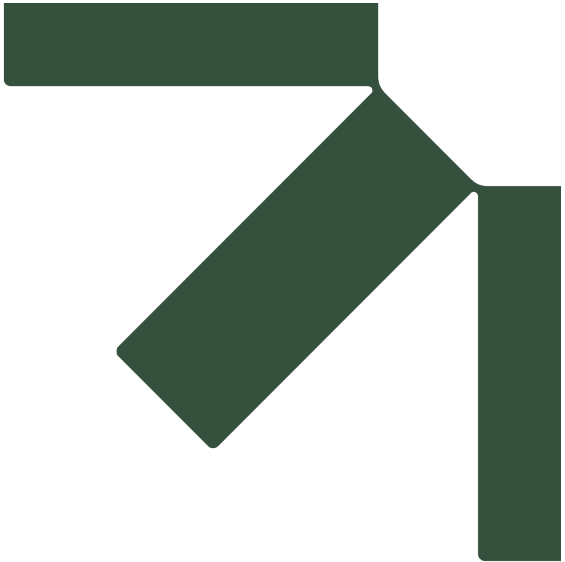




Appendix I Flood Emergency Response Plan

Construction Environmental Management Plan

SSD-55266460 - 45-47 Moxon Road, Punchbowl, NSW

Vaughan Constructions Pty Ltd

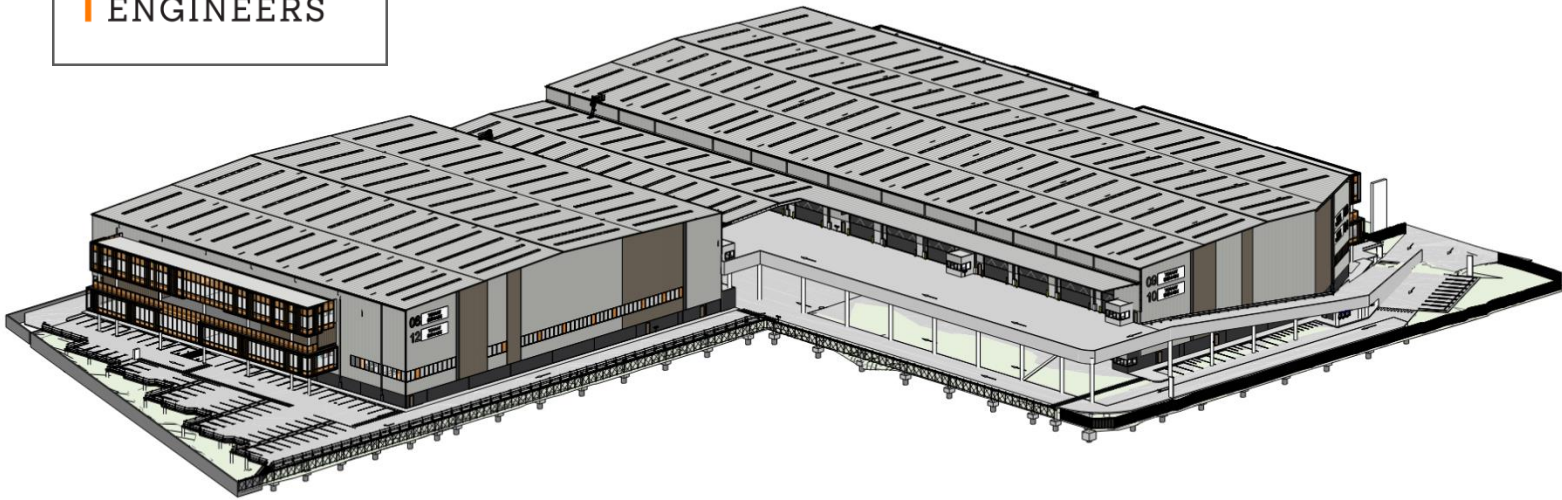
SLR Project No.: 630.031503.00001

25 September 2024



COSTIN ROE
CONSULTING

CIVIL &
STRUCTURAL
ENGINEERS



FLOOD MANAGEMENT PLAN

INCORPORATING FLOOD EMERGENCY RESPONSE PLAN

PROPOSED INDUSTRIAL FACILITY

45-57 MOXON ROAD

PUNCHBOWL NSW 2196

Prepared for:

Hale Capital Development Management Pty Ltd

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Client Contact	Mr Dominic Sester, Hale Capital	
	Name	Signature
Prepared by	Lourens de Villiers	
Checked by	Daniel Soliman	
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1 INTRODUCTION

Costin Roe Consulting Pty Ltd has been commissioned by Hale Capital Development Management Pty Ltd (Hale) to prepare this *Flood Management Plan (FMP)* for the industrial development located at 45-57 Moxon Road, Punchbowl, NSW.

This *Flood Management Plan (FMP)* addressed the flooding present on the proposed development site and incorporates a *Flood Emergency Response Plan (FERP)* for the 45-57 Moxon Road, Punchbowl development.

This plan details the site responses to flooding including predicted flood levels, flood warnings and flood notifications, evacuation and refuge protocols and awareness training for employees and contractors.

The requirements outlined in this report are consistent with the provisions of the *NSW Flood Risk Management Manual (2023)*.

The subject area of this FMP/FERP comprises emergency responses for the construction and operational phases of the development.

This plan addresses the requirements of the Department of Planning, Industry and Environment Development Approval SSD-55266460 dated 19 July 2024, as included in Table 1 below.

Table 1.

SSD-55266460	CC Condition	How It Is Addressed
B49	Flood Management Prior to the commencement of construction of the development, the Applicant must prepare a Construction Flood Emergency Response Plan (CFERP) to the satisfaction of the Planning Secretary. The CFERP must form part of the CEMP required by condition C2 and must: (a) be prepared by a suitably qualified and experienced person(s); (b) be prepared in consultation with the NSW State Emergency Service; (c) address the provisions of the Floodplain Development Manual (2023) and associated guidance in the Department's 'Flood risk management toolkit'; and (d) include details of: (i) the flood emergency responses for construction of the development; (ii) predicted flood levels; (iii) flood warning time, flood notification, signs and depth indicators;	Refer to this report for the Flood Emergency Response Plan. (c) refer to Section 3 of this report for guidelines adopted for the FERP. i) refer to Section 7 for the flood emergency responses. ii) refer to Section 4 for a discussion on flood behaviour. iii) Refer to Section 6 & Section 7 for Flood

SSD-55266460	CC Condition	How It Is Addressed
	(iv) assembly points and evacuation routes; (v) evacuation and refuge protocols; and (vi) awareness training for employees and contractors.	Safety, evacuation and response iv) Refer to Section 6 & Section 7 for Flood Safety, evacuation and response v) Refer to Section 6 for Flood Safety, evacuation and response vi) refer to Section 6 of this report for the flood education, awareness and preparedness program.
B51	Prior to the commencement of operation of the development, the Applicant must update the CFERP for the purposes of operation of the development in an Operational Flood Emergency Response Plan (OFERP) to the satisfaction of the Planning Secretary. The OFERP must: (a) be prepared by a suitably qualified and experienced person(s); (b) be prepared in consultation with the NSW State Emergency Services; (c) address the provisions of the Floodplain Development Manual (2023) and associated guidance in the Department's 'Flood risk management toolkit'; and (d) include details of: (i) the flood emergency responses for operation of the development; (ii) predicted flood levels; (iii) flood warning time, flood notification, signs and depth indicators; (iv) assembly points and evacuation routes;	Refer to this report for the Flood Emergency Response Plan. (c) refer to Section 3 of this report for guidelines adopted for the FERP. i) refer to Section 7 for the flood emergency responses. ii) refer to Section 4 for a discussion on flood behaviour. iii) Refer to Section 6 & Section 7 for Flood Safety, evacuation and response. iv) Refer to Section 6 & Section 7 for Flood Safety, evacuation and response.

SSD-55266460	CC Condition	How It Is Addressed
	(v) evacuation and refuge protocols; and (vi) awareness training for employees and contractors.	v) Refer to Section 6 for Flood Safety, evacuation and response. vi) refer to Section 6 of this report for the flood education, awareness and preparedness program.

2 DEVELOPMENT SITE

2.1 Site Description

The property is located within the City of Canterbury-Bankstown Council (CBC) local government area (LGA), as shown in **Figure 2.1**.

The proposal applies to land at 45-57 Moxon Road, Punchbowl, being Lots 1, B, 23, 221-222 of DP618465, DP390488, DP552521 and DP840328 (subject site).

The subject site comprises of multiple allotments located on the western side of Moxon Road, within the CBC Local Government Area (LGA), and is zoned IN2 Light Industrial, pursuant to the Bankstown Local Environmental Plan 2015 (BLEP2015).

Existing attributes of the subject site are noted as follows:

- The subject site affords a primary frontage of 189m to Moxon Road to the east.
- Vehicular access to the subject site is currently facilitated via existing access points on Moxon Road.
- In its existing state, the subject site comprises multiple warehouses and office buildings at 45-57 Moxon Road with at-grade parking and concrete driveways.
- The subject site is within the existing Punchbowl industrial precinct, predominantly characterised by established industrial development of similar scale.
- The subject site is serviced by road infrastructure including Moxon Road, Wiggs Road and Canterbury Road.



Figure 2.1. Site Location and Aerial Imagery (Source: Nearmap October 2022)

2.2 Topography & Description

The site generally grades down from the north-east towards the south-east. The highest level is RL 4.35 towards the north-east corner of the site. The lowest level on the site is in along the western boundary at RL 1.40m. Moxon Road, which the site fronts, falls from north (at RL 3.75) to south (RL 2.11).

2.3 Proposed Development Description

The proposal involves the construction and operation of a multi-level warehouse and distribution facility at 47-57 Moxon Road, Punchbowl. The proposed building ground floor FFL is set at RL4.00, above the flood planning level specified by City of Canterbury-Bankstown in their Stormwater System Report (document ref: WP-SIA-1682/2020 dated 02/11/2020) and is noted to be above the 1% AEP Flood level of RL3.30.

The construction of the warehouse will include the provision of twelve (12) warehouse tenancies, split over two (2) storeys. The typical use for the warehouse buildings will be for distribution, and will contain associated ancillary office space, car parking areas, truck circulation and loading zones, fire brigade access and landscaping.

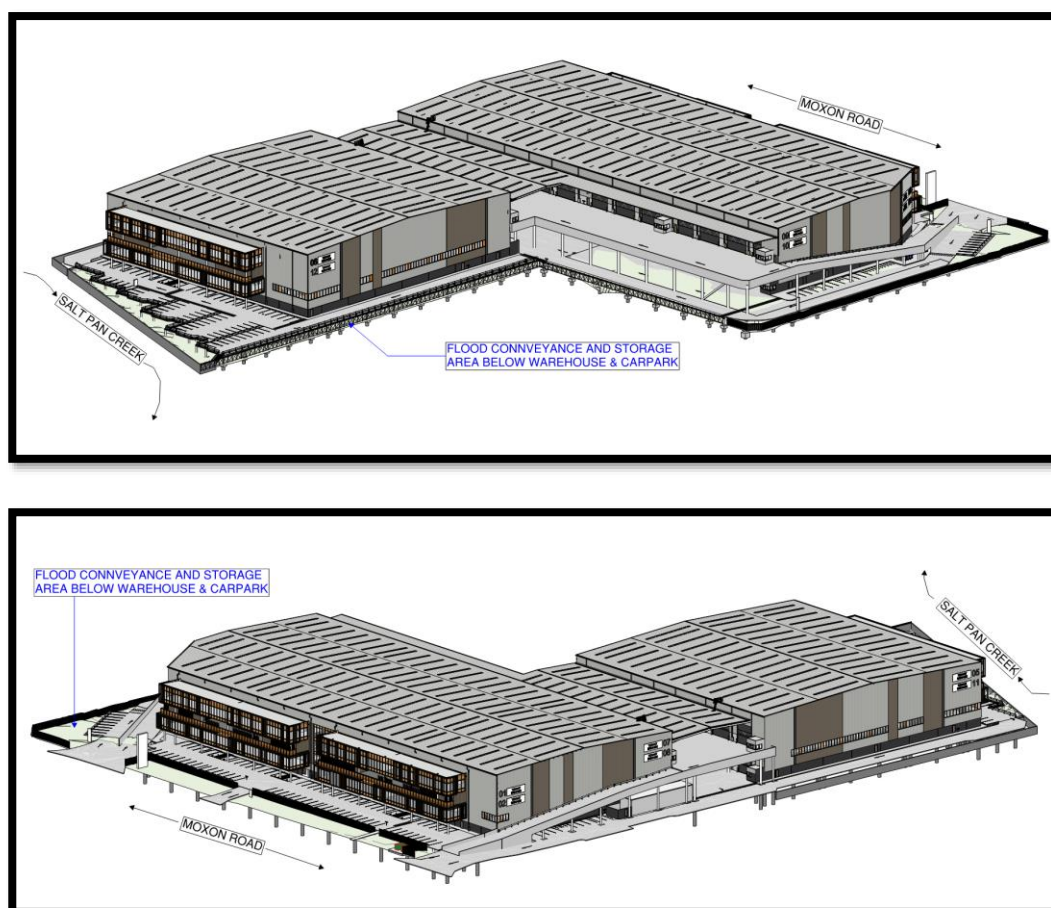


Figure 2.2. 3D depiction of development site depicting overland flow zone below suspended levels above.

