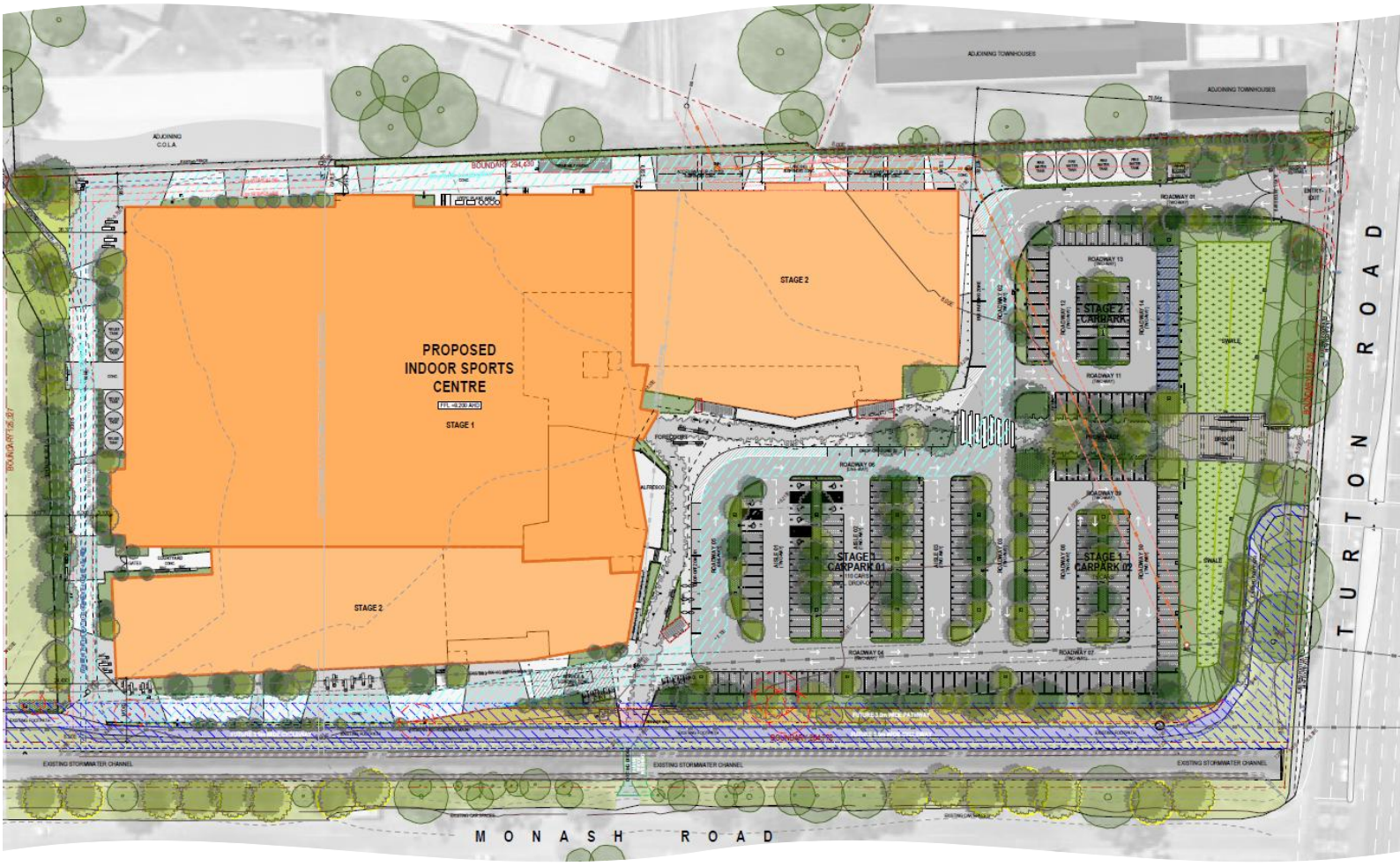
Hunter Indoor Sports Centre

Flood Emergency Response Plan

R.T2468.002.07



March 2026

Response to Submissions Round 2 Final

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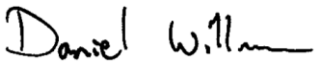

Synopsis

Flood Emergency Response Plan for proposed development on the Hunter Indoor Sports Centre at 2 Monash Road and 24 Wallarah Road, New Lambton, NSW.

Revision History

Revision	Description	Date
01	Final	8/07/2024
02	Response to Submissions Draft	26/05/2025
03	Response to Submissions Draft	3/06/2025
04	Response to Submissions Final	11/06/2025
05	Response to Submissions Round 2 Draft	18/01/2026
07	Response to Submissions Round 2 Final	16/03/2026

Disclaimer

Executive Summary

This Flood Emergency Response Plan is prepared to support the proposed development of the Hunter Indoor Sports Centre at 2 Monash Road and 24 Wallarah Road, New Lambton NSW. This document outlines the overall strategy for Flood Emergency Response Management, which will be developed into a more detailed Flood Emergency Response Plan prior to occupation of the proposed development.

The key requirements for development of an effective FERP have been established. The development and adoption of an FERP requires full integration with the site management, health and safety and incident management structures and is typically required prior to occupation. However, the overall flood emergency response strategy, flood intelligence and key components of the FERP were assessed.

The staff members responsible for the FERP should monitor BOM severe weather warnings and site management should consider the need to cancel or postpone events if a relevant severe weather warning is issued by the BOM. Travel is typically discouraged in such circumstances due to the risk of heavy rainfall and strong winds increasing the risk of driving. Such advice was in place across Newcastle prior to the April 2015 flood event.

The recommended flood emergency response (if people are present on the Site during a flood) is to seek refuge from flooding within the Site, only vacating the Site when it is safe to do so following the recession of flood inundation. There is however an opportunity for pedestrian evacuation from the Site (if required and safe to do so) and for flood emergency egress/ingress during a flood event, from the rear building access to Womboin Road.

An alarm system will activate once the water level within the swale area is sufficiently high to require an emergency response. This will occur when Site egress by vehicle is compromised through flooding of the access road and Turton Road. A remotely operated gate at the Site entrance will then be closed, to be re-opened once it is safe to vacate the Site. If the flood level continues to rise to a level at which the car park becomes flooded then a second alarm will be activated, signalling a requirement to relocate to the first floor of the building.

The Flood Refuge area is the first-floor level of the building. With an available floor area of around 2400 m^2, the Flood Refuge can accommodate up to 2500 people potentially present on the Site. Being a fully functioning part of the building, the Flood Refuge is inherently well-equipped to service the needs of potential occupancy for an expected period of a few hours.

On-site flood refuge requires structural certification that the proposed building can withstand the expected hydraulic loads of the PMF event. Given the heavy construction type of the building this is expected to be readily achieved. The modelled flood depths adjacent to the building at the PMF event are locally as high as 1.4 m, with peak velocities typically no higher than up to 1.7 m/s. Confirmation has been provided by Northrop (the Project Structural Engineers) that the proposed building can be designed to resist the expected forces of flood waters and remain structurally adequate.

