MOTT MACDONALD

211A-215 Harbour Drive, Coffs Harbour

Flood Impact and Risk Assessment

September 2025

Acknowledgment of Country

On behalf of Mott MacDonald, we would like to begin by acknowledging the Traditional Custodians of the land on which we meet today, and pay our respects to their Elders past and present.

We recognise and respect their cultural heritage, beliefs, continued connection to the land and water and commit to building a brighter future together.

Artwork by
Ben Gardiner Williams

Mott MacDonald
383 Kent Street
Sydney
NSW 2000
PO Box Q1678
QVB Sydney NSW 1230
Australia

T +61 (0)2 9098 6800
mottmac.com

Homes NSW
Level G, 4 Parramatta Square
Darcy Street
Parramatta NSW 2150

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Issue and Revision Record

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Executive summary

This Flood Impact and Risk Assessment (FIRA) has been prepared by Mott MacDonald Pty Ltd on behalf of Homes NSW for a State Significant Development Application (SSD-83294209) for the construction of a residential flat building up to four storeys with a total of 60 apartments for the purpose of affordable housing at 211A-215 Harbour Drive, Coffs Harbour, NSW.

The purpose of this FIRA is to is to support the proposed redevelopment where specific elements of the design may alter flood behaviour or introduce additional flood risk and to address the Secretary's Environmental Assessment Requirements (SEARs) for the project issued on 2 May 2025

The purpose of this FIRA is to support the proposed redevelopment where specific elements of the design may alter flood behaviour or introduce additional flood risk and to address the Secretary's Environmental Assessment Requirements (SEARs) for the project issued on 2 May 2025, which identified the following specific assessment requirements:

19 – Flood Risk

- Identify the flood planning area and level as set out in the relevant EPI and other supporting documents to determine:
  - the flood extent and velocity up to the Probable Maximum Flood and risk on-site having regard to adopted flood studies, floodplain risk management studies and plans
  - the site access and egress routes
  - the potential effects of climate change
  - any relevant provisions of the *NSW Flood Risk Management Manual*, and any other relevant guidelines
- Where the development is occurring on flood prone land a flood impact and risk assessment (FIRA) must be prepared having regard to the *Flood Impact and Risk Assessment – Flood Risk Management Guide LU01*. When determining the scope and category of the FIRA the requirements outlined in the FIRA guide must be considered
- Detail any flood risk management measures that are to be incorporated as part of the development having regard to relevant guidelines (including any design solutions, flood modification measures, property modification measures, operational procedures or Flood Emergency Response Plan)

The 1% AEP and probable maximum flood (PMF) have been assessed as they relate to the flood planning levels for the development. The PMF is the largest flood that could conceivably occur at a location and defines the maximum extent of flood-prone land. Dry areas above the PMF level are expected to be free from flooding under all scenarios.

Whilst the Flood Risk SEAR requests a FIRA for the site, the housing development does not fall within land identified by the peak flood 1% AEP design event. To ensure a robust design, this FIRA has been developed to support the SSDA as outlined by Flood Risk Management Guideline LU01 (FIRA guide).

By implementing the design recommendations outlined in this report, direct flood risk to any person could be reduced and the residual flood risk could also be reduced by complying with the Coffs Harbour DCP 2015. Compliance can be achieved without negatively affecting the existing flood risk to the surrounding areas.

To summarise the outcome of the design:

- Flood Planning Level requirements in line with specific Coffs Harbour Development Controls,
  - The minimum finished floor level of all habitable room(s) is to be at the height of the 100-year Average Recurrence Interval (ARI) flood level plus 0.5 metre freeboard
  - Basement car parks (where relevant) have weir protection from the 100-year ARI flood level plus 100mm freeboard

The flood emergency management (EM) strategy for the development has been assessed following advice provided in the North Coast regional Emergency Management Plan (EMPLAN, 2024), Flood risk management guideline E4 Flood Planning Requirements (DCP 2015), relevant plans from the NSW SES Flood Emergency Sub Plan (2023) and the Coffs Harbour Floodplain Risk Management Plan (2025).

The subject site is considered a flood-affected property, as although it is not affected by events up to the 1% AEP flood, it is affected by the PMF, which is the largest flood that could theoretically occur at a location and defines the maximum extent of flood-prone land.

The assessment established that the site itself is not inundated during the 1% AEP event, although it does situate adjacent to roadways that are impacted by flash flooding and critical storms in a 1% AEP event. Inundation caused by flash flooding can typically occur with little or no warning and cause a rapid rise in water level over a brief period. Flood events of this nature do not last more than a few hours.

Rather than modifying the basement structure and raising it further to meet PMF level, an overall risk-based approach has been proposed to manage flood safety by assessing the actual risk to life and introducing targeted controls. These include a basement escape staircase with exits above the 5.85m AHD PMF level to ensure safe evacuation during a flood, integration with existing fire escapes, clear flood safety signage and the adoption of a FERP to provide a practical and compliant solution without altering the basement levels.

Site-specific flood planning levels are listed in Section 6 within the body of the report, with locations shown in Table 6.1.

Based on the 211A-215 Harbour Drive, Coffs Harbour FIRA, an evacuation pathway towards North Street or the east side of the development should be adopted, if sufficient flood warning is available. Targeted SMS warnings may be in place, triggered by water levels at local gauges monitored by the NSW SES.

Should warning not be available, or inundation affects surroundings roads, a shelter in place policy during a flood emergency would be achievable, given the following:

- The site is at risk from flash flooding; the interval between the observable causative event and the flood is within 6 hours. Consequently, this could result in insufficient warning time to adequately evacuate the population of the site. Additionally:
  - The opportunities for horizontal evacuation during a storm may be limited if surrounding streets are subject to high flood hazards. For example, flood hazard at the nearby Harbour Drive and Curacoa street crossroads would present an unacceptable risk to people. NSW SES advice is not to venture out during a storm or cross any area of flood inundation
  - The rate of rise and extent of flooding in the most extreme events means that emergency evacuation centres may not get set up and evacuees would generally have to take shelter in private premises
- The time of isolation is short, based on the duration of flooding around the precinct. A development which is isolated for a few minutes by low hazard flood water in PMF does not pose a significant risk to life.

- The development affords a means of creating a safe, on-site shelter above the 1% + 0.5m and PMF levels suitable for vertical evacuation
  - development which caters for sheltering in place can be used to reduce existing risk to life for individuals who are due to occupy the site
- Additional Development Controls can be imposed for shelter in place, which seek to manage the residual secondary risks to life caused by flood isolation to ensure that risks remain tolerable, with input from NSW SES, Ambulance NSW, fire services, and health agencies.

1 Introduction

1.1 Aims and Objectives

This Flood Impact and Risk Assessment (FIRA) has been prepared by Mott MacDonald Pty Ltd on behalf of Homes NSW for a State Significant Development Application (SSD-83294209) for the construction of a residential flat building up to four storeys with a total of 60 apartments for the purpose of affordable housing at 211A-215 Harbour Drive, Coffs Harbour, NSW.

The purpose of this FIRA is to is to support the proposed redevelopment where specific elements of the design may alter flood behaviour or introduce additional flood risk and to address the Secretary's Environmental Assessment Requirements (SEARs) for the project issued on 2 May 2025, which identified the following specific assessment requirements:

SEAR	SEAR Description	Section of Report where response is provided

19. Flood Risk	• Identify the flood planning area and level as set out in the relevant EPI and other supporting documents to determine.
	• The flood extent and velocity up to the Probable Maximum Flood and risk on-site having regard to adopted flood studies and, floodplain risk management studies and plans
	  ○ The site access and egress routes
	  ○ the potential effects of climate change,
	  ○ any relevant provisions of the NSW Flood Risk Management Manual, and any other relevant guidelines
		Table 6.1
		5.1
		5.2
		6.2
		6.4

	• Where the development is occurring on flood prone land a flood impact and risk assessment (FIRA) must be prepared having regard to the Flood Impact and Risk Assessment – Flood Risk Management Guide LU01. When determining the scope and category of the FIRA the requirements outlined in the FIRA guide must be considered. • Detail any flood risk management measures that are to be incorporated as part of the development having regard to relevant guidelines (including any design solutions, flood modification measures, property modification measures, operational procedures or Flood Emergency Response Plan).	6.1 6.2 6.3 6.4

1.2 Background

Homes NSW has identified the site as an opportunity to deliver 60 new, quality affordable housing apartments in a well-located area that is serviced by a high level of amenity, services and public active transport.

1.3 The Site

The site is located at 211A-215 Harbour Drive, Coffs Harbour, in the City of Coffs Harbour Local Government Area (LGA).

The site has a total site area of 3,807 m^2 and has two street frontages: Harbour Drive to the south-west and North Street to the east. Refer to Figure 1.1.

The site is vacant, with only some minor structures, such as driveways associated with former dwellings previously on the site. A number of existing trees are also located on the site.

Figure 1.1: Site Location

1.4 Proposed Development

The proposed development comprises the construction of a new residential flat building to accommodate 60 apartments to be used for affordable housing, a communal room, basement car parking including excavation, tree removal and associated servicing, landscaping and public domain works.

Refer to the proposed Site Plan below (Figure 1.2).

Figure 1.2: Site Plan

1.5 FIRA Requirements

The FIRA will demonstrate compatibility of the development with any existing relevant state environmental planning policies (SEPPs), local environmental plans (LEPs), Development Control Plans (DCPs) or policies, as well as existing industry guidance, government guidance and reference documents.

The site is located within a recent existing flood study - *Coffs Creek Floodplain Risk Management Study and Plan 2025*. This study was requested from Council and has been used as the basis of this FIRA. It is the best available flood information for the development area.

For the FIRA to meet the desired aims of the guidance, it requires an understanding of:

- A range of flood risk examining major and extreme storm events
- The constraints that flood places on the land (floodways, flood storage, flood hazard and emergency response issues)
- The appropriateness of the development or development types for the location, based on the flood constraints on the land.
- The adequacy of management measures and controls to:
  - Effectively address these constraints to ensure the flood risks to the proposed development and its users are acceptable.
  - Manage flood and associated emergency management (EM) impacts to the existing community due to the development.

2 Background

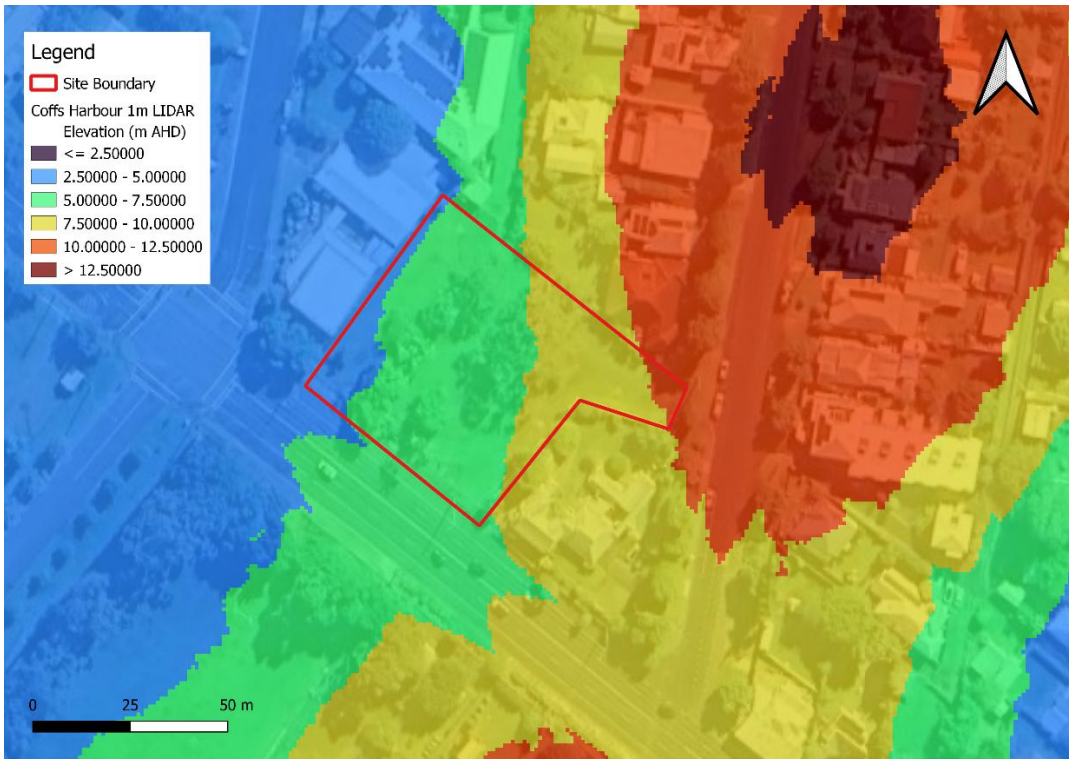
2.1 Study Area

The subject site is identified in Figure 1.1 and Figure 2.1, located to the east of the intersection of Harbour Drive and Curacoa Street, with an approximate area of 3,807 m^2. The site is situated next to the Coffs Harbour Baptist Church and opposite Coffs Harbour Public School.