A dedicated flood conveyance path is provided to receive and convey the 1% AEP flood event into the offset flood storage areas below the suspended development above.

The ground floor of the development site is suspended on a grid of columns approximately 2m above the flood conveyance area, ensuring the building's finished floor levels are at least 500mm above the 1% AEP flood levels. Flood waters from Moxon Road and the Wiggs Road Channel access the flood conveyance area from Moxon road and flows to the west of the development site and is discharge to Salt Pan Creek via an appropriately sized outlet structure, water quality device and an existing formal inground drainage systems, with the majority of stormwater being piped into drainage systems along Salt Pan Creek.

The development site is also separated from the Salt Pan Creek by a levee wall and in addition, a system of pumps has been installed to provide flood immunity to the existing building. It is understood that the levee wall prevents flood waters from Salt Pan Creek from entering the property, whilst the pump and sump system removes nuisance flood water from Wiggs Road floodwater ingress.

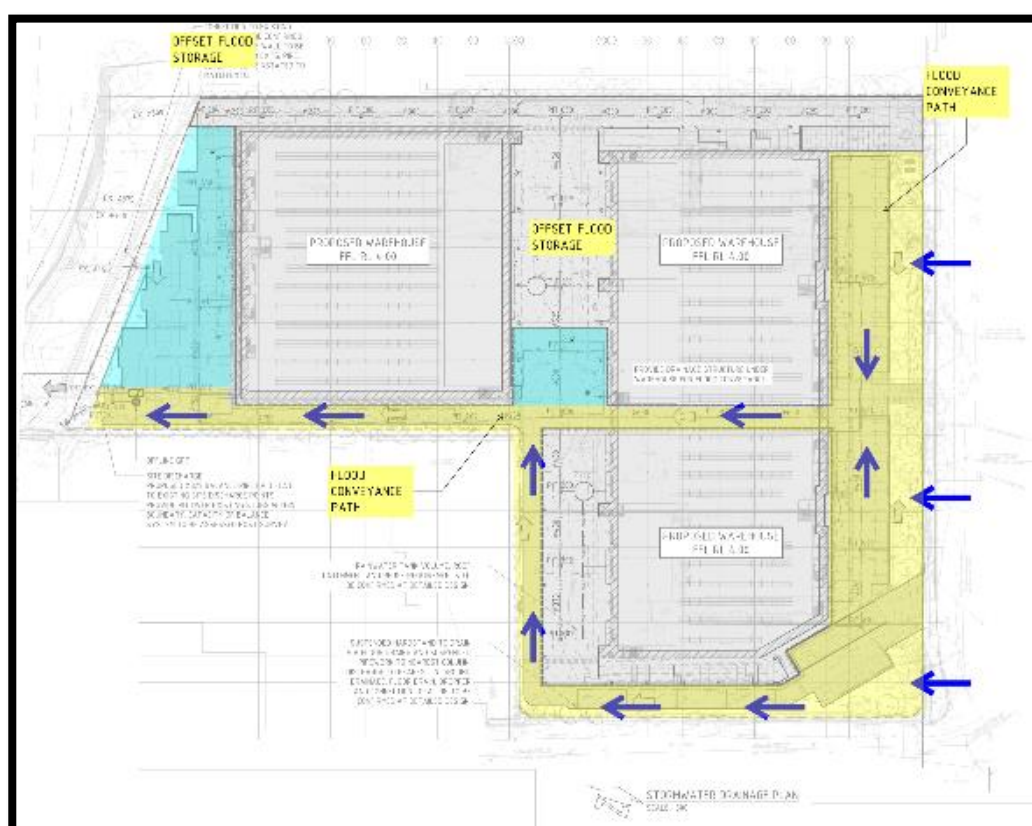


Figure 2.3. Proposed Overland Flow Path

The proposed suspended slab locations and extent are above the flood conveyance area. The on-grade areas of the development are shown in grey, and the suspended areas of the development are shown in orange on the finished levels plans in orange per Figure 2.4 below.

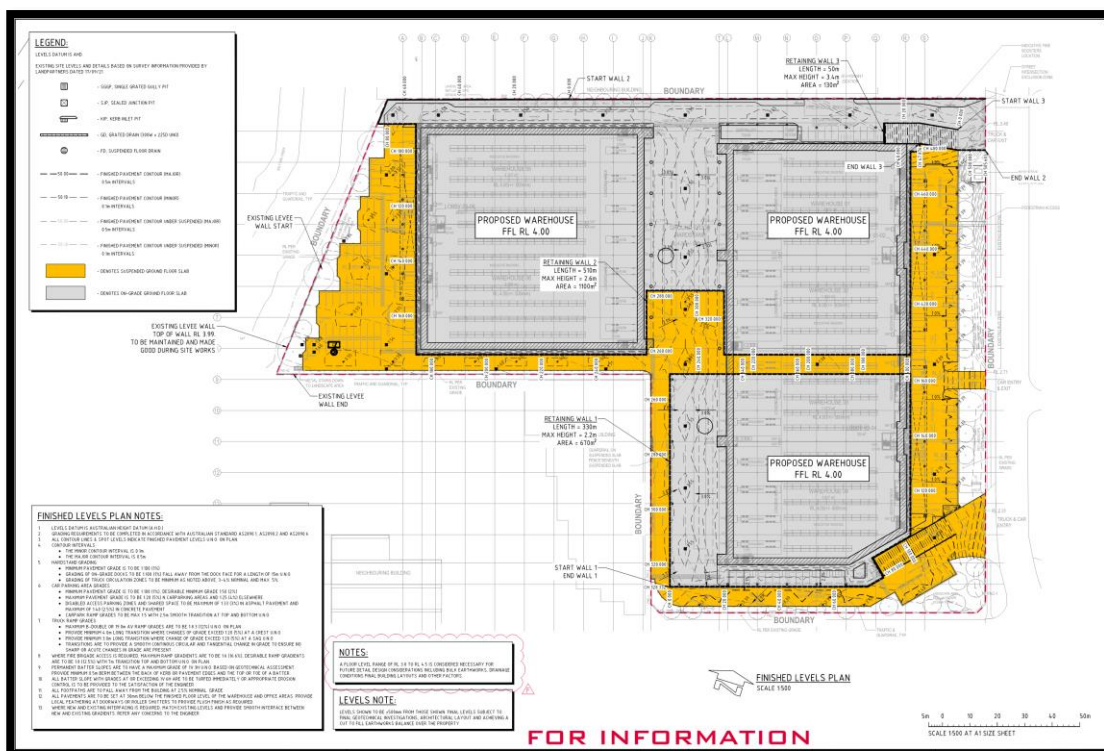


Figure 2.4. Finished Levels Plan – On-Grade and Suspended

The layout of the proposal prepared by Pace Architects is shown in **Figure 2.5 & Figure 2.6.**

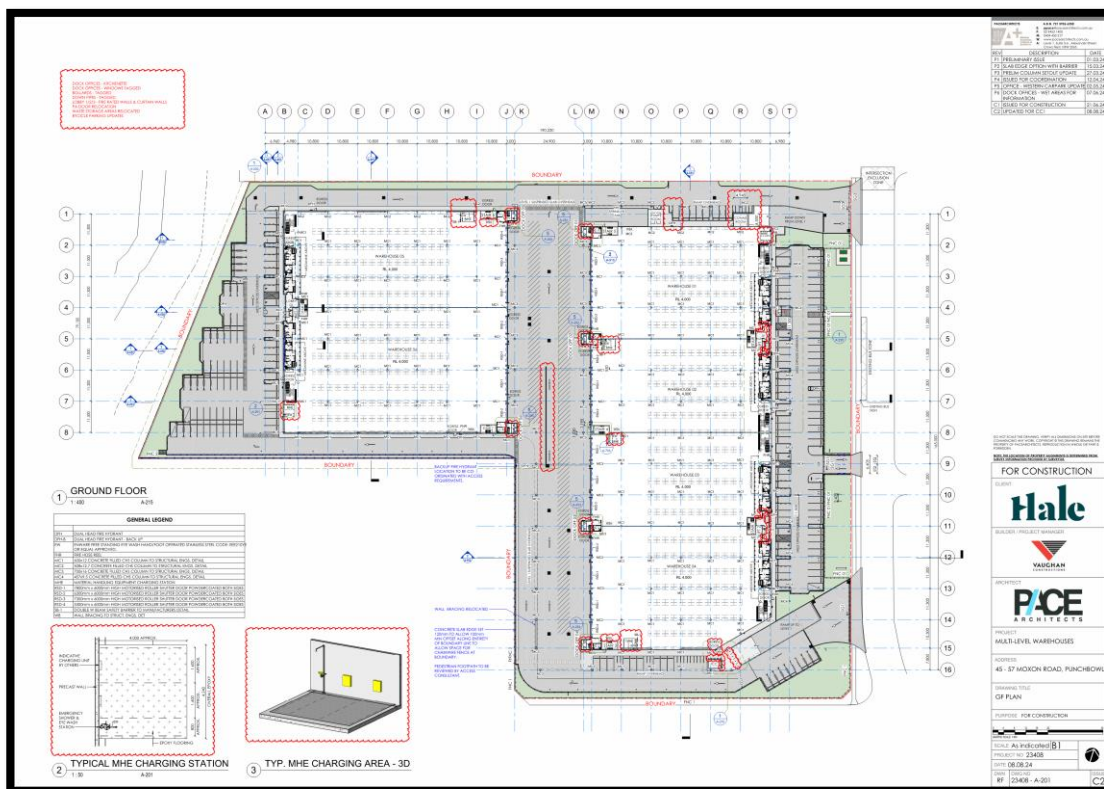
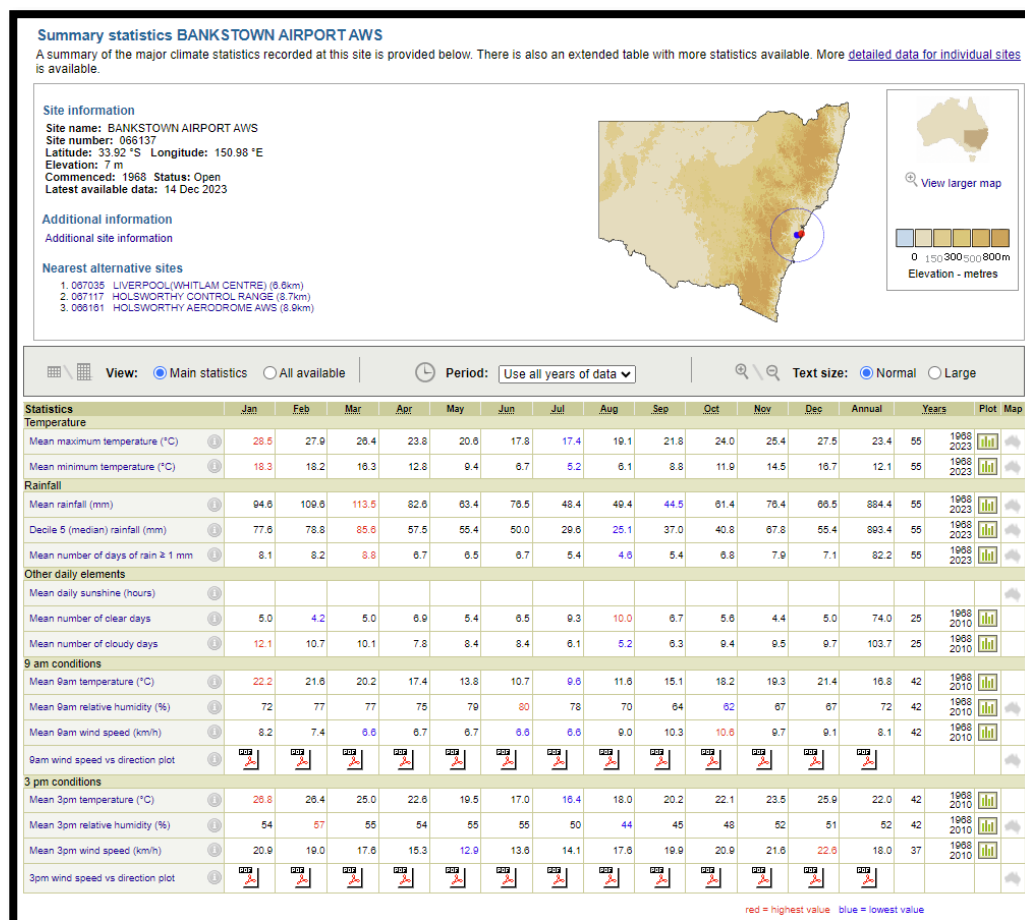