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1 Introduction

1.1 Project Overview

Torrent Consulting has been commissioned by Basketball Association of Newcastle Limited (BANL) to prepare this report in accordance with the technical requirements of the Secretary's Environmental Assessment Requirements (SEARs), and in support of the State Significant Development Application (SSD- 65595459) for the proposed Hunter Indoor Sport Centre with courts, indoor stadium, amenities and associated civil and landscaping works, at 2 Monash Road and 24 Wallarah Road, New Lambton (the Site).

The site is located at 2 Monash Road and 24 Wallarah Road, New Lambton (refer to Figure 1-1), within the Newcastle local government area (LGA). The site comprises multiple parcels of land and is legally described as:

- Lot 2380 DP755247
- Lot 2379 DP755247
- Lot 2378 DP755247
- Lot 2377 DP755247
- Lot 1 DP1304081

The Site is located beside Lambton Ker-rai Creek, which is a tributary of Styx Creek, located some 450 m downstream. The Site is known to be flood-prone, as identified in the Newcastle City-wide Floodplain Risk Management Study (BMT WBM, 2012) and the recent update to the Throsby, Styx, and Cottage Creeks Flood Study (Rhelm, 2024).

1.2 Scope of Assessment

This report addresses the key requirements of an effective FERP. The development and adoption of an FERP requires full integration with the site management, health and safety and incident management structures and is typically required prior to occupation. This document outlines the preliminary Flood Emergency Response Plan, which will be further developed prior to occupation of the proposed development.

Flood emergency response for the management of risk to life from flooding typically involves evacuation of flood-affected areas on major river systems with sufficient warning time to execute a safe evacuation to flood-free land. In local catchment "flash flood" environments such as Newcastle, a shelter-in-place policy is preferred, as there is insufficient opportunity to affect an evacuation, and the risk exposure is typically lower within the buildings than the surrounding roadways. A shelter in place policy for the management of risk to life from flooding is adopted by CN.

Title:

Study Locality

0 100 200 m

approx. scale

Figure: 1-1

Revision: A

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1.3 Flood Emergency Management Strategy

Flood emergency response for the management of risk to life from flooding typically involves evacuation of flood-affected areas on major river systems with sufficient warning time to execute a safe evacuation to flood-free land. In local catchment "flash flood" environments such as Newcastle, a shelter-in-place policy is preferred, as there is insufficient opportunity to affect an evacuation, and the risk exposure is typically lower within the buildings than the surrounding roadways.

A shelter in place policy for the management of risk to life from flooding is adopted by CN, for which the requirements are satisfied by the proposed development. The project design also satisfies the intent of the Shelter in Place Guideline for Flash Flooding (DPHI, 2025) requirements, which include a maximum period of duration for isolation of 12 hours and the provisions expected to be afforded by a Flood Refuge.

The key elements of the proposed development design that support the shelter-in-place flood emergency response strategy include:

- The nature of Site usage enables operations to be suspended, and the Site closed when major flood events are forecast, with the NSW SES indicating their support for this approach
- The finished floor level of 9.2 m AHD limits internal flood inundation at the PMF to below 0.5 m and a low hazard (H1-H2) flood condition
- Access to a first-floor internal area for flood refuge above the PMF level
- Limited high hazard (H5) exposure to the building at the PMF within the service loading zone, with the heavy building construction expected to withstand the hydraulic forces
- Flood inundation times of less than 12 hours (the PMF inundation duration analysis in the Broadmeadow Place Strategy FIRA confirms that the Site and surrounds are subject to inundation periods of 6-9 hours)
- The external site grading provides rising access from parked cars to the building and flood refuge location
- Emergency egress/ingress to Womboin Road is available even during the peak of a PMF event.

The Shelter in Place Guideline for Flash Flooding recommends a minimum floor space of 2 m^2 per person. For the typical expected usage of the Site, the first floor of the building has sufficient space available to satisfy this recommendation. However, if the Site is at capacity in the extremely unlikely event of flood refuge being required, the available area on the first floor is reduced to around 1 m^2 per person. This is consistent with the Australian Red Cross guidelines for refuge areas.

It is important to consider that a floor area of less than 2 m^2 being available represents a worst-case scenario, in which the Site is being used during a flood event, that it is being used for an event that fills the venue to capacity and that the flood event will inundate the ground floor of the building. The probability of this scenario is so remote (rarer than a 1-in-30,000,000 AEP) that in practical terms the proposed development is expected to comfortably provide above a 2 m^2 floor area per person in the event of it being used for flood refuge.

The principal risk management measure is to close the Site when flood conditions are expected, for example when a large weather system threatens to bring heavy rain. Most rare flood events are associated with large weather systems, such as East Coast Lows and ex-tropical cyclones. The most likely scenario in the event of a flood impacting the Site is that the Site has been closed and nobody is present there. However, some level of risk remains that a flood event impacting the Site is not forecast, such as a rapidly developing thunderstorm. The typical expected usage of the Site also serves to significantly reduce the risk exposure.

The critical thresholds for flood affectation at the Site are the point at which vehicular access will be cut, the point at which flooding of the car park will occur and the onset of internal inundation of the building. These occur at a flood level of around 7.8 m AHD, 8.2 m AHD and 9.2 m AHD, respectively. The best estimate of probabilities at which these thresholds will be exceeded are around a 10% AEP, 1.5% AEP and 1-in-300,000 AEP.

An alarm system will activate once the water level within the swale area is sufficiently high to require an emergency response. This will occur when Site egress by vehicle is compromised through flooding of the access road and Turton Road. A remotely operated gate at the Site entrance will then be closed, to be re-opened once it is safe to vacate the Site. If the flood level continues to rise to a level at which the car park becomes flooded then a second alarm will be activated, signalling a requirement to relocate to the first floor of the building.

The first floor of the building provides a suitable flood free refuge above the PMF level. It can reliably accommodate the number of people exposed to be present at the Site in the unlikely event that the refuge needs to be utilised in the occurrence of internal flood inundation to the building.

Even during the peak conditions of a PMF event, an overland escape route is available through medium hazard flood waters. Although facing its own challenges and constraints, this provides an opportunity for ingress by emergency services in the event of a medical emergency.

A flood depth marker sign is located at the lowest point of the Site access road, with appropriate signage also placed around the swale area to warn of the potential for deep flood waters within it.

Further detail regarding the analysis of the probabilities of the likely level of flood risk exposure at the Site and the suitability of the flood refuge are available in the accompanying Flood Impact and Risk Assessment (refer R.T2468.001).

