



# FLOOD RISK MANAGEMENT PLAN

PROPOSED ALTERATIONS AT  
46 Gondola Road  
NORTH NARRABEEN NSW 2101  
Ref: 24.103-001-frm

9<sup>th</sup> May 2024

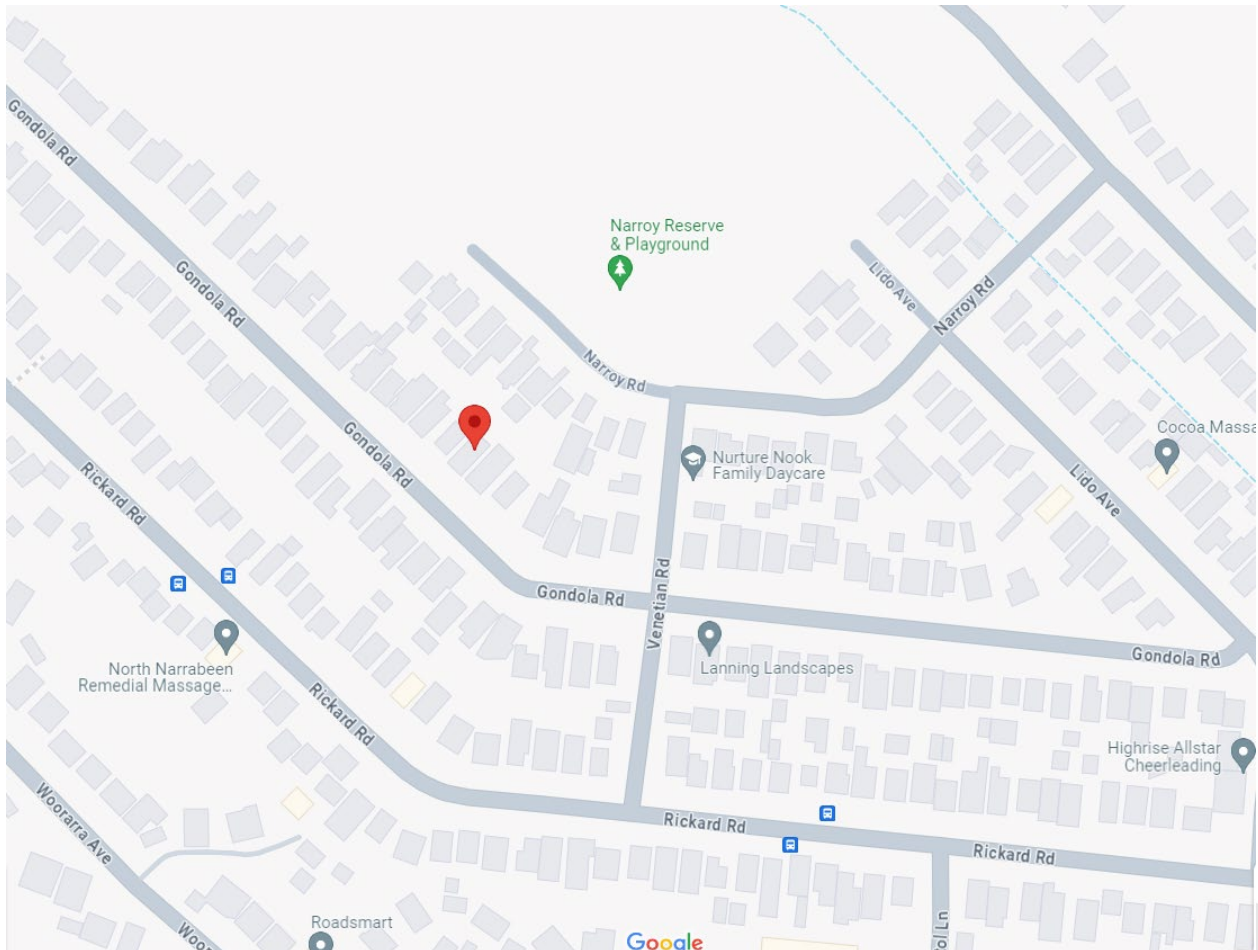
E2 Civil And Structural Design were commissioned to prepare a Flood Risk Management Report in support of the proposed swimming pool to the residence at 46 Gondola Road, North Narrabeen NSW 2101.

