Hunter River High School

Flood Emergency Response Plan

Customer	The APP Group
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Author	Nicola De Paolis, Mel Adam
Reviewed By	Kieran Smith
Project Manager	Mel Adam

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1 Introduction

This Flood Emergency Response Plan (FERP) has been prepared for the proposed redevelopment and upgrade works within Hunter River High School (herein 'HRHS' or 'The Site') at 36-40 Elkin Avenue, Heatherbrae, NSW 2324. The Site is bounded by Adelaide Street and the Pacific Highway to the south-east, residential properties to the north-east and south-west, and open grassed land to the north-west. The Site is located approximately 600 m east of the Hunter River and 500 m south-west of the junction of Grahams Town Drain and Windeyers Creek

In 2023, BMT was engaged by SINSW to investigate the existing flood risk at the Site as well as Port Stephens Council's flood-related planning controls, and to assess the suitability of the HRHS development. BMT subsequently completed the following Flood Impact Assessment (FIA) and Flood Emergency Response Plan (FERP) for the site based on the original proposed design of works:

- 'Flood Impact Assessment - Hunter River High School' (BMT, 2023) (hereafter referred to as the "2023 FIA")
- 'Hunter River High School Flood Emergency Response Plan' (BMT, 2023) (hereafter referred to as the "2023 FERP")

Since the completion of the 2023 FIA and 2023 FERP, the proposed design has been revised to raise the finished floor levels of Block X and Block Z to provide immunity up to the Probable Maximum Flood (PMF) level. As such, an updated FIA and FERP are required to assess the revised design. The updated FIA (which should be read in conjunction with this document) is documented in 'Flood Impact Assessment - Hunter River High School' (BMT, 2024) (hereafter referred to as the "2024 FIA") (Reference: R.A12187.001.06_HRHS_FIA.pdf).

The Site is subject to mainstream Hunter River flooding in rare and extreme flood events, with flood depths and extent of inundation increasing in magnitude up to the Probable Maximum Flood (PMF). In such events, the site is subjected to high flood depths and hazardous flood conditions for which flood emergency management is required.

This report outlines the proposed strategy for flood emergency management at the Site, with consideration of Hunter River flooding, the proposed development, and relevant local and state government policies and guidelines including the *NSW Floodplain Development Manual* (NSW Government, 2005) and *Flood Risk Management Manual* (NSW Government, July 2023). The report describes the requirements for the proposed buildings such as required finished floor levels, as well as procedures for flood evacuation, warning systems, signage, and responsibilities of building wardens in case of a flood emergency during school operational phase.

The principal flood emergency management strategy proposed herein is the non-attendance (i.e closure) of the school prior to flooding based on the issue of a flood warning by BoM or the SES, emergency storm warning or the on-site water level sensor systems. In the event that this does not happen, and the school is in operation when a flood warning is issued or the on-site water level gauge is triggered, the recommended secondary emergency management strategy is off-site evacuation based on the triggers specified in this FERP.

The FERP documented in this report reflects the design assessed in the 2024 FIA. If the proposed design changes in the future or in the detailed design stage, the FERP may need to be further refined to reflect relevant modifications. Once the proposed development is completed, a concise operational flood emergency management plan (OFEMP) is recommended to be developed by the school in consultation of SES based on this FERP.

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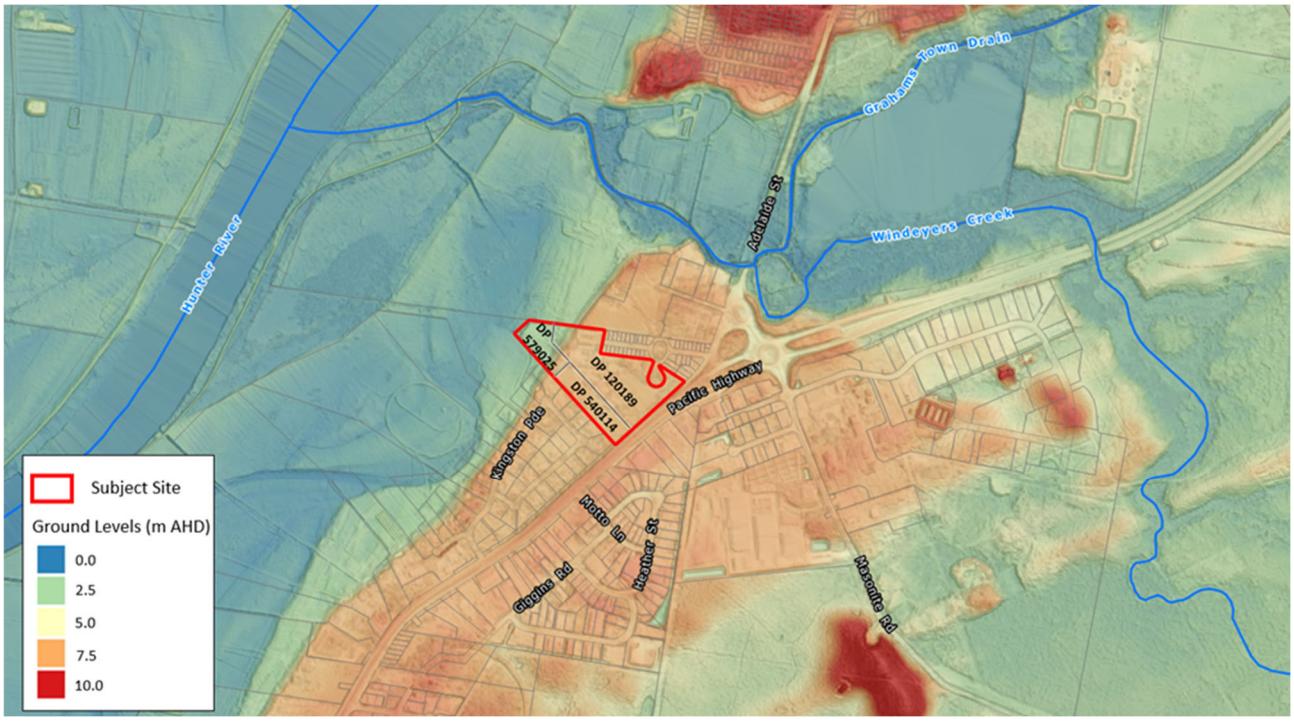