Figure 2.5. Proposed Development (Ground Level) (Reference: PACE Architects – Ground Floor Plan – drawing 23408-A-201)

2.4 Climate and Meteorology

The Punchbowl area experiences relatively mild temperatures and moderate rainfall, with a mean annual rainfall of about 885mm, based on records from Bankstown Airport AWS (Station 066137 since 1968) which is approximately 6km to the north-west of the development site.



Typically, the wettest month (mean rainfall) is March, and driest usually September.

The annual mean minimum temperature is 12.1°C and the mean maximum temperature is 23.4°C. The hottest month is usually January (mean maximum of 28.5°C) and the coldest month is usually July (mean minimum of 5.2°C).

Climate statistics and average annual rainfall data and rainfall patterns relevant to this site (as sourced from Australian Bureau of Meteorology (BOM)) are included for reference in **Appendix B** of this **FMP**.

3 GENERAL REQUIREMENTS

3.1 General Requirements Introduction

This FMP has been prepared with the purpose of providing an understanding of flood behaviour to the facility owners, management, and contractors during operation and construction of the development.

This document has been completed with consideration to the following (**Referenced Documents** – Development Owners and Management need to ensure latest revisions of referenced documents is consulted in between periodic review of FERP):

- Flood Risk Management Manual (2023)
- Canterbury-Bankstown Council’s Stormwater System Report (WP-SIA-1682/2020),
- Chapter 2.2 – Flood Risk Management – Catchments Affected by Stormwater Flooding, of Canterbury-Bankstown’s DCP 2023 in relation to the development including review of potential impacts of the development on existing flooding, and potential impacts on the development from flooding; and
- Salt Pan Creek Flood Study (SPCFS) (September 2011) and the Salt Pan Creek Floodplain Risk Management Study (SPCFRMS) (May 2015)
- NSW Government (2023). Flood Impact and Risk Assessment. Flood Risk management guideline LU01;
- Provision and Requirements for Flood Warning in New South Wales – SES (Nov 2019);
- Bureau of Meteorology (2013). Service Level Specification for Flood Forecasting and Warning Services for New South Wales – Version 2.0;
- Costin Roe Consulting (2024), Civil Engineering Report (Co13924.01-04g.rpt)

The following sections of this FMP provide confirmation of roles and responsibilities, statutory requirements, measures to monitor and report on impacts and performance of the measures implemented, contingency planning and protocols for review and improvement.

3.2 Roles and Responsibilities

1. The builder during construction and the warehouse owners/management during operations are the key persons responsible for the implementation of this FMP and have the responsibility action measures if there is potential for a safety or environmental incident to occur.
2. The key roles and responsibilities for the responsible personnel in relation to flood risk management are outlined below in **Table 3.1**.

Table 3.1 Roles and Responsibilities

Role	Responsibilities
Development Owners and Management	Provide for training in stormwater management for personnel directly involved with the implementation of this plan, as required. Identify and allocate Project resources to implement the requirements of this plan.

Role	Responsibilities
	Oversee the implementation and maintenance of this plan. Ensure all measures are performing adequately throughout the operation of the centre in perpetuity.
Construction Contractor's EM	Ensure maintenance and monitoring of the stormwater management measures are undertaken in accordance with Section 7 .
Construction Contractors	Ensure flood behaviour local to the development is understood. Ensure personnel are educated in the overall FERP .

3.3 General FMP/FERP Requirements

1. This document and associated drawings are subject to further periodic review throughout the operational period to ensure the requirements and measures set out in this **FMP/FERP** are fit for purpose and allow for any changes which might occur not envisaged during the initial preparation of the **FMP/FERP**.
2. All flood management and response measures will conform to the standards and information contained in:
 - (i) This **FMP/FERP**;
 - (ii) Conditions of Consent;
 - (iii) Canterbury-Bankstown Council's Stormwater System Report (WP-SIA-1682/2020);
 - (iv) Salt Pan Creek Flood Study (SPCFS) (September 2011) and the Salt Pan Creek Floodplain Risk Management Study (SPCFRMS) (May 2015);
 - (v) The latest version of SES flood emergency response plans;
 - (vi) The latest version of Canterbury Bankstown Council's Local Emergency Management Plan.

3.4 Review and Improvement

During operation, effectiveness of the flood detention basin & flood emergency response management measures will be confirmed through regular review of the **FERP**. It is recommended that this **FERP** be reviewed every 3 to 5 years once operations commence. Further additional reviews are to be undertaken following major flood event to confirm real life conditions against baseline conditions and make any necessary adjustments.

Adjustments as required will be made based on confirmed site conditions and effectiveness of the implemented measures. These will need to be made in conjunction with a suitably qualified engineer, or other professional, who specialises in stormwater management and flood management.

A copy of the updated plan and changes will be distributed to all relevant stakeholders in accordance with the approved document control procedure. Construction will be undertaken in accordance with the most recent, approved version of this **FMP/FERP**.

4 FLOOD BEHAVIOUR

4.1 Flood Behaviour Introduction

The site is located around 35m east of Salt Pan Creek and 85m north of the Wiggs Road channel. The site is affected by overland flow and flooding associated with the Salt Pan Creek and the Wiggs Road Stormwater Channel.



Figure 4.1 Development Site Location between Salt Pan Creek and the Wiggs Road Stormwater Channel

Extracts from a flood study of the Punchbowl catchment was provided by Canterbury-Bankstown Council. The study involved a hydrological and hydraulic assessment of the catchment at a regional level.

We provide excerpts of flooding associated with the 1% AEP storm event from the report in **Figure 4.2** below. **Figure 4.2** is noted to be an excerpt of the 1% AEP Flood Extents and Flood Depth.

The contributing upstream catchment for the overland flow catchment is generally comprised of developed land (mostly residential) and roads.

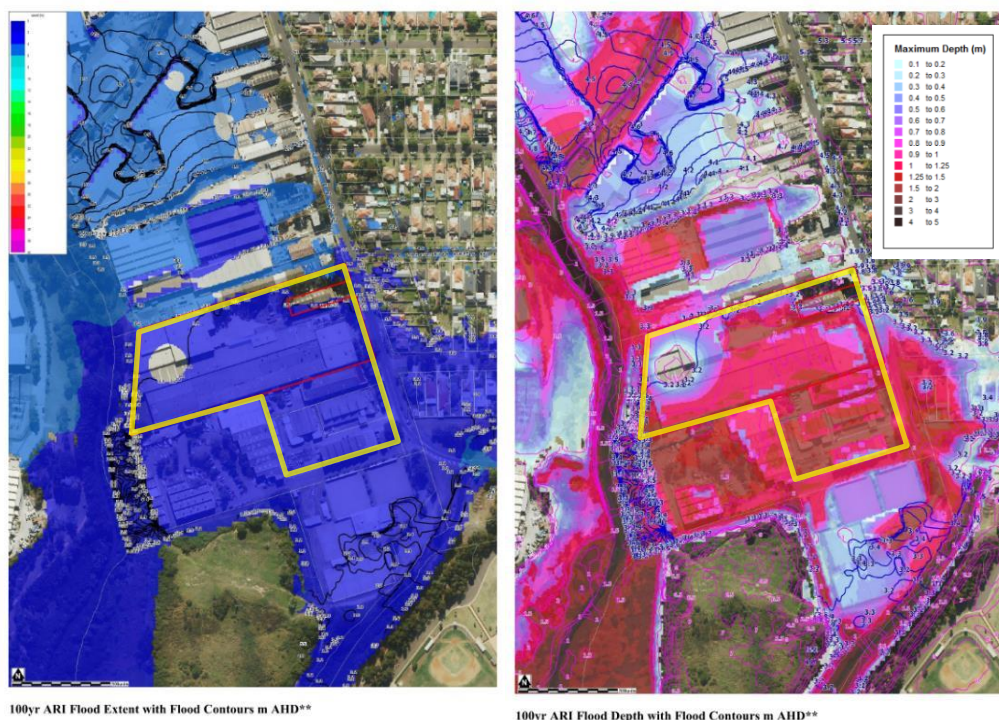


Figure 4.2. CBC Stormwater System Report – 1% AEP Flood Extent & Flood Levels

The site is directly impacted by flooding on-lot, the FPL for this site is RL 3.8m AHD (as per City of Canterbury-Bankstown Stormwater System Report WP-SIA-1682/2020) and is associated with an overland flow path from the upstream catchment and drainage system (Salt Pan Main Stream) towards the south and west of the site. The proposed operational portion of the site (Hardstand, carpark, Warehouse FFL) are designed to be suspended above the overland flow area.

Reference should be made to **Section 2.4** which discusses climate and rainfall. The wettest month is noted to be in March; however, we note that the meteorologic conditions in which overland flow through Moxon Road could be expected when either an East Coast Low, or similar low-pressure conditions are present. These conditions are more predominant during February through June, however occurrences outside of these months could also be expected.

4.2 Flood Extent

The post-development flood extent (Shown in **Figures 4.3 & 4.4**) and level for the 1% AEP storm event, presented at the peak flow, can be seen to be around RL3.30m AHD at Moxon Road frontage and approximately RL3.43m at the western boundary of the property along the levee wall.

Reference to **Figures 4.3 & Figure 4.4** below should be made for the post-development flood levels and depths and velocity for the 1% AEP event.

An assessment has been undertaken for the effect of climate change on the development. The assessment takes into consideration potential effect from increased rainfall intensity and sea level rise.

An assessment of the 0.2% AEP and 0.5% AEP was included as a proxy for the effect of climate change and is considered a conservative assessment for a 10% increase in flow to the 1% AEP event.

Reference to **Figures 4.5** below should be made for the post-development flood levels and depths for the 0.2% AEP event.

