LEVEL
KI - KERB INVERT LEVEL
LP - LIGHT POLE
PATIO- PATIO LEVEL
PIT- STORMWATER PIT
PINV- PIT INVERT
POND - POND LEVEL
PP - POWER POLE
RAMP - RAMP LEVEL
RIDGE - RIDGE LEVEL
ROCK - ROCK LEVEL
ROOF - ROOF LEVEL
SER - UNKNOWN SERVICES
SHED - SHED LEVEL
SI - SIGN POLE
SIC - SEWER INSPECTION CAP
SMH - SEWER MAINTENANCE HOLE
SPHT - SPOT HEIGHT / NATURAL SURFACE LEVEL
STEP - STEP LEVEL
SVENT- SEWER VENT
TB - TOP OF BANK
TG - TOP OF GUTTER
TPIT - TELECOM PIT
VC - VEHICLE CROSSING
WALL - WALL LEVEL (TOW- TOP OF WALL, BOW- BOTTOM OF WALL)
WM - WATER METER

TR/0.2/6/5 - TREE (TRUNK Dia. 0.2m, CANOPY SPREAD 6m, HEIGHT 5m) *DIMENSIONS ARE APPROXIMATE*

WINDOW
TW- WINDOW TOP
BW- WINDOW BOTTOM

DOOR
TD- WINDOW TOP
BD- WINDOW BOTTOM

CONTOUR INTERVAL - 0.5m

NOTES:

1. A FIELD BOUNDARY SURVEY (BOUNDARY IDENTIFICATION) HAS BEEN UNDERTAKEN WITH BOUNDARIES DEFINED UTILISING DP16719 & DP1101087. BOUNDARY DIMENSIONS CAN MOVE TO A DEGREE WITH THE LODGEMENT OF A PLAN AT THE TITLES OFFICE OF THE SUBJECT LOT OR OF A LOT IN THE VICINITY.
2. ORIGIN OF LEVELS PM5315 RL: 1.631m (A.H.D.- CLASS LC) SEARCH DATED 30/09/2021
3. BEARINGS ARE ON MGA GRID NORTH.
4. DIMENSIONED STRUCTURES (IN RED) ARE IN RELATION TO THIS BOUNDARY SURVEY.
5. RELATIONSHIP OF OTHER IMPROVEMENTS, DETAIL AND ADJOINING BUILDINGS TO THE BOUNDARY, IF CRITICAL, WILL REQUIRE FURTHER SURVEY. IF ANY FENCING OR BUILDING NEAR THE SUBJECT BOUNDARIES IT IS RECOMMENDED THAT THE BOUNDARIES BE PHYSICALLY MARKED BY A REGISTERED SURVEYOR.
6. SERVICES SHOWN ARE BASED ON VISIBLE SURFACE INDICATORS EVIDENT AT THE DATE OF SURVEY ONLY. DIAL BEFORE YOU DIG AND ALL SERVICE AUTHORITIES SHOULD BE CONTACTED PRIOR TO ANY DEVELOPMENT.
7. ROOF AND EAVE & GUTTER HEIGHTS HAVE BEEN OBTAINED BY AN INDIRECT METHOD AND ARE ACCURATE FOR PLANNING PURPOSES ONLY.
8. ADJOINING BUILDINGS AND DWELLINGS HAVE BEEN PLOTTED FOR DIAGRAMMATIC PURPOSES ONLY AND SPECIFIC DETAILS, IF CRITICAL, WILL REQUIRE FURTHER SURVEY.
9. THE DIAMETER OF TREE TRUNKS CONTAINED WITHIN TREE SYMBOLS ARE NOT TO SCALE AND ARE INDICATIVE ONLY.
10. A COVENANT (DEALING D230687) IS NOTED ON TITLE.

WALL TO BOUNDARIES AS SHOWN IN RED

ANDREW KOROMPAY **ID No.SU000114**
Surveyor Registered under The Surveying Act, 2002.

0	AK	INITIAL ISSUE	27/10/2021
REVISION	BY	REVISION DESCRIPTION	DATE

PLAN OF DETAIL OVER
No. 3 GONDOLA RD
NORTH NARABEEN , NSW, 2101.

TRUE NORTH SURVEY GROUP
REGISTERED SURVEYORS
Incorporating
NORTHWEST SURVEYS · TRUE NORTH SURVEYS · GEOMAT ENGINEERING PTY LTD

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SCALE: 1:100 @ A1 : 1:200 @ A3			DATE: 27/10/2021
CLIENT: BRETT CROWTHER			DATUM: AHD
JOB No. 2368			SHEET 1 OF 1
DRAWN	CHECKED		APPROVED
SJ	AK		AK
DRAWING No. 2368			REVISION 0

9 Attachment B: Narrabeen Lagoon Flood Report Maps (BMT WBM, 2013)

Title:

Study Locality

Figure: 1-1

Rev: A

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

N

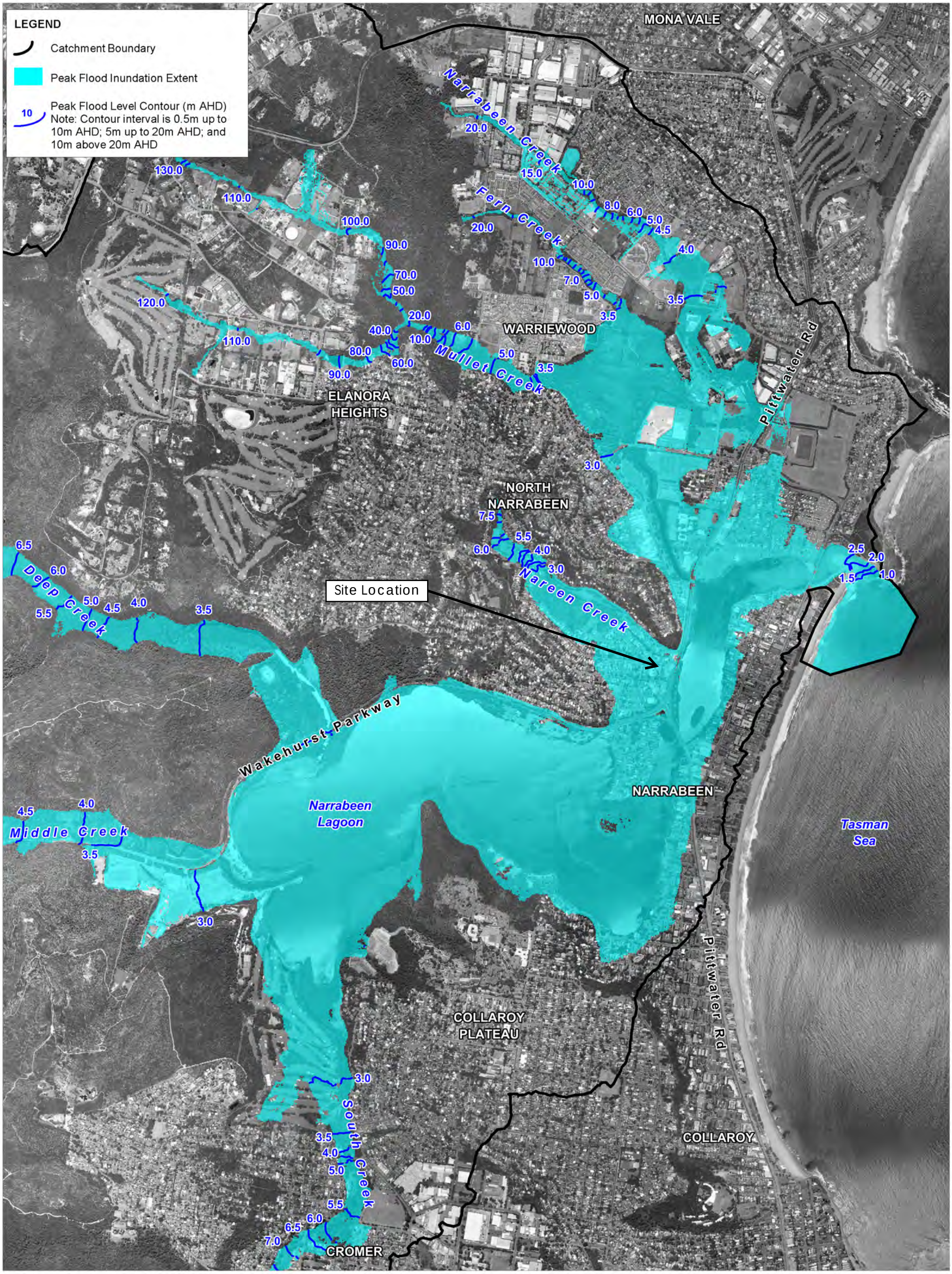
0 1 2km

Approx. Scale

BMT WBM

www.bmtwbm.com.au

Filepath : K:\N2070_Narrabeen_Lagoon_Flood_Study\GIS\Workspaces\DWG_001_StudyLocality.WOR



Title:

Narrabeen Lagoon Flood Study - Peak Flood Extent and Peak Flood Levels: 1% AEP Catchment Derived Event

Figure: **A-6**

Rev: **A**

N

0 0.5 1km

Approx. Scale

BMT WBM
www.bmtwbm.com.au

Filepath : K:\N2070_Narrabeen_Lagoon_Flood_Study\MI\Workspaces\Design_Mapping_A3\Final_Design_Maps\Fig_A_6_1%AEP_WaterLevel.WOR

LEGEND

Catchment Boundary

Peak Flood Inundation Extent

10 Peak Flood Level Contour (m AHD)
Note: Contour interval is 0.5m up to 10m AHD; 5m up to 20m AHD; and 10m above 20m AHD

MONA VALE
Narrabeen Creek
Fern Creek
WARRIEWOOD
Mullet Creek
Pittwater Rd
ELANORA HEIGHTS
NORTH NARRABEEN
Nareen Creek
Deep Creek
Wakehurst Parkway
Narrabeen Lagoon
Middle Creek
NARRABEEN
Tasman Sea
COLLAROY PLATEAU
South Creek
CROMER
COLLAROY

Title:

Narrabeen Lagoon Flood Study - Peak Flood Extent and Peak Flood Levels: PMF Catchment Derived Event

Figure: A-10

Rev: A

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

N

0 0.5 1km

Approx. Scale

BMT WBM
www.bmtwbm.com.au

Filepath : K:\N2070_Narrabeen_Lagoon_Flood_Study\MI\Workspaces\Design_Mapping_A3\Final_Design_Maps\Fig_A_10_PMF_WaterLevel.WOR

10 Attachment C: Northern Beaches Council Flood Information Report

FLOOD INFORMATION REPORT – COMPREHENSIVE

Property: 3 Gondola Road NORTH NARRABEEN NSW 2101
Lot DP: Lot 188 DP 16719
Issue Date: 29/03/2022
Flood Study Reference: Narrabeen Lagoon Flood Study 2013, BMT WBM, Ingleside, Elanora and Warriewood Overland Flow Flood Study 2019, WMAwater

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Flood Information for lot [1]:

Flood Risk Precinct – See Map A

Flood Planning Area – See Map A

Maximum Flood Planning Level (FPL) [2, 3, 4]: 3.53 m AHD

1% AEP Flood – See Flood Map B

1% AEP Maximum Water Level [2, 3]: 3.03 mAHD

1% AEP Maximum Depth from natural ground level[3]: 1.10 m

1% AEP Maximum Velocity: 0.20 m/s

1% AEP Hydraulic Categorisation: N/A **See Flood Map D**

Probable Maximum Flood (PMF) – See Flood Map C

PMF Maximum Water Level [4]: 4.89 m AHD

PMF Maximum Depth from natural ground level: 2.96 m

PMF Maximum Velocity: 0.98 m/s

PMF Hydraulic Categorisation: N/A **See Flood Map E**

Flooding with Climate Change (See Flood Map F)

The following is for the 30% Rainfall intensity increase and 0.9m Sea Level Rise Scenario:

1% AEP Maximum Water Level with Climate change [3]: 3.90 m AHD

1% AEP Maximum Depth with Climate Change[3]: 1.97 m

1% AEP Maximum Velocity with Climate Change[3]: m/s

Flood Life Hazard Category – See Map G

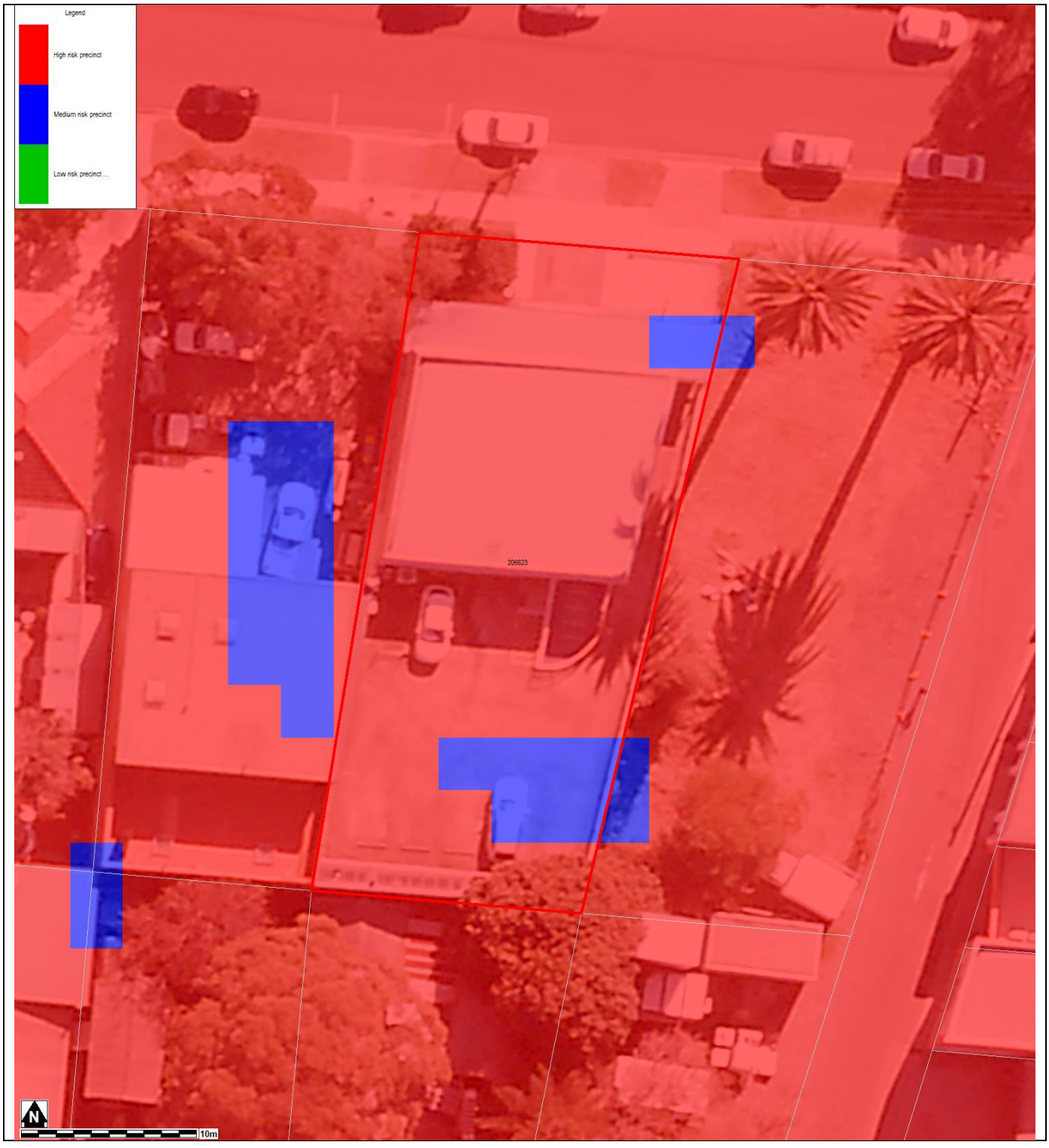
Indicative Ground Surface Spot Heights – See Map H

[1] The flood information does not take into account any local overland flow issues nor private stormwater drainage systems.
[2] Overland flow/mainstream water levels may vary across a sloping site, resulting in variable minimum floor/ flood planning levels across the site. The maximum Flood Planning Level may be in a different location to the maximum 1% AEP flood level.
[3] Intensification of development in the former Pittwater LGA requires the consideration of climate change impacts which may result in higher minimum floor levels.
[4] Vulnerable/critical developments require higher minimum floor levels using the higher of the PMF or FPL.

General Notes:

- All levels are based on Australian Height Datum (AHD) unless otherwise noted.
- This is currently the best available information on flooding; it may be subject to change in the future.
- Council recommends that you obtain a detailed survey of the above property and surrounds to AHD by a registered surveyor to determine any features that may influence the predicted extent or frequency of flooding. It is recommended you compare the flood level to the ground and floor levels to determine the level of risk the property may experience should flooding occur.
- Development approval is dependent on a range of issues, including compliance with all relevant provisions of Northern Beaches Council's Local Environmental Plans and Development Control Plans.
- Please note that the information contained within this letter is general advice only as a detail survey of the property as well as other information is not available. Council recommends that you engage a suitably experienced consultant to provide site specific flooding advice prior to making any decisions relating to the purchase or development of this property.
- The Flood Studies on which Council's flood information is based are available on Council's website.

FLOOD MAP A: FLOOD RISK PRECINCT MAP



Notes:

- **Low Flood Risk precinct** means all flood prone land not identified within the High or Medium flood risk precincts.
- **Medium Flood Risk precinct** means all flood prone land that is (a) within the 1% AEP Flood Planning Area; and (b) is not within the high flood risk precinct.
- **High Flood Risk precinct** means all flood prone land (a) within the 1% AEP Flood Planning Area; and (b) is either subject to a high hydraulic hazard, within the floodway or subject to significant evacuation difficulties (H5 or H6 Life Hazard Classification).
- The **Flood Planning Area** extent is equivalent to the Medium Flood Risk Precinct extent, and includes the High Flood Risk Precinct within it. The mapped extent represents the 1% annual Exceedance Probability (AEP) flood event + freeboard.
- None of these mapped extents include climate change.

FLOOD LEVEL POINTS

Note: Cadastre Lines (Source: NSW Government Land and Property Information), flood levels/extents (Source: Narrabeen Lagoon Flood Study 2013, BMT WBM, Ingleside, Elanora and Warriewood Overland Flow Flood Study 2019, WMAwater) and aerial photography (Source: NearMap 2014) are indicative only.