Figure 1.1 Hunter River High School Locality and Existing Terrain

2 Description of Proposed Development and Site Flood Behaviour

2.1 Proposed Development Summary

The proposed development is an upgrade of the existing school campus located on Site. The following three (3) buildings are proposed:

- Block X (Administration building – staff only)
- Block Z (Student learning hub including 8 classrooms)
- Block Y (Gymnasium consisting of a basketball court, equipment storage, canteen kitchen, staff room, first aid room and change room amenities). In February 2024, a Development Application for the Site was approved for various works including the construction of Block Y.

Existing road access to the Site is via Elkin Avenue (to the north), with additional access points on Adelaide Street (at the south-east). The proposed development works will involve the construction of a new access point at the south-eastern lot boundary.

2.2 Proposed Access Arrangement

Information regarding the proposed Site access has been sourced from the Site plan provided by The App Group and from the traffic report undertaken as part of this project *Hunter River High School Upgrade Flood Evacuation Transport Assessment* (Stantec, 2024). The access arrangement is described below.

2.2.1 Pacific Highway (State Road)

The Pacific Highway is orientated in a north-east to south-west direction and acts a major connecter between surrounding towns (Heatherbrae, Raymond Terrace, Tomago and Hexham etc) as well as providing access to local roads in the vicinity of the Site including Adelaide Street (access provided via a roundabout).

2.2.2 Adelaide Street (Local Road)

Adelaide Street is orientated in a north-south direction which connects Heatherbrae (at a cul-de-sac location at the most eastern part of the Site) to Raymond Terrace. Adelaide Street provides a direct access to Elkin Avenue.

2.2.3 Elkin Avenue (Local Road)

Elkin Avenue is orientated in an east to west direction and provides a local road access from Adelaide Street to the school at two entrances:

- The proposed kiss and drop bay and the dedicated bus zone which is located as off-road from the roundabout in Elkin Avenue
- The carpark to staff carpark entry at the most western point of Elkin Avenue

2.2.4 South-east Lot boundary road (south-west arrangement):

It is understood that a controlled vehicular entry gate is proposed at the south-eastern Lot boundary road.

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2.3 Flood Behaviour

Existing and post-development flood conditions at the Site were determined as part of the 2024 FIA for a range of design flood events. A full range of flood mapping including peak flood depth with flood level contours, velocities, flood hazard and flood function were provided for all design events for the existing flood conditions (refer to Annex D of the 2024 FIA) and post-development flood conditions (refer to Annex E of the 2024 FIA)

Existing flood conditions in the vicinity of the Site are characterised by deep slow-moving water from the Hunter River. From the most frequent design event simulated (10% AEP flood), floodwater inundation on-Site is confined to lower-lying areas in the north-west of the Site. Floodwaters are contained in this low-point with only minor increases in flood extents (couple of meters) up to the 0.2% AEP (1 in 500 AEP) event. The area designated for the proposed development is not inundated by floodwaters until the 0.02% AEP (1 in 5000 AEP) event, in which the entire Site is inundated with a peak flood level at the Elkin Street entrance of 7.5m AHD. In the PMF, the flood level at this same location is 8.5m AHD.

Peak flood levels applicable to this assessment were determined as part of the 2024 FIA and are provided in Table 2.1 for a range of design flood events including the 5% AEP, 1% AEP, 0.02% (1 in 5000 AEP), PMF and the 1% AEP Future Climate (Planning Horizon 2100) events.

All potential egress routes from the Site will be cut during rare flood events, with some routes cut during frequent storms. The Pacific Highway (south direction) will become cut-off from a 10% AEP event, whilst the Pacified Highway (north direction) and Adelaide Street (north direction) are cut-off in a 2% AEP event. The Site is classified as a “Low Flood Island (LFI)”. Further discussion of evacuation routes is included within this FERP.

Flood hazard and flood function classifications (refer to the 2024 FIA for information on the definitions) at the location of the existing and proposed buildings under post-development flood conditions are as follows:

- The peak flood hazard predicted using the hazard approach defined in the Floodplain Development Manual (2005) is low hazard in the 0.02% AEP flood and high hazard in the PMF.
- The peak flood hazard predicted using the hazard approach defined in the AIDR (2017) varies between a low of H1 to a high of H5 in the 0.02% AEP flood and H5 in the PMF.
- The peak flood function predicted varies between flood fringe and flood storage in the 0.02% AEP flood and floodway and flood storage in the PMF.

In the PMF event, all areas on Site would be considered unsafe for all people and vehicles with buildings requiring special engineering design and construction.

Points of interest on Site are shown Figure 2.1. Flood extents for the assessed design events are shown in Figure 2.2.