The site is accessible by public transport with frequent bus services that run along Harbour Drive. Coffs Harbour Train Station is also located within 2km of the site.

The area around the site has a slight medium slope from West to East of around 2.5 - 6%. The area around the Harbour Drive is low lying, with typical elevations between 2.5 m and 12.5 m AHD. Elevations across the site itself range from 4.4m AHD in the West to 10.5m AHD in the East.

Figure 2.1: 211A-215 Harbour Drive – Site Boundary Location and Topography



2.2 Flood Context and Behaviour

Coffs Harbour is subject to three sources of flood risk: mainstream flooding from Coffs Creek and its tributaries, overland flow from intense storms that exceed the capacity of the local stormwater drainage networks and coastal flooding.

2.2.1 Mainstream Flooding

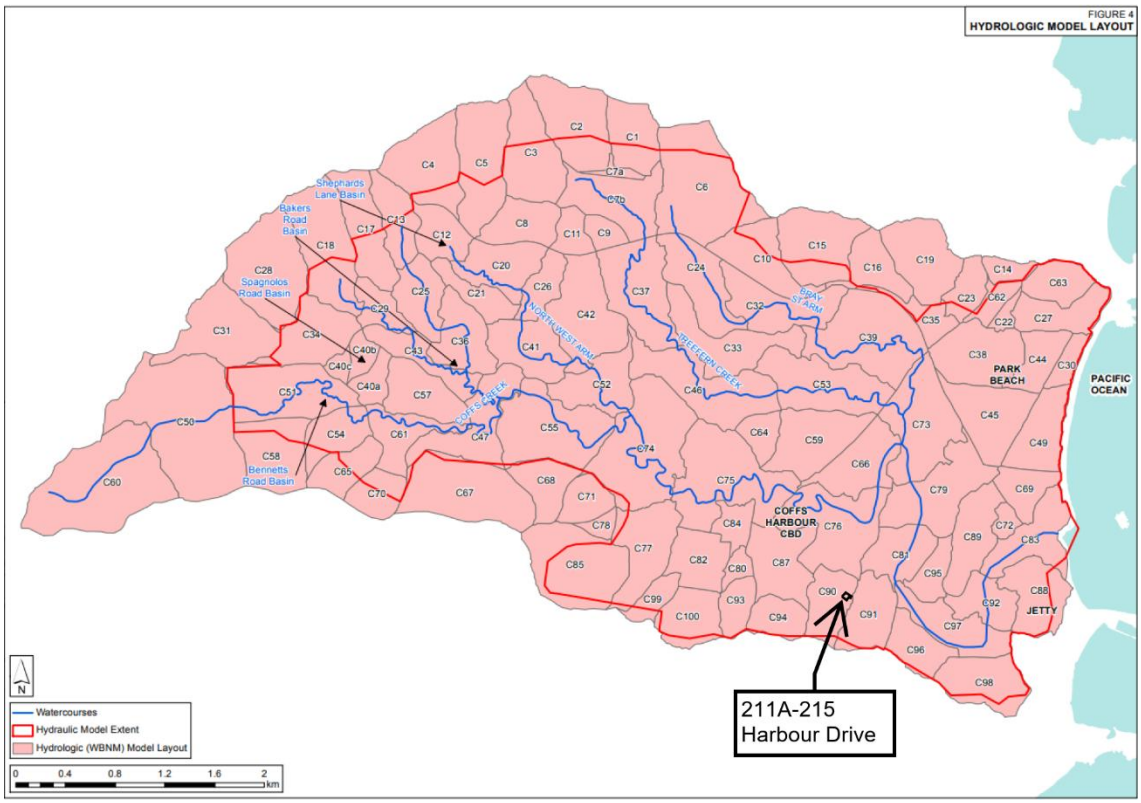
The *Coffs Harbour River Floodplain Risk Management Plan* (FRMP) was prepared in May 2025 to provide the basis for future management of the floodplain of Coffs Creek within the Coffs Harbour Council LGA.

Coffs Creek is the main watercourse in the catchment. It has multiple branches that can be divided into three sections:

- Coffs Creek itself, which includes the main arm and minor tributaries to the northwest
- the Northern Tributaries of Coffs Creek, flowing adjacent to Argyll and Bray Street; and
- the area situated east of the railway, which drains towards the low-lying areas of Park Beach

The Coffs Creek catchment is shown in Figure 2.2.

Figure 2.2: Coffs Creek Catchment (Coffs Creek FRMP, 2025)

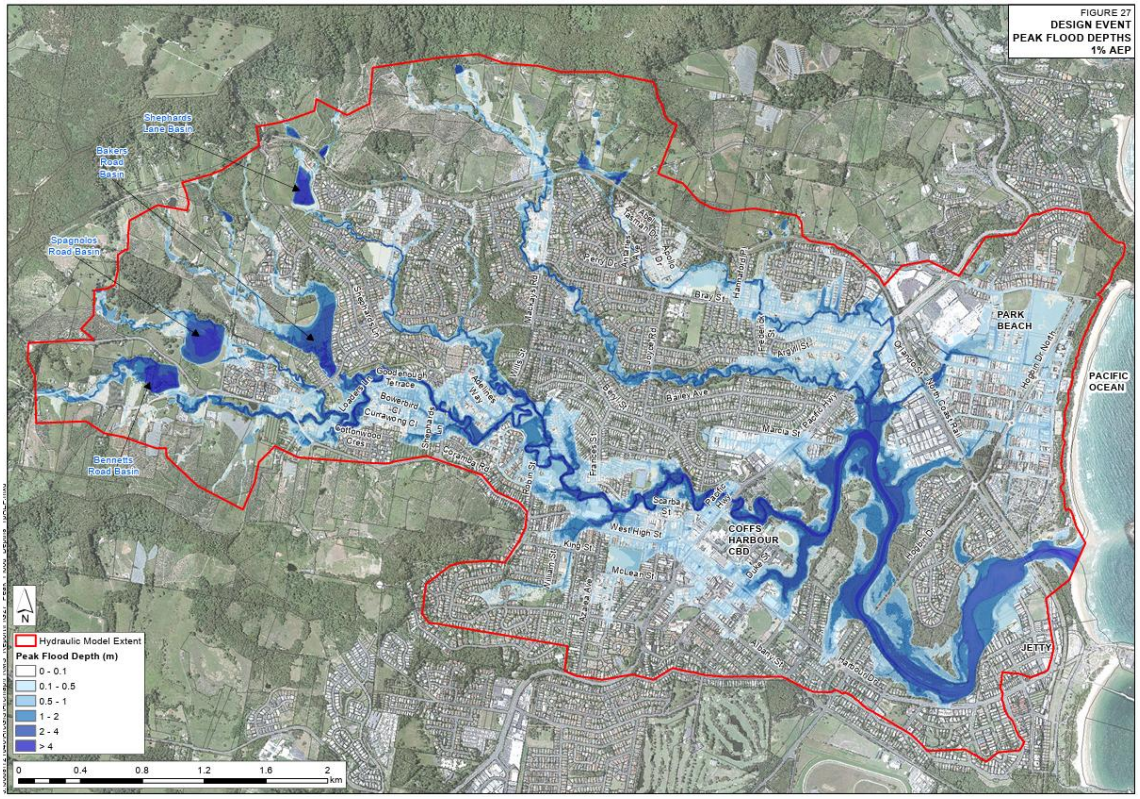


The Coffs Creek estuary forms the downstream limit of the catchment. The estuary is predominantly open but has closed in the past due to low flow conditions, during periods of beach accretion, or after large ocean storm events. The tidal limit of Coffs Creek extends upstream along the main arm to just upstream of the Pacific Highway Bridge.

Coffs Creek catchment creates conditions that are favourable for extreme weather events, especially during East Coast Low (ECL), as the terrain is steep close to the coastline, which facilitates intense rainfall over the upper catchment.

Flood depths and extents for the 1% AEP design flood event are shown in Figure 2.3.

Figure 2.3: 1% AEP Design Event – Peak Flood Levels (Coffs Creek FRMP, 2025)



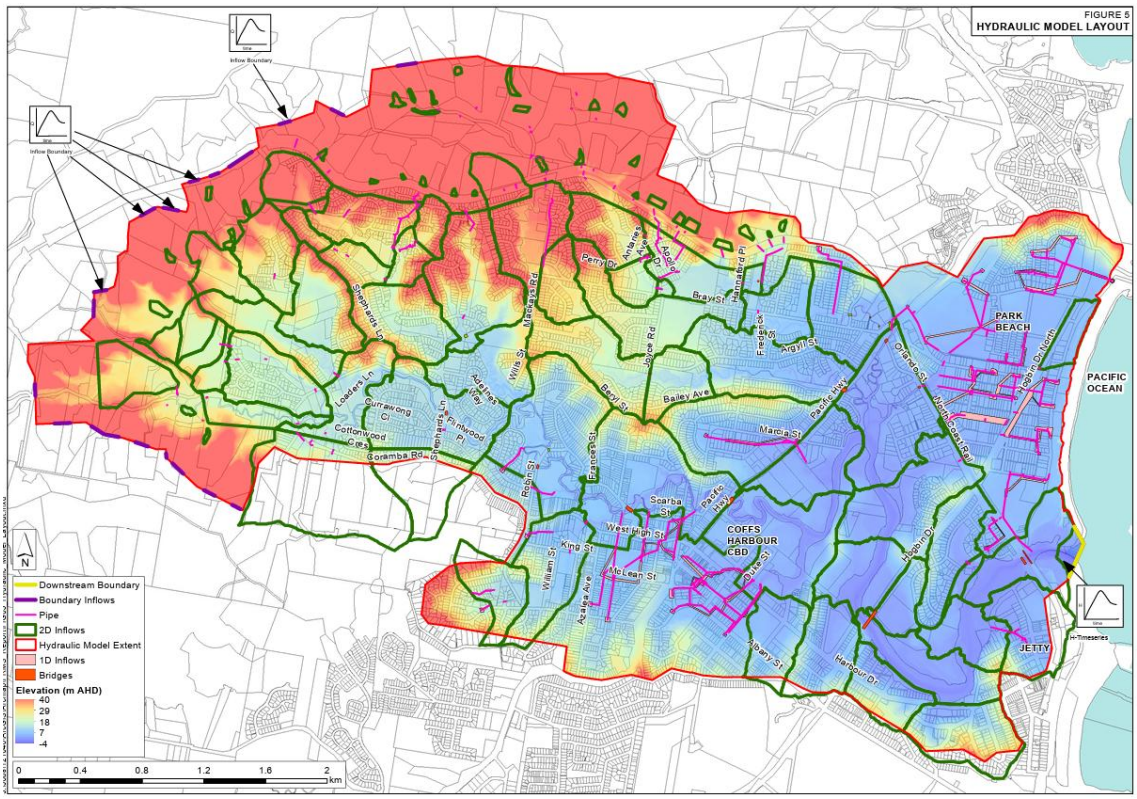
2.2.2 Overland Flow

Overland flow occurs when rainfall intensity exceeds the capacity of stormwater systems. It is prominent in Park Beach, Coffs Harbour CBD, and Bray Street tributaries, where flat terrain and poor drainage lead to ponding and shallow flooding under lower AEP events. Areas affected include Walker Close, Rigoni Crescent, Pearce Drive, and Antaries Avenue.