The aim of the report is to identify & assess the flood risks of the site and recommend measures to minimise the risk to property & personal safety under 1 in 100 year ARI & Probable Maximum Flood (PMF) storm events.

## 2.

## SITE DESCRIPTION

The proposed alterations & additions is on a site with an area of 464.4 m<sup>2</sup>. The existing residence is near the crest of Gondola Road and is approximately 250m from Nareen Creek.



The figure above shows the location of the subject lot



The figure above shows the view looking up Gondola Road



The figure above shows the view looking down Gondola Road

### 3.

## FLOOD INFORMATION

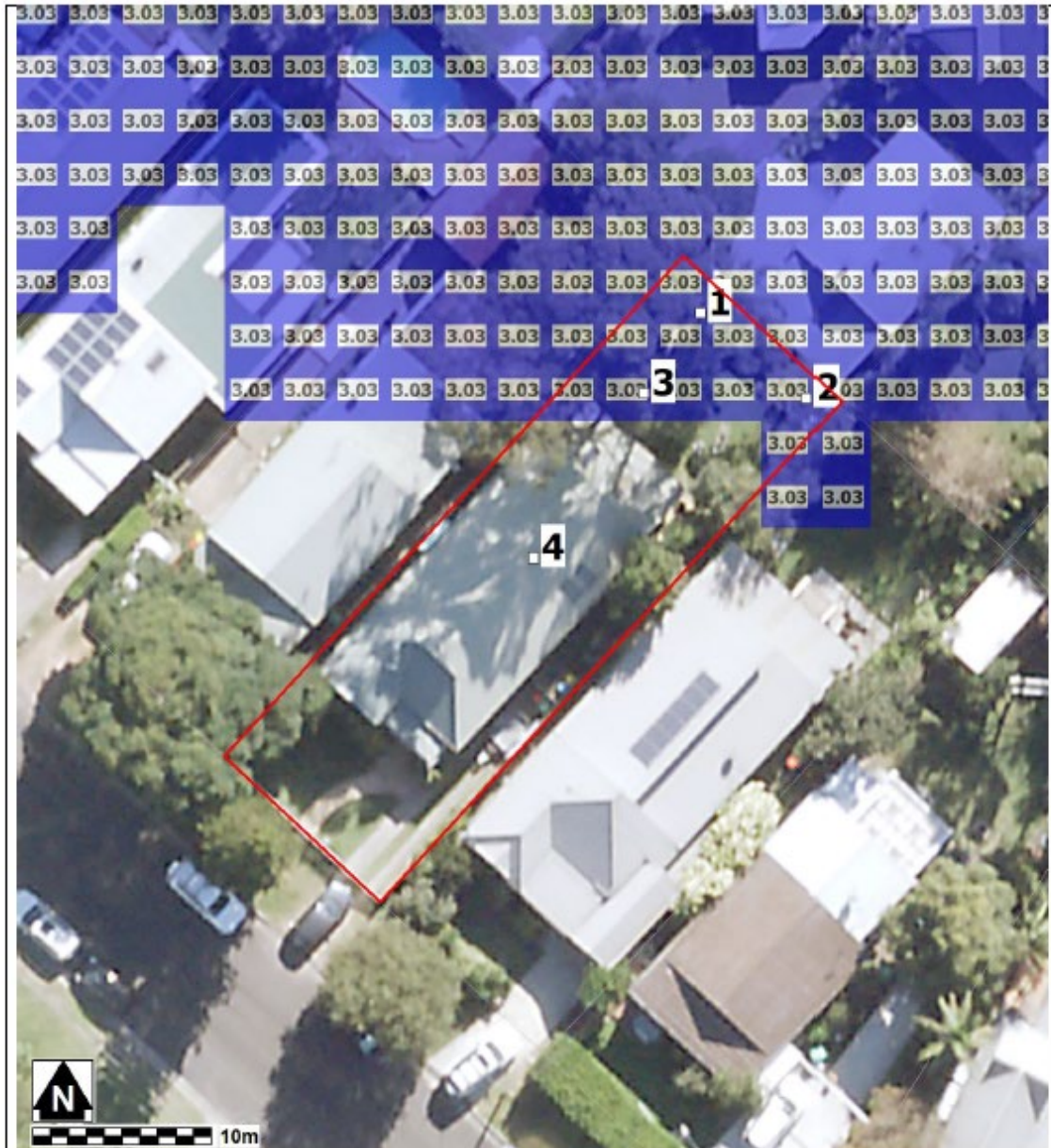
The flood information that this report is based on was taken from the Flood Level Information Report obtained from Northern Beaches Council. The following flood levels were specified below:

- GONDOLA ROAD:  
1:100 Year Flood Level = 3.03 AHD  
1:100 Year Flood Planning Level = 3.53 AHD  
PMF Water Level = RL 4.9 AHD

The diagram on the following page shows the extent of the flooding in the in 100 year ARI event. Overall it can be said that the main water overland flow path occurs a significant distance away from the subject site. The overland flow path affecting this site is Nareen Creek which drains to Narrabeen lakes which is a direct estuary to the ocean.

The flood planning top water level of RL 3.53m AHD and the floor level of the existing residence is RL 4.36m.

## MAP B: FLOODING - 1% AEP EXTENT & KEY POINTS

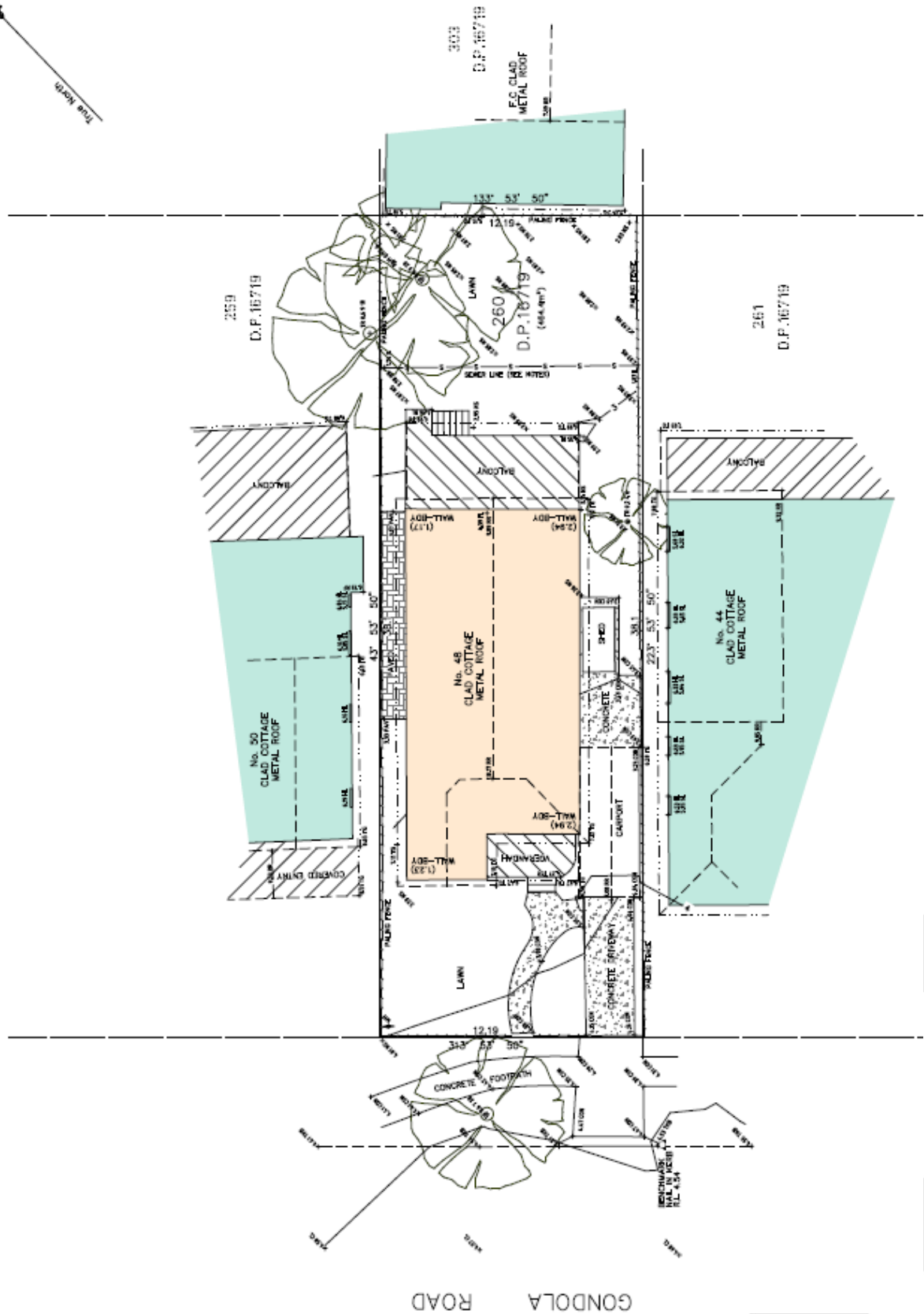


### Notes:

- 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) and aerial photography (Source Near Map 2014) are indicative only.

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## Survey of Existing Site