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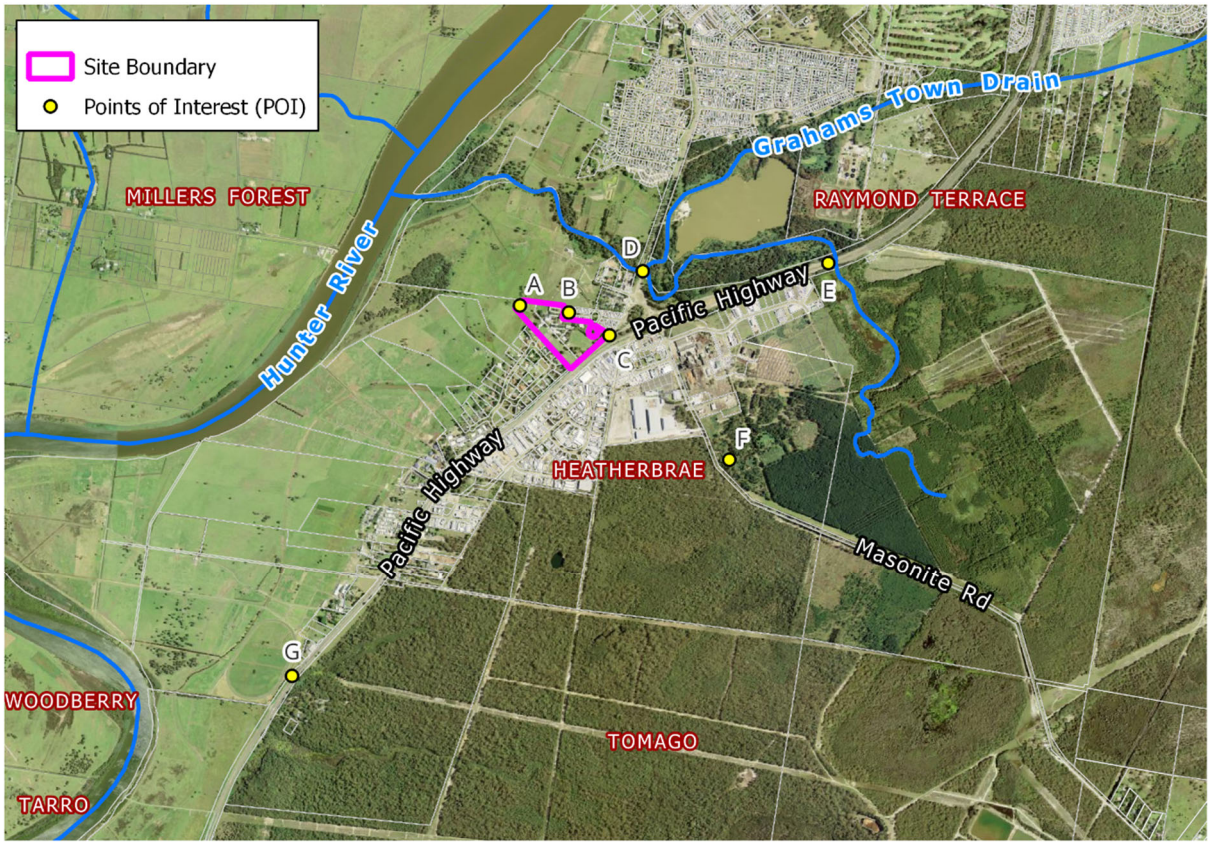