Flood Levels

ID	5% AEP Max WL (m AHD)	5% AEP Max Depth (m)	1% AEP Max WL (m AHD)	1% AEP Max Depth (m)	1% AEP Max Velocity (m/s)	Flood Planning Level (m)	PMF Max WL (m AHD)	PMF Max Depth (m)	PMF Max Velocity (m/s)
1	2.68	0.63	3.03	0.98	0.18	3.53	4.89	2.84	0.32
2	2.68	0.55	3.03	0.91	0.04	3.53	4.89	2.77	0.17
3	2.68	0.61	3.03	0.96	0.14	3.53	4.89	2.82	0.28
4	2.68	0.56	3.03	0.92	0.19	3.53	4.89	2.78	0.22
5	2.68	0.46	3.03	0.81	0.14	3.53	4.89	2.67	0.36
6	2.68	0.51	3.03	0.86	0.13	3.53	4.89	2.72	0.28
7	2.68	0.46	3.03	0.81	0.15	3.53	4.89	2.67	0.48
8	2.68	0.56	3.03	0.91	0.14	3.53	4.89	2.77	0.33
9	2.68	0.61	3.03	0.96	0.15	3.53	4.89	2.83	0.35

WL – Water Level
PMF – Probable Maximum Flood
N/A = no peak water level/depth/velocity available in flood event

Climate Change Flood Levels (30% Rainfall intensity and 0.9m Sea Level Rise)

ID	CC 1% AEP Max WL (m AHD)	CC1 % AEP Max Depth (m)
1	3.90	1.85
2	3.90	1.78
3	3.90	1.83
4	3.90	1.79
5	3.90	1.68
6	3.90	1.73
7	3.90	1.68
8	3.90	1.78
9	3.90	1.84

WL – Water Level
PMF – Probable Maximum Flood
N/A = no peak water level/depth/velocity available in flood event.

A variable Flood Planning Level might apply. Freeboard is generally 0.5m above the maximum 1% AEP water level. However for overland flow with a depth less than 0.3m and a VelocityxDepth product less than $0.3m^2/s$, a freeboard of 0.3m may be able to be justified.

FLOOD MAP B: FLOODING - 1% AEP EXTENT

Notes:

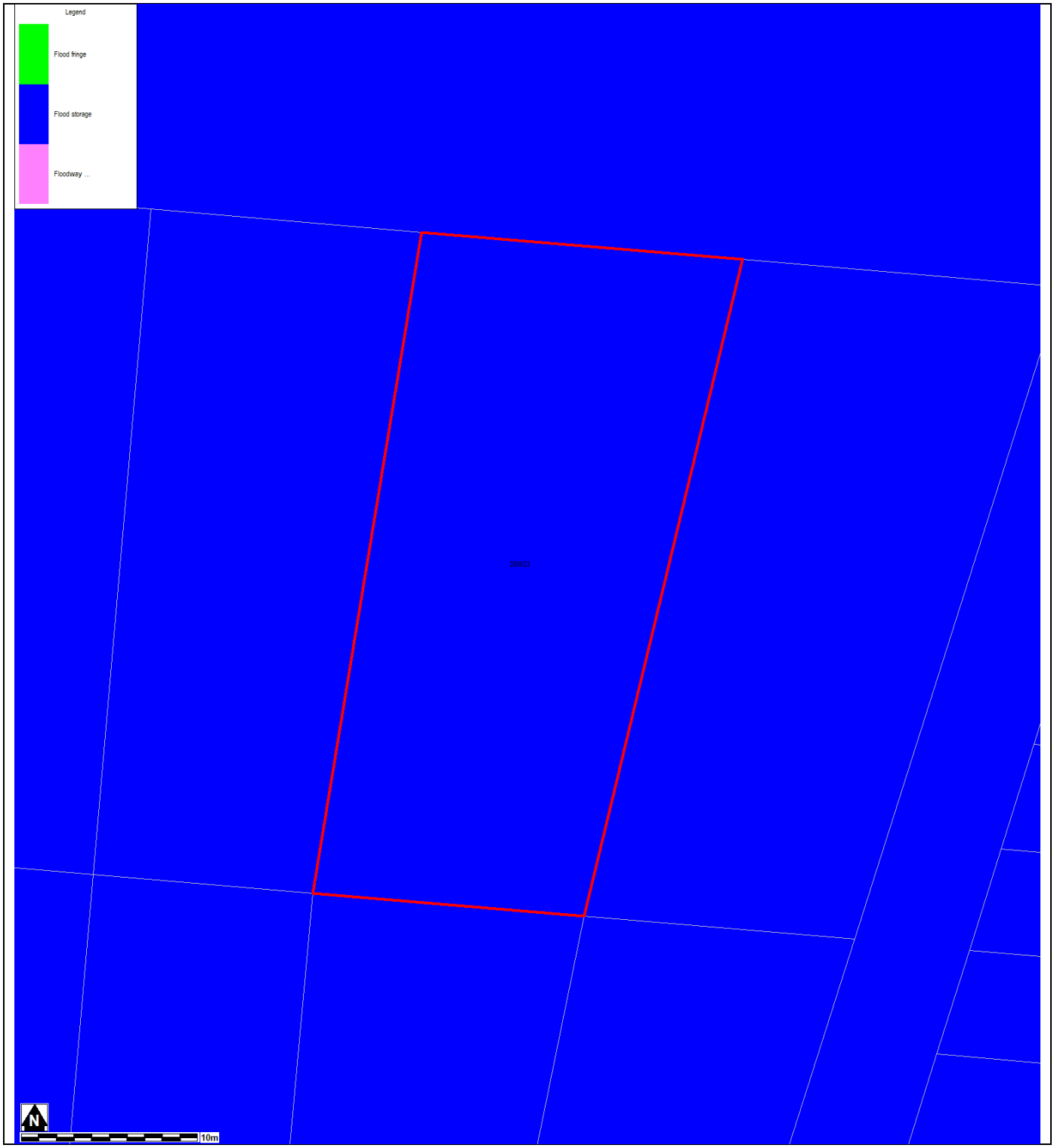
- Extent represents the 1% annual Exceedance Probability (AEP) flood event.
- Flood events exceeding the 1% AEP can occur on this site.
- Extent does not include climate change.
- Cadastre Lines (Source: NSW Government Land and Property Information), flood levels/extents (Source: Narrabeen Lagoon Flood Study 2013, BMT WBM, Ingleside, Elanora and Warriewood Overland Flow Flood Study 2019, WMAwater) and aerial photography (Source Near Map 2014) are indicative only.