#### 4. PROPOSED DEVELOPMENT & FLOOD IMPACTS

The development proposal involves the construction of an in ground swimming pool in the rear yard of the residence.

The finished coping level of the proposed pool is as follows:

- GROUND LEVEL: Existing = 2.85 AHD
- COPING LEVEL: Proposed = 3.00 AHD

The construction being proposed is an in ground fibreglass pool, which will only raise the existing ground level by the depth of the coping (generally 150mm).

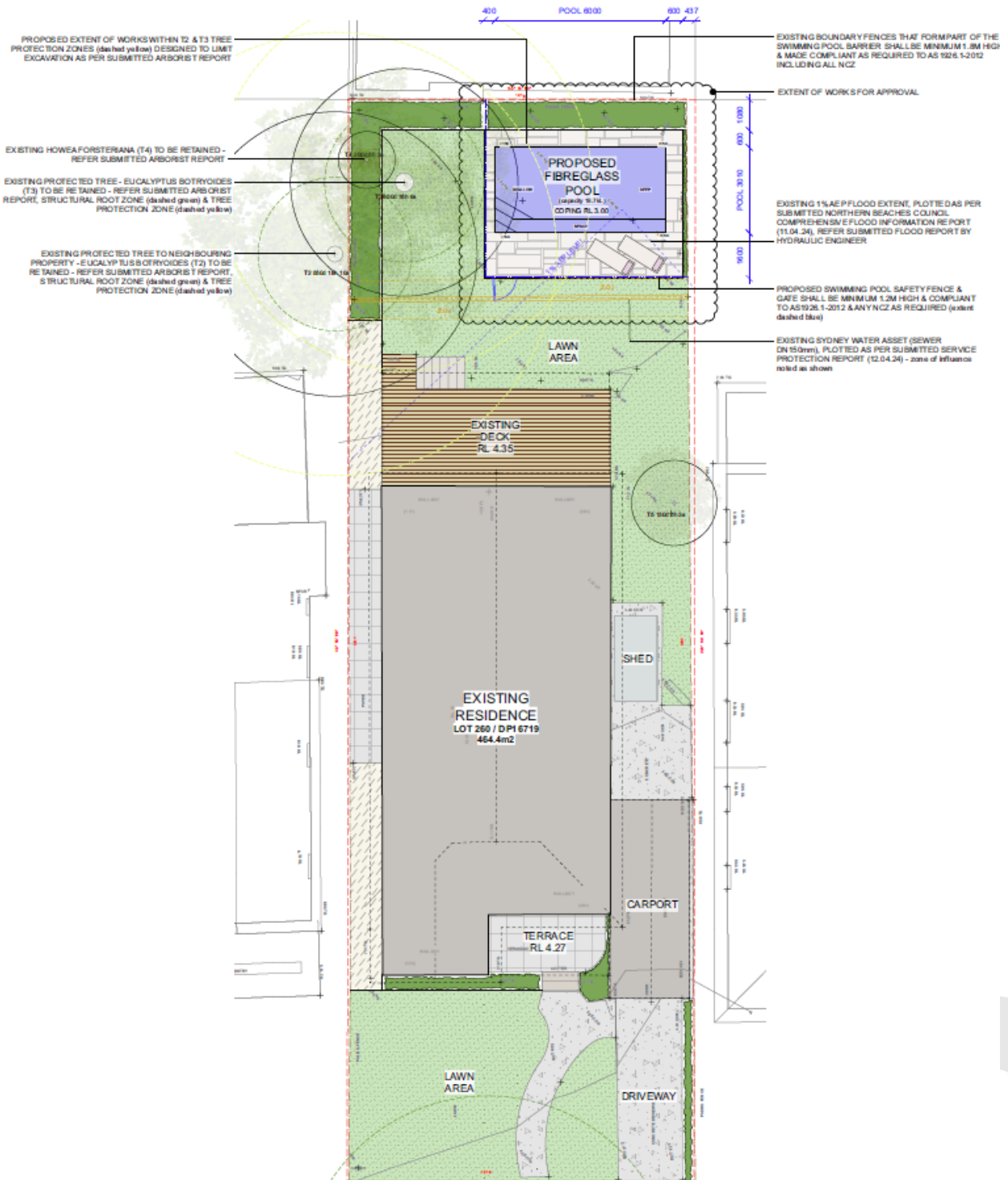
Based on the flood mapping provided, it can be seen that the location of the pool is within the flood affected zone for all mapped floods. It is also noted that the swimming pool is not considered a habitable structure, and therefore is a very low risk of being in use by humans at the time of a flood or being used as a refuge point during a flood.