Figure 2.1 Points of Interest

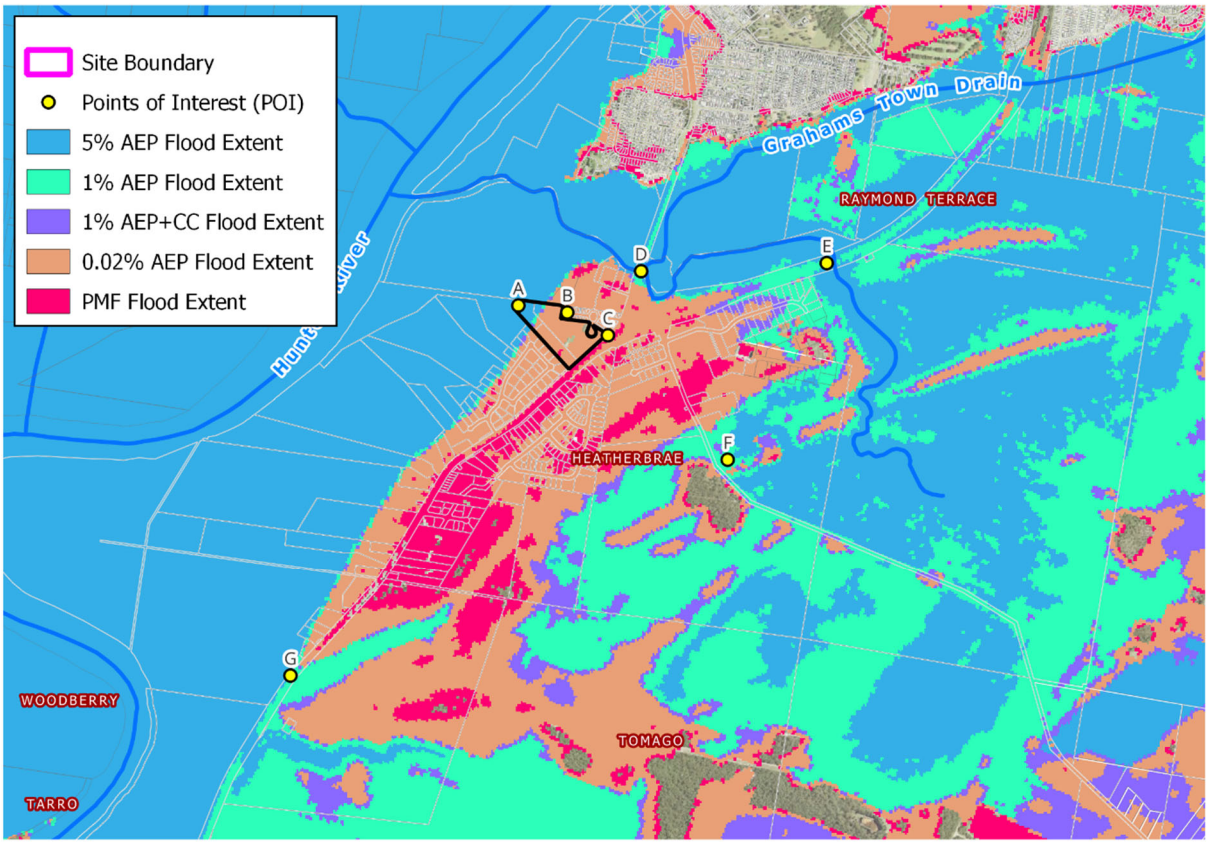

Figure 2.2 Points of Interest overlayed with peak flood extents

Table 2.1 Peak Flood Levels at Points of Interest

Points of Interest		Peak Flood Level (mAHD)*					
ID	Description	5% AEP	2% AEP	1% AEP	1% AEP CC**	0.02% AEP	PMF
A	Subject Site - Low Point	3.05	2.04	4.67	5.22	7.59	8.52
B	Subject Site - Elkin Avenue Entrance	N/A	N/A	N/A	N/A	7.48	8.48
C	Subject Site – Adelaide Street Entrance	N/A	N/A	N/A	N/A	7.57	8.42
D	Adelaide Street @ Windeyers Creek Bridge	N/A	1.8	4.66	5.21	7.52	8.36
E	Pacific Highway @ Windeyers Creek Bridge	N/A	0.34	4.63	5.20	7.50	8.32
F	Masonite Road @ Low point	N/A	0.28	4.59	5.21	7.45	8.27
G	Pacific Highway @ Hunter Region Botanic Gardens	N/A	0.93	4.53	5.08	7.42	8.36

** = Peak flood levels extracted from the post-development flood conditions TUFLOW modelling results from the 2024 FIA. (Flood levels relate to Hunter River flooding)*
*** = "1% AEP+CC" is the 1% AEP event calculated for the year 2100 to account for possible future and more severe climate conditions including a 900m sea level rise and increased rainfall intensities by 20% in accordance with the Williamtown FRMS+P.*

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2.4

2.4 Available Flood Warning Time and Rate of Rise

Flood modelling undertaken as part of the 2024 FIA has been used to determine flood behaviour across the Site, including the available flood warning time, average rate of rise and the duration of flooding. Points of interest are shown in Figure 2.1 and a summary of flood behaviour is provided in the following sections. Post-development flood behaviour across the Site has been used in the development of the flood emergency management strategy, discussed in Section 4.

An understanding of available weather forecast monitoring and warnings is an integral step in managing the flood risk of the Site. A review of the available flood warning and warning systems is discussed in Section 4.3; however, for the purposes of assessing appropriate warning times, key information regarding the Bureau of Meteorology's (BoM) flood forecasting and warning services is provided below.

A description of the existing BoM Flood Warning system is provided in Section 4.1.1. The key information applicable to this available flood warning time is based on the BoM flood classification level[1] for the Raymond Terrace Gauge, summarised in Table 2.1.

Table 2.2 BoM Flood Classification Level at Raymond Terrace gauge (Bureau ID number 561037)

Gauge Location	SES Flood Classification Level (m AHD)		
	Minor	Moderate	Major
Raymond Terrace	2.5	3.1	3.5

2.4.2 Analysis of Flood Warning Time and Rate of Rise

The following section provides information on the flood warning time and rate of rise with consideration of BoM issued flood level triggers (Minor, Moderate and Major) for the Raymond Terrace Gauge. Water level hydrographs have been provided for points of interest (POI) (refer to Figure 2.1 and Figure 2.2) to determine the rate of rise and the available flood warning times.

The rate of rise describes how fast the flood rises: a flood that rises quickly provides less time for warning and evacuation and underpins the importance of early warning systems as preparedness measures in flood-prone areas. It is calculated from the onset of flooding at the POI (i.e. when the measured water level raises above the ground level).

Total flood warning time at the Site includes the target warning lead time issued by BoM, and the time between a flood classification being reached and a point of interest (i.e. the Site or a critical evacuation route) becoming inundated by floodwaters. Specifically:

1. **Target warning lead time issued by BoM** - BoM issue target warning lead time which is the minimum lead time that is provided before the flood level of the flood classification level is exceeded. For the Raymond Terrace Gauge, BoM has a target lead time of 6 hours for a Minor and Moderate flood level classification and 18 hours for a Major flood level classification. Please note this information has not been included on the water level hydrographs below.

2. **A flood classification being reached and when the Site or a critical evacuation route** - The time at which the Minor, Moderate and Major flood level at the Raymond Terrace gauge are reached has been included on the water level hydrographs for the purposes of calculating total flood warning time.

[1] http://www.bom.gov.au/nsw/NSW_SLS_Current.pdf

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3. **Flooding at the POI -** Flooding at the POI begins when the measured water level raises above the Ground level: therefore, the horizontal trend in the hydrographs shown in Figure 2.3 and Figure 2.4 indicates long time spans in which flooding at the POI has not yet occurred. Although it is acknowledged that actual flood events can have different rates of rise and durations, use of design flood events can provide an acceptable representation of flood behaviour across the Site and therefore have been used in the development of the flood emergency management strategy discussed in Section 3. From the onset of flooding at the POI, the rate-of-rise and the duration of flooding are also shown in the design flood hydrographs .

Further information on flood warning is provided within this FERP (refer to Section 4.1).

Water level hydrographs are presented for the 1% AEP+CC, 0.02% AEP and PMF events for each POI. It is noted that the 1% AEP+CC uses a tailwater of 1.2m AHD (a sea level rise of 900mm) whilst the other modelled design events adopt a 0.3m AHD tailwater. As such, for some POIs in low-lying areas the hydrographs may show inundation in the 1% AEP+CC occurs before the rarer events.

2.4.3 Point of Interest A (POI A) – Low point in Subject Site

Water level hydrographs at point of interest “A” (POI A) for the 1% AEP+CC, 0.02% AEP and PMF events are shown in Figure 2.3 to Figure 2.5 respectively. These figures also provide the time at which Minor, Moderate and Major flood levels are reached at the Raymond Terrace gauge on the Hunter River.

In the 1% AEP+CC event, POI A will be inundated approximately 0.5 hours after the beginning (onset) of the rain event. In the PMF, this occurs at 5.5 hours after the beginning of the event. This occurs as the 1% AEP+CC event incorporates a sea level increase of 0.9m which subjects the POI to earlier inundation.