The CBD area, including Harbour Drive, is impacted by overland flow paths that develop due to the flat terrain and limited drainage capacity. In a 1% AEP event, the floodplain expands significantly. Floodwaters overtop detention basins upstream, and the area around Harbour Drive becomes inundated; however, **the subject site is not impacted by the 1% AEP overland flow flooding.**

Figure 2.4 shows the extent of the local stormwater catchments and major drainage networks.

Figure 2.4: Coffs Creek Stormwater Catchments and Networks



2.2.3 Coastal Flooding

In addition to runoff from the catchment, the lower reaches of the estuary can also be influenced by backwater effects resulting from elevated ocean levels. Hence, the height of the tide at the time of the arrival of the peak runoff from the catchment can also have an influence on flood levels in the lower reaches.

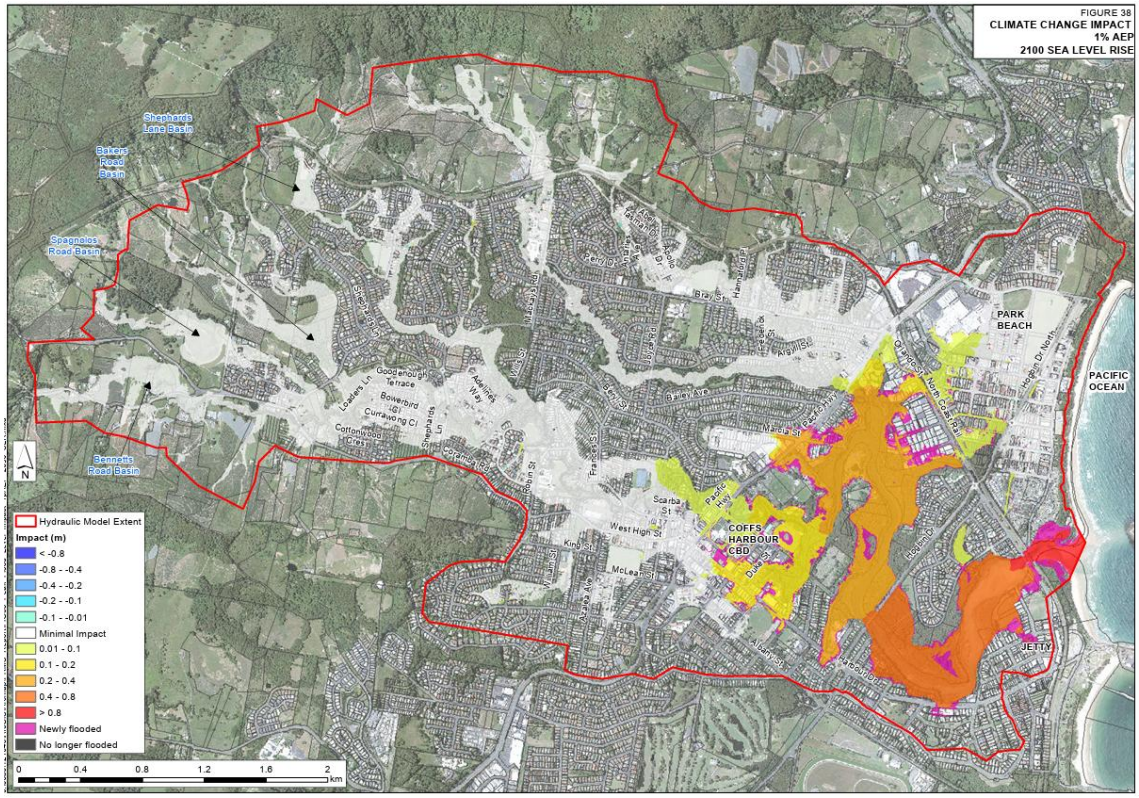
Design tidal hydrographs in the Coffs Creek FRMP were based on the following (Table 11, Coffs Creek FRMP):

Table 2.1: Coffs Creek FRMP 2025 – Ocean Boundary Peaks

Design AEP	Catchment	Peak Ocean Water level
10%	10%	HHWS (1.13mAHD)
5%	5%	HHWS (1.13mAHD)
2%	2%	5% (2.0mAHD)
1%	1%	HHWS (1.13mAHD)
	5%	1% (2.1mAHD)
	1%	5% (2.0mAHD)
0.5%	0.5%	1% (2.1mAHD)
0.2%	0.2%	1% (2.1mAHD)
PMF	PMF	HHWS (1.13mAHD)
	PMF	1% (2.1mAHD)

The influence of sea level is indicated in Figure 2.5.

Figure 2.5: Coffs Creek – Influence of Sea Level (2100 Sea Level Rise)



2.3 Flood History

Numerous instances of flooding have occurred in Coffs Harbour since the 1800s. Significant flooding events occurred in November 1917 and February 1938. Limited rainfall records are available for the floods of June 1950, April 1962 and 1963. Approximately 570mm of rainfall was recorded over a 48-hour period during the April 1963 event.

Large flood events occurred in March 1974 and May 1977 and 1991. The 1991 event was a result of heavy rainfall across the entire catchment. Around 200mm was recorded in the 24 hours on the 13th of December, by numerous rainfall gauges across the catchment. The most intense rainfall occurred in a nine‐hour period, with Coffs Harbour Airport recording 195mm over this time and resulted in significant flooding in the Coffs Harbour CBD.

The flood of November 1996 was declared a natural disaster. It was the largest on record in Coffs Harbour. The flood level exceeded the former estimated 1% AEP flood level (4.75m at Coffs Creek near Highway Bridge). Some 260 residential homes and 200 commercial buildings were flooded above floor level during the 1996 flood; however, it did not affect the subject site.

Figure 2.6: 2009 Coffs Harbour Flood – Harbour Drive

The most recent flood event of note occurred in February 2022, with a rainfall event of approximately 10% AEP falling across the catchment.

3 Methodology and Approach

3.1 Available information

WMAwater was engaged by the City of Coffs Harbour to develop a floodplain risk management study and plan for Coffs Creek. The objectives of the present Study are to identify and compare various management options, including an assessment of their social, economic and environmental impacts, together with opportunities to enhance the floodplain environments. It also seeks to ensure future development is controlled in a manner consistent with the flood hazard and risk at this time, and in the future as a result of predicted climate change.

The *Coffs Creek FRMP* (2025) is a comprehensive catchment-wide flood model, ensuring that recent (and known upcoming) major developments are accurately accounted for, and that current best practice data and methods for estimating design floods are applied.

The extent of the catchment is shown in Figure 2.4 and is sufficiently large to represent the hydrological catchments around the proposed site at 211A-215 Harbour Drive to analyse potential flood risks.

3.2 Modelling Approach

3.2.1 Basis of Flood Model

The 2025 study builds upon a previous study undertaken in 2018. The 2018 assessment developed an XP-RAFTS / TUFLOW model. Following a review of the 2018 modelling, WMAwater converted the XP-RAFTS model to the Watershed Bounded Network Model (WBNM) as XP-RAFTS was no longer supported by its developer.

The updated WBNM model incorporated improved resolution and was calibrated against the February 2022 flood event. Parts of the model have been checked and incorporated into the current study.

3.2.2 TUFLOW Software Package

TUFLOW is a one and two-dimensional (1D/2D) hydraulic modelling program that simulates the flow of water across a landscape and through any conveyance structures such as pipes or culverts.

The 2D component of the TUFLOW software package determines overland flow paths by dividing the landscape into a grid of individual cells. The flow of water between cells is then computed repeatedly at regular time steps by solving two-dimensional shallow water equations to estimate the spread and flow of the water. Flows are routed in the direction of water that will naturally follow the modelled topography.

The 1D component (called ESTRY) is a separate calculation engine incorporated into TUFLOW to manage flows through structures which cannot be accurately represented with 2d grid cells. ESTRY is a network dynamic flow program suitable for mathematically modelling floods and tides (and/or surges) in a virtually unlimited number of combinations. ESTRY has been developed in conjunction with TUFLOW to resolve complex 1D-2D flows across the floodplain interface.

3.2.3 Modelling Scenarios

3.2.3.1 Existing Flooding Conditions

The 1% AEP and probable maximum flood (PMF) have been assessed at the subject site as they relate to the flood planning levels for the development. To clarify, **all events up to and including the 1% AEP do not inundate the site**. The PMF is the largest flood that could conceivably occur at a location and defines the maximum extent of flood-prone land. Dry areas above the PMF level are expected to be free from flooding under all scenarios. **The site is only partially impacted by the PMF, see 5.1.1.3 for further details.**

3.2.3.2 Influence of Climate Change

The Coffs Creek flood model was provided with hydrological rainfall increased outputs for 9.5% (low) and 19.7% (high) as well as a 0.4m increase in seal level by 2050 and 0.9m increase by 2100 to account for future climate scenarios.

4 Flood Related Requirements

The following guidelines and standards relate to civil works as they potentially influence flood behaviour and form the basis of engineering decisions regarding stormwater management and the provision of overland flow.

4.1 Australian Rainfall and Runoff (2019)

Prepared by the Institution of Engineers, *Australian Rainfall, and Runoff – A Guide to Flood Estimation* was written to provide "*Australian designers with the best available information on design flood estimation.*" It contains procedures for estimating stormwater runoff for a range of catchments and rainfall events, as well as design methods for urban stormwater drainage systems. The document has been updated from the previously used 2001 version with a more refined methodology for hydrological analysis based on the latest hydrological data gathered.

4.2 Coffs Harbour Council Requirements

4.2.1 Coffs Harbour Local Environment Plan (2013)

The Coffs Harbour Local Environmental Plan 2013 (LEP 2013) was prepared in September 2013 in accordance with the Standard Instrument - Principal Local Environmental Plan that applies across NSW. Clause 7.3 of LEP 2013 was related to flood planning. This Clause has been repealed since the LEP version dated 01/02/2021. The Flood planning requirements, however, are discussed in detail within the Coffs Harbour Development Control Plan 2015.

On the 14th of July 2021, the NSW Government's Flood Prone Land Package commenced, and a revised flood clause (Clause 5.21 Flood Planning) was introduced across all LEPs in NSW, including the Coffs Harbour Local Environmental Plan 2013, which applies to the study area. This clause allows for the flood planning area to include areas outside the 1% AEP event where the damages in more extreme flood events warrant additional development controls. The standard instrument clause is shown below.

1. The objectives of this clause are as follows:
   a. to minimise the flood risk to life and property associated with the use of land
   b. to allow development on land that is compatible with the flood function and behaviour on the land, taking into account projected changes as a result of climate change
   c. to avoid adverse or cumulative impacts on flood behaviour and the environment
   d. to enable the safe occupation and efficient evacuation of people in the event of a flood
2. Development consent must not be granted to development on land the consent authority considers to be within the flood planning area unless the consent authority is satisfied that the development:
   a. is compatible with the flood function and behaviour on the land, and
   b. will not adversely affect flood behaviour in a way that results in detrimental increases in the potential flood affectation on other development or properties, and
   c. will not adversely affect the safe occupation and efficient evacuation of people or exceed the capacity of existing evacuation routes for the surrounding area in the event of a flood, and
   d. incorporates appropriate measures to manage risk to life in the event of a flood, and

e. will not adversely affect the environment or cause avoidable erosion, siltation, destruction of riparian vegetation or a reduction in the stability of river banks or watercourses

3. In deciding whether to grant development consent on land to which this clause applies, the consent authority must consider the following matters:
   a. the impact of the development on projected changes to flood behaviour as a result of climate change – see 5.2.
   b. the intended design and scale of buildings resulting from the development – see 1.4
   c. whether the development incorporates measures to minimise the risk to life and ensure the safe evacuation of people in the event of a flood - see 6.2 and 6.3
   d. the potential to modify, relocate or remove buildings resulting from development if the surrounding area is impacted by flooding or coastal erosion - see 5.1.1.2
4. A word or expression used in this clause has the same meaning as it has in the Considering Flooding in Land Use Planning Guideline, unless it is otherwise defined in this clause
5. In this clause:

- **Considering Flooding in Land Use Planning Guideline** means the Considering Flooding in Land Use Planning Guideline published on the Department's website on 14 July 2021
- **Flood planning area** has the same meaning as it has in the Floodplain Development Manual
- **Flood Risk Management Manual** means the Flood Risk Management Manual, ISBN 978-1923076-17-4, published by the NSW Government in June 2023

The Flood Prone Land Package included a second optional clause 'Special Flood Consideration', which provides councils with the mechanism to apply development controls to land outside the FPA but within the PMF. This clause is specific to land with a significant risk to life, sensitive, vulnerable or critical uses, or land with hazardous materials or industry. The City has included this clause in an amendment to the LEP.