In regards to the structural adequacy of the pool, it can be said that the flood waters will impart additional buoyancy forces to the pool shell. Consideration to this will have to be made by the designer when providing the structural design for the pool. However, it is common design practice to provide hydrostatic valves to the base of a pool to relieve differential hydrostatic forces between the inside and the outside of the pool shell, which should be sufficient in this loading case too.

Based on the above results from the 1 in 100 year storm event, the safety of the occupants of the residence would not be compromised so long as they remain indoors and do not enter the rear yard. Should the occupants need to leave the residence, they should do so through the front exist only as this area will not be subject to the flooding.

The above information also indicates the major flood impacts to safety of the building occupants and property that would occur under PMF storm conditions where the majority of the existing ground floor would be inundated by flood waters. In the event of this extremely rare circumstance occurring, there must be measure in place to provide a safe flood refuge on the first floor of the building. Damage to property and proposed pool on the ground floor will be unavoidable.

The figure on the following page shows the proposed swimming pool.



## 5. RECOMMENDATIONS & EMERGENCY EVACUATION STRATEGY

The information provided in section 4 indicated the major impact the PMF storm event would have on the property given the inundation that would occur. Under the PMF event personal safety is of concern. Furthermore, given the fact that Northern Beaches Council is a moderately urbanised environment, the quantity and susceptibility to flash flooding is worthy of noting. As a result, there is often little warning time for response to the onset of a flood. Consequently the occupants of the residence shall be prepared for the unlikely event to occur by implementing the following:

As a general rule we recommend the following to ensure structural performance during a flood event, the residence is appropriately configured to withstand flooding, and the tools required to manage a flood event are available:

- A. The proposed pool shall be constructed with an appropriate hydrostatic valve and structural reinforcement to withstand the additional hydrostatic pressures and buoyancy loads associated with flood waters. If this is implemented, the proposal will not cause any additional risks to the site due to failure of the pool shell.
- B. Any new pool equipment shall have wiring above RL 3.53 AHD, or shall be suitable for continual submergence in water and shall contain no fibrous material. Any conduit placed below this level shall be capable of self draining as required. Should any electrical device be subjected to flooding it shall be thoroughly cleaned & checked by an appropriately qualified professional before reconnection.
- C. A 'Home-Emergency-Kit' shall be prepared & be readily accessible & portable. The kit shall have a sleeping bags, mobile phone portable solar charger, portable radio & torch with spare batteries, as well as a first aid kit, candles, waterproof matches, a waterproof bag for valuables, and a list of emergency contact numbers.