From the onset of flooding of the POI (water level ~1.20m AHD), the average water level rate of rise is 0.08m/hr in the 1%AEP+CC event, 0.05m/hr in the 0.02% AEP and of 0.77m/hr in the PMF event.

In the 1% AEP+CC, 0.02% AEP and PMF events, point of interest A is predicted to be inundated for a long period of time (i.e. longer than 48 hours).

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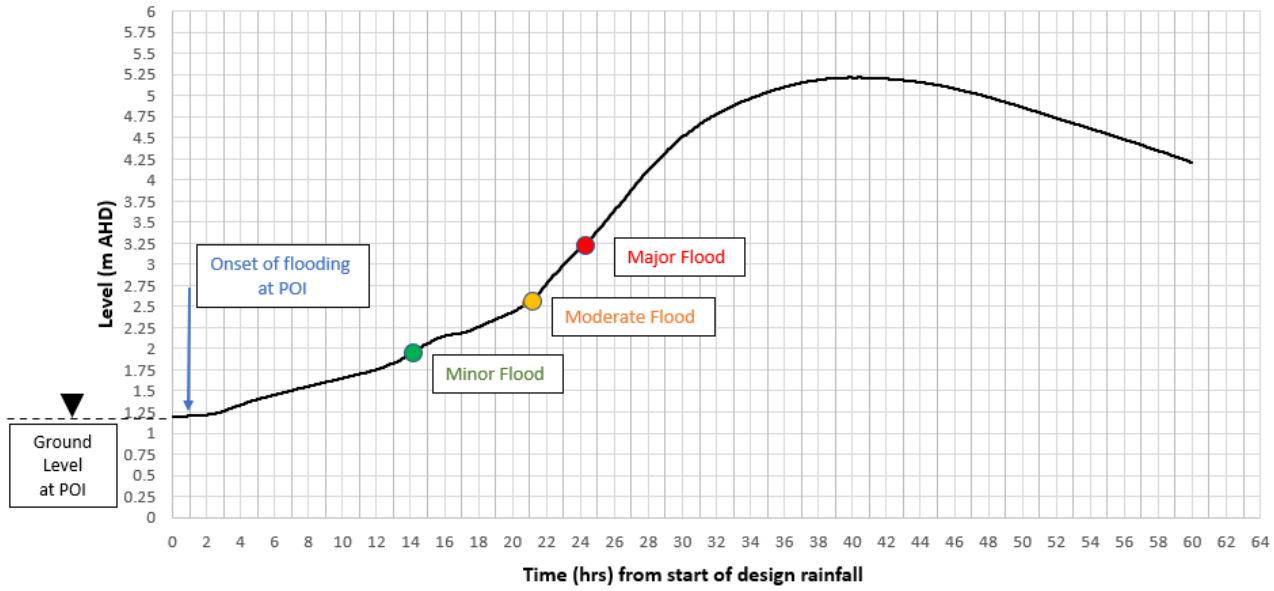

Figure 2.3 1%AEP+CC water level hydrograph at Point of Interest "A" with indicated timeframe when flood levels thresholds are reached at Raymond Terrace gauge station

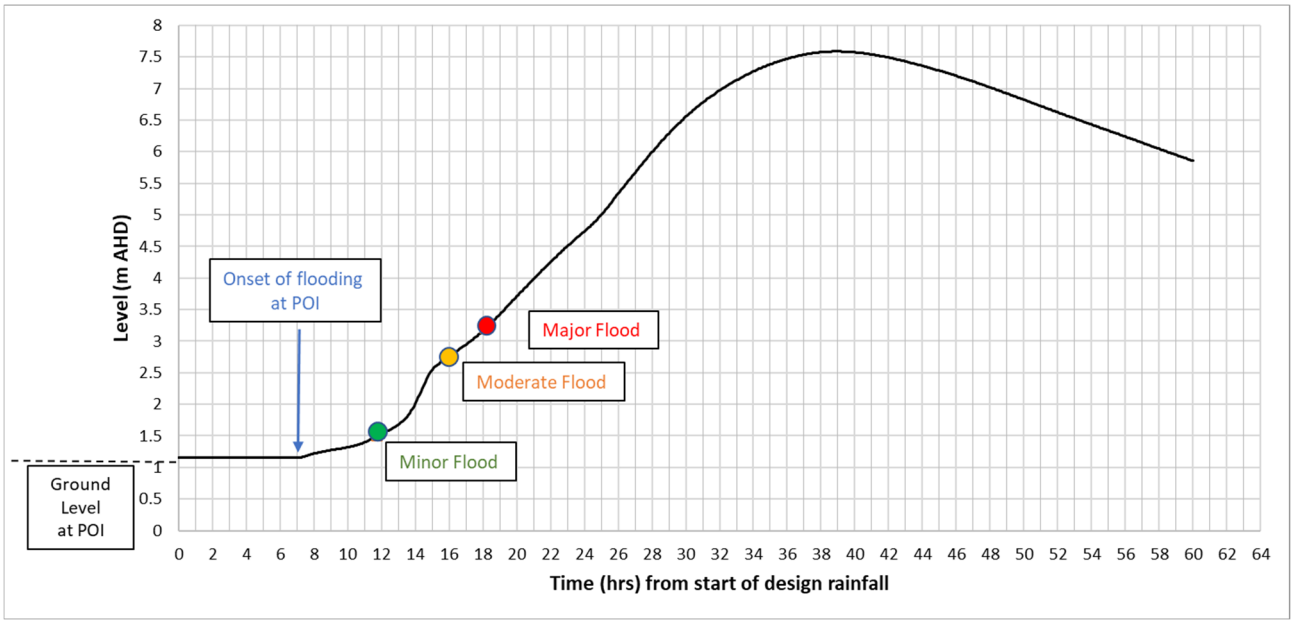

Figure 2.4 0.2% AEP water level hydrograph at Point of Interest "A" with indicated timeframe when flood levels thresholds are reached at Raymond Terrace gauge station