The standard instrument Clause 5.22 Special Flood Considerations is provided below:

1. The objectives of this clause are as follows:
   a. to enable the safe occupation and evacuation of people subject to flooding
   b. to ensure development on land is compatible with the land's flood behaviour in the event of a flood
   c. to avoid adverse or cumulative impacts on flood behaviour
   d. to protect the operational capacity of emergency response facilities and critical infrastructure during flood events
   e. to avoid adverse effects of hazardous development on the environment during flood events
2. This clause applies to:
   a. for sensitive and hazardous development—land between the flood planning area and the probable maximum flood, and
   b. for development that is not sensitive and hazardous development—land the consent authority considers to be land that, in the event of a flood, may
      i. cause a particular risk to life, and
      ii. require the evacuation of people or other safety considerations
3. Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that the development:
   a. will not affect the safe occupation and efficient evacuation of people in the event of a flood (see 5.1.1.2), and

b. incorporates appropriate measures to manage risk to life in the event of a flood (see 6.2 and 6.3) and
c. will not adversely affect the environment in the event of a flood (see 5.1.1.2),

4. A word or expression used in this clause has the same meaning as it has in the Considering Flooding in Land Use Planning Guideline, unless it is otherwise defined in this clause.
5. In this clause:

- Considering Flooding in Land Use Planning Guideline—see clause 5.21(5).
- flood planning area—see clause 5.21(5).
- Floodplain Risk Management Manual, see clause 5.21(5).
- Probable maximum flood has the same meaning as it does in the Floodplain Development Manual.

4.2.2 Coffs Harbour Council Development Control Plans (2015)

Development control plans (DCP) support the implementation of the objectives of the LEP, providing specific guidance for the design and assessment of proposed developments. Chapter E4 of the Coffs Harbour DCP 2015 addresses flood planning requirements. Clause E4.1 includes general flood planning requirements.

Table 4.1: DCP Compliance

DCP Requirement	Required Level (m AHD)	Adopted Level	Compliance
The minimum finished floor level of all habitable room(s) is to be at the height of the 100-year Average Recurrence Interval (ARI) flood level plus 0.5 metre freeboard	4.99	4.60	Yes
Basement car parks (where relevant) have weir protection from the 100-year ARI flood level plus 100mm freeboard	4.59	7.90	Yes

4.2.2.1 E4.1 Flooding Planning Requirements – General

Requirements

- Development is to be designed and located so that it is free from any land that is at or below the 100-year Average Recurrence Interval flood level
- Development is to be designed and located so that it is free from any floodways
- Development is not to comprise the external storage of any materials below the 100-year Average Recurrence Interval flood level that are potentially hazardous or that may cause pollution
- Development is not to result in an increase in flood levels on adjoining or surrounding land
- Operational access to the development is to provide a level of service commensurate with the zoning and proposed use, with consideration to both on-site and off-site access

Exceptions

- Development (including fill) may be supported below the 100-year Average Recurrence Interval flood level, provided that:
  – the measures specified in this Chapter for specific development types are satisfied; and

  - no net filling is undertaken with the Coffs Creek Catchment west of the highway, excluding balanced earthworks which may be supported subject to a merit assessment; and
  - Basement car parks (where relevant) have weir protection from the 100-year Average Recurrence Interval flood level plus 100mm freeboard
- Development proposals resulting in an increase in flood levels on adjoining land may be supported where consent is obtained from affected land owners agreeing to such increases. In this regard, written confirmation of acceptance of changed flood conditions from all adversely affected land owners is required to accompany the relevant development application. Proposals of this nature will be assessed on merit, taking into account existing land uses, zoning and predicted impacts on adjoining land. Low intensity land uses, including land zoned for rural, recreational and environmental purposes under Coffs Harbour LEP 2013 have additional merit.

4.2.2.2 E4.2 Planning Requirements – Residential and Tourist Development

Requirements

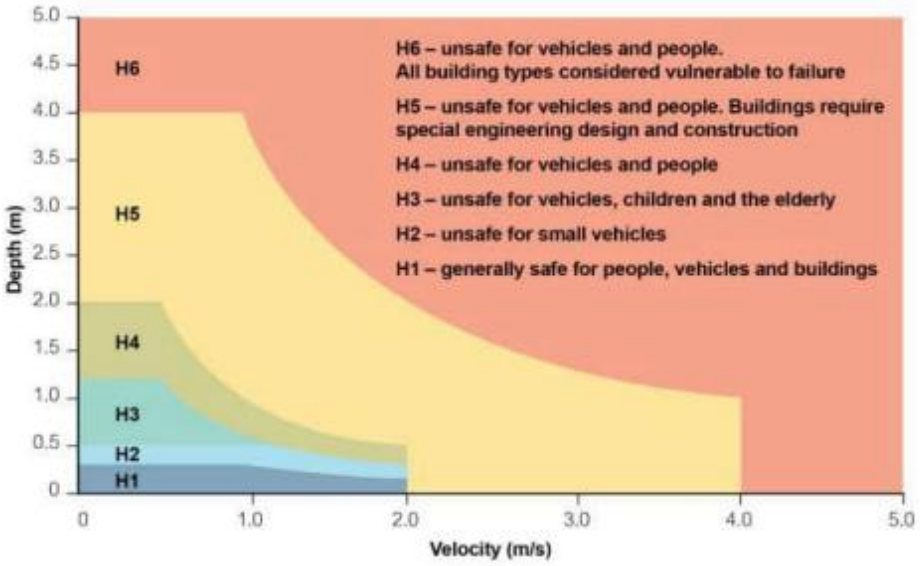
- Buildings are to be designed and located so that they are free from any high hazard flood area.
- Development is to be designed and located with consideration to impacts from any high hazard flood area on access to the development and the operation of the development.
- Development applications for development at or below the 100-year Average Recurrence Interval flood level are to be accompanied by a flood study prepared by a suitably experienced and qualified engineer to substantiate that the development will not increase upstream or downstream flood levels or change flood behaviour to the detriment of any other property
- The minimum finished floor level of all habitable room(s) is to be at the height of the 100-year Average Recurrence Interval flood level plus 0.5 metre freeboard
- The minimum finished floor level of all non-habitable room(s) is to be at the height of the 100-year Average Recurrence Interval flood level

4.3 NSW Flood Risk Management Manual (June 2023)

The NSW Government's manual supersedes the previous *Floodplain Development Manual – the Management of Flood Liable Land* (2005) and is concerned with the management of the consequences of flooding as they relate to the human occupation of urban and rural developments. The manual outlines the floodplain risk management process and assigns roles and responsibilities for the various stakeholders.

The manual applies to all development and provides additional guidelines for ensuring safe overland flow paths are provided. These guidelines adopt the hazard categorisation which was developed by the Australian Emergency Management Institute in 2014, defining hazards into six categories. The categories relate to the flood vulnerability curves shown in Figure 4.1.

Figure 4.1: General Flood Hazard Vulnerability Curve



Source: Australian Emergency Management Institute (2014)

4.4 Flood Risk Management Guideline LU01 (2023)

Published by the Department of Planning and Environment (DPE), this guideline provides advice on the scope and scale of a flood impact and risk assessment. It does not replace the processes or requirements of the consent authority. It should be read in conjunction with and address any other assessment requirements for the development proposal/application.

It should be read in conjunction with and address any other assessment requirements for the development proposal/application, including those of referral authorities. For example, for state significant development proposals being considered by the NSW Government, this guideline should be read in conjunction with the Planning Secretary's Environmental Assessment Requirements (SEARs) issued for the development.

4.5 Shelter in Place Guideline for Flash Flooding (2025)

Published by the Department of Planning, Housing and Infrastructure (DPHI), this guideline aims to assist consent authorities to undertake site specific, risk-based assessment to assess if shelter in place is a suitable emergency management strategy for development proposed in flash flood environments.

The intent of the guideline is to:

- guide proponents on where shelter in place may be considered in land use planning
- provide consent authorities guidance on matters that may be considered in assessing planning proposals and development applications where shelter in place is proposed
- assist councils when considering the role of shelter in place within their own local guidelines, policies, and development control plans.

The shelter in place guideline defines the following:

- Shelter in place - the internal movement of a building's occupants to an area within the building above the probable maximum flood (PMF) level before their property becomes inundated by flood waters

- Flash flooding – flash flooding is "flooding that occurs within 6 hours of the precipitating weather event, and often involves rapid water level changes and flood water velocity"[1]
- Flood behaviour
  - Flash flooding is the only flood risk present at the site, whether it be from overland flooding, a nearby creek or riverine flooding
  - The critical flooding occurs within less than 6 hours from the commencement of causative rain and the duration of shelter in place due to isolation by floodwaters is less than 12 hours from the commencement of rainfall
  - The development is not subject to high hazard flooding (e.g. floodways, high hazard H5 or H6 areas) or surrounding roadways are not subject to high hazard flooding[2]

[1] Flash flooding as defined in Emergency Planning and Response to Protect Life in Flash Flood Events (2018) AFAC (Australasian Fire and Emergency Service Authorities Council)

[2] Flood Risk Management Guideline FB03 Flood Hazard, DCCEEW, 2023

5 Hydraulic Modelling

5.1 Existing Flood Behaviour

5.1.1 Design Storm Events

5.1.1.1 1% AEP Event

The 1% AEP storm forms the basis of the Council's flood planning levels. The storm is very rare, having a 1% chance of occurring during any given year. It is equivalent to the 1 in 100 year ARI.

The modelling for Coffs Creek does not show any flooding to the subject site (Figure 5.1). To the west of the site is some minor inundation with depths up to 300 mm predicted to a peak level of 4.41 mAHD. The peak velocity in the flooded area is between 0 - 0.5 m/s. Based on both the low flood depths and velocity, the resulting provisional hydraulic hazard is shown as H1 – no constraints (Figure 5.2). As such, any water within the site should be considered localised nuisance flooding that is inconsequential relative to the surrounding floodway.