FLOOD MAP C: PMF EXTENT MAP

Notes:

- Extent represents the Probable Maximum Flood (PMF) flood event
- Extent does not include climate change
- Cadastre Lines (Source: NSW Government Land and Property Information), flood levels/extents (Source: Narrabeen Lagoon Flood Study 2013, BMT WBM, Ingleside, Elanora and Warriewood Overland Flow Flood Study 2019, WMAwater) and aerial photography (Source: NearMap 2014) are indicative only

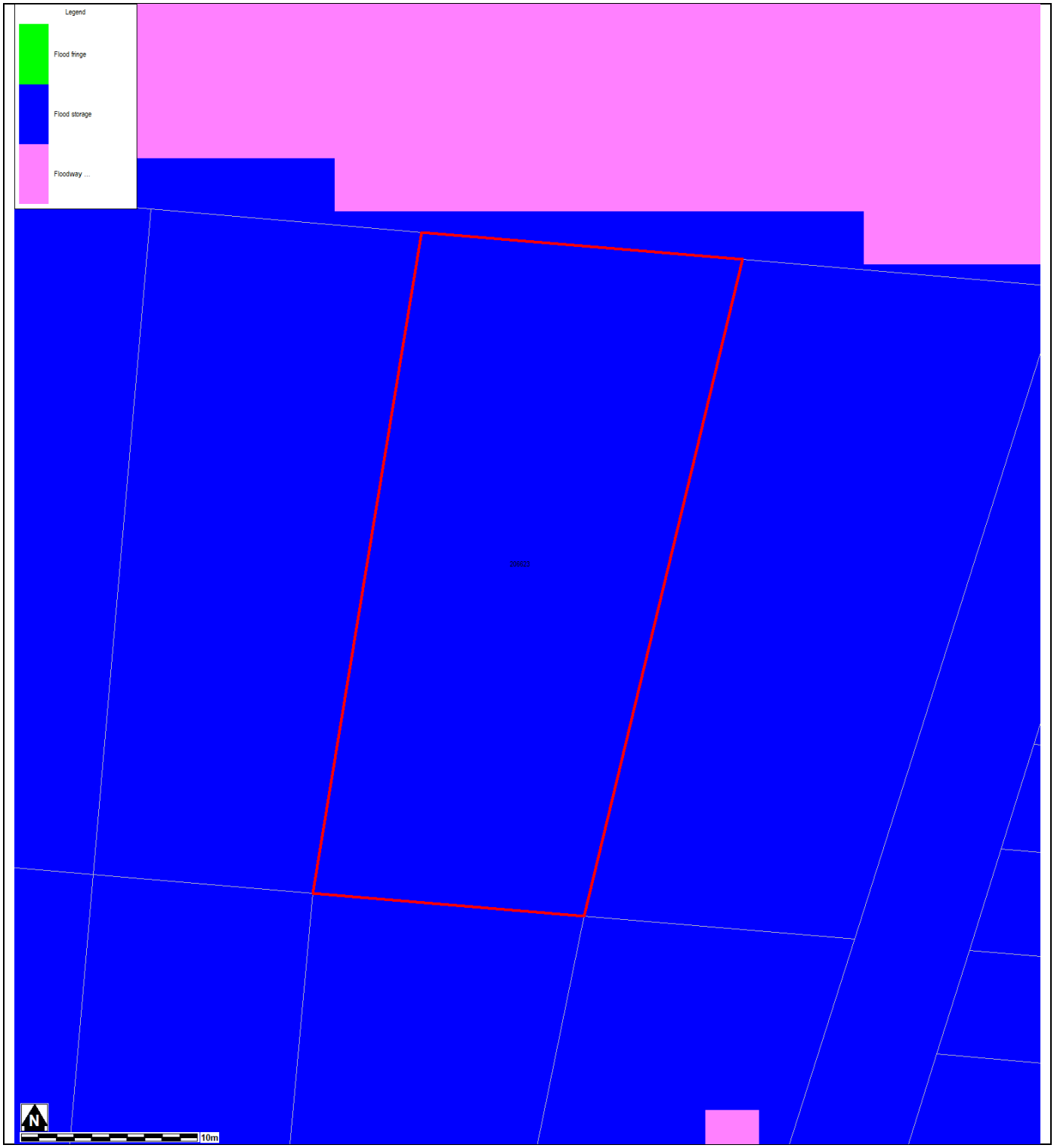
FLOOD MAP D: 1% AEP FLOOD HYDRAULIC CATEGORY EXTENT MAP



Notes:

- Extent represents the 1% annual Exceedance Probability (AEP) flood event
- Extent does not include climate change
- Cadastre Lines (Source: NSW Government Land and Property Information), flood levels/extents (Source: Narrabeen Lagoon Flood Study 2013, BMT WBM, Ingleside, Elanora and Warriewood Overland Flow Flood Study 2019, WMAwater) and aerial photography (Source: NearMap 2014) are indicative only

FLOOD MAP E: PMF FLOOD HYDRAULIC CATEGORY EXTENT MAP



Notes:

- Extent represents the Probable Maximum Flood (PMF) event
- Extent does not include climate change
- Cadastre Lines (Source: NSW Government Land and Property Information), flood levels/extents (Source: Narrabeen Lagoon Flood Study 2013, BMT WBM, Ingleside, Elanora and Warriewood Overland Flow Flood Study 2019, WMAwater) and aerial photography (Source: NearMap 2014) are indicative only

FLOOD MAP F: FLOODING – 1% AEP EXTENT PLUS CLIMATE CHANGE

Note:

- Extent represents the 1% annual Exceedance Probability (AEP) flood event including 30% rainfall intensity and 0.9m Sea Level Rise climate change scenario
- Flood events exceeding the 1% AEP can occur on this site.
- Cadastre Lines (Source: NSW Government Land and Property Information), flood levels/extents (Source: Narrabeen Lagoon Flood Study 2013, BMT WBM, Ingleside, Elanora and Warriewood Overland Flow Flood Study 2019, WMAwater) and aerial photography (Source: NearMap 2014) are indicative only

FLOOD MAP G: FLOOD LIFE HAZARD CATEGORY

Notes:

- Cadastre Lines (Source: NSW Government Land and Property Information), flood levels/extents (Source: Narrabeen Lagoon Flood Study 2013, BMT WBM, Ingleside, Elanora and Warriewood Overland Flow Flood Study 2019, WMAwater) and aerial photography (Source Near Map 2014) are indicative only.

MAP H: INDICATIVE GROUND SURFACE SPOT HEIGHTS

Notes:

- The surface spot heights shown on this map were derived from Airborne Laser Survey and are indicative only.
- Accuracy is generally within ± 0.2m vertically and ± 0.15m horizontally, and Northern Beaches Council does not warrant that the data does not contain errors.
- If accuracy is required, then survey should be undertaken by a registered surveyor.

Preparation of a Flood Management Report

Introduction

These guidelines are intended to provide advice to applicants on how to determine what rules apply on flood prone land, and how to prepare a Flood Management Report. The purpose of a Flood Management Report is to demonstrate how a proposed development will comply with flood related planning requirements.

Planning Requirements for Flood Prone Land

Development must comply with the requirements for developing flood prone land set out in the relevant Local Environment Plan (LEP) and Development Control Plan (DCP). There are separate LEPs and DCPs for each of the former Local Government Areas (LGAs), although preparation of a LGA-wide LEP and DCP is currently under way.