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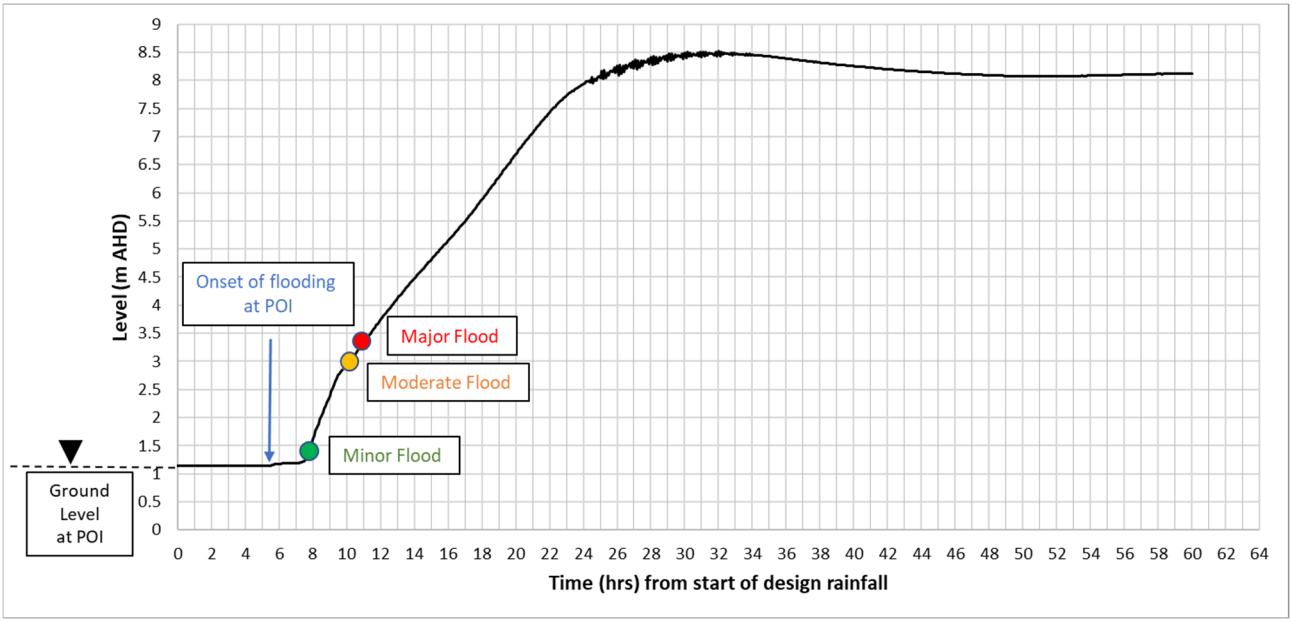

Figure 2.5 PMF water level hydrograph at Point of Interest "A" with indicated timeframe when flood levels thresholds are reached at Raymond Terrace gauge station

2.4.4 Point of Interest (POI) B – Elkin Avenue Site entrance

Water level hydrographs at point of interest "B" for the 1% AEP+CC event, 0.02% AEP and PMF are shown in Figure 2.6 to Figure 2.8. The time at which Minor, Moderate and Major flood levels are reached at the gauge station at Raymond Terrace are also shown. Figure 2.6 shows that the Elkin Avenue access has a high level of flood immunity (i.e. the POI is not flooded in the 1% AEP+CC event). However, POI B will be inundated from the 0.02% AEP flood at approximately 32 hours following the onset of rainfall. The maximum depth is predicted to be 1.1m with a rate of rise of 0.23m/hr. In the PMF event, flooding at this location occurs approximatively 21 hours after the onset of rainfall with a maximum flood depth of almost 2m and an average rate of rise of 0.44m/hr. In the 0.02% AEP event, this location is predicted to be inundated in excess of 24 hours, with inundation in excess of 48 hours in the PMF event.

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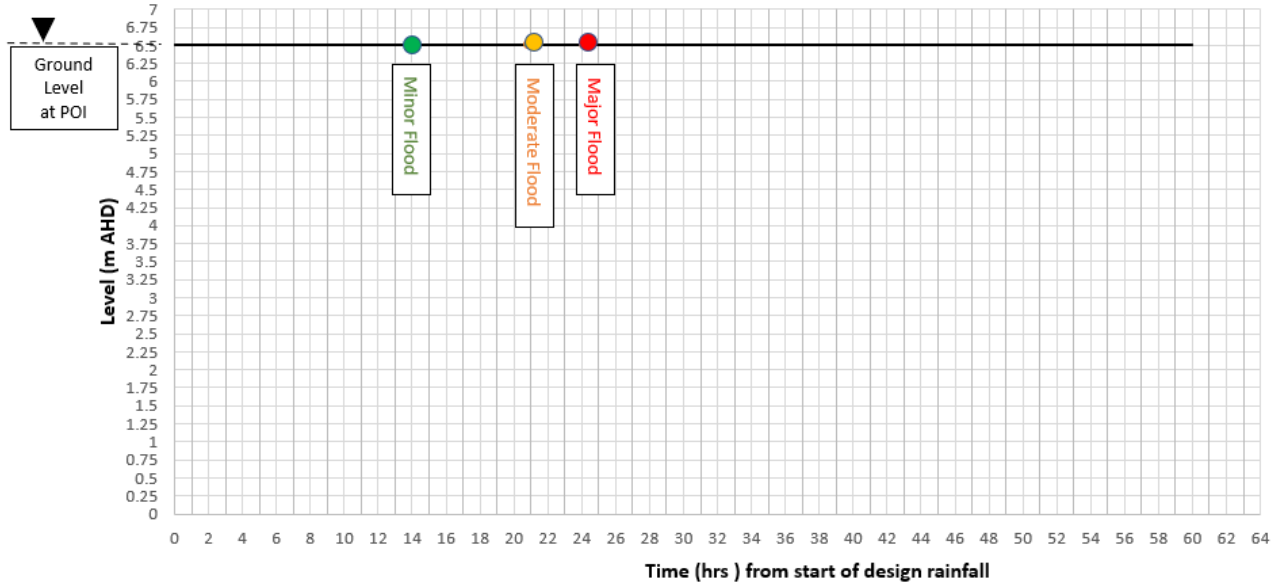