Figure 5.1: 1% AEP Design Storm Flood Depth and Extent

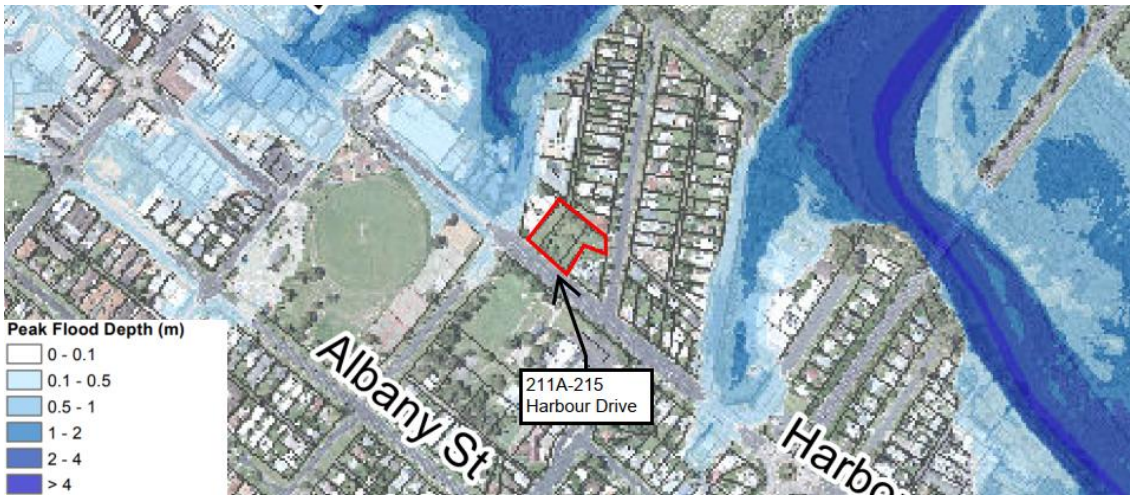
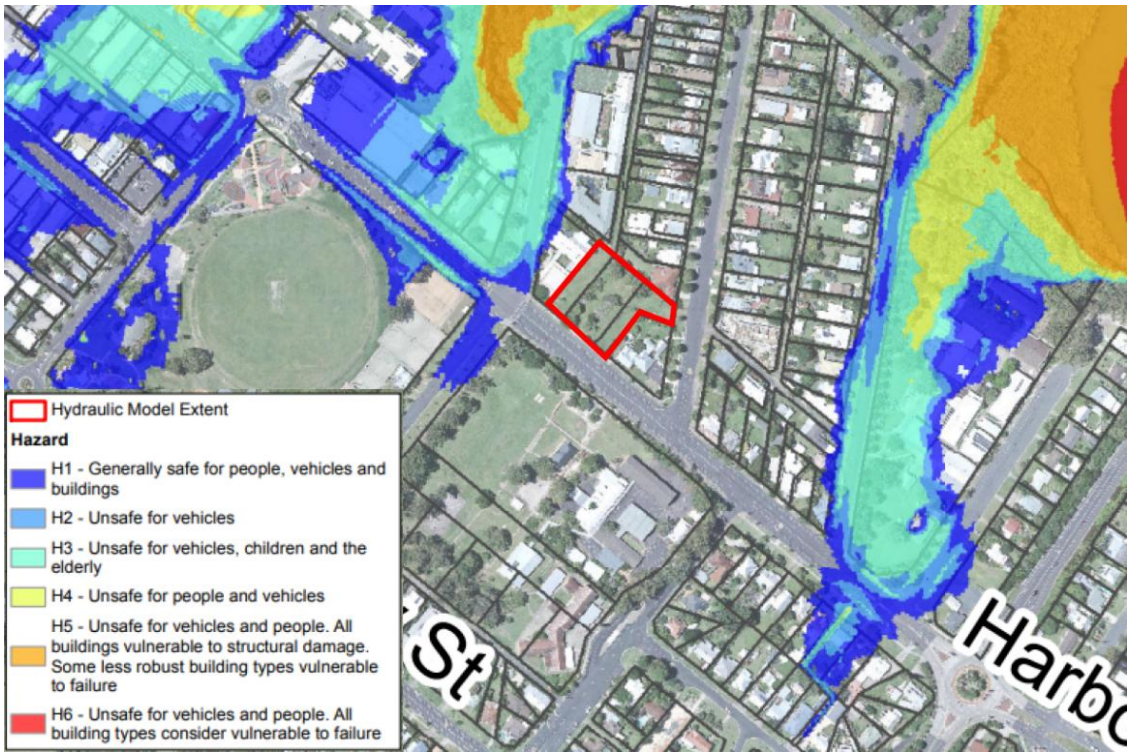


Figure 5.2: 1% AEP Design Storm Flood Hazard



5.1.1.2 1% AEP Flood Afflux

The site is not subject to 1% AEP flooding; consequently, the proposed development will not significantly alter ground levels external to the site boundary. 1% AEP water levels would remain unchanged.

5.1.1.3 Probable Maximum Flood

PMF results are provided for flood planning requirements, but do not form part of the flood impact assessment. The PMF is a theoretical maximum flood that can occur at a location with a probability of occurring between 1 in 100,000 and 1 in 10,000,000 in any year.

Modelling suggests the PMF may cause some inundation to the fringe of the development site (Figure 5.3). The site is shown to have a depth of up to 1.25m within the site boundary. Peak velocities around the site lie between 0 - 0.5 m/s. Flood hazards around the site range between H1 and H3 (Figure 5.4).

Figure 5.3: PMF Design Storm Flood Depth and Extent

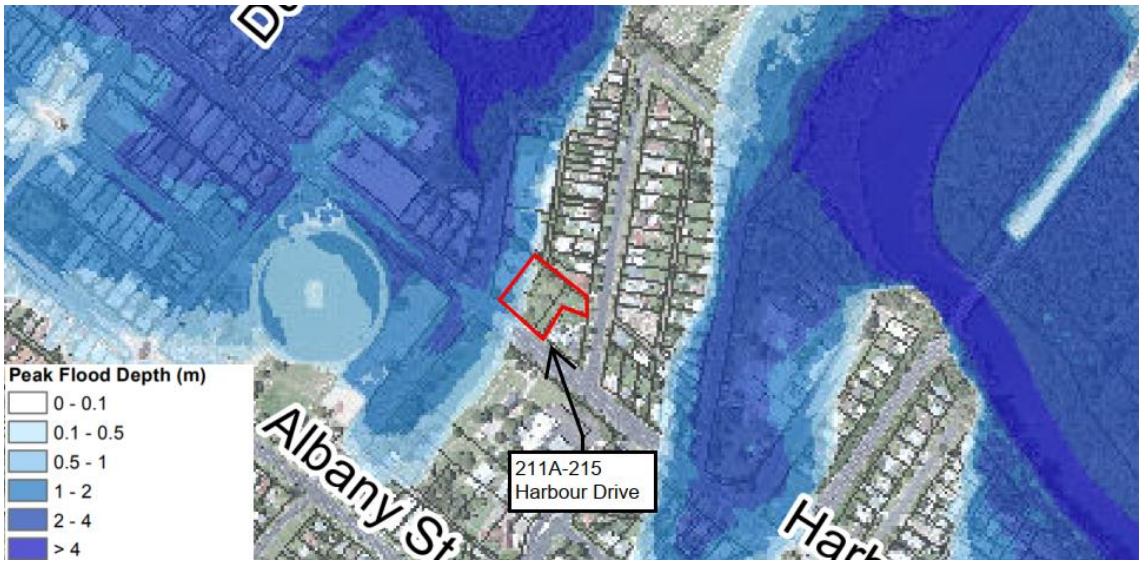
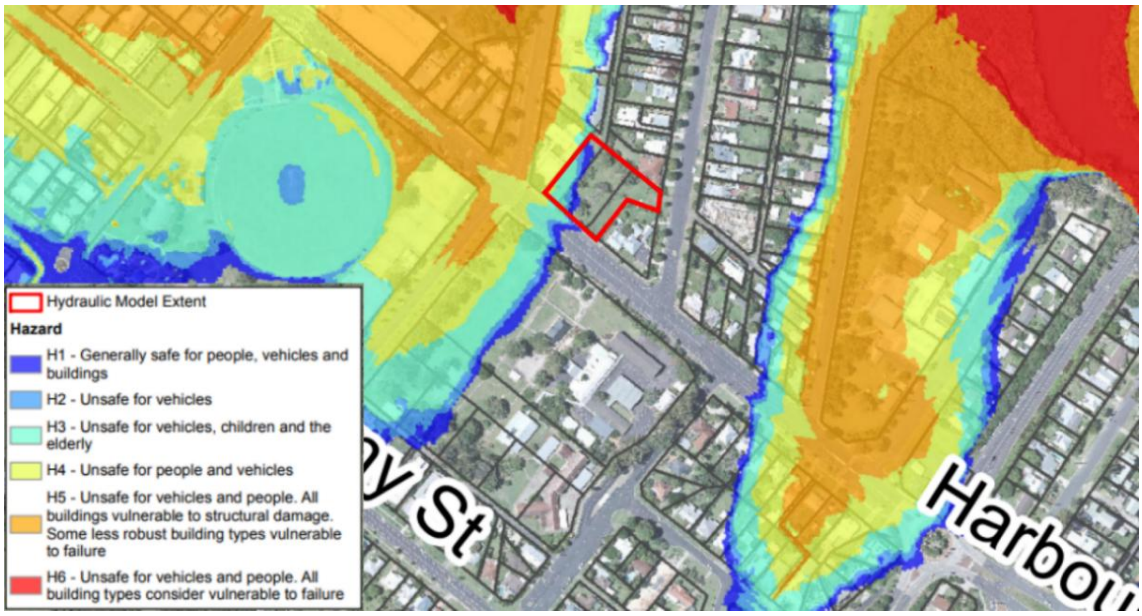


Figure 5.4: PMF Design Storm Flood Hazard



5.2 Climate Change

Several climate change scenarios were modelled for the 1% AEP flood event as part of the Coffs Creek FRMP. The flood study adopted the following 1% AEP scenarios to assess the sensitivity to climate change:

- 0.4m rise in tailwater level in the Coffs Creek
- 0.9m rise in tailwater level in the Coffs Creek
- 9.5% increase in design rainfall intensity
- 19.7% increase in design rainfall intensity
- Combinations of the above

The impacts of both rainfall increase and tailwater rise show a general increase in flood levels across the entire catchment. The results concluded that even in the worst-case combination,

with a 0.9m rise in tailwater level and 19.7% increase in design rainfall intensity to the 1% AEP, the boundary is only inundated on the Eastern corner and the depth of inundation is below 200mm to a peak level of 4.49 m AHD (Figure 5.5).

Figure 5.5: 1% AEP (with rainfall increase and sea level rise)

5.3 Managing Flood Risks

The flood risk does not impact the proposed building footprint significantly; however, it should be advised that in line with the *Australian Disaster Resilience Handbook, Managing the Floodplain: A Guide to Best Practice in Flood Risk Management in Australia*, the structure should be designed for flood impacts with suitable water-resistant structural materials up to the PMF level (5.85m AHD).

6 Design Recommendations

6.1 Flood Planning Levels

Table 6.1: Site Specific Flood Planning Levels

Location ID	Description	1% AEP Water Level (mAHD)	1% AEP Flood Hazard	PMF Water Level (m AHD)	Finished Floor Level (m AHD)	Adopted Flood Planning Level
Lower Ground Floor	Mainstream flooding into the lower ground floor (car park)	N/A	N/A	5.85	4.60	4.60*
Ground Floor	Habitable floors and a communal courtyard	N/A	N/A	5.85	7.90	7.90

**The adopted floor level for the lower ground floor car park has been designed in accordance with the 1% AEP + 100mm as per Council's requirements is less than the PMF. As the entrance is at grade, the PMF floodwater may enter the car park on the lower ground floor. The depth of water may reach around 1.25m, which is not sufficient to flood the lower ground floor to the ceiling level. Further discussion regarding emergency management for the lower ground floor is in Section 6.1.3*

Figure 6.1: Lower Ground Floor (RL 4.60m)