- D. In any storm event ensure the occupants are kept up-to-date on the latest developments and warnings by listening to radio & television including contacting the following agencies for updated information:
  - Bureau of Meteorology: (02) 9296 1652
  - State Emergency Service (SES): 132 500
- E. Install flood depth indicators in the front & rear yard visible from the residence.
- F. Have in storage enough food and water to supply the residents of the residence a minimum consumption of 1 week.
- G. Follow the procedures & recommendations of the SES on how to be flood ready as specified in the *“Home Flood Safe Tool Kit”* available in the appendices of this report.

6.

## CERTIFICATION

If the proposed procedure outlined in this report is followed during major flood events, the risk to property & person shall be minimised as well as possible.

I certify that I am a fully qualified and practicing structural engineer in accordance with the requirements of the Building Code of Australia and The Institution of Engineers, Australia.

Yours faithfully,



**Christopher Errington**

BE(Hons) MIEAust CPEng NPER RPEQ RBP

Member No: 2537063

DIRECTOR



7.

APPENDIX: SES HOME FLOOD SAFE TOOL KIT





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*Where possible,  
use floor coverings, furniture and fittings  
that are water resistant*

## Tick ☒ the actions off and review every year

- ☐ Fill in the list of emergency numbers on the emergency contact numbers page and add the SES emergency 132 500 number into your mobile phone
- ☐ Fill in the local radio station frequencies on the emergency contact numbers page
- ☐ Make up a Home Emergency Kit (e.g. in a large plastic container) consisting of:
  - ☐ A portable radio with spare batteries
  - ☐ A torch with spare batteries
  - ☐ A first aid kit with appropriate contents necessary to the needs of the household
  - ☐ Candles and waterproof matches
  - ☐ A waterproof bag for valuables
  - ☐ A copy of the emergency contact numbers list
- ☐ Put important documents in the document wallet and store in an accessible place
- ☐ Consider the needs of pets and other domestic animals in a flood
- ☐ Always consider the potential for flooding when storing items around the house and identify high points for stacking and storing possessions and furniture
- ☐ Find out how to make the home more flood resistant
- ☐ Check insurance policy fully
- ☐ Check torch and radio batteries and review the Toolkit at the beginning of daylight savings each year
- ☐ Other preparations for a flash flood: \_\_\_\_\_

## preparing for a flood



*The Bureau of Meteorology issues  
Severe Thunderstorm Warnings and  
Severe Weather Warnings, including  
those for flash flooding  
[www.bom.gov.au](http://www.bom.gov.au)*

*Heavy rain can also indicate that flash  
flooding may occur*

*These triggers can be used to prepare for the  
potential of flash floods*

## Tick ☒ the actions to consider when a flood is likely

- ☐ Check your FloodSafe Guide in this Toolkit for specific information
- ☐ Turn on and listen to the radio for information, updates and advice
- ☐ Monitor local weather conditions that could cause flash flooding
- ☐ Be prepared to **act quickly** should there be any warnings of flash flooding (you may be asked to evacuate with very little warning time and well before your home is inundated). It is safer to evacuate before your home is inundated
- ☐ Keep in contact with neighbours who might be affected by flash flooding. Make sure they are aware of this possibility
- ☐ Place plastic document wallet, medication containers and prescriptions into the Home Emergency Kit
- ☐ Place mementoes and valuables into a waterproof bag and put in the Home Emergency Kit
- ☐ Locate pets and other domestic animals quickly and ensure they are safe
- ☐ If water may enter your home or property, secure objects that may float and cause damage as well as stack furniture and possessions on benches and tables, placing electrical items on top. Relocate waste containers, chemicals and poisons well above floor level
- ☐ Block toilets and floor drains (sand bags, etc) from inside the home to prevent sewage backing up
- ☐ Other actions if a flash flood is likely: \_\_\_\_\_