Figure 2.6 1% AEP+CC water level hydrograph at Point of Interest “B” with indicated timeframe when flood levels thresholds are reached at Raymond Terrace gauge station

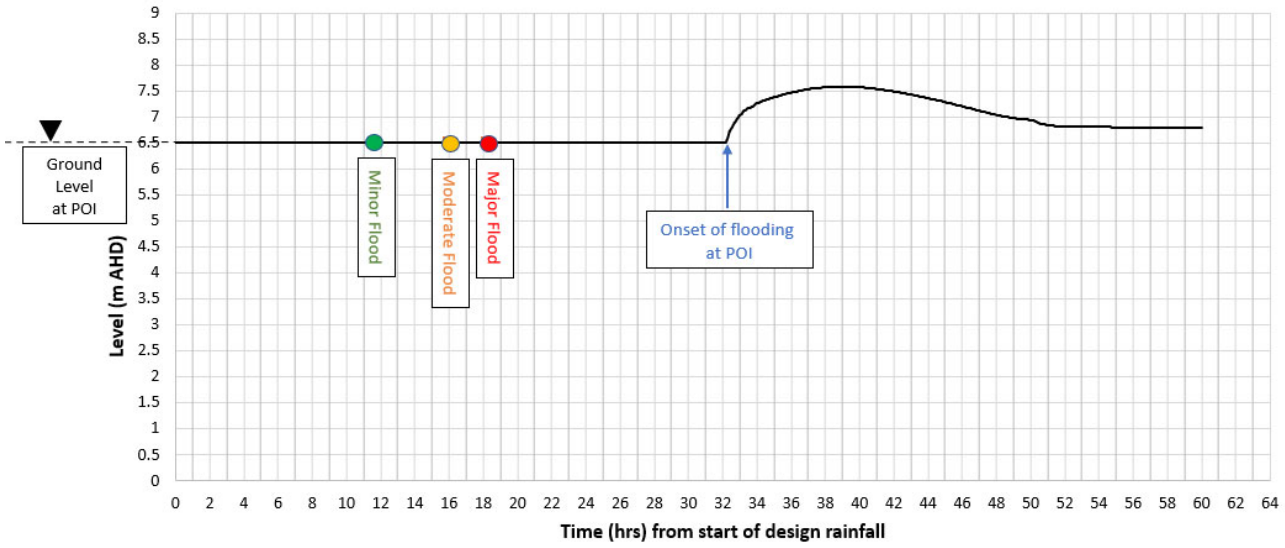

Figure 2.7 0.02% AEP water level hydrograph at Point of Interest “B” with indicated timeframe when flood levels thresholds are reached at Raymond Terrace gauge station

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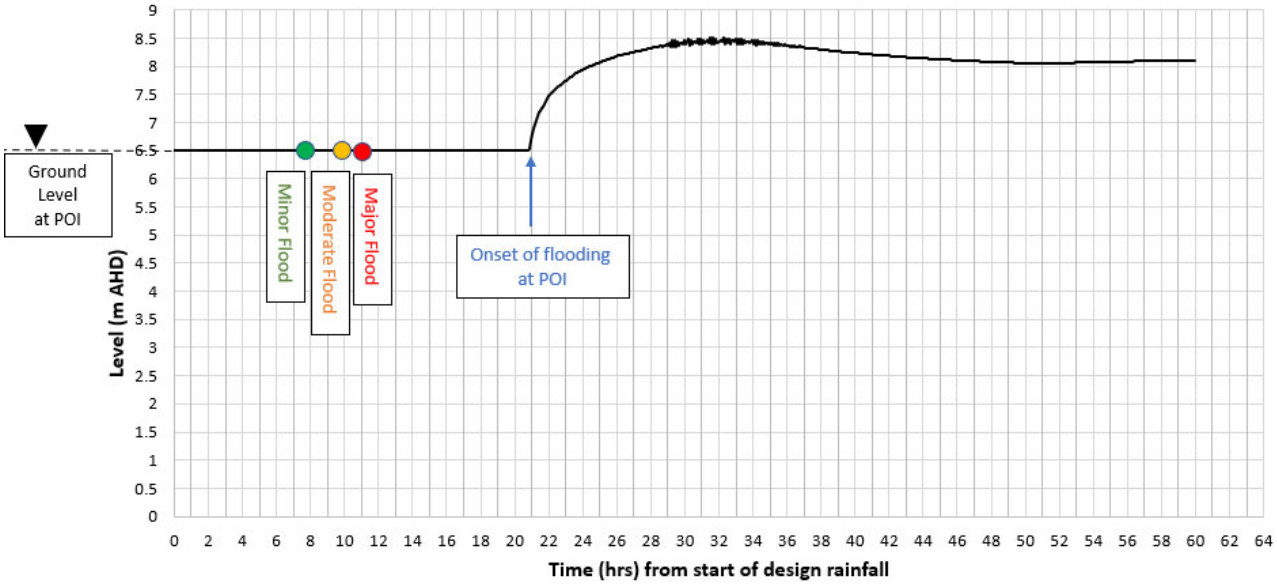

Figure 2.8 PMF water level hydrograph at Point of Interest "B" with indicated timeframe when flood levels thresholds are reached at Raymond Terrace gauge station

2.4.5 Point of Interest C (POI C) – Adelaide Street site entrance

The main proposed access to the Site is via Adelaide Street. Water level hydrographs for POI C, as shown in Figure 2.9 to Figure 2.11, indicate that in the 1% AEP+CC event the entrance is not flooded but depths of water up to 0.5m and 1.4m are predicted in the 0.02% AEP flood and PMF respectively. An average rate of flood rise of 0.12m/hr and 0.19m/hr is predicted in the 0.02% AEP flood and PMF respectively and long durations of flooding are expected. In the 0.02% AEP event, this location is predicted to be inundated for 14 hours whilst in the PMF inundation is predicted to be in excess of 48 hours.