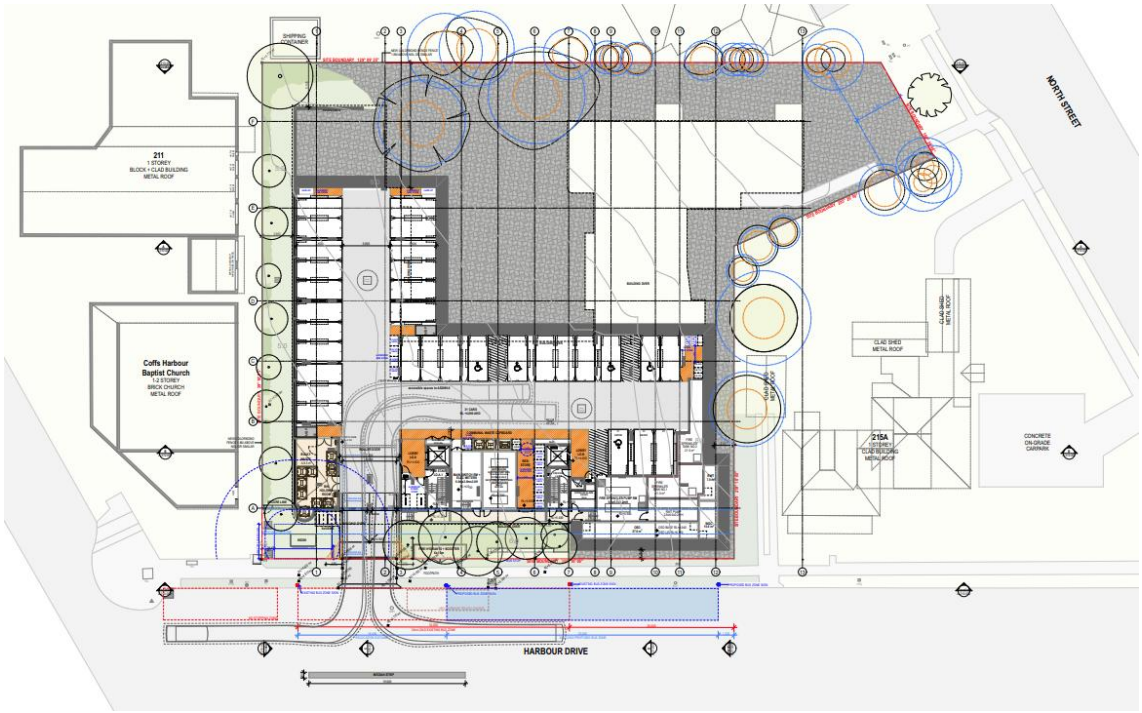


Figure 6.2: Ground Level (RL7.90)

6.1.1 Habitable Floor Levels

All habitable floors are located on the ground floor level of the development. Due to the gradient of the site, the ground floor level is 7.90m AHD. This level exceeds both the 1% AEP (including climate change) and PMF levels, meeting the habitable floor levels requirement of E4.2 of Coffs Harbour's DCP 2015.

Figure 6.3: 211A-215 Harbour Drive South Elevation

6.1.2 Non-Habitable Flood Levels

The minimum finished floor level of all non-habitable rooms is above the height of the 1% AEP (including climate change).

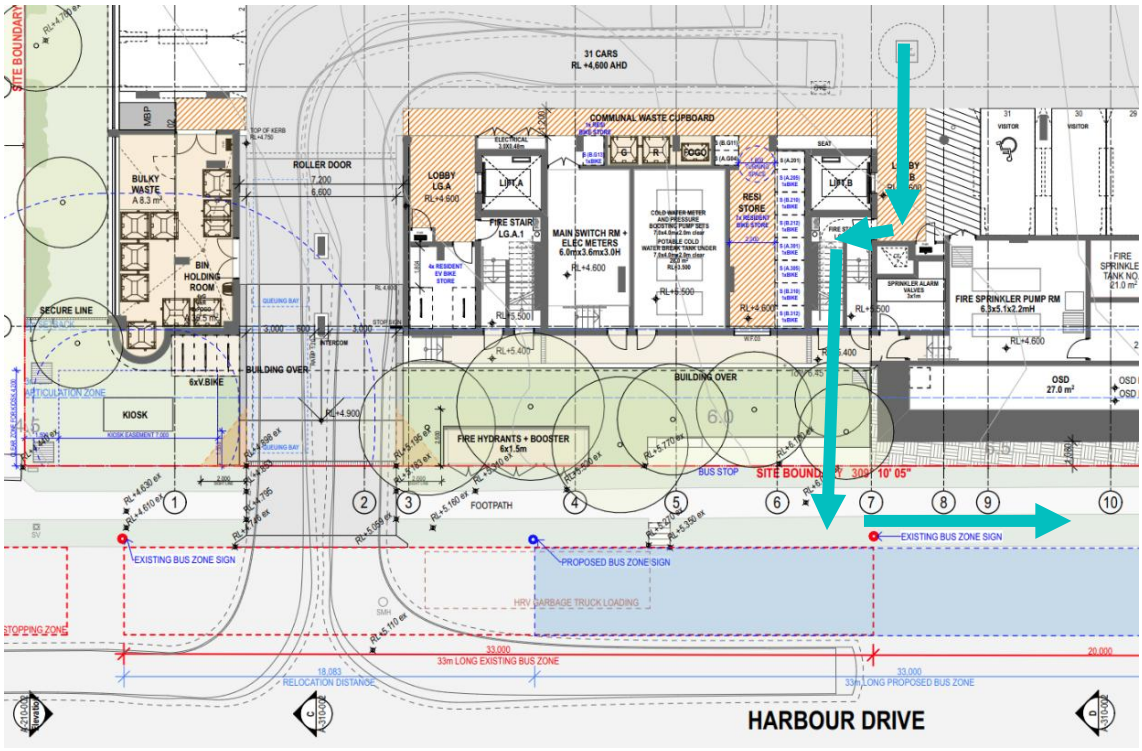
6.1.3 Lower Ground Floor

The site has a single lower ground car park to cater for residential parking, with an entry located on Harbour Drive (Figure 6.4). The entry to the car park is at grade (4.60m AHD) and may permit water entry during a PMF event (5.85m AHD). Therefore, a PMF event may cause 1.25 m of ponding water in the lower ground floor parking area.

The Coffs Harbour DCP does not require PMF protection for lower ground floors or basements, stipulating a minimum of 1 in 100-year ARI + 100 mm. The present design meets this DCP requirement. (Refer to E4.1 of the Coffs Harbour DCP).

Based on the locations of the fire stairs, it would be possible to exit the lower ground floor level to Harbour Drive at a location that is above the PMF water level. Once at this level, occupants could reach the ground floor level of the development, which is entirely above the maximum PMF water level.

Figure 6.4: Lower Ground Floor Exit Above PMF



6.2 Flood Emergency Management

The flood emergency management (EM) strategy for the site has been assessed following advice provided in the North Coast regional Emergency Management Plan (EMPLAN, 2024), Flood risk management guideline E4 Flood Planning Requirements (DCP 2015), relevant plans from the NSW SES Flood Emergency Sub Plan (2023) and the Coffs Harbour Floodplain Risk Management Plan (2025).

The EMPlan details arrangements for prevention, preparation, response and recovery to emergencies within the North Coast Emergency Management Region (NCEMR). The objectives of this plan are to:

- Support Local Emergency Management Plans (EMPLANs) and augment them when required.
- Identify trigger points for regional level activation, escalation and demobilisation.
- Define participating organisation and Functional Area roles and responsibilities in preparation for, response to and recovery from emergencies.
- Set out the control, co-ordination, support and liaison arrangements at the Regional level.
- Detail activation and alerting arrangements for involved agencies at the regional level; and
- Detail arrangements for the acquisition and coordination of resources at the regional level.

The NSW SES leads flood EM planning and has the following legislative responsibilities in accordance with the State Emergency Service Act 1989:

- To protect persons from dangers to their safety and health, and to protect property from destruction or damage, arising from floods, storms and tsunamis
- to function as the combat agency for dealing with floods (including the establishment of flood warning systems) and to coordinate the evacuation and welfare of affected communities

The role of the NSW SES includes community education, collation of flood intelligence, flood EM planning and flood response, including the evacuation and welfare of affected communities.

To help minimise the flood risk to future occupants, it is important that developments consider flood emergency response. There are two main forms of response that may be adopted:

- Evacuation
  - Horizontal evacuation of occupants from the floodplain before the properties and/or evacuation routes become flooded
- Shelter-in-place
  - Vertical evacuation of occupants in a building to a level higher than the PMF level, who then shelter from the flood until it is safe to return to the ground floor and external areas

6.3 Emergency Planning

It has been established that roads around the site are at risk of flash flooding as critical storm durations are less than 6 hours. Inundation caused by flash flooding can occur with little or no warning and cause a rapid rise in water level over a brief period of time. Flood events of this nature do not last more than a few hours.

Severe storms can arrive with little warning or intensify over a short period of time, posing a challenge to evacuation as an EM strategy. An EM strategy for the site has been considered for two separate time periods, with the emphasis on self-preparation and self-evacuation:

- The period of time prior to the arrival of a storm when surrounding roads are free from flooding
- The period of time during and after the storm when surrounding roads may be inundated

6.3.1 Emergency Management Strategy – Prior to Storm

SES advises that when flash flooding is likely, the best action to take is to leave low-lying homes and businesses (evacuation) well before flooding begins, but only if it is safe to do so. This self-evacuation would need to take place in the hours preceding a predicted storm event before flooding begins to impact the road network.

There are no evacuation centres identified within the Coffs Harbour Local or NSW State Flood Sub Plans, Coffs Creek FRMP or North Coast Regional EMPlan. It is recommended that evacuation centres for flood events be reviewed and updated for use in all types of emergencies. In this instance, evacuation to North Street or Salamander Street is logical while the surrounding road networks are free from flooding. These roads provide access to:

- Jetty Memorial Theatre (via Harbour Drive)
- Coffs Harbour Racing Club and Function Centre (Via Albany Street and Howard Street)

In addition to these suggested evacuation centres, the following arterial roads can be accessed:

- Hogbin Drive to the South via Salamander and Albany Street (including access to Pacific Highway)

- Thompsons Road (via Salamander and Raleigh Street (including access to Pacific Highway)

These arterial roads provide a means of moving to safer locations, whether that is the nominated evacuation centre or away from a forecasted storm area, if possible. However, it should be noted that evacuation centres are set up at the discretion of the SES incident controller and may not be operating or may take time to get up and running in the event of a flash flood.

Enacting this strategy would require local monitoring of forecasts issued by the Bureau of Meteorology (BoM), including the daily Thunderstorm Forecast and the more specific Regional Severe Thunderstorm Warning and Detailed Severe Thunderstorm Warnings. This could be undertaken by a nominated flood warden for the precinct via the PA system for the buildings.

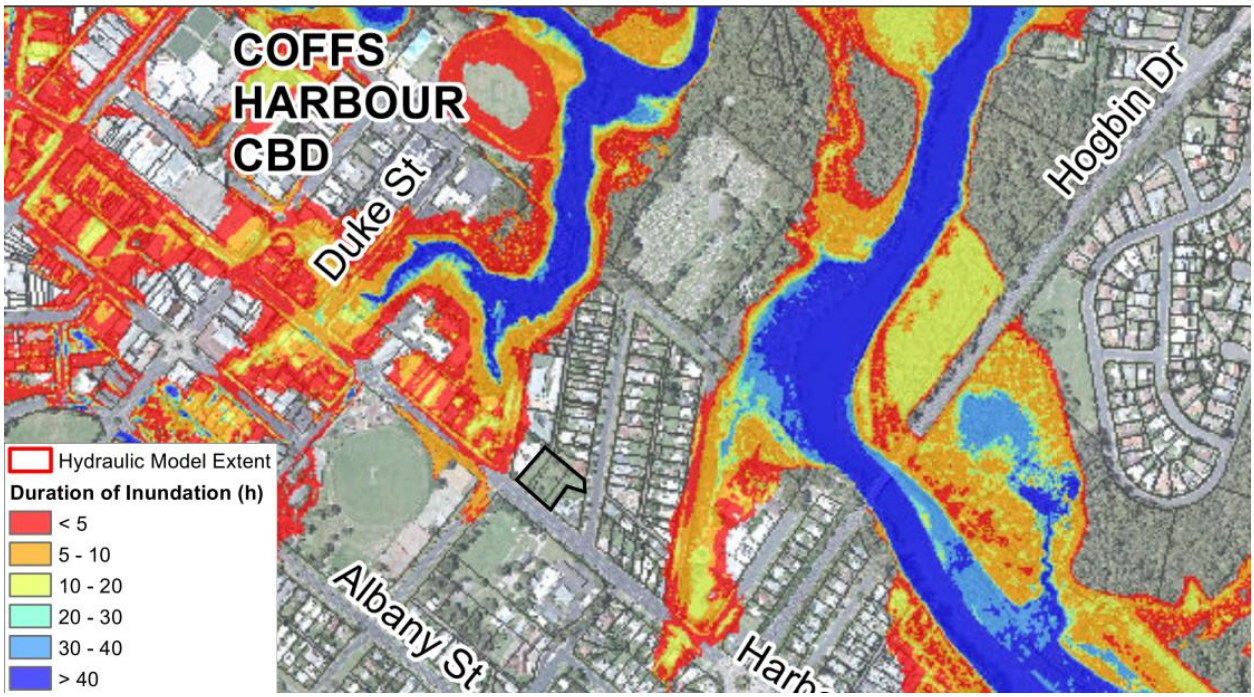
The NSW SES monitors local flood gauges and maintains a flood intelligence database to support targeted SMS warnings based on emergency response regions (FRMP, 2025). In Coffs Harbour, a flash flood warning system tracks water levels at the Coffs Creek Highway Bridge and stream gauges at Bray Street, Gundagai Street, Grafton Street, and Loaders Lane, along with local rainfall and detention basin data, triggering alerts to the SES when thresholds are met. It is advised that all residents of the site are signed up to receive SMS alerts in order to be informed in the event of a flood and mitigate risk.