The post-development flood extent and level for the 0.2% AEP storm event, presented at the peak flow, can be seen to be around RL3.74m AHD at Moxon Road frontage and approximately RL3.73m at the western boundary of the property along the levee wall.

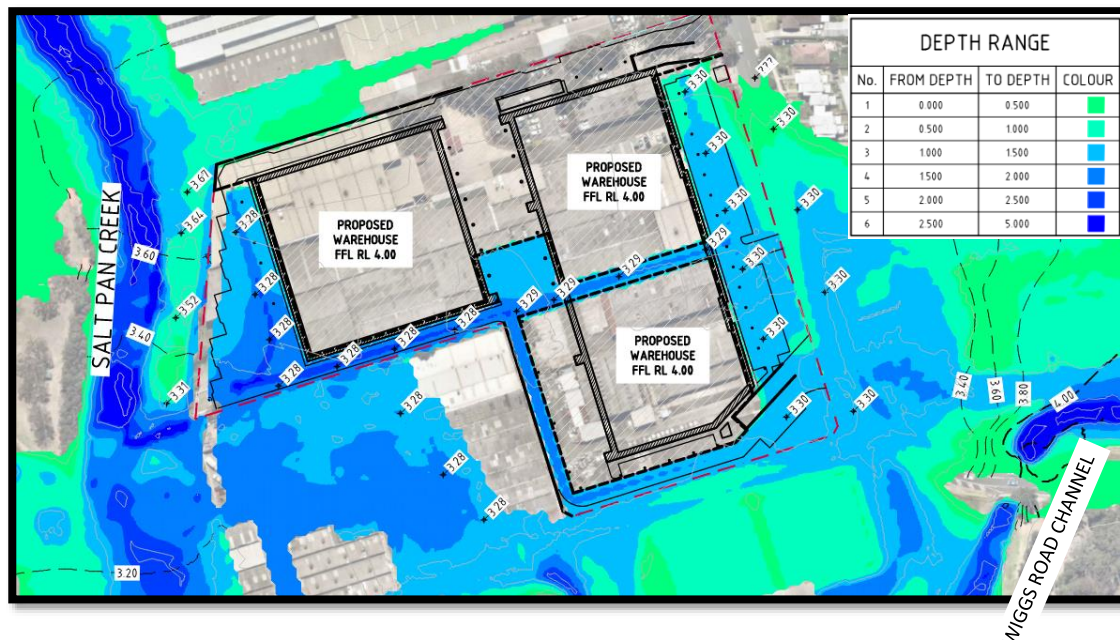


Figure 4.3 - 1% AEP Post-Development Flood Levels & Depths

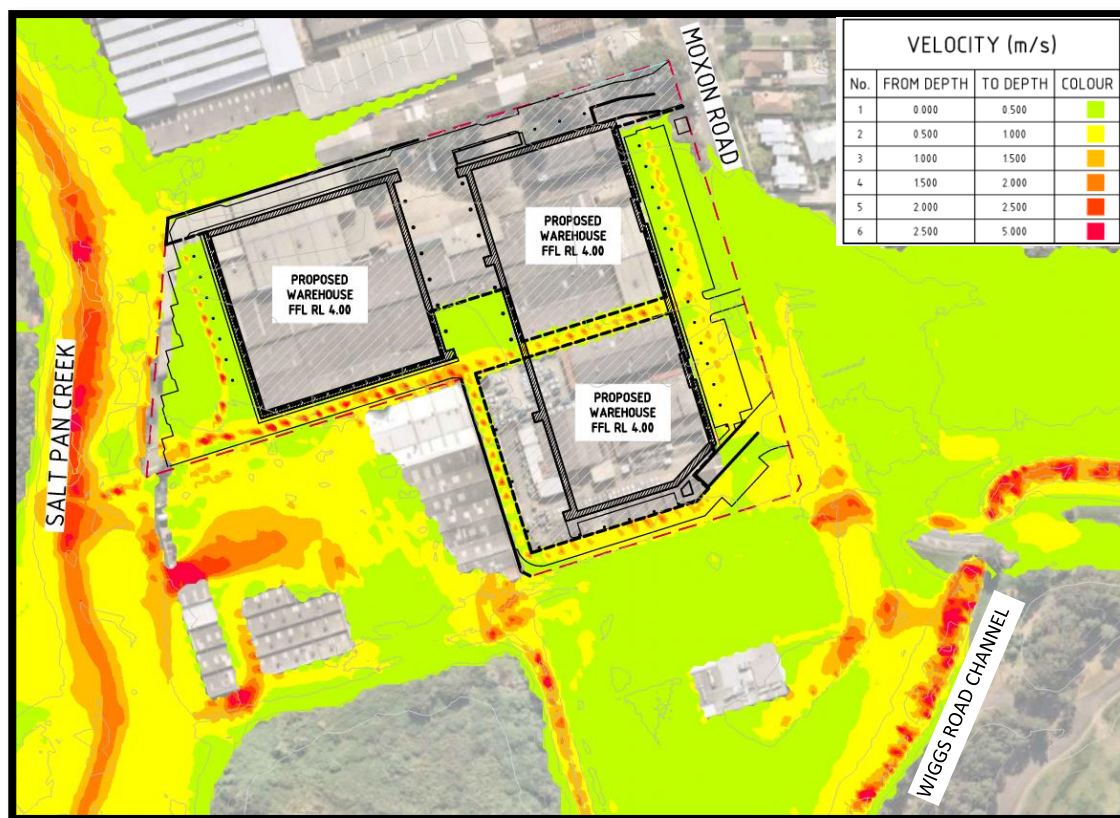


Figure 4.4 - 1% AEP Post-Development Flood Velocity

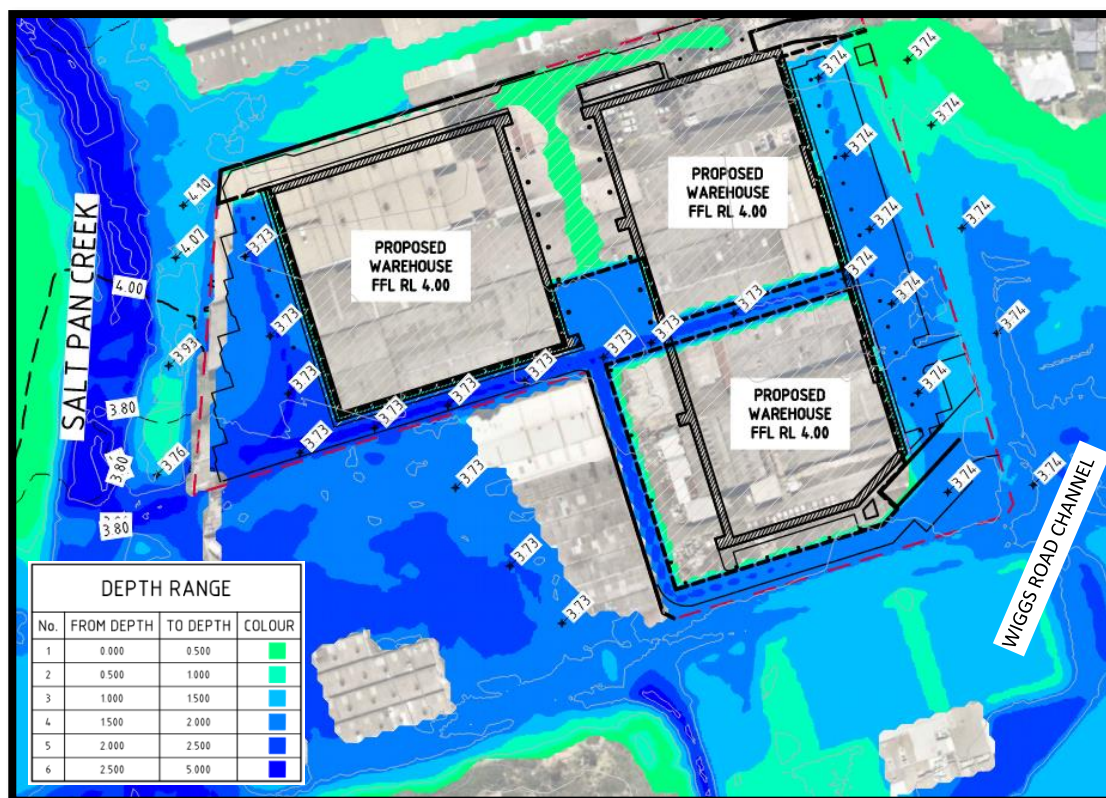


Figure 4.5 – 0.2% AEP Post-Development Flood Levels & Depths

5 HAZARD CATERGORIES & MAPPING

5.1 Introduction

Flood hazard categories are broken down into high and low hazard (H1 to H6 categories depending on depth and velocity, and their interaction with each other as set out in **Figures 5.1a** and **5.1b**) for each hydraulic category. High hazard areas are defined as those where there is a possible danger to personal safety and the potential for significant structural damage. Able-bodied adults would have difficulty in wading to safety. With low hazard areas, should it be necessary, a truck could evacuate people and their possessions, and able-bodied adults would have little difficulty in wading to safety.

Flood hazard criteria and mapping has been completed for the 1% AEP and PMF post development conditions as per criteria set out in the *Australian Rainfall and Runoff (2019)*, *A Guide to Flood Estimation – Book 6 – Flood Hydraulics* and Figure 6.7.9 as included as **Figure 5.1** below.

Refer **Section 5.2** for hazard mapping. Reference should be made to Section 6 for a detailed description of flood safety and -evacuation.

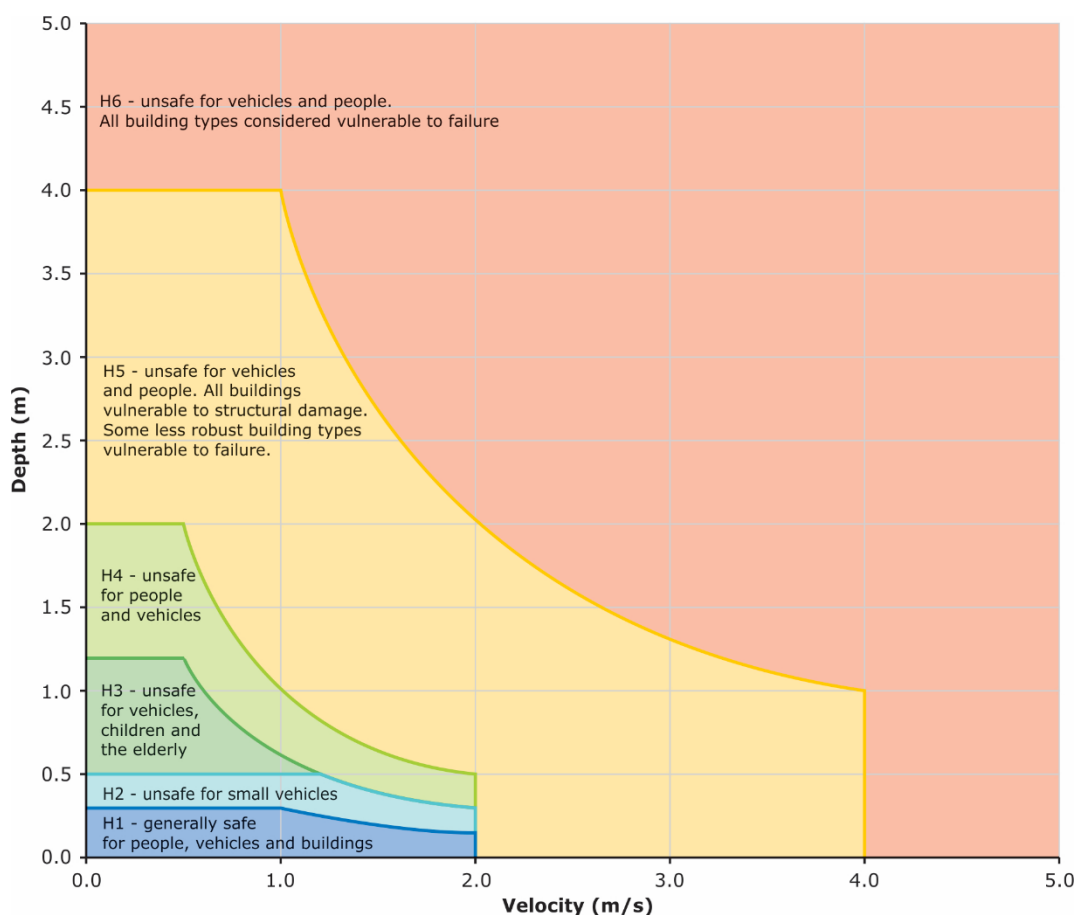


Figure 5.1a. Provisional Flood Hazard Chart (AR&R 2019)

Table 6.7.3. Combined Hazard Curves - Vulnerability Thresholds (Smith et al., 2014)

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

Table 6.7.4. Combined Hazard Curves - Vulnerability Thresholds Classification Limits (Smith et al., 2014)

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

Figure 5.1b. Adopted Hazard Criteria (AR&R 2019)

5.2 Hazard Mapping

Flood hazard criteria and mapping (for the 1% AEP storm event) has been included in **Figure 5.2** below. The operational portion of the site (Hardstand, carpark, Warehouse FFL) are above the 1% AEP hazard zone, suspended above the overland flow area, with the overland flow area below the suspended hardstand area being noted to have a hazard categorisation ranging between H3 & H5.