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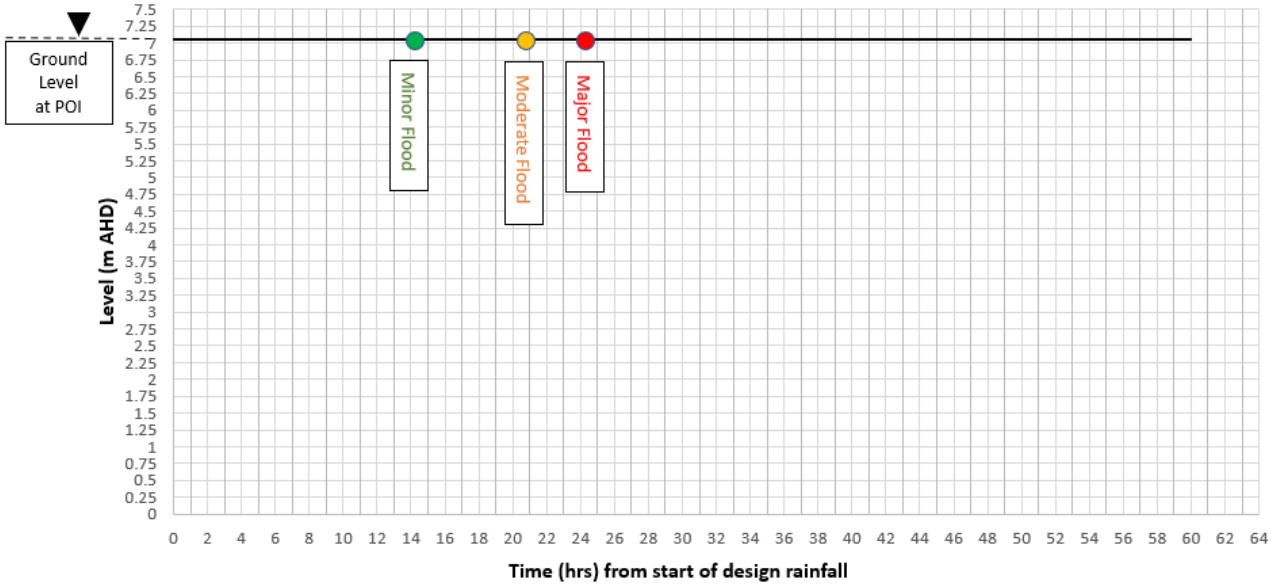

Figure 2.9 1%AEP+CC water level hydrograph at Point of Interest "C" with indicated timeframe when flood levels thresholds are reached at Raymond Terrace gauge station

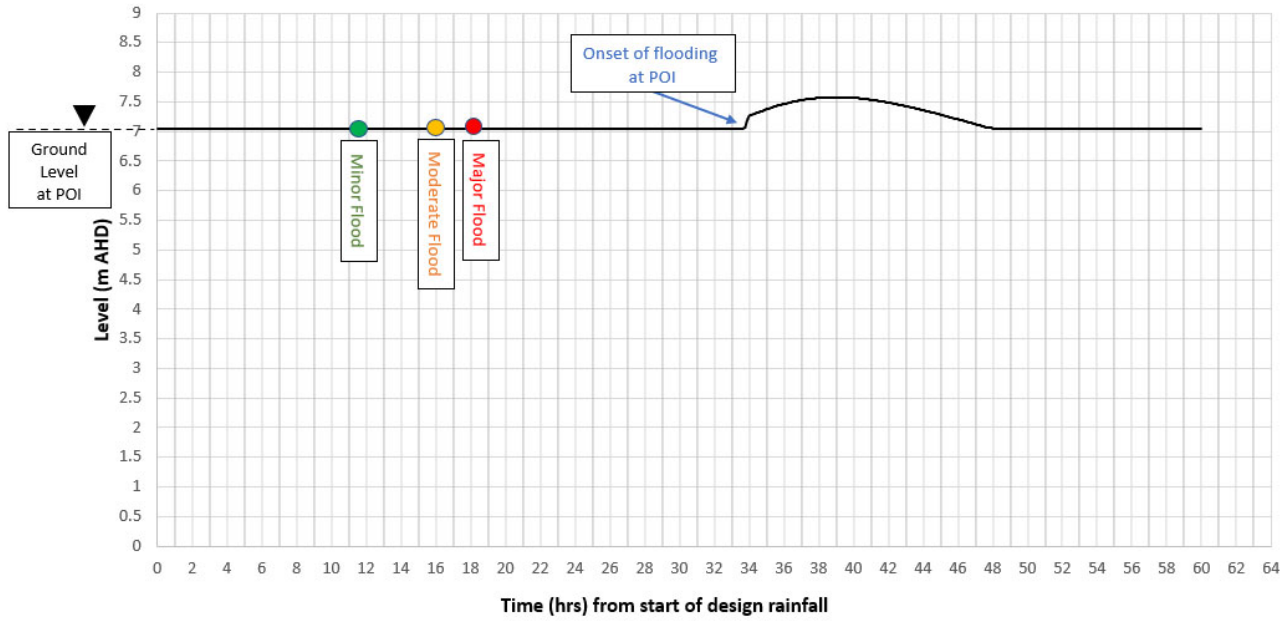

Figure 2.10 0.02% AEP water level hydrograph at Point of Interest "C" with indicated timeframe when flood levels thresholds are reached at Raymond Terrace gauge station

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