**when a flood is likely**



*If evacuating, it is safer to  
leave well before flooding occurs.  
You may only have several minutes to evacuate*

*If you are inside your home or property and  
surrounded by flash floodwater, it is safer to  
stay inside and shelter in the highest point*

*Never drive, ride, walk or play in floodwater*

## Tick ☒ the actions to consider during a flood

- ☐ Keep listening to the radio for information, updates and advice
- ☐ Contact others from the household that are away from home using the contact list on the last page. Tell them to return home only if it is safe
- ☐ Keep in contact with neighbours and make sure they are safe
- ☐ Securely stack possessions on benches and tables, placing electrical items on the top
- ☐ Remember to ensure the safety of pets and other animals
- ☐ If advised to evacuate:
  - ☐ Leave well before flash flooding occurs
  - ☐ Follow all instructions given by authorities
  - ☐ Take the Home Emergency Kit
  - ☐ Take pets. Dogs should be muzzled. Take required pet medication
  - ☐ Turn off electricity and gas at the mains. Secure gas bottles and any other items that could float
  - ☐ Keep members of the household together
  - ☐ Proceed to an evacuation centre if told to do so
  - ☐ If not, shelter at a friend's or relative's residence on higher ground away from the floodplain. Advise relatives and authorities of this location
- ☐ If you are inside and your home or property is surrounded by flash floodwater:
  - Do not enter floodwater. It is safer to stay inside and shelter at the highest point
  - You may have little or no time to prepare for flooding. **Your life is the priority**
  - In life-threatening emergencies, call 000
  - For emergency help in floods, call the SES on 132 500
- ☐ Other actions to carry out during a flash flood: \_\_\_\_\_

**during a flood**



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*Keep away  
from fallen trees, power lines  
and damaged structures*

## *Consider these actions after a flood*

- If evacuated, wait for permission from emergency services to return home. There is a possibility of evacuation after a flood for safety and health reasons
- The Department of Community Services (DoCS) may coordinate recovery assistance in your area. For information on welfare assistance after a flood from DoCS call **1800 018 444**
- Before entering any flood-affected part of the home, ensure its safety is checked. Checks should investigate at least:
  - Structural safety of the building
  - Safety of electrical and gas supplies and equipment and whether the sewerage system is working properly. These should be checked by qualified people (note their details on the emergency contact list)
  - Potential slips, trips and falls with mud and water
  - Any venomous spiders and snakes
  - Any debris
- Wear non-slip footwear, protective clothing and puncture-resistant gloves while cleaning up and use disinfectant
- Never consume food or liquid that has been in contact with floodwater
- Help neighbours and others that have been affected by the flood
- Replace damaged floor coverings, furniture and fittings with water resistant ones
- Other actions after a flash flood: \_\_\_\_\_

**after a flood**



***Reminder:***  
***check batteries and review***  
***the Home FloodSafe Toolkit***  
***at the start of daylight savings each year***

***Date to review Toolkit and check batteries:***

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| WHO                                                                                                                       | NAME                    | NUMBER       |
|---------------------------------------------------------------------------------------------------------------------------|-------------------------|--------------|
| Help in floods and storms<br>Life threatening situations<br>Radio station for flood advice is<br>Members of the household | SES                     | 132 500      |
|                                                                                                                           | Ambulance, Police, Fire | 000          |
|                                                                                                                           |                         | Frequency    |
|                                                                                                                           |                         |              |
| Work<br>Other family and friends                                                                                          |                         |              |
|                                                                                                                           |                         |              |
| Neighbours                                                                                                                |                         |              |
|                                                                                                                           |                         |              |
| DoCS Disaster Recovery<br>Electrical<br>Gas<br>Water<br>Sewerage<br>Telephone<br>School<br>Vet<br>Other                   | DoCS                    | 1800 018 444 |
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|                                                                                                                           |                         |              |

emergency contact numbers

# HOME FLOODSAFE TOOLKIT

FOR EMERGENCY HELP IN FLOODS AND STORMS

CALL THE SES ON 132 500

[www.ses.nsw.gov.au](http://www.ses.nsw.gov.au)