The forecasts have the following approximate lead times:

- Thunderstorm Forecast
  - 24-48 hours – forecasts the likelihood of severe thunderstorms developing across NSW from ‘possible’ through to ‘likely’
  - If the forecast indicates severe thunderstorms are likely, then advice should be issued to residents to prepare accordingly. This may entail more active monitoring of BoM forecasts, activating a Home FloodSafe Plan, or preparing to self-evacuate
- Regional Severe Thunderstorm Warning
  - 3 hours - forecasts broad areas where severe thunderstorms are occurring or may occur in the next 3 hours
  - The regional warning indicates severe storms are likely, giving less than three hours' warning. This time period is the last feasible window where occupants could evacuate to safer areas prior to the storm arriving. However, due to local storm activity and storm tracks, arterial roads surrounding the precinct area may already be affected by flooding
  - A previous state of readiness should allow the rapid mobilisation to evacuate to a nearby hub or to seek shelter in higher parts of the buildings prior to the arrival of a severe storm
- Detailed Severe Thunderstorm Warning
  - less than 60 minutes - detailed warnings are issued when individual severe thunderstorms are within range of the city's weather radars
  - They indicate the forecast direction of movement for 60 minutes and the immediate Threat Area ahead of the storm
  - If the Detailed Severe Thunderstorm Warning or Threat Area encompasses the site of 211A-215 Harbour Drive, then it may be too late to safely evacuate before the storm arrives

Inundation times in low lying areas near to the site such as Duke St and Marcia St are up to 10 or 20 hours in some cases during the 1% AEP event. Figure 6.5 depicts the time at which each adjacent emergency access road is cut in a 1% AEP event relative to the nearest flood level gauge. Due to some sections of Harbour Drive being inundated for the period of time, the emergency vehicular routes shown in Figure 6.6 and Figure 6.7 are all directed through Salamander Street.

Figure 6.5: Catchment time of inundation - 1% AEP



Source: Coffs Creek FRMP, 2025

6.3.2 Emergency Management Strategy – Evacuations during a Storm

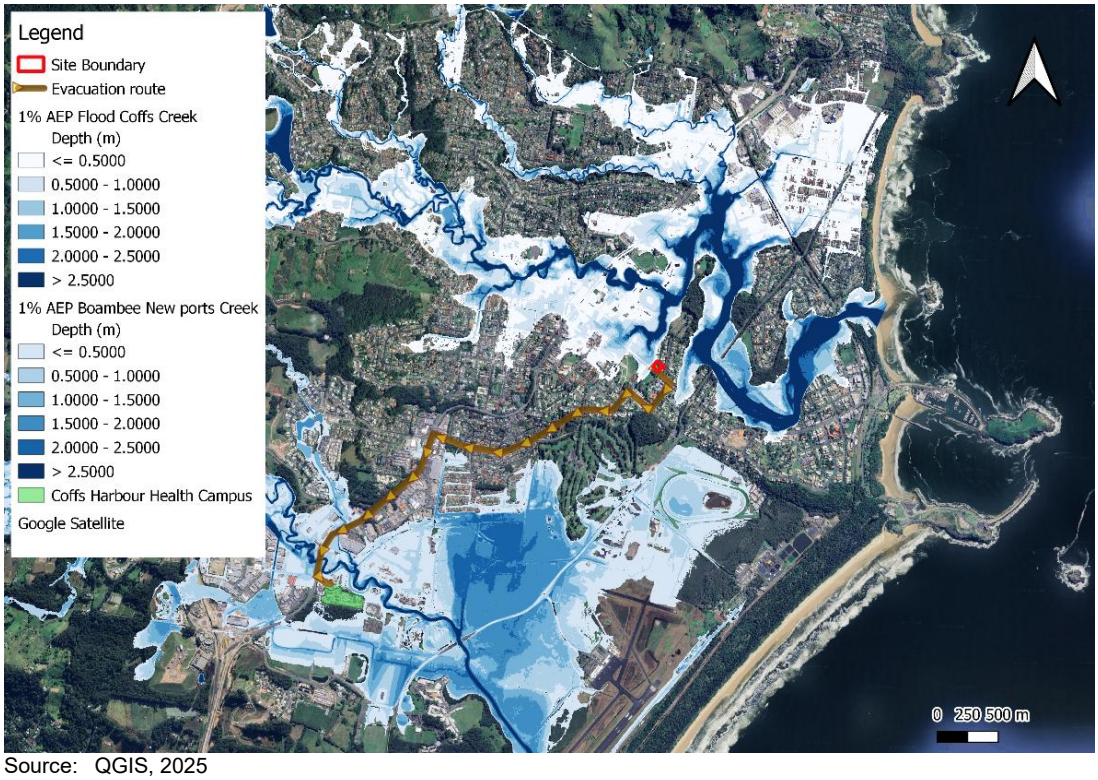
211A – 215 Harbour Drive is located on the fringe of the Coffs Harbour CBD, which is an area of flooding concern. It is noted that the rate of rise, resulting flood depths and the size of the floodplain would make it unsafe to evacuate through the CBD during a storm.

Evacuation by either vehicle or on foot from this area will be difficult for affected occupants. However, during a 1% AEP, a suitable evacuation pathway is shown in Figure 6.4, which continues towards Coffs Harbour Health campus. Hogbin Drive is mentioned as a key evacuation route for areas east of the Pacific Highway in the FRMP; however, the Boambee New Ports Creek suggests that Hogbin Drive is inundated along its stretch adjacent to the airport within the 1% AEP event.

General evacuation routes should follow the roadway via Salamander Road, Raleigh Street until Thompsons Road, which sits along the border of both the Coffs Creek and Boambee catchment. Beyond here, the evacuation route continues towards the direction of the Health Campus via the Specific Highway. The route is only inundated en route by the campus itself with shallow depths (<300mm) during the 1% AEP event. If the flood event exceeds the 1% AEP, such as a PMF event, the evacuation strategy should be reviewed against the Boambee Catchment FRMP or as Section 6.3.1 suggests, evacuation to the nearer suggested evacuation centres.

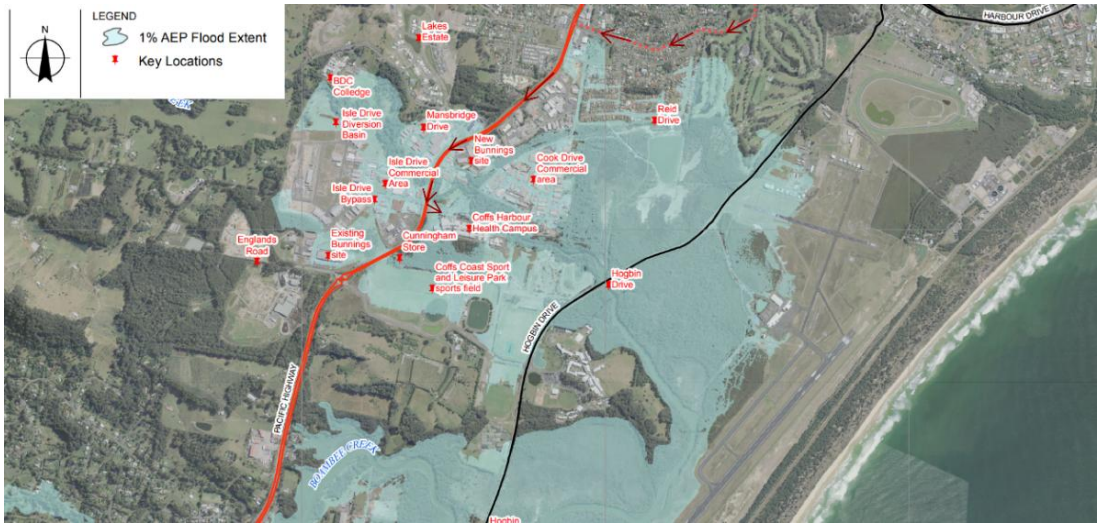
SES and emergency access to the site during flooding may also be difficult as it is adjacent to the roads within areas of the floodplain with significant flood depths. Due to these problems, special shelter-in-place provisions should be provided as a secondary measure if conditions do not allow for safe horizontal evacuation to higher, non-inundated roads.

Figure 6.6: Evacuation path from site to Coffs Harbour Health Campus



Source: QGIS, 2025

Figure 6.7: 1% AEP Evacuation Path within Boambee Newports Creek Floodplain



Source: Boambee New ports Creek Floodplain Risk Management Study and Plan. 2011

6.3.3 Emergency Management Strategy – Shelter in Place (SIP) during a Storm

NSW SES StormSafe advises the following during a storm:

- never enter or travel through floodwater,
- stay indoors,
- Stay clear of creeks, drains, causeways, gutters and streams.

Section 5.1.7 in the NSW State Flood Plan describes Shelter in Place (SIP) as an appropriate strategy to be considered where significant constraints to evacuation exist. Shelter-in-place is determined as a refuge occurring above the PMF level and may occur when there is a risk to public safety and other means of evacuation are not possible.

The site is embedded within an existing road network that was not designed to be free from flooding during extreme storms. It is beyond the scope of the proposal to consider upgrades to local drainage networks to provide flood-free evacuation routes. Consequently, SES advice would preclude evacuating when local roads are flooded, as it poses a significant risk to life, as entering flood waters is the main cause of death during a flood event.

6.3.4 Compatibility with Shelter in Place Guideline for Flash Flooding

The Shelter in Place guideline for flash flooding (DPHI 2025) indicates that SIP is a suitable emergency management strategy for the development proposed in flash flood environments. Table 6.2 outlines the decision-making process for 211A-215 Harbour Drive, based on the advice provided in the Shelter in Place guideline for flash flooding.