Figure 5.3 below show the majority of the operational portion of the site are above the 0.2% AEP hazard zone, with a small portion of the hardstand associated with and H1 hazard categorisation, which is considered generally safe for vehicles and people.

Reference should be made to Section 6 for a detailed description of flood safety and - evacuation.

The assessment and hazard categorisation has been completed based on criteria set out in the *Australian Rainfall and Runoff (2019), A Guide to Flood Estimation – Book 6 – Flood Hydraulics* and *Figure 6.7.9*.

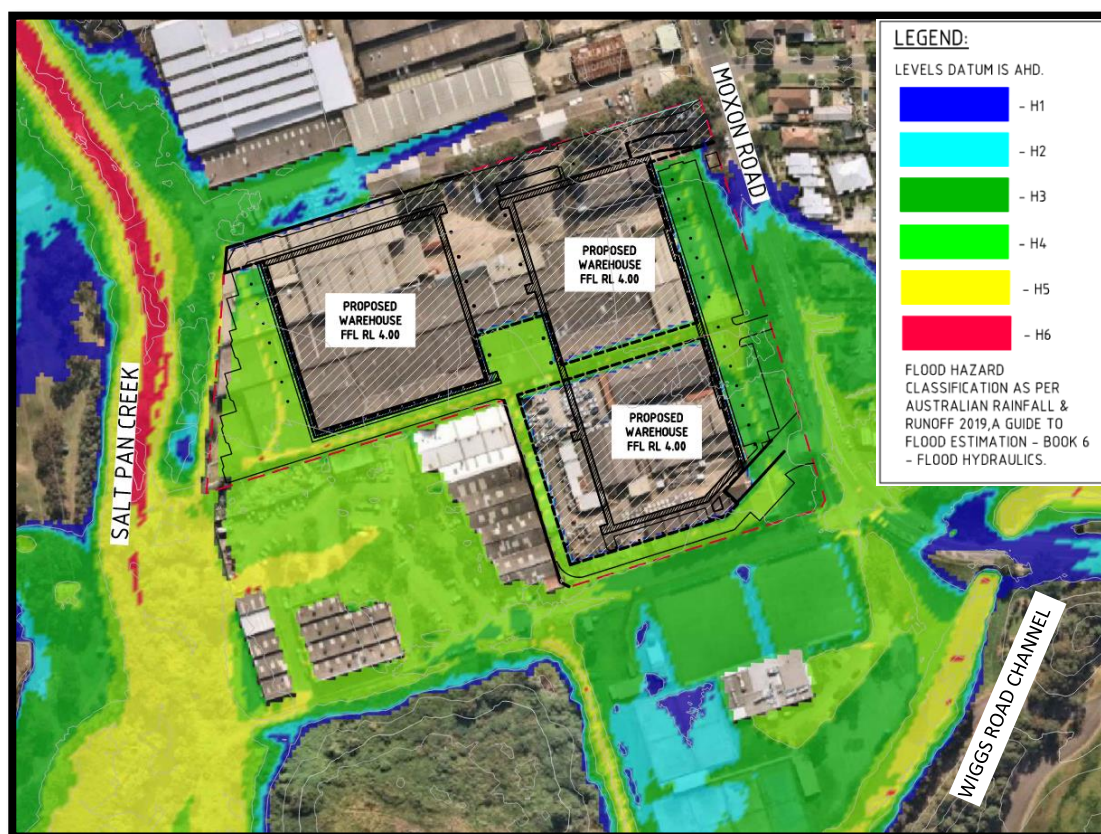


Figure 5.2 Post-development Flood Hazard Map (1% AEP Storm Event)

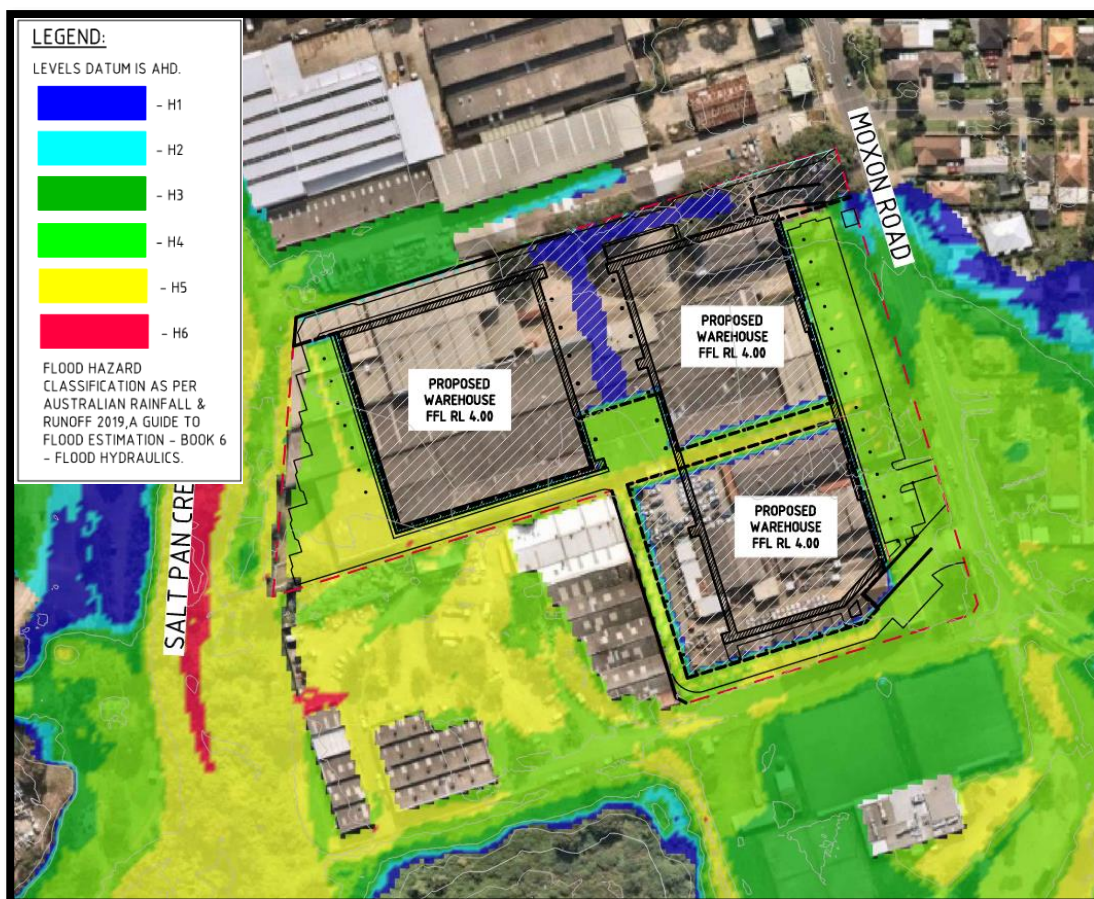


Figure 5.2 Post-development Flood Hazard Map (0.2% AEP Storm Event)

5.3 Flood Damage Assessment

Damage caused by floods is generally categorised as either tangible or intangible. Tangible damages are financial in nature and can be readily measured in monetary terms. They include direct damages such as damage or loss caused by floodwaters wetting goods and property, and indirect damages such as lost wages incurred during cleanup periods after the flood event. Intangible damage includes emotional stress and even mental and physical illness caused by the flood. It is difficult, if not impossible to quantify intangible damages in financial terms.

From a flood planning perspective, it is important to consider the following direct damage categories:

- Contents Damage – refers to damage to the contents of buildings, including carpets and furniture etc.;
- Structural Damage – refers to damage to the structural fabric of buildings, such as foundations, walls floors, windows, and built-in fittings; and
- External Damage – includes damage to all items external to buildings, including cars, landscaping etc.

The NSW Flood Damage Assessment Tool available on the NSW SES Flood Data Portal ([NSW Flood damage assessment tool - Datasets - NSW Flood Data Portal](#)) can be utilised to calculate damages associated with flooding and facilitate cost benefit assessments of potential floodplain risk management measures on the development site.

The tool should be used in conjunction with the Flood Risk Management - Management Measures guideline (MM01) associated with the Flood Risk Management Manual (DPE, 2023).

Additionally to the completion of the Flood Damage Assessment tool prior to operation of the facility, routine and triggered (by heavy rainfalls) inspections need to be completed and recorded during construction and during operation of the facility, as discussed below.

Routine- and Triggered Inspections

Routine Inspections

It would be recommended that routine inspections of the infrastructure and structures located within the dedicated overland flow area is carried out after significant storm events. Compiling and implementing a comprehensive *Flood Damage Inspection process and procedure* is essential to safeguard the longevity of structures, ensure the safety of occupants, and protect the individuals performing the flood damage assessment.

These routine inspections are to assess the need for maintenance and are primarily concerned with checking the condition of the suspended structure and the functionality of the stormwater drainage and treatment facilities; items such as columns, footings, retaining walls, drains, drainage pits, box culverts, culverts and headwalls. Maintenance of these items is vitally important for the integrity of the suspended structure and the ongoing drainage and treatment of stormwater.

Should the inspection reveal that maintenance of any item is required, this is to be reported to the building management for action.

Inspection Frequency

Routine Inspections for Maintenance shall be carried out over the life of the development.

The inspections shall occur on a monthly frequency during the construction period, and shall continue on a yearly basis in perpetuity.

In addition to the normal inspection frequency nominated inspections should also be carried out following heavy rain events (**triggered inspections**). Event heavy rain inspections should be carried out as soon as practicable following an intense period of rainfall (i.e. greater than 100mm over 24 hours, as measured at Bankstown Airport AWS Station 066137). A process to establish when periods of high rainfall occur should be put in place with Building Management.

Records

Records detailing each of the routine inspections for maintenance should be completed during the inspection, and describe in detail any required maintenance. The inspection records are to be provided to Building Management for action and then filed appropriately. Records of any maintenance carried out as a result of the inspection should be completed immediately after the works have been finalised, and filed appropriately.

Personnel

Routine inspections for maintenance are required to establish the need for basic maintenance, as described above. On this basis, such inspections do not require professional engineering knowledge and may be carried out by any responsible person,

including property management staff or maintenance staff. It is, however, recommended that a structural engineer conduct the investigation of the conditions of the structures after a heavy rainfall event (i.e. greater than 100mm over 24 hours, as measured at Bankstown Airport AWS Station 066137).

Alternatively, professional engineering staff may be employed to complete the routine inspections for maintenance concurrently with the engineering inspections for maintenance.