2 Flood Behaviour

2.1 Flood Probabilities

The Australian Rainfall and Runoff (ARR) 2019 guidelines describe two approaches that are typically used to express the probability of flood events:

- Annual Exceedance Probability (AEP) – the probability of an event being equalled or exceeded within a year. Typically, the AEP is estimated by extracting the annual maximum in each year to produce an Annual Maxima Series (AMS); and
- Average Recurrence Interval (ARI) – the average period between occurrences equalling or exceeding a given value. Usually, the ARI is derived from a Peak over Threshold series (PoTS) where every value over a chosen threshold is extracted from the period of record.

A summary of flood probability terminology from ARR 2019 is reproduced in Figure 2-1.

Frequency Descriptor	EY	AEP (%)	AEP (1 in x)	ARI
Very Frequent	12			
	6	99.75	1.002	0.17
	4	98.17	1.02	0.25
	3	95.02	1.05	0.33
	2	86.47	1.16	0.5
	1	63.21	1.58	1
Frequent	0.69	50	2	1.44
	0.5	39.35	2.54	2
	0.22	20	5	4.48
	0.2	18.13	5.52	5
Intermediate	0.11	10	10	9.49
	0.05	5	20	19.5
Rare	0.02	2	50	49.5
	0.01	1	100	99.5
Very Rare	0.005	0.5	200	199.5
	0.002	0.2	500	499.5
	0.001	0.1	1000	999.5
Extreme	0.0005	0.05	2000	1999.5
	0.0002	0.02	5000	4999.5
			↓	
			PMP/ PMP Flood	

Figure 2-1 Flood Probability Terminology

Very frequent flood events are expressed as exceedances per year (EY). At the other end of the probability spectrum, the Probable Maximum Flood (PMF) event is a function of the Probable Maximum Precipitation (PMP), which is the most rainfall that can be practically considered as being possible to occur over a given location or area. It is an extreme event with an approximate probability of between a 1-in-10,000 and a 1-in-1,000,000,000 AEP, dependant on catchment area. For small catchments such as Lambton Ker-rai Creek the best estimate of the probability of the PMF event is a 1-in-10,000,000 AEP.

2.2 Flooding at the Site

The flood-producing weather events most-likely to affect the Site include East Coast Lows (ECL). The Bureau of Meteorology (BOM) defines ECLs as being very intense low-pressure systems characteristic of the eastern coastline of Australia, occurring on average several times each year. Although they can occur at any time of the year, they are more common during autumn and winter with a maximum frequency in June. East Coast Lows will often intensify rapidly over a period of 12-24 hours making them one of the more dangerous weather systems to affect the eastern coast.

Other weather systems that present a flood risk at the Site include ex-tropical cyclones that occasionally move south into NSW and severe thunderstorms that can develop quickly and affect relatively small areas.

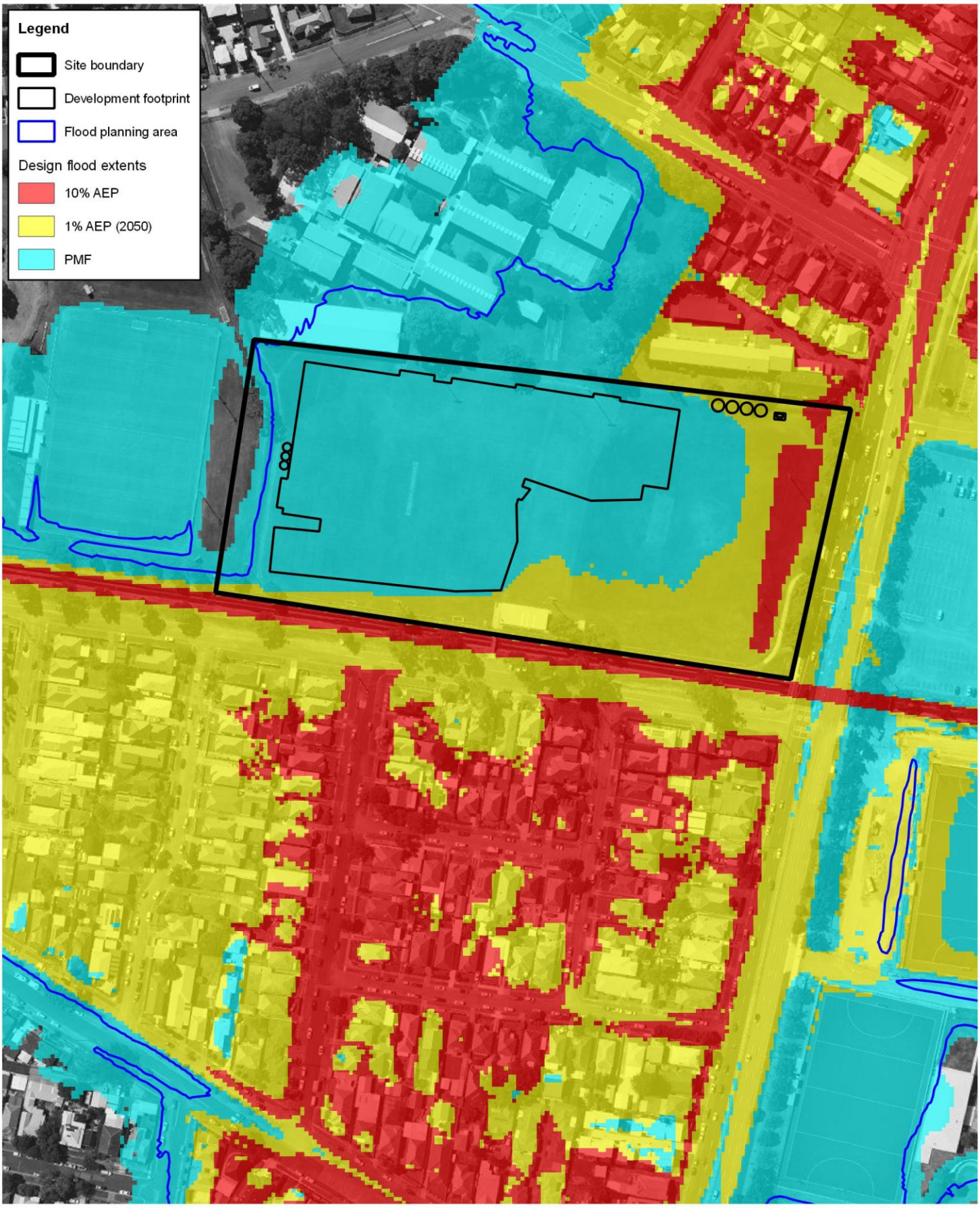
Flood risk at the Site (for events of a 1% AEP or rarer probability) is principally from the capacity of the Lambton Ker-rai Creek stormwater channel being exceeded. Flood waters are typically relatively-well contained upstream of Wallarah Road, but floodplain inundation becomes more extensive at the Site and further downstream. When the capacity of Lambton Ker-rai Creek is exceeded at Turton Road, flood waters inundate the floodplain at the Site and the residential area to the south of Monash Road. The obstruction presented by Turton Road forces excess flows northwards through the Site towards the Turton Road – Griffiths Road intersection.