Table 6.2: Compatibility with Shelter in Place Guideline

Shelter in Place Consideration	Decision	Relevant FIRA Section
Understanding the full range of flood behaviour up to, and including the PMF	A range of storms has been assessed to understand the range of flood behaviour from minor (10% AEP) to major (1% AEP) and the PMF	5.1.1
Does shelter in place align with existing emergency management strategies for the area	Yes – There is no formal evacuation procedure or routes identified for Coffs Harbour, other than those proposed in the NSW SES Local Flood Plan (2023)	6.3.1
Has evacuation off-site (the primary emergency management strategy) been investigated and determined to be unachievable	Yes – Access has been investigated and is feasible in both 1% and PMF events, assuming suitable access to North Street is provided or exit pathways leave the building on the higher, East side of the site towards Salamander Street	6.3.2
Does the development include medical centres, emergency service and community facilities, and sensitive and hazardous land uses, some of which may not be suitable for shelter in place	No	6.3.2
Shelter in place for greenfield development is not supported	The site is upon undeveloped land so shelter in place as not been elected as a primary evacuation proposal, instead a secondary.	1.3
Whether there are existing government developed flood warning systems that give advanced, detailed forecasts of flash flooding to allow sufficient time to evacuate to the proposed refuge locations	Due to the flash flood nature of Coffs Creek, warning times are limited, especially during rapidly rising events. The Bureau of Meteorology (BoM) provides a 1-hour lead time flood forecast for the Coffs Creek Highway Bridge gauge. The City of Coffs Harbour supplements this with its own flash flood warning system, monitoring multiple stream and rainfall gauges. When certain thresholds are met, SMS alerts are sent to the NSW SES.	6.3.1 and Coffs Creek Floodplain Risk Management Study and Plan Review
Can the community effectively be informed of the risks associated with the emergency management strategy	Yes	6.3.1 and Coffs Creek Floodplain Risk Management Study and Plan Review

Shelter in Place Consideration	Decision	Relevant FIRA Section
Detailed assessment of evacuation off-site (the primary emergency management strategy) to determine that evacuation off-site is not achievable	Evacuation to North Street or Salamander Street is logical while the surrounding road networks are free from flooding.	Figure 6.6
Flash flooding is the only flood risk present at the site	No, mainstream flooding is the main source of flood risk, although critical storm durations are within 6 hours for the site.	2.2

6.3.5 Emergency management strategy – Residual risks

6.3.5.1 Education

Community awareness of flooding is a significant issue within the floodplain due to the infrequency of severe floods and the anticipated depths of these floods in a PMF event. The Precinct Manager needs to be aware of the flood risk and their obligation to evacuate the basement car park and ground floor levels when inundation begins to occur. Residents need to be aware of the flood risk and the response requirements during a PMF flood event. As part of this procedure, evacuation drills should be conducted regularly to ensure residents are aware of the procedures for sheltering within the site.

6.3.5.2 PA System

The building PA system can be used to communicate evacuation directions and safety messages to the population in the lead-up to and during a flood to assist in improving the safety of the community.

6.3.5.3 Medium and high-density residential buildings

Make buildings as safe as possible to occupy during flood events. An area of habitable floor of any residential development should be located above the PMF with the building structurally designed for the likely flood and debris impacts. The buildings should include:

- Alternative power source, with capacity for at least 8h for essential needs
- Automatic fire suppression systems
- Emergency telecommunication system
- Toilet facilities accessible to people with disabilities
- First-aid kit
- Emergency supplies kit
- Shelf-stable food

6.3.6 Emergency Management Considerations

Table 6.3 details key considerations and the advised outcomes related to each flood risk emergency management.

Table 6.3: Emergency Management Considerations

Shelter in Place Consideration	Decision and Evidence	Relevant FIRA Section	Outcome
Is warning time available to the onset of flooding?	No - The time to flooding and flood duration are typically very short with	6.3.1	Unable to evacuate in rapid onset event

Shelter in Place Consideration	Decision and Evidence	Relevant FIRA Section	Outcome
	minimal warning time. Critical storm durations in the catchment are less than 6 hours with flood warnings limited to severe weather warnings for the area and no specific advice on local impacts of flash flooding. However, the residential apartment's habitable floor level is situated above the PMF level.		
Can development be modified to allow evacuation?	Yes – Evacuation routes should be directed towards the East of the development towards North Street.	6.3.2	No requirement for stormwater drainage system amendments, outcome should revolve around safe evacuation either to a communal location outside the floodplain or shelter in place.
Is time of isolation short?	The period of worst-case inundation in the area surrounding the site is within 6 hours	6.3.1	Consider development types and apply controls
Are occupants able to be safe and self-sufficient for duration of flooding	Yes - FPLs are designed to keep the buildings free from flooding under the most extreme circumstances Flood-free areas exist within the precinct that could be used as muster points in the event of a flood emergency	6.1	Consider development types and apply controls
Are residual risks associated with SIP tolerable	Yes - Low flood hazard predicted within the precinct during the most extreme storms FPLs are designed to keep the buildings and below ground car parks free from flooding under the most extreme circumstances Flood-free areas located within the precinct could be used as a muster point or shelter location Building PA system can be used to relay emergency information to residents	6.1 6.3.5	Consider development types and apply controls

6.4 Compatibility with Design Controls

The Design Recommendations within this FIRA have been proposed to meet the requirements of the Design Controls applicable to the site. A summary of the site compatibility is presented below:

- This FIRA has been undertaken in accordance with the NSW Government's Flood Prone Land Policy and the principles of the Flood Risk Management Manual

The precinct development enables the increase in density in line with endorsed NSW Government strategies. While the NSW Flood Prone Land 2021 package notes a planning proposal must not permit a significant increase in development density, the proposed development of the site at 211A-215 Harbour Drive is required to accommodate the additional residents in Coffs Harbour in the near future. The proposed development will be in the form of a new vertical development with maximum height and Floor Space Ratio (FSR) increases to accommodate the growing population.

It is possible that direct flood risk to any person could be reduced by implementing the design recommendations and that the residual flood risk could also be reduced. To summarise:

  - This type of development can elevate the higher risk residential use above the PMF level and can make allowance for shelter-in-place refuge and vertical evacuation, which is considered an improvement on the current flood exposure
  - intensified development offers more shelter-in-place opportunities as it will likely provide more floor space for refuge above the PMF level
  - The expected number of persons located on ground floors can be limited to the current occupation or increased if the raised ground floor level reduces the risk to future occupants
- FPL requirements and other Development Controls
  - All habitable floor levels are above the PMF
  - It is expected that the development will be stable during flooding up to the PMF and that all non-ground-floor residents in multi-storey residential development will be only exposed to an indirect flood risk
- Implementation of Flood Emergency Response Plan (FERP),
  - A developed site-specific FERP could address the flood risk faced directly and indirectly by future residents, in contrast to the flood risks faced by existing residents in flood-affected locations.
  - It is conceivable that the new residential flat development with an effective flood emergency response plan will reduce residual flood risk, with opportunities for vertical evacuation

6.5 Summary of Flood Emergency Management

Section 6.3 outlines the relative flood risk that the site at 211A – 215 Harbour Drive is exposed to. The site is affected by flash flooding coupled with mainstream flooding from the nearby overtopping Coffs Creek. This is largely due to the short times associated with flash flood events, the speeds and depths associated with these events, and difficulties associated with evacuation to a safe location.

In flash flood catchments, the time to flooding and flood duration are typically short with minimal warning time. Warnings to the community are often limited to severe weather warnings or flood watches for the general area. There is often no specific advice available on the local impacts of flash flooding and there may be little time between the start of flood-producing rainfall and flooding of roads, property and potentially buildings.

To help minimise the flood risk to future occupants, the first response that should be adopted in a flood emergency event is horizontal evacuation of occupants from the site before the properties and/or evacuation routes become flooded. This should be done through the East side of the building towards North Street or Salamander Street, if safe to do so.

Sheltering in place is also an appropriate response when the flood warning time and flood duration are both less than 6 hours, as is the case for the site. Flooding along Harbour Drive also limits the horizontal evacuation potential for the area. The lack of pre-determined evacuation locations and the rapid onset of flooding in the catchment lead to sheltering being the most suitable secondary means of emergency management.

7 Conclusions

This FIRA has been prepared to address the Secretary's Environmental Assessment Requirements (SEARs) issued by the Department of Planning, Housing and Infrastructure (DPHI) for the subject SSDA.

The Coffs Harbour Flood Risk Management Study was made available for this flood impact and risk assessment. The model was developed using TUFLOW in 2018 by WMAwater and reviewed in 2025 for the City of Coffs Harbour and received by Mott MacDonald. It is the current Council adopted model for the catchment.

The Flood Risk SEAR requests a FIRA for the site to support the SSDA in accordance with the principles of the Flood Risk Management Manual and Flood Risk Management Guideline LU01.

Flood model scenarios for 211A – 215 Harbour Drive were based on the following:

- Existing conditions
  - An assessment of the current flooding conditions based on the existing survey of the site
- Design conditions with mitigation measures:
  - A review of the existing conditions model was completed with no building block out required to represent the proposed development layout

The subject site is considered a flood affected property, as although is not affected by events up to the 1% AEP flood, it is affected by the PMF, which is the largest flood that could theoretically occur at a location and defines the maximum extent of flood-prone land. Dry areas above the PMF level are expected to be free from flooding under all scenarios. Aspects of this development are required to meet flood related development controls, and the key risks as addressed through design are noted here:

Flood Levels and Appropriate Immunity

The design Flood Levels in Table 6.1 highlight the minimum required floor levels to appease this requirement. According to the development-specific advice and development controls of the Council relating to the habitable rooms, 1% AEP + 0.5m freeboard is required to enable a level of flood resilience for the residences and provide a reasonable level of flood mitigation.

The proposed habitable floor level of 7.90m AHD exceeds Coffs Harbour Council's minimum flood planning requirement of 4.99m AHD (1% AEP + 0.5m freeboard), ensuring compliance with the Coffs Harbour Flood Policy, LEP 2013, DCP 2015 and relevant flood planning guidelines. The proposed basement car park entrances and stairways are also set at a minimum level of 4.99m AHD and are consistent with Council's requirements.

The guidance from the DCP requires a minimum 1% AEP + 100mm minimum freeboard level for basement car parks. This equates to a level of 4.59m AHD, so the provided 4.60m AHD lower ground FFL is suitable to meet DCP requirements.

Rather than modifying the basement structure and raising further to meet PMF level, an overall risk-based approach has been proposed to manage flood safety by assessing the actual risk to life and introducing targeted controls. These include a basement escape staircase with exits above the 5.85m AHD PMF level to ensure safe evacuation during a flood, integration with existing fire escapes, clear flood safety signage and the adoption of a FERP to provide a practical and compliant solution without altering the basement levels.

Flood Impacts

The design has suitably addressed the key risk of flood impacts as the site is not directly affected during the 1% AEP based upon Coffs Harbour Council's adopted flood model. Subsequently, there would be no flood impacts greater than 10mm and no flood impacts requiring mitigation.

Emergency and potential evacuation during flood events

The required emergency and potential evacuation during flooding events for the site have been considered regarding both the severity of flooding and the duration of flooding events. The site is affected by mainstream flooding and there is only risk of extended periods of flood risk that could lead to isolation or a need for prior preparations of flooding provisions in the modelled rare PMF event.

Based on this FIRA and the Coffs Harbour Flood Risk Management Study, an evacuation strategy and a shelter in place policy during a flood emergency are the most logical EM approaches to protect life, given the following constraints:

- The roads surrounding the site are partially at risk from flash flooding; flooding that has a relatively high discharge over a short duration – the interval between the observable causative event and the flood is less than six hours. Given the site does have sufficient warning time to adequately evacuate the population of the precinct via the East building, this should be preferable, however it should be made clear that:
  - The opportunities for horizontal evacuation during a storm are limited as surrounding streets, such as the intersection between Harbour Drive and Curacoa Street are subject to high flood hazards that present an unacceptable risk to people. NSW SES advice is not to venture out during a storm or cross any area of flood inundation
  - The rate of rise and extent of flooding in the most extreme events means that emergency evacuation centres may not get set up and evacuees would generally have to take shelter in other private premises that may not have robust flood controls
- The time of isolation is short, based on the duration of flooding around the precinct. A development which is isolated for a few hours by flood water in PMF does not pose a significant risk to life
  - The development affords a means of creating a safe, on-site shelter above the PMF – development, which caters for sheltering in place and can be used to reduce existing risk to life for individuals who will occupy the floodplain, but will increase the number of individuals at risk.
- Additional Development Controls can be imposed for shelter in place, which seek to manage the residual secondary risks to life caused by flood isolation to ensure that risks remain tolerable. This refers to detailed amendments, such as the impact of a flood on people's access to water and electricity, the availability of food, management of medical emergencies, building fires and their health and well-being. The NSW SES, Ambulance NSW, fire agency servicing and relevant health functional area may require consultation to minimise risks during flooding for a shelter in place arrangement.