Inspection Safety

General

As described earlier in this document, regular inspections and maintenance of structures and drains are essential for their ongoing stability. However, carrying out inspections and maintenance activities will place those personnel involved with the inspections and maintenance at varying levels of risk. Therefore, to reduce the risk, certain minimum procedures and activities must be carried out before, during and after the inspections.

Inspections/ Maintenance

In order to reduce the risk, any inspections or maintenance activities should be carried out under the following protocols:

- Inspections/Maintenance teams must comprise a minimum of two, preferably three people, in order to prevent inspection personnel working alone;
- Inspections/Maintenance must be carried out within 48 hours of a rain event, preferably within 24 hours;
- Personnel completing inspections/maintenance must be able to communicate and be contactable, eg by carrying mobile phones or UHF radios; and
- For entry to confined spaces, the Contractor should establish if relevant training is required to enter these spaces, as well as provision of appropriate equipment to carry out the inspections.

Prior to Inspection/ Maintenance

It is the responsibility of the Building Management to appoint the appropriate personnel to carry out the inspections and maintenance, and to nominate appropriate times for the inspections to occur, according to the frequencies recommended above.

Prior to any inspection/maintenance commencing, the Building Management or representative shall:

1. Review and sign off an Inspection/Maintenance Safety Plan provided by the personnel completing the inspection or carrying out the maintenance. Sufficient time should be allowed to review the plan, request changes/alterations, and approve the updated document.

The Inspection/Maintenance Safety Plan must include:

- a) A list of personnel and backup personnel completing the inspections/maintenance, along with their qualifications and experience. The qualifications should include a list of tertiary education (if applicable), “green card” status or equivalent (e.g. Occupational Health and Safety Induction Training for Construction Work – General Course), and any required licences such as drivers licence/Bobcat operators licence;

- b) A list of the items and areas to be inspected/maintained;
 - c) The procedures to be undertaken during the inspections/maintenance;
 - d) The methodology proposed to complete the inspections/maintenance;
 - e) A Job Safety Analysis (JSA)/Health and Safety Plan (HASP), or equivalent, that documents the following:
 - i. Each Inspection/Maintenance Activity and associated Hazard.
 - ii. An initial risk assessment;
 - iii. Control measures to be implemented to reduce unacceptable risks; and
 - iv. A second risk assessment that re-assesses the risk considering the control measures suggested for implementation in Point “iii” above.
 - f) Details of evacuation procedures and muster points in the event of an emergency;
 - g) A list of safety equipment to be taken, including a radio, first aid kit; and
 - h) Where appropriate ablutions and wash facilities are located.
2. Ensure the inspection and maintenance personnel entering the site have filled in a dedicated Sign In/Sign Out register. This register can be located at the Building Management office. Location to be confirmed to all parties involved. The register should also record which personnel have custody of any keys that provide access through locked gates/barricades. Any keys should be signed back in at the end of each days work; and
 3. Be present during a Tool Box talk that summarises the JSA/HASP, highlighting the main hazards and risks. If Building Management is aware of any hazards and risks not mentioned in the JSA/HASP, they are to be raised during the Tool Box Talk and the JSA/HASP amended accordingly.

Following the completion of these activities, the Inspections and or Maintenance may commence.

During Inspections/ Maintenance

During the inspection and maintenance activities, it is the responsibility of those personnel carrying out the works to ensure that the requirements of the Inspection/Maintenance Safety Plan are adhered to. Safety whilst completing the inspections/maintenance is as important as the functionality of the drains themselves.

Whilst working within the drain pits, overland flow area or through intermediate access points, the inspection and maintenance work teams shall:

- Complete visual inspections of the drain and pits for signs of shifting and or damage;
- Check for accumulations of scale or sedimentation within the pipes/drains;
- Be vigilant with regard to loose items that could fall from the suspended slabs above;
- Be vigilant with regard to rock falls from the batters;
- Work in minimum groups of two people, preferably three;
- Perform inspections during period of forecast dry weather;
- Ensure that sufficient PPE is worn and utilised. As a minimum (subject to the maintenance activity), the following PPE is required:
 - i. High Visibility Safety Vest;
 - ii. Steel Capped Boots;
 - iii. Helmet;

- iv. Safety glasses;
- v. Mobile Phone/UHF Radio (or other means of telecommunication);
- vi. First Aid Kit; and
- vii. Long pants and long sleeve shirts.

Subsequent to Inspection

At the completion of each days work, all members of the inspection/maintenance parties must complete the Sign In/Sign Out register to note that they have left the site. Any keys issued to provide access through locked gates/barricades must be returned and signed for.

The completed Inspection/Maintenance Records must be handed over to the Building Management for actioning. If a report needs to be furnished, it must be finalised and submitted within 2 weeks of inspection/maintenance works being completed.

6 FLOOD SAFETY AND EVACUATION

6.1 Introduction

This section of the report presents the relevant information in relation to egress and evacuation during the approach of a significant flood event. The information in this report can be used as a framework for the overall precinct and for more detailed emergency response plans for individual tenants.

This framework has been completed with consideration to the State Emergency and Rescue Management Act 1989 (NSW), the State Emergency Service Act 1989 (NSW), and the *SES Canterbury-Bankstown Flood Emergency Sub Plan*.

Safe evacuation from the development site is the recommended procedure for all storm events up to the 0.2% AEP storm event. Provisions should be made during operations to facilitate sheltering in place on the upper levels of the multi-storey facility in case of a PMF event that causes total inundation of site access or if individuals on-site feel it is unsafe to evacuate. However, early evacuation of the facility is advised when a more severe storm event is anticipated.

6.2 Flood Extent

The flood behaviour, including flood levels and extents (refer **Figure 4.3, Figure 4.4 and Figure 4.5**), during the 1% and 0.2% AEP storm events are included in **Section 4** of this plan.

As discussed in earlier sections of the report, the operational parts of the site are designed to be suspended above the overland flow path from the upstream catchment and drainage system (Salt Pan Main Stream) which travels from the north-east to the south-west of the site.

Further discussion on effective warning measures and triggers are included in the following sections.

6.3 Preparedness

Education, awareness, and preparedness program:

The FRM plan provide the opportunity to develop engagement and education materials to support flood awareness activities. These activities should also be part of any major FRM measure that alters flood behaviour, flood warning or how the community needs to respond to the flood threat. Management (construction & operational stages) need to be responsible for ongoing awareness and education including informing the community on how to prepare for, and how and when to act in response a flood threat.

Education should seek to provide information to raise awareness of flooding so as to enable individuals to understand how to manage themselves and their property in response to flood warnings.

It is recommended that flooding emergency plans is regularly exercised. Should the exercise drills highlight particulars that need to be updated in the flood emergency plan, it is recommended that the plan is updated and circulated to all parties affected.

Flood Signage:

Appropriate flood signage should be provided on the development site as continuous awareness of designated flood emergency access and egress routes and locations. The following flood signage is proposed on the development site:

- Signage to accentuate the designated **emergency access** locations into the development site for both personnel/visitors and emergency services during an emergency, noting the preferred safe access and egress from the site is via the
 - o Noting that the designated **operational exit** from the development site, appropriate flood signs should clearly permit the **entry of emergency services vehicles during an emergency.**
- Signage at the exit from the development site proposing evacuation in a northerly direction along Moxon Road (turning left into Moxon Road when exiting the development site)
- Signage should be installed at the site's **operational entrance** to indicate that access is prohibited during emergency situations, such as larger storm events. During emergencies, the gates at the main entrance should be closed to all vehicles, and signage should be provided to direct emergency vehicles to the **emergency access** located to the north of the development site.
- Signage indicating the proposed flood emergency evacuation routes from all areas of the proposed warehousing to the evacuation assembly point should be provided, including signage indicating the evacuation assembly point
- Signage should be provided within the flood conveyance zone indicating this area to be a Flood Zone and should be off limits to personnel.
- Signage should be provided at several key locations as appropriate summarising the site's proposed evacuation procedure.

It should be noted that signage should not be limited to the above signage only. If during the review of the FERP, additional signage requirements is discussed, these signs should be created and installed as appropriate.

Development of Warning Systems

Each tenant should have a tenant specific plan which sets out flood warden, evacuation zones and responsible persons. This flood plan should:

- Provide an overview / summary of the flood risk on site;
- Explain and demonstrate emergency evacuation procedures;

This flood awareness program should be incorporated into the induction process for new and existing staff members of tenants on the development site and is to be repeated annually as part of any "refresher" training. The program is to be reviewed when new tenants move into the building. Management should consider installing signage in around the site which outlines the flood evacuation procedure.

Visitors are to be briefed on the basics of the flood evacuation procedure upon arrival to the site. This training may include identification of the Flood Warden on site during the duration of their stay and showing visitors the designated refuge areas and evacuation pathways.

As noted, the advice in this report can be used as a framework for these site-specific plans, in conjunction with Canterbury-Bankstown Council and SES sub plans as required. During construction, the warehouse site should have a responsible person (EM or site manager) who understands the flood behaviour of this area, is familiar with this report and flood management responses set out in the FERP.

The Bureau of Meteorology (BoM) will issue flood alerts as part of their responsibility for the issue of warnings of weather conditions likely to give rise to Floods and for the provision of forecasting and warning services for Extreme Weather and Hazard Impact Events. Severe Weather Warnings, Severe Thunderstorm Warnings & Flood warnings are issued by the Bureau of Meteorology to alert communities to the threat of severe weather at (<http://www.bom.gov.au/nsw/warnings/> & <http://www.bom.gov.au/nsw/flood/sydney.shtml>).

Development Owners and Management should appoint personnel (person or committee) involved with the implementation of this plan. As part of an early warning system, the appointed person or committee should be aware of the weekly weather forecast to identify heavy forecasted rainfall to prepare according. It is recommended that, if possible, the committee/Flood warden, bookmark the BoM warning pages for quick access.

The appointed person or committee should, during periods of heavy or forecast heavy rainfall, diligently observe the Severe Weather Warnings, rainfalls and road closures from the BoM.

The NSW SES Canterbury-Bankstown Local Incident Controller is responsible for monitoring the flood risk over the area and for issuing flood warnings to the community. Any person or group occupying the precinct at the time of flood danger should adhere to any warnings issued. The warning message will normally be issued via SMS (phone text) by the SES, and flood alerts would also be provided by the BOM prior to SES flood warning. During periods of heavy or forecast heavy rainfall it is important that one or some of the occupants of a facility should be able to receive such messages. The occupants must then immediately follow the flood evacuation plan in this report or the instructions of the SES controller in the area.