Whilst the flood event conditions driving the management of risk to life and risk to property from flooding are from Lambton Ker-rai Creek flooding, for events of a 2% AEP or more frequent probability, the principal source of flood inundation is water from the smaller drainage channel to the north (located just to the south of Griffiths Road). The limited capacity of the drainage under Turton Road results in surface inundation in the area around Womboin Road and Young Road. At around the 10% AEP event, backwater inundation from this location begins to spill into the Site and flow south to Lambton Ker-rai Creek.

2.2.1 Flood Extent and Levels

The design flood extents for the 10% AEP, 1% AEP (2050) and PMF events were modelled as part of the flood impact and risk assessment (FIRA) and are representative of an intermediate, rare, and extreme flood condition, respectively. The simulated flood conditions include an allowance for debris blockage of hydraulic structures and are presented in Figure 2 2, for the post-development scenario. The Flood Planning Area (FPA) and building footprint are also shown for context.

At the 10% AEP flood event inundation is limited to the north-eastern corner of the Site and swale, through backwater inundation from Young Road. The internal road access to the Site is impacted, but only to s depth of less than 50 mm. However, it is likely that low-lying roads surrounding the Site may be subject to flood inundation and affect routes available for ingress/egress. The backwater flooding within Young Road reaches a level of around 7.9 m AHD.



Title:

Modelled Design Flood Extents

0 60 120 m

approx. scale

Figure: **2-2**

Revision: **D**

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At the 1% AEP (2050) event there is widespread inundation of the local road network and residential areas, with Turton Road cut both to the north and south of the Site. Excess flood waters backing up behind Turton Road flow north through the front of the Site towards the Turton Road – Griffiths Road intersection. The peak flood level reaches around 8.5 m AHD at the south-west corner of the Site, reducing to around 8.4 m AHD at the north-east corner.

In a PMF event there would be hazardous flood conditions across much of the city, together with widespread destruction of property and scour erosion. Internal inundation of the building will occur, with the modelled peak flood level being around 9.7 m AHD at the south-west corner of the Site, reducing to around 9.5 m AHD at the north-east corner.

Peak flood depth and level mapping for the simulated 10% AEP, 1% AEP (2050) and PMF events is presented in Appendix A.

2.2.2 Frequency of Flooding

The frequency of flooding can also be impacted by the extent and magnitude of debris blockage to hydraulic structures within the stormwater drainage network and through the potential increase of rainfall intensity resulting from future climate change conditions.

With these factors in mind, inundation of the Site could be expected to occur at a frequency of around a 10% AEP, with inundation of the car park expected to occur at a frequency of around a 1% AEP. Inundation of the ground floor level of the building will only occur during an extreme flood event such as the PMF. Given the uncertainty associated with the estimation of probability of a PMF condition it is difficult to determine the relative flood immunity afforded within the building. However, given a best estimate of a 1-in-10,000,000 AEP for the PMF rainfall, the building would not be internally inundated until somewhere in the order of a 1-in-300,000 AEP flood condition and so offers a substantial level of immunity.

Given the nature of the Site usage, it is not permanently occupied and the principal emergency response will be to close the Site in advance of an expected flood event. This significantly reduces the probability of the Site being occupied when subject to flood inundation. Further, the Site is only expected to operate at full capacity several times a year. When combined with the extremely rare probability of internal inundation to the building, the likelihood of a large-scale occupation of the on-site Flood Refuge is remote.

The first-floor level within the building is elevated significantly higher than the PMF level and so offers full immunity from flooding and can be regarded as a flood-free space.

2.2.3 Flood Hazard

The flood hazard conditions are a function of both flood depth and flood velocity and can be used to help understand the potential risk to people exposed to flooding at the Site.

Flood hazard mapping for the simulated 10% AEP, 1% AEP and PMF events is presented in Appendix B.

The flood hazards have been determined in accordance with Guideline 7-3 of the Australian Disaster Resilience Handbook 7 Managing the Floodplain: A Guide to Best Practice in Flood Risk Management in Australia (AIDR, 2017). This produces a six-tier hazard classification, based on modelled flood depths, velocities, and velocity-depth product. The hazard classes relate directly to the potential risk posed to people, vehicles, and buildings, as presented in Figure 2-3.

At the 10% AEP flood event the hazard of inundation within the Site is very low (H1) and does not present a significant risk to people located there. However, there are localised areas of low to medium hazard (H2 to H3) within Turton Road to the north of the Site.

At the 1% AEP flood event the hazard of inundation within the Site is very low (H1) within the lowest parts of the car park, located furthest from the building. The shared pathway adjacent to Lambton Ker-rai Creek and the landscaped area between the swale and Turton Road are subject to a medium (H3) hazard, with the deeper water within the swale being a medium (H4) hazard.

At the PMF event the internal building inundation is a low hazard (H1-H2) environment, with the surrounding exterior being a low to medium hazard (H2-H3) environment. Most of the car park, swale and area adjacent to Lambton Ker-rai Creek is a medium to high hazard (H4-H5) environment.

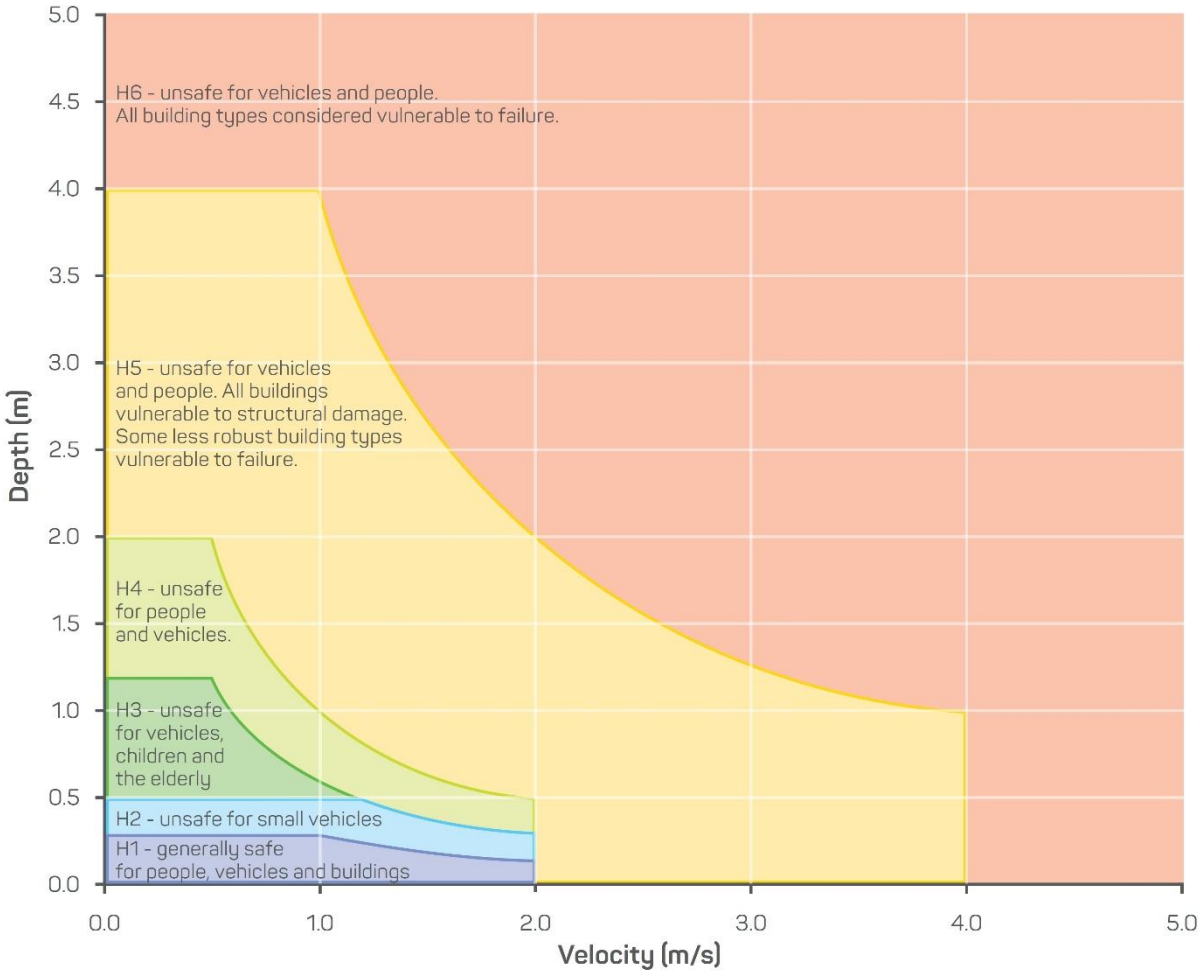


Figure 2-3 General Flood Hazard Vulnerability Curves (AIDR, 2017)

2.2.4 Flood Rate of Rise and Duration

Because of the urban and small catchment context of the local flood environment the rate of rise of flood waters can be rapid, particularly in an extreme event. However, this environment also produces floods of a relatively short duration, with flood waters quickly receding following the peak conditions.

For flood events such as the 10% AEP or 1% AEP, the rate of rise of flood waters within the Lambton Ker-rai Creek channel is in the order of 4 m per hour, increasing to over 10 m per hour for extreme flood event such as the PMF. Once the flood levels exceed the channel capacity the rate of rise reduces significantly, to around 1 m per hour across all events. The duration of floodplain inundation will vary on an event-specific basis but is expected to be in the order of between one to four hours.

The local road network is expected to be flooded prior to inundation of the Site, with the first location to be impacted expected to be south of the Turton Road – Griffiths Road intersection. Exact times of inundation will always be dependent on individual event specifics. Nevertheless, the design flood simulations provide an indication as to the order of expected timeframes for inundation of the local road network.

The low point on Turton Road to the south of the Griffiths Road intersection becomes inundated at around 90 mins from the onset of the flood-producing rainstorm in an event comparable to the 10% AEP design event, reducing to around 60 mins at a 1% AEP (2050) event and 30 mins at the PMF event.

Access to the Site from the south will become impacted when flooding impacts the intersection of Lambton Road and Turton/Bridges Roads. This is expected to occur at around 150 mins from the onset of the flood-producing rainstorm in an event comparable to the 10% AEP design event, reducing to around 90 mins at a 1% AEP (2050) event and 45 mins at the PMF event.

The short duration from which the inundation of local roads occurs following the onset of rainfall is a key reason why flood evacuation is an unreliable and risky emergency response, with sheltering in place a more appropriate emergency response strategy.

3 Flood Forecasts and Warnings

3.1 Bureau of Meteorology

The BOM has a few generalised warning services that can provide an indication of an increased likelihood of flooding, including:

- Severe Weather Warnings
- Severe Thunderstorm Warnings
- Flood Watches
- Flood Warnings

3.1.1 Severe Weather Warnings

The BOM issues Severe Weather Warnings whenever severe weather is occurring in an area or is expected to develop or move into an area. The warnings describe the area under threat and the expected hazards. Warnings are issued with varying lead-times, depending on the weather situation, and range from just an hour or two to 24 hours or sometimes more.

Severe Weather Warnings are issued for:

- Sustained winds of gale force (63 km/h) or more
- Wind gusts of 90 km/h or more (100 km/h or more in Tasmania)
- Very heavy rain that may lead to flash flooding
- Abnormally high tides (or storm tides) expected to exceed highest astronomical tide
- Unusually large surf waves expected to cause dangerous conditions on the coast
- Widespread blizzards in Alpine areas

3.1.2 Severe Thunderstorm Warnings

The BOM issues Severe Thunderstorm Warnings to alert communities of the threat of these more dangerous thunderstorms. A severe thunderstorm is one that produces any of the following:

- Large hail (20 mm in diameter or larger)
- Giant hail (50 mm in diameter or larger)
- Damaging or destructive wind gusts (generally wind gusts exceeding 90 km/h)
- Heavy rainfall which may cause flash flooding
- Tornadoes

Most thunderstorms do not reach the level of intensity needed to produce these dangerous phenomena, so the BOM does not warn for all thunderstorms.

Standard public forecasts will include information when there is a reasonable risk of severe storms. This information will allow people to prepare for the potential severe weather. Severe thunderstorms can be quite localised and can develop quickly. The exact location of severe thunderstorms can be hard to predict. As it is difficult to forecast the precise location and movement of severe storms before they have started to develop, detailed warnings will generally be provided once they have been observed or detected. The detailed warnings are usually issued without much lead-time before the event.

3.1.3 Flood Watches

The BOM issues a Flood Watch to provide early advice of a developing situation that may lead to flooding. A Flood Watch is not a warning of imminent flooding.

A Flood Watch provides information about a developing weather situation including forecast rainfall totals, catchments at risk of flooding, and indicative severity where required. The product also provides links to weather warnings, other BOM flood-related products, and contact details and information of relevant emergency services.

Although there is uncertainty attached to a Flood Watch, its early dissemination can help individuals and communities to be better prepared should flooding eventuate. A Flood Watch may discuss possible snowmelt, local flooding, or tidal impacts but a Flood Watch will not be issued solely based on these phenomena.

A Flood Watch is generally issued up to four days in advance of the expected onset of flooding. A Flood Watch can be issued before, during and after the rainfall has occurred, depending on the level of maturity of the flood warning systems and services, and flood impact information made available from the local emergency services or state agency.

Flood Watches are updated at least daily and finalised once all areas are covered by flood warnings or the risk of flooding has passed.

3.1.4 Flood Warnings

Flood Warnings are issued by the BOM to advise that flooding is occurring or expected to occur in a geographical area based on defined criteria. Flood Warnings may include either qualitative or quantitative predictions or may include a statement about future flooding that is more generalised. The type of prediction provided depends on the quality of real-time rainfall and river level data, the capability of rainfall and hydrological forecast models and the level of service required.

A quantitative or qualitative flood warning of Minor, Moderate or Major flooding is provided in areas where the BOM has specialised warning systems. They provide advanced warning about the locations along river valleys where flooding is expected, the likely class of flooding and when it is likely to occur. Predictions of expected water levels and the timing of flood peaks are provided at key forecast locations.

The BOM also provides generalised flood warnings when there is not enough data to make specific predictions or in the developing stages of a flood. They typically rely on forecast rainfall and knowledge of historical flood response. Generalised warnings contain statements advising that flooding is expected in particular river valleys but do not provide information about flood class nor precise locations.

As part of its Severe Weather Warning Service, the BOM also provides warnings for severe weather that may cause flash flooding. State emergency services or local authorities may provide flash flood warnings in some locations.

3.1.5 Accessibility of BOM Warning Services

The current BoM Warnings active in NSW can be accessed at http://www.bom.gov.au/nsw/warnings/

The rainfall recently recorded by rainfall warning gauge locations across Newcastle can be accessed at http://www.bom.gov.au/nsw/flood/newcastle.shtml

Current rainfall radar monitoring for the Newcastle (Williamtown Airport) 64 km radius loop can be accessed at http://www.bom.gov.au/products/IDR044.loop.shtml#skip

3.2 On-site Warning System

An on-site flood warning system monitors the water level within the swale area at the front of the Site adjacent to Turton Road. Once the water level reaches a sufficient height to compromise egress from the Site (7.8 m AHD), an alarm will be activated inside the building. This will enable the closure of a hinged bar gate by site management, preventing vehicular egress from the Site.

A second alarm will be activated if the water level in the swale continues to rise to a level high enough to initiate flooding within the car park (8.2 m AHD). This provides sufficient time to relocate people to the first floor of the building prior to any potential (albeit extremely unlikely) internal inundation of the building.

Whilst the Flood Warnings issued by the BOM and SES are the primary source of warning for advanced closure of the Site, the on-site system provides an additional layer of warning to inform site management and flood emergency response.

4 Flood Emergency Response Plan

4.1 The Emergency Response Strategy

Frequent to intermediate flood events, whilst potentially resulting in localised inundation within the Site, only produce low hazard flood conditions (albeit with a medium H3 hazard within the swale) that do not present a significant risk to people located there. However, for rare, very rare and extreme flood events, parts of the Site will become exposed to increasingly hazardous flood conditions.

The flood hazard within the local and broader city-wide road network will be higher than within the Site and so leaving the Site during or immediately prior to a flood event can increase the level of risk, particularly given the context of the local “flash flood” environment. Coupled with a relatively short warning time, these conditions make evacuation from the Site prior to a flood challenging, from both a logistical and risk-based perspective.

The recommended flood emergency response (if people are present on the Site during a flood) is therefore to seek refuge from flooding within the Site (as triggered by escalation to a Red Alert Mode), only vacating the Site when it is safe to do so following the recession of flood inundation (following de-escalation to a Green Alert Mode).

The responsibilities and actions for effective flood emergency response management at the Site are outlined in this FERP. The FERP forms part of the broader Risk and Emergency Management framework of BANL.

The flood emergency response strategy is consistent for both the Stage 1 and Stage 2 development, with the only difference being the amount of floor space area available for flood refuge. However, the combination of scenarios that would lead to the building being used for flood refuge with less than a 2 m^2 per person floor space area available at any stage of the development is rarer than a 1-in-30,000,000 AEP. The proposed building design therefore adequately meets the flood refuge requirements in practical terms.

4.1.1 Alert Modes

To assist in managing flood risks and communicating response actions, three flood Alert Modes have been developed for use in this FERP. They are:

- Amber: flooding of the Site is possible within the hours of operation
- Red: imminent flooding of the Site is expected
- Green: all clear, floodwaters have receded and local access to the Site is available

The Amber Alert Mode is called following the issuing of a Severe Weather Warning, Severe Thunderstorm Warning, Flood Watch, or Flood Warning for Newcastle by the BOM, if it indicates an increased potential for flooding.

A Red Alert Mode is triggered if water within the swale area at the Site reaches a sufficiently high level to impact vehicular egress via the access road.

The Green Alert Mode is called following a flood event, once flood waters have receded.

4.1.2 Flood Refuge

The Flood Refuge area is on the first-floor level of the building. With a combined floor area of around 2400 m^2, the Flood Refuge can readily accommodate the 2500 people potentially present on the Site. The first-floor refuge also provides around one toilet per 78 people if filled to a capacity 2500 people. Whilst the provision of space and toilets is slightly less than recommended in the Australian Red Cross guidelines, this is only when the Site is at capacity, for which the chances of a coincident flood event requiring use of the first floor as a Flood Refuge are extremely low. For typical rates of occupation up to 1200 people, the availability of space and toilet facilities is greater than the recommended provision.

Being a fully functioning part of the building, the Flood Refuge is inherently well-equipped to service the needs of potential occupancy for the expected period of 6-9 hours and includes the following:

- Emergency lighting (as provided by the battery storage of the PV system)
- Access to clean water (via the mains water supply)
- Access to bottled water and emergency snack foods in the kitchen
- First aid kits to include basic first aid supplies, plus EpiPen and Defibrillator (AED)
- Fire-fighting equipment including fire extinguishers and fire blankets

The Flood Refuge is well equipped to deal with minor medical and fire risks. With the expected period of isolation being only a few hours, the likelihood of a major medical or fire emergency is small. However, access to the Site by Emergency Services personnel is possible via Womboin Road even during the peak flood conditions of an extreme flood event, as shown in Figure 4-1.

An evacuation chair will be available at each of the stair wells within the building to assist site management in the relocation of physically impaired patrons to the upstairs flood refuge area.

4.2 Responsibilities

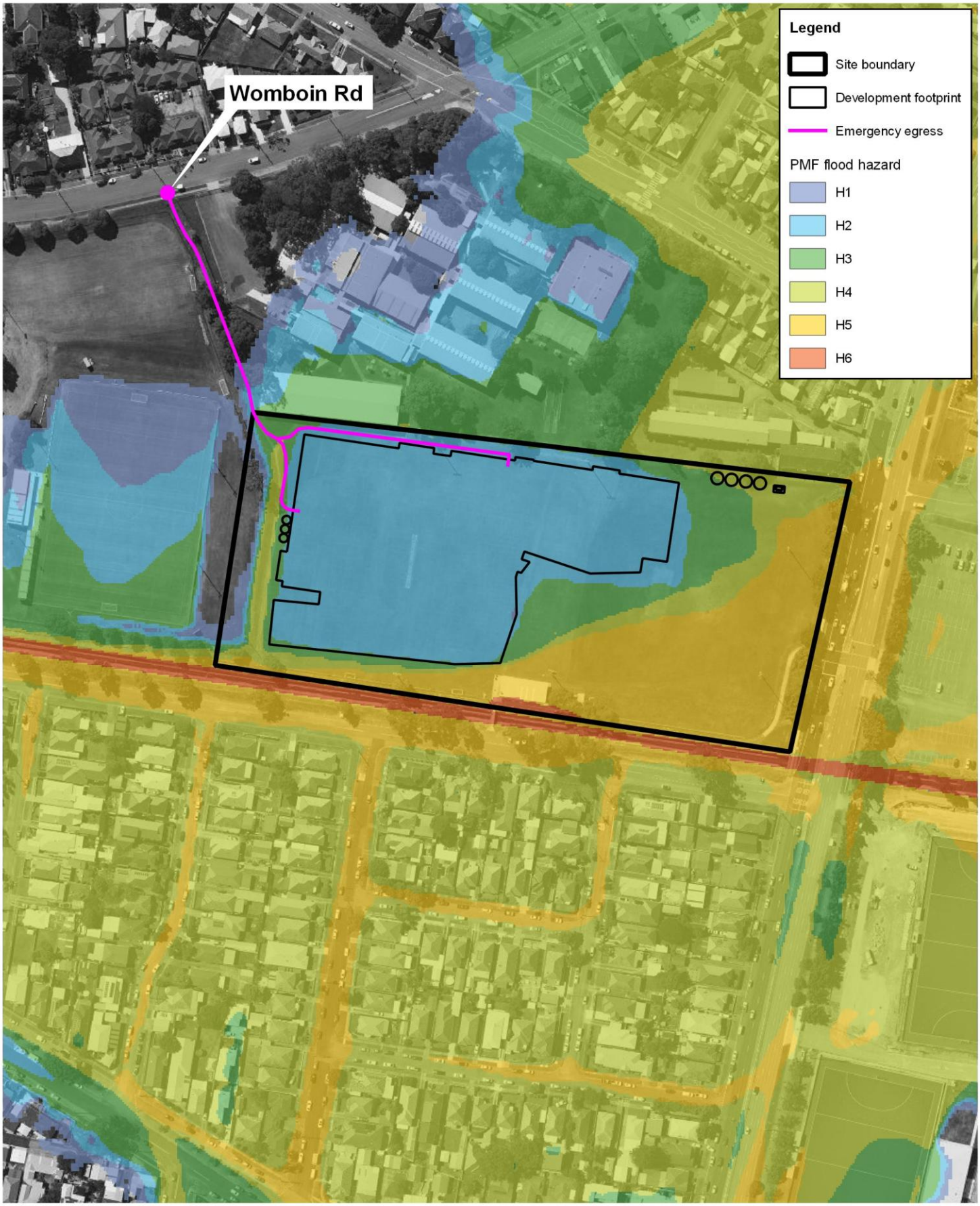
Roles and responsibilities of BANL staff in relation to a flood emergency response will be confirmed prior to occupation of the Site. However, at this stage it is expected that this responsibility will be delegated to a team responsible for venue management.

The responsibility of successful implementation of the FERP sits with BANL (specifically with Venue Management), however, the NSW SES as the State combat agency for flood events and the NSW Police Force have right to and may intervene before, after or during a flood to provide guidance or prescriptive directions to BANL.

4.2.1 NSW State Emergency Services

The NSW State Emergency Service (SES) is the lead combat agency for flooding in NSW. It can command resources from other government organisations including local Councils, Transport for NSW, and the Police to assist in flood operations under its command.

Under the State Emergency and Rescue Management Act, 1989, the SES has the power to direct any citizen or organisation to take actions in response to flooding. This includes the power to order evacuations.



Title:

Flood Egress / Ingress Route

0 60 120 m

approx. scale

Figure: 4-1

Revision: D

Information shown on this figure is compiled from numerous sources and may not be complete or accurate. Torrent Consulting cannot be held responsible for the misuse or misinterpretation of any information and offers no warranty guarentees or representations of any kind in connection to its accuracy or completeness. Torrent Consulting accepts no liability for any loss, damage or inconvenience caused as a result of reliance on the information.

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Any flood response directive issued by the SES or by delegated authority to others acting on its behalf must be followed by BANL staff and visitors. This includes any order to evacuate the Site or not evacuate the Site, irrespective of what decisions have been made by management in accordance with this FERP.

4.2.2 The Venue Management Team

The venue management team is responsible for initiating and orchestrating any required flood emergency response at the Site. The team comprises the venue manager, operations manager and other key staff.

During a flood emergency response, venue management is responsible for:

- High-level decision making relating to flood emergency response
- External stakeholder communication (parents and carers, State Emergency Services, etc.).

The venue management team will be responsible for the following tasks:

- Subscribe to the BOM Warning Service
- Ensure that the above services are available and setup to deliver notifications on the devices of the team members
- Ensure that staff receive the required training to assist in the implementation of the FERP.

4.2.3 Chief Warden

When the Site is operational, either the venue manager or operations manager will be present and will act in the role of Chief Warden during a flood emergency response. The Chief Warden will:

- Direct staff present on Site during a flood emergency response to assist in facilitating the required response
- Ensure that the Site flood management measures and infrastructure are functional
- Lead the annual drill of the flood emergency response procedures
- Monitor Warnings and Alert Mode triggers in accordance with this FERP
- Undertake management responses in accordance with the relevant triggers set in this FERP
- Assist, coordinate and communicate flood response messages to staff and visitors in accordance with this FERP
- Coordinate all flood emergency procedures
- Participate in a review of this FERP annually and following a flood event.

4.2.4 Staff and Visitors

Staff and visitors will:

- Follow the directions of the Chief Warden
- Report any concerns.

4.2.5 Training

All staff are to undertake the required training. Ensuring that this training is provided is the responsibility of the venue management team. Most training is consistent with broader Emergency

Management requirements and not specific to the FERP. This includes standard training for Fire Wardens and First Aid Officers, etc.

Familiarisation with the FERP should form part of the induction and regular training for staff. In addition, a full drill of a flood emergency response will be undertaken annually. The performance outcomes of the drill will be reviewed by the venue management team.

Specific training is also to be provided to the Chief Wardens (and potential delegates) as to the accessibility and interpretation of the available flood warning information and how this can improve the decision-making process during the management of a flood emergency response.

Annual communications will be provided by BANL to users of the facility, educating them about the FERP and their requirement not to attempt to collect travel to the Site during a flood emergency, until advised that the Site has re-opened.

4.3 Communication Methods

The venue management team is responsible for communications with external stakeholders during a flood emergency response.

In situations where a potential flood event is identified by the BOM via a Warning being issued, the venue management team will communicate with one another using their standard means. If the decision is made to close the Site in advance of an expected flood event, then this will be communicated by BANL to scheduled users of the Site the morning of the event or the day prior.

In situations where the Site is currently in use and a flood event impacting the Site is imminently expected (i.e. a Red Alert Mode) then communication is made, advising occupants as to the need for responsive action.

The Flood Refuge will inherently contain numerous laptops and mobile phones that can be used to facilitate communication with external stakeholders. Many of these will likely have sufficient charge to last throughout the duration of emergency response. Emergency lighting and limited power supply is likely to be available from the on-site battery storage system.

4.4 What to do Before, During and After a Flood

4.4.1 Normal Operation

During normal day-to-day operations, when the Site is not in a state of flood alert, the venue management team will:

- Ensure that this FERP is reviewed annually or after any flood event to reflect any lessons learnt or changes in the Site layout, features, or operations or to incorporate new data on flood behaviour as this becomes available
- Ensure that this FERP is included in induction and training of Site staff
- Ensure that the Chief Warden or delegates are aware of flood risks and of the risk management actions and responsibilities detailed in this FERP
- Organise a drill of the flood emergency response procedures annually

The Chief Warden (or delegate) will:

- Monitor the BOM warning service for triggers of the Amber Alert Mode

- Ensure that all staff who are on Site are aware of the flood risks and the flood management procedures detailed in this FERP
- Ensure that the Site flood management measures and infrastructure are functional
- Lead the annual drill of the flood emergency response procedures
- Participate in a review of this FERP annually and following a flood event

4.4.2 Amber Alert Mode

The Amber Alert Mode is called by the venue management team in advance of Site usage, or by the Chief Warden during Site usage, if any of the relevant triggers are detected. Under the Amber Alert Mode, a flood affecting the Site within the hours of operation is possible. The management actions to be undertaken will depend on when the Amber Alert Mode is called and are reported below.

Triggers to call an Amber Alert Mode

The following Warnings issued by the BOM for Newcastle may trigger an Amber Alert Mode:

- A Severe Weather Warning (see explanation below) OR
- A Severe Thunderstorm Warning OR
- A Flood Watch OR
- A Flood Warning

Any of the above Warnings listed on the BOM Warnings page that reference a geographical area that includes Newcastle will be accessed and reviewed. The Warnings are often descriptive in nature and will elaborate on the weather conditions that are expected to occur. Key indicators to be aware of are Severe Weather or Thunderstorm Warnings that include references to heavy rainfall, particularly if local catchment and/or flash flooding is mentioned.

Flood Watches and Flood Warnings tend to be issued for larger river catchments with flood level gauge locations and longer warning times, such as the Hunter River. However, they could potentially be issued for local catchment and/or flash flooding within a metropolitan area such as Newcastle.

Prior to commencement of Site usage

Details regarding any applicable BOM Warnings are reviewed by the venue management team as to the potential for flooding to occur during the upcoming hours of operation for the Site. The Warnings can be issued days in advance; in which case they will be periodically updated as the forecast event approaches.

Warnings that indicate heavy rainfall with a likelihood of local catchment and/or flash flooding and have an expected coincidence with upcoming hours of operation at the Site indicate an increased likelihood that a Red Alert Mode might be triggered. Depending on the expected severity and timing of the weather event, the venue management team will consider closing the Site, or suspending the planned activities. This decision will need to be taken 12-24 hours in advance to effectively communicate closure of the Site.

During periods of Site usage

Most BOM Warnings are provided at least a day in advance and so the issuing of a Warning that impacts the Site during operation without prior notice would be limited to rapidly developing, localised storm systems such as thunderstorms.

If a BOM Warning is issued that impacts current Site usage, then the Chief Warden and venue management team will determine whether it is appropriate to continue with the planned operations. In such circumstances, the risk of people being caught in transit by severe weather needs to be considered against the risk of becoming isolated by flood waters at the Site.

4.4.3 Red Alert Mode

The management actions to be undertaken will depend on when the Red Alert Mode is called and are reported below.

Triggers to call a Red Alert Mode

The Red Alert Mode is called immediately upon the on-site warning system activating the alarm. This indicates that flood affectation of the Site is expected imminently.

Prior to commencement of Site usage

Any planned use of the Site will be suspended immediately by the venue management team. Once the flood event has passed and safe access to the Site is possible, the team will inspect the Site to check for any flood damage or associated hazards that need addressing. The Site can then be re-opened, and planned activities resumed once it is safe to do so.

During periods of Site usage

When a Red Alert Mode is triggered, then the following actions are to be undertaken:

- Communication is made, advising occupants as to the potential for local flooding
- The boom gate is closed to prevent egress from the Site
- If flood waters begin to inundate the car park and the second alarm is sounded, then Site activities should be ceased and people relocated to the Flood Refuge
- Anyone within the car park should relocate to the building, which is self-evident with rising egress.

The Flood Refuge is well equipped to deal with minor medical and fire risks. With the expected period of isolation being only 6-9 hours, the likelihood of a major medical or fire emergency is small. However, access to the Site by Emergency Services personnel is possible via Womboin Road even during the peak flood conditions of an extreme flood event.

Evacuation off site will not be undertaken until a Green Alert Mode has been called, as this may expose people to a higher level of risk.

4.4.4 Green Alert Mode

The Green Alert Mode is called by the Chief Warden (in consultation with the venue management team), once flood waters are receding and the flood emergency has passed. For minor, localised events this will be evident from observation of conditions surrounding the Site. However, for major flood events consultation with the NSW SES will be required, to ensure that conditions more

broadly across the city are safe to begin vacating the Site and further flooding is not expected. The management actions to be undertaken are reported below.

The Chief Warden (or delegate) will:

- Communicate to staff and visitors that the flood emergency has now passed
- Keep monitoring the sources of information for the triggers of the Alert Modes
- Listen to the local radio station for updates on the weather / flood situation
- If the Site has experienced any flooding, then inspect the Site and adjacent roads for signs of any potential hazards that could present a risk for access to and from the Site
- Audit that all refuge supplies are returned to their resident locations

The staff will:

- Help people exit the Flood Refuge when the Chief Warden has confirmed that this can be undertaken
- Provide support while people leave the Site
- Help address any concerns of people arising from their potential collection from the Site, if required
- Identify any medical concerns and report them to a first aider.

The venue management team will:

- Coordinate with people to facilitate their collection from the Site, as required
- Arrange subsequent inspection of the building by a Structural Engineer if it has been inundated by flood waters
- Review this FERP to reflect any lessons learnt or changes in the Site layout, features, or operations or to incorporate new data on flood behaviour as this becomes available.

5 References

AIDR (2017) *Guideline 7-3, Australian Disaster Resilience Handbook 7 Managing the Floodplain: A Guide to Best Practice in Flood Risk Management in Australia*

City of Newcastle Council (2023) *Development Control Plan*

DPHI (2025) *Shelter in Place Guideline for Flash Flooding*

Geoscience Australia (2019) *Australian Rainfall and Runoff: A Guide to Flood Estimation*

Red Cross Australia (2014) *Preferred Sheltering Practices for Emergency Sheltering in Australia*

Rhelm (2024) *Throsby, Styx, and Cottage Creeks Flood Study*