The clauses specific to flooding in the LEPs and DCPs are as follows:

LEP Clauses	**DCP Clauses**
Manly LEP (2013) – 6.3 Flood Planning	Manly DCP (2013) – 5.4.3 Flood Prone Land
Warringah LEP (2011) – 6.3 Flood Planning Warringah LEP (2000) – 47 Flood Affected Land *	Warringah DCP (2011) – E11 Flood Prone Land
Pittwater LEP (2014) – 7.3 Flood Planning Pittwater LEP (2014) – 7.4 Flood Risk Management	Pittwater 21 DCP (2014) – B3.11 Flood Prone Land Pittwater 21 DCP (2014) – B3.12 Climate Change

* The Warringah LEP (2000) is relevant only for the “deferred lands” which affects only a very small number of properties, mostly in the Oxford Falls area.

Development on flood prone land must also comply with Council’s Water Management for Development Policy, and if it is in the Warriewood Release Area, with the Warriewood Valley Water Management Specification. Guidelines for Flood Emergency Response Planning are available for addressing emergency response requirements in the DCP. These documents can be found on Council’s website on the Flooding page.

Note that if the property is affected by estuarine flooding or other coastal issues, these need to be addressed separately under the relevant DCP clauses.

When is a Flood Management Report required?

A Flood Management Report must be submitted with any Development Application on flood prone land (with exceptions noted below), for Council to consider the potential flood impacts and applicable controls. For Residential or Commercial development, it is required for development on land identified within the Medium or High Flood Risk Precinct. For Vulnerable or Critical development, it is required if it is within any Flood Risk Precinct.

There are some circumstances where a formal Flood Management Report undertaken by a professional engineer may not be required. However the relevant parts of the DCP and LEP would still need to be addressed, so as to demonstrate compliance. Examples where this may apply include:

- If all proposed works are located outside the relevant Flood Risk Precinct extent
- First floor addition only, where the floor level is above the Probable Maximum Flood level
- Internal works only, where habitable floor areas below the FPL are not being increased

Note that development on flood prone land will still be assessed for compliance with the relevant DCP and LEP, and may still be subject to flood related development controls.

What is the purpose of a Flood Management Report?

The purpose of a Flood Management Report is to demonstrate how a proposed development will comply with flood planning requirements, particularly the development controls outlined in the relevant LEP and DCP clauses. The report must detail the design, measures and controls needed to achieve compliance, following the steps outlined below.

A Flood Management Report should reflect the size, type and location of the development, proportionate to the scope of the works proposed, and considering its relationship to surrounding development. The report should also assess the flood risk to life and property.

Preparation of a Flood Management Report

The technical requirements for a Flood Management Report include (where relevant):

1. Description of development
   - Outline of the proposed development, with plans if necessary for clarity
   - Use of the building, hours of operation, proposed traffic usage or movement
   - Type of use, eg vulnerable, critical, residential, business, industrial, subdivision, etc

2. Flood analysis
   - 1% AEP flood level
   - Flood Planning Level (FPL)
   - Probable Maximum Flood (PMF) level
   - Flood Risk Precinct, ie High, Medium or Low
   - Flood Life Hazard Category
   - Mapping of relevant extents
   - Flood characteristics for the site, eg depth, velocity, hazard and hydraulic category, and the relevance to the proposed development

   If the property is affected by an Estuarine Planning Level (EPL) which is higher than the FPL, then the EPL should be used as the FPL. If the FPL is higher than the PMF level, then the FPL should still be used as the FPL, as it includes freeboard which the PMF does not.

3. Assessment of impacts
- Summary of compliance for each category of the DCP, as per the table below.

	Compliance		
	N/A	Yes	No
A) Flood effects caused by Development			
B) Building Components & Structural Soundness			
C) Floor Levels			
D) Car parking			
E) Emergency Response			
F) Fencing			
G) Storage of Goods			
H) Pools			

- Demonstration of how the development complies with any relevant flood planning requirements from the DCP, LEP, Water Management for Development Policy, and if it is in the Warriewood Valley Urban Land Release Area, with the Warriewood Valley Water Management Specification (2001)
- For any non-compliance, a justification for why the development should still be considered.
- Calculations of available flood storage if compensatory flood storage is proposed
- Plan of the proposed development site showing the predicted 1% AEP and PMF flood extents, as well as any high hazard or floodway affectation
- Development recommendations and construction methodologies
- Qualifications of author - Council requires that the Flood Management Report be prepared by a suitably qualified Engineer with experience in flood design / management who has, or is eligible for, membership to the Institution of Engineers Australia
- Any flood advice provided by Council
- Any other details which may be relevant

Further information and guidelines for development are available on Council's website at:

https://www.northernbeaches.nsw.gov.au/planning-and-development/building-and-renovations/development-applications/guidelines-development-flood-prone-land

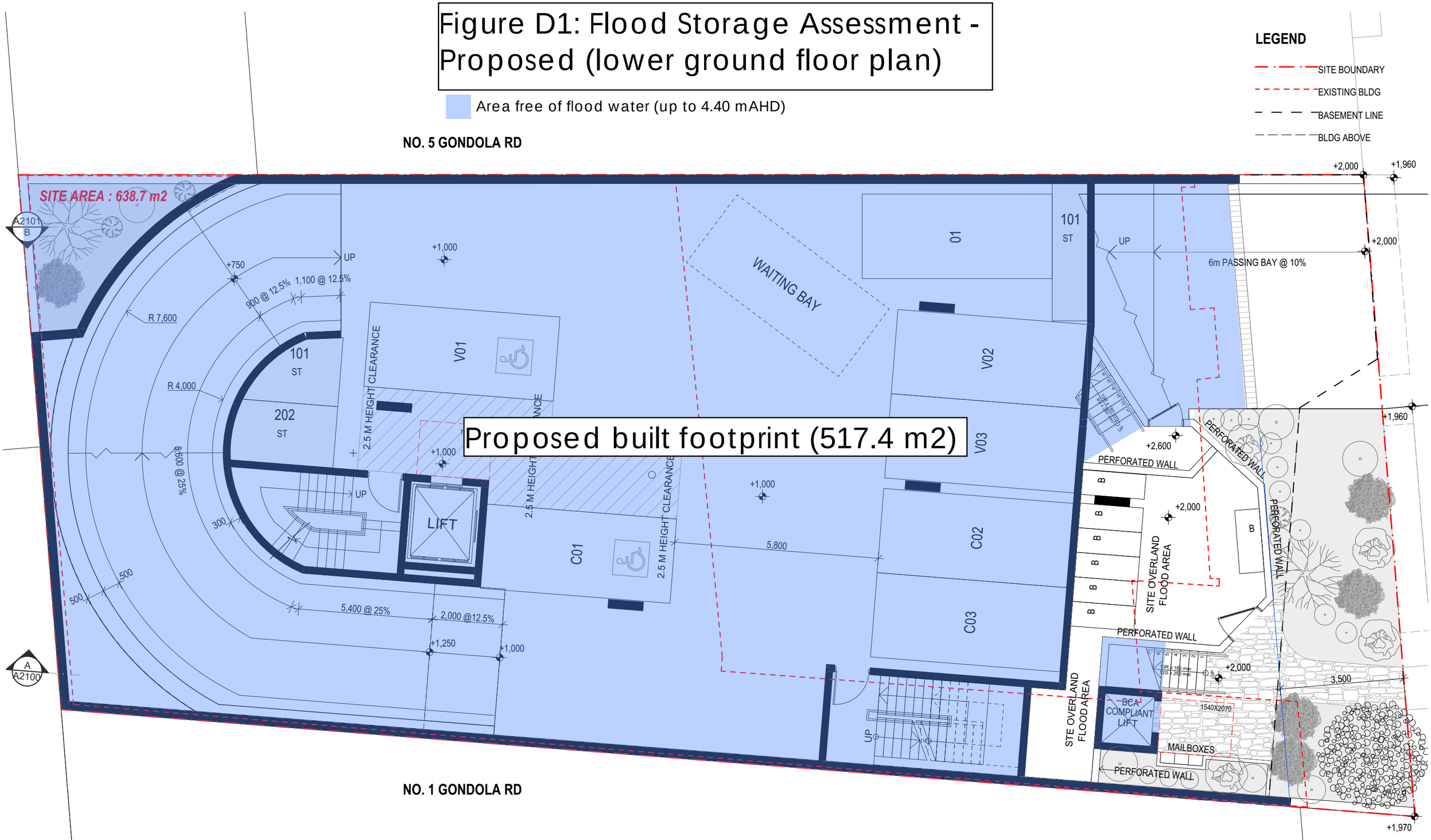
Council's Flood Team may be contacted on 1300 434 434 or at floodplain@northernbeaches.nsw.gov.au .

11 Attachment D: Flood Storage Assessment Figures

Figure D1: Flood Storage Assessment - Proposed (lower ground floor plan)

Area free of flood water (up to 4.40 mAHD)

NO. 5 GONDOLA RD



mackenzie architects international

Pacific Hwy, Gordon 2072
Phone: (02) 9967 9966
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info@mainternational.com.au
www.mainternational.com.au

Nominated Architect No.6033
ABN 76 091 107 201
ACN 091107201

STATUS: #Project Status

LEGEND
DO NOT SCALE DRAWINGS
VERIFY ALL DIMENSIONS ON SITE BEFORE COMMENCING WORK

AMENDMENTS

REV	STATUS	BY	DATE
A	DA	AM	18/05/2022

PROJECT NORTH

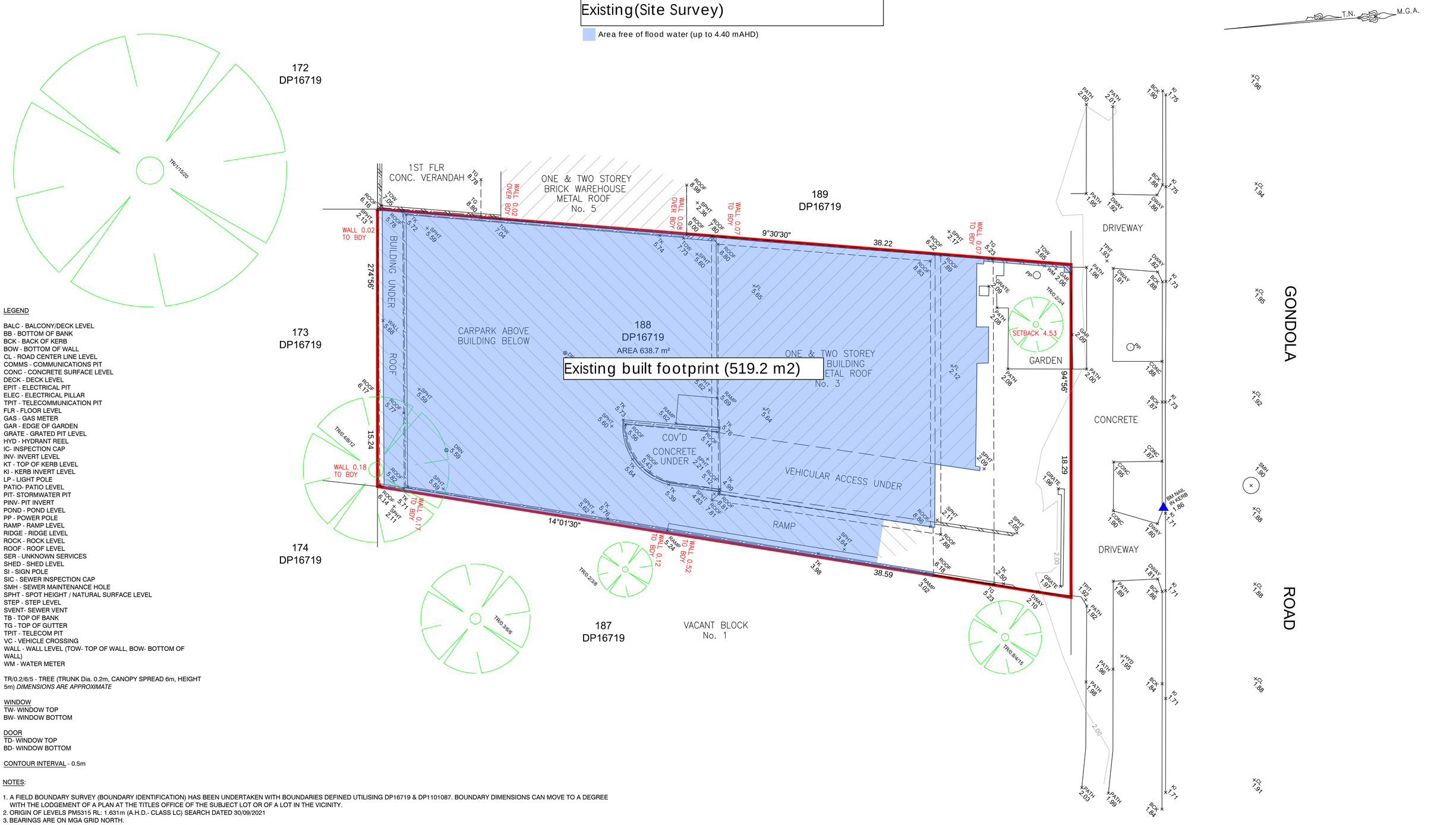
PROJECT
Development Application
3 GONDOLA RD
NORTH NARRABEEN
NSW 2101, AUSTRALIA

DRAWING: LOWER GROUND FLOOR

SCALE:	DRAWING NO.:	ISSUE:
1:100@A3	A1002	A

Figure D2: Flood Storage Assessment - Existing(Site Survey)

Area free of flood water (up to 4.40 mAHD)



LEGEND

BALC - BALCONY/DECK LEVEL
BB - BOTTOM OF BANK
BCK - BACK OF KERB
BOW - BOTTOM OF WALL
CL - ROAD CENTER LINE LEVEL
COMMS - COMMUNICATIONS PIT
CONC - CONCRETE SURFACE LEVEL
DECK - DECK LEVEL
EPIT - ELECTRICAL PIT
ELEC - ELECTRICAL PILLAR
TPIT - TELECOMMUNICATION PIT
FLR - FLOOR LEVEL
GAS - GAS METER
GAR - EDGE OF GARDEN
GRATE - GRATED PIT LEVEL
HYD - HYDRANT REEL
IC- INSPECTION CAP
INV- INVERT LEVEL
KT - TOP OF KERB LEVEL
KI - KERB INVERT LEVEL
LP - LIGHT POLE
PATIO- PATIO LEVEL
PIT- STORMWATER PIT
PINV- PIT INVERT
POND - POND LEVEL
PP - POWER POLE
RAMP - RAMP LEVEL
RIDGE - RIDGE LEVEL
ROCK - ROCK LEVEL
ROOF - ROOF LEVEL
SER - UNKNOWN SERVICES
SHED - SHED LEVEL
SI - SIGN POLE
SIC - SEWER INSPECTION CAP
SMH - SEWER MAINTENANCE HOLE
SPHT - SPOT HEIGHT / NATURAL SURFACE LEVEL
STEP - STEP LEVEL
SVENT- SEWER VENT
TB - TOP OF BANK
TG - TOP OF GUTTER
TPIT - TELECOM PIT
VC - VEHICLE CROSSING
WALL - WALL LEVEL (TOW- TOP OF WALL, BOW- BOTTOM OF WALL)
WM - WATER METER

TR/0.2/6/5 - TREE (TRUNK Dia. 0.2m, CANOPY SPREAD 6m, HEIGHT 5m) *DIMENSIONS ARE APPROXIMATE*

WINDOW
TW- WINDOW TOP
BW- WINDOW BOTTOM

DOOR
TD- WINDOW TOP
BD- WINDOW BOTTOM

CONTOUR INTERVAL - 0.5m

NOTES:

1. A FIELD BOUNDARY SURVEY (BOUNDARY IDENTIFICATION) HAS BEEN UNDERTAKEN WITH BOUNDARIES DEFINED UTILISING DP16719 & DP1101087. BOUNDARY DIMENSIONS CAN MOVE TO A DEGREE WITH THE LODGEMENT OF A PLAN AT THE TITLES OFFICE OF THE SUBJECT LOT OR OF A LOT IN THE VICINITY.
2. ORIGIN OF LEVELS PM5315 RL: 1.631m (A.H.D.- CLASS LC) SEARCH DATED 30/09/2021
3. BEARINGS ARE ON MGA GRID NORTH.
4. DIMENSIONED STRUCTURES (IN RED) ARE IN RELATION TO THIS BOUNDARY SURVEY.
5. RELATIONSHIP OF OTHER IMPROVEMENTS, DETAIL AND ADJOINING BUILDINGS TO THE BOUNDARY, IF CRITICAL, WILL REQUIRE FURTHER SURVEY. IF ANY FENCING OR BUILDING NEAR THE SUBJECT BOUNDARIES IT IS RECOMMENDED THAT THE BOUNDARIES BE PHYSICALLY MARKED BY A REGISTERED SURVEYOR.
6. SERVICES SHOWN ARE BASED ON VISIBLE SURFACE INDICATORS EVIDENT AT THE DATE OF SURVEY ONLY. DIAL BEFORE YOU DIG AND ALL SERVICE AUTHORITIES SHOULD BE CONTACTED PRIOR TO ANY DEVELOPMENT.
7. ROOF AND EAVE & GUTTER HEIGHTS HAVE BEEN OBTAINED BY AN INDIRECT METHOD AND ARE ACCURATE FOR PLANNING PURPOSES ONLY.
8. ADJOINING BUILDINGS AND DWELLINGS HAVE BEEN PLOTTED FOR DIAGRAMMATIC PURPOSES ONLY AND SPECIFIC DETAILS, IF CRITICAL, WILL REQUIRE FURTHER SURVEY.
9. THE DIAMETER OF TREE TRUNKS CONTAINED WITHIN TREE SYMBOLS ARE NOT TO SCALE AND ARE INDICATIVE ONLY.
10. A COVENANT (DEALING D230687) IS NOTED ON TITLE.

WALL TO BOUNDARIES AS SHOWN IN RED

Akorompay

ANDREW KOROMPAY **ID No.SU000114**
Surveyor Registered under The Surveying Act, 2002.

0	AK	INITIAL ISSUE	27/10/2021
REVISION	BY	REVISION DESCRIPTION	DATE

PLAN OF DETAIL OVER
No. 3 GONDOLA RD
NORTH NARABEEN , NSW, 2101.

TRUE NORTH SURVEY GROUP
REGISTERED SURVEYORS
Incorporating
NORTHWEST SURVEYS · TRUE NORTH SURVEYS · GEOMAT ENGINEERING PTY LTD

TRUENORTH SURVEY GROUP
A.B.N. 97 106 447 198
Registered Consulting Surveyors
16/9 Narabang Way
Belrose NSW 2085
Tel : (02) 9450 0868
Mob : (0412) 353 784
Email : andrew@truenorthsurveys.com.au

SCALE: 1:100 @ A1 : 1:200 @ A3		DATE: 27/10/2021
CLIENT: BRETT CROWTHER		DATUM: AHD
JOB No. 2368		SHEET 1 OF 1
DRAWN	CHECKED	APPROVED
SJ	AK	AK
DRAWING No. 2368		REVISION 0