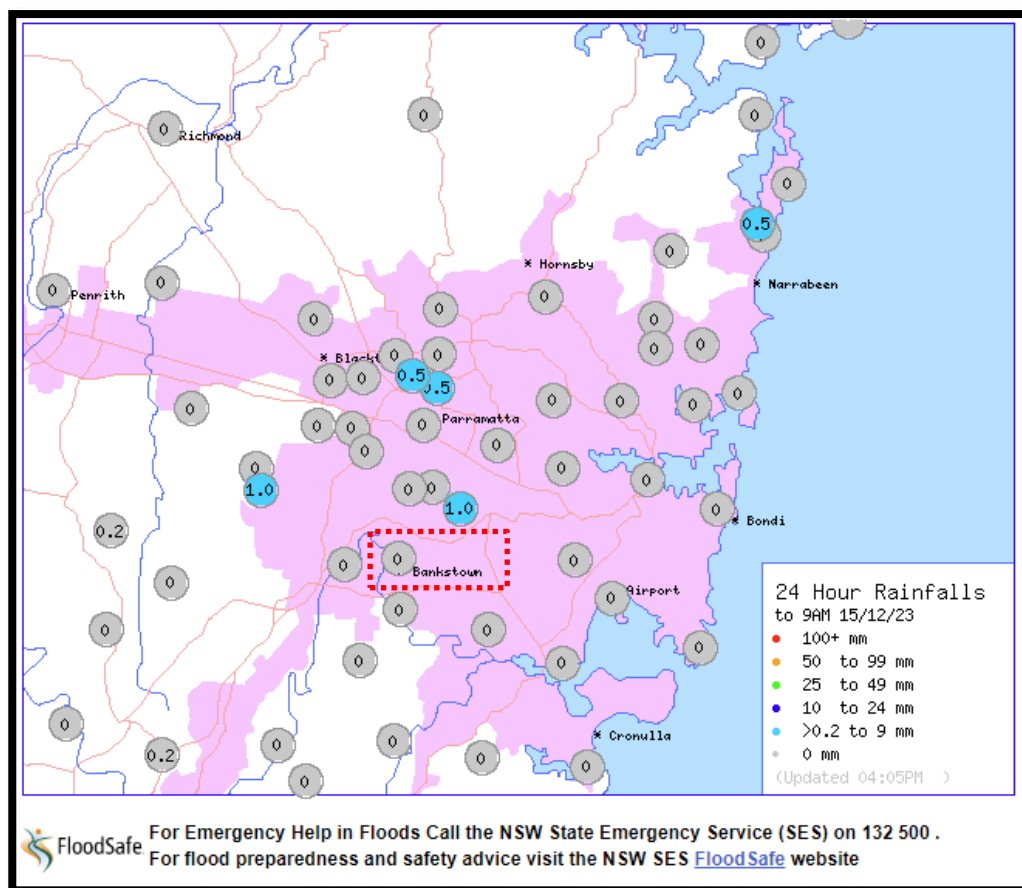
As described in **Section 6.5** below, the SES Warning System is based on predicted rainfall and gauges in the Sydney Airport region. This includes identification of potential flooding areas, estimated impacts of flooding at different heights and action time.

The BOM/SES warning system will provide good initial guidance for triggering of flood measures, however in addition to the SES flood warning system, it is recommended that a site-specific warning system is employed to supplement the BOM gauges. Such a warning system could consist of a series of flood depth markers or responders placed within the flood conveyance zone and around the proposed development area. A suitable response/trigger methodology has been outlined in **Section 6.5** which can be utilised to inform users of the site to prepare their own site-specific flood management response plans.

Flood warning and emergency response for the development site will be based on the rainfall within the adjoining catchments.

Real-time data (updated at 15-minute intervals) for these sites can be accessed through the BoM website via the following hyperlink (refer **Figure 6.1** for an indication of the relevant site-specific station):

<http://www.bom.gov.au/nsw/flood/sydney.shtml>



6.4 Emergency Response Planning

Flood Emergency Management planning refers to the preparation of a formal community-based plan of action to deal with the threat, onset and aftermath of flooding. It involves planning for an event equal to, or greater than the event used to derive the FPL.

The plan of action should include an on-site response plan that addresses what measures should be undertaken once the threat of a flood is determined to be imminent. A flood evacuation strategy should also be included so that all persons within the precinct are familiar with the processes required if a flood occurs. Refer to Section 6.3 proposing appropriate signage to be provided to assist personnel during the evacuation process.

In summary, the review shows that safe access/egress (Hazard Categorisation <H1) is available to and from the **northern** access (operational exit) of the site in all storm events up to the 0.2% AEP storm event as shown in **Figure 6.1A & B** below.

Safe evacuation routes to the north-east of the site's northern access are available and occupants would be able to move to PMF free areas (Punchbowl Train Station, Roselands Shopping Centre), at the direction of the SES or other appropriate authority. The possible evacuation route is shown in **Figure 6.2** below.

Provisions should be made during operations to facilitate sheltering in place on the upper levels of the multi-storey facility in case of a PMF event that causes total inundation of site access or if individuals on-site feel it is unsafe to evacuate. Safe refuge is available on the site in the upper levels of the hardstand, warehouse and

offices. The upper levels of the warehouse are free of the PMF. However, early evacuation of the facility is advised when a more severe storm event is anticipated.

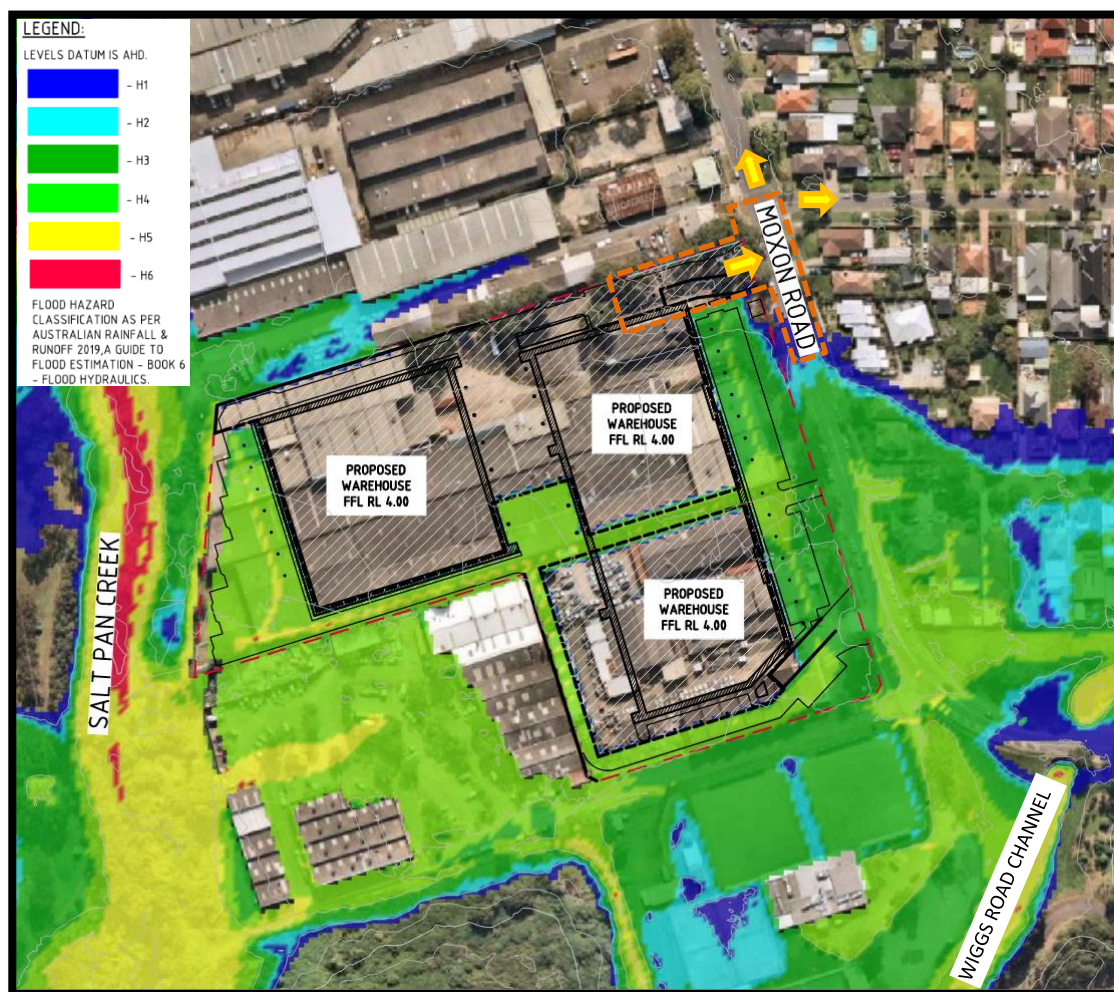


Figure 6.1A Safe access and egress to and from the Northern Entrance of 45-57 Moxon Road, Punchbowl during the 1% AEP storm event

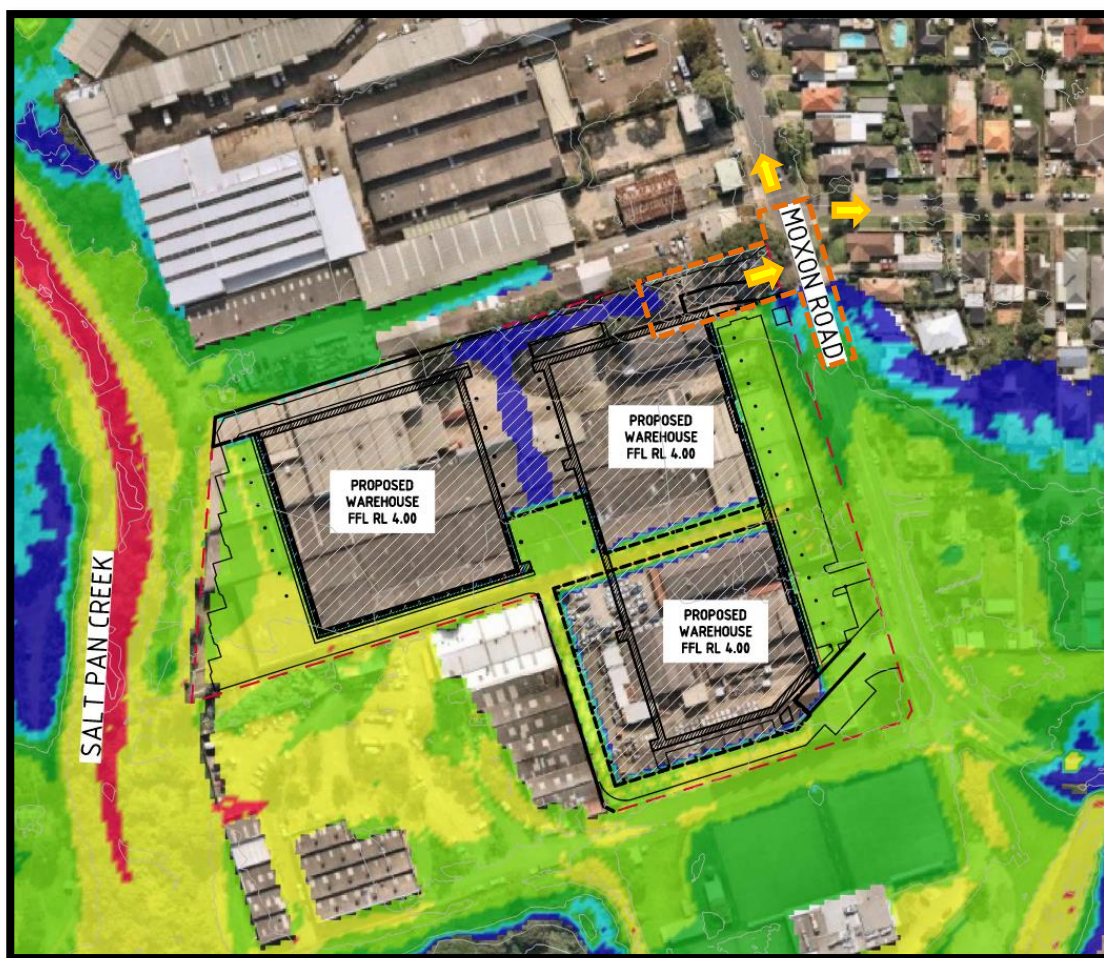


Figure 6.1B Safe access and egress to and from the Northern Entrance of 45-57 Moxon Road, Punchbowl during the 0.2% AEP storm event

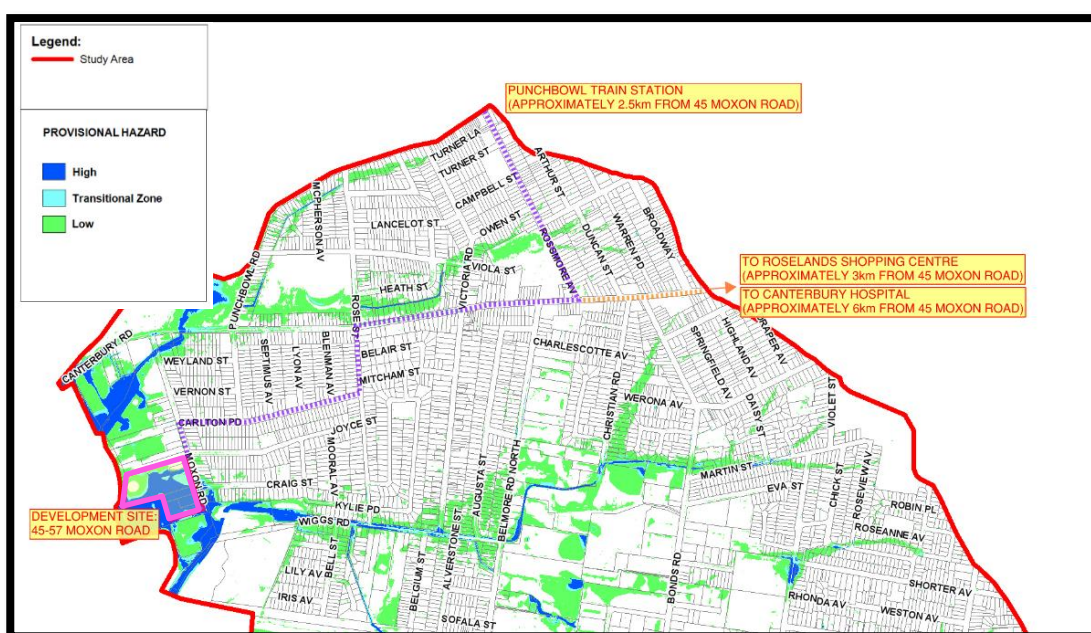


Figure 6.2 Potential Emergency Evacuation Route (Ref: Final Overland Flow Study – Canterbury LGA Salt Pan Creek Catchment – 59915011 – August 2016)

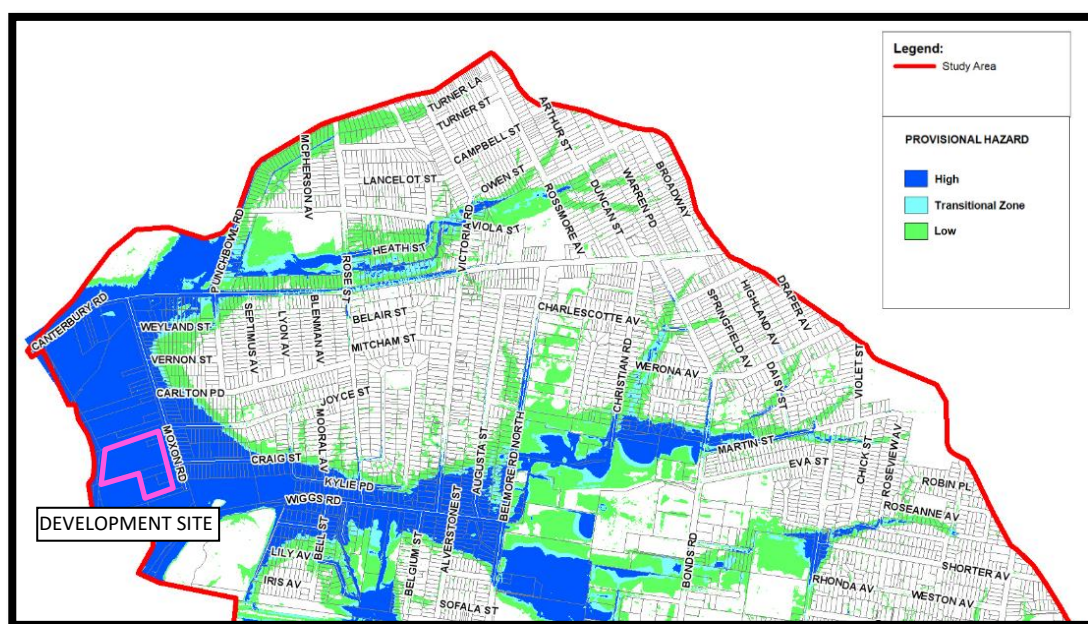


Figure 6.3 Salt Pan Creek Provisional PMF Hazard Map (Ref: Final Overland Flow Study – Canterbury LGA Salt Pan Creek Catchment – 59915011 – August 2016)

6.5 Preparation Steps

It is the responsibility of Management to understand the risks and dangers of flooding relating to the development site, and the need to restrict access to the flood management zone (overland flow path) (subject to flooding) in such an event.

It is recommended that key persons within Management are registered to be able to receive flood warning messages via SMS from the NSW SES. This should include a specific Flood Warden, as well as upper management personnel.

Lastly, the evacuation framework contained in this report must be understood and adapted, as necessary. It is recommended that a copy or copies of this report are kept at several locations on site such as the construction site shed, maintenance manager, and office administrator. A thorough understanding of *Councils Local Flood Plan* should also be made.

The plan of action includes an on-site response plan that addresses what measures should be undertaken once the threat of a flood is determined to be imminent and the occupants should be inducted so that all persons within the precinct are familiar with the processes and the flood evacuation strategy required if a flood occurs.

It is noted that significant lead warning time would be required to enable effective flood response plans to be initiated for this site to address safety of persons. Lead warning would be necessary for removal of vehicles from the basin areas or understanding when restriction of vehicles from entering the basin area should be made. Refer to **Section 7.1** below for early warning systems.

7 FLOOD RESPONSE

7.1 Flood Response Introduction

The following sub-sections of the report provide information on potential flood triggers that could be utilised by site management (during construction and operation) to be able to prepare their own flood response plans.

The site management may install site flood depth gauges along eastern boundary (Moxon Road) within the landscaped area in front of the carpark as well as along the western boundary along the levee wall located along Salt Pan Creek where floodwaters enter the site. Refer to Figure 7.1 for possible Flood Depth Gauge locations.

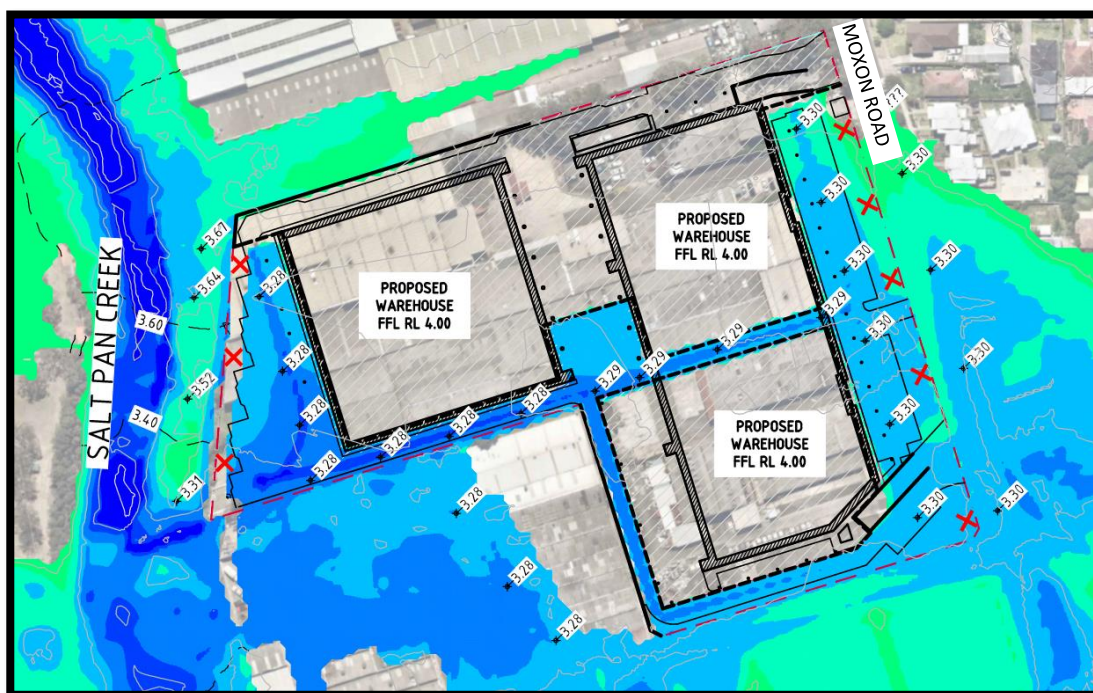


Figure 7.1 Flood Depth Gauge Locations

7.2 Response Triggers & Site-Specific Measures

7.2.1 Trigger 1 - A flood alert/watch/advice is issued by the BOM.

The BOM alert will be issued if flood producing rain is predicted. This provides an early warning that flooding may occur, however is not confirmation that flooding will occur. If this alert is issued then the Flood Warden should be on alert for further BOM, SES or site-specific Triggers.

7.2.2 Trigger 2 – General flood alert issued by the BOM.

A generalised flood warning would be issued when flooding is expected to occur in a given area. These would generally be provided by the BOM with three hours warning time is expected from issue of warning to peak flood level as per the “*Service Level Specification for Flood Forecasting and Warning Services for New South Wales – Version 2.0*” (Bureau of Meteorology, 2013).

Maintenance workers, or other persons, who might need to access the flood storage area should be notified prior to entering the potentially flood affected areas.

It is noted that Trigger 3 may occur prior to Trigger 2 and the Flood Warden is required to consider this eventuality.

7.2.3 Trigger 3 - Site flood level gauge achieves flood depth of 0.01m – 0.05m.

Flood Warden at this point should put Warehouse occupants on alert to evacuate the site from the northern entrance and close the southern access from entry or exit.
Flood warden to contact SES for additional updates, if required.

7.2.4 Trigger 4 - Site flood level gauge achieves flood depth greater than 0.05m.

Flood warden should advise the immediate evacuation of the development site to the north-east and to ensure the southern exit remain closed for both cars and personnel. Safe evacuation to the north-east only, no evacuation should be made in a southern direction.

Flood warden should advise occupants or remaining occupants (those opting to seek refuge on site) to move to higher ground (upper levels), for example within the Warehouse or Office.

End of Response Operations

Once the flood levels recede below the trigger level and the danger posed by flooding has passed, the NSW SES Canterbury-Bankstown Local Incident Controller will issue an “all clear” message which will be conveyed in the same format as the warning message, via SMS. The site occupiers can then leave the industrial precinct if on site refuge was undertaken or return to the precinct if evacuated.

8 CONCLUSION

Costin Roe Consulting Pty Ltd has been commissioned to develop this **FMP/FERP** for the industrial development at 45-57 Moxon Road, Punchbowl, NSW.

The report provides a summary of flood behaviour of local flooding which affects the site, and the different conditions which cause flooding on the site.

Flood preparedness and response techniques have been clarified, including warning triggers and distribution of the flood response procedures. During flooding events, the southern access to and from the site should be closed all personnel and vehicles and evacuation should take place to the north and north-east of the site while conditions allow.

The report provides requirements for the monitoring and maintenance of the existing flood detention basin during construction and operation to maintain the current design standard.

Further the report provides the framework for the preparation of the flood egress plans as required throughout the operational phase of the development.

9 REFERENCES

- Flood Risk Management Manual (2023)
- Canterbury-Bankstown Council's Stormwater System Report (WP-SIA-1682/2020)
- Chapter 2.2 – Flood Risk Management – Catchments Affected by Stormwater Flooding, of Canterbury-Bankstown's DCP 2023 in relation to the development including review of potential impacts of the development on existing flooding, and potential impacts on the development from flooding
- Salt Pan Creek Flood Study (SPCFS) (September 2011)
- Salt Pan Creek Floodplain Risk Management Study (SPCFRMS) (May 2015)
- SES (Nov 2019). Provision of and Requirements for Flood Warning
- Bureau of Meteorology (2013). Service Level Specification for Flood Forecasting and Warning Services for New South Wales – Version 2.0
- NSW Government (2023). Flood Impact and Risk Assessment. Flood Risk management guideline LU01;
- Provision and Requirements for Flood Warning in New South Wales – SES (Nov 2019);
- Costin Roe Consulting (2024), Civil Engineering Report (Co13924.01-04g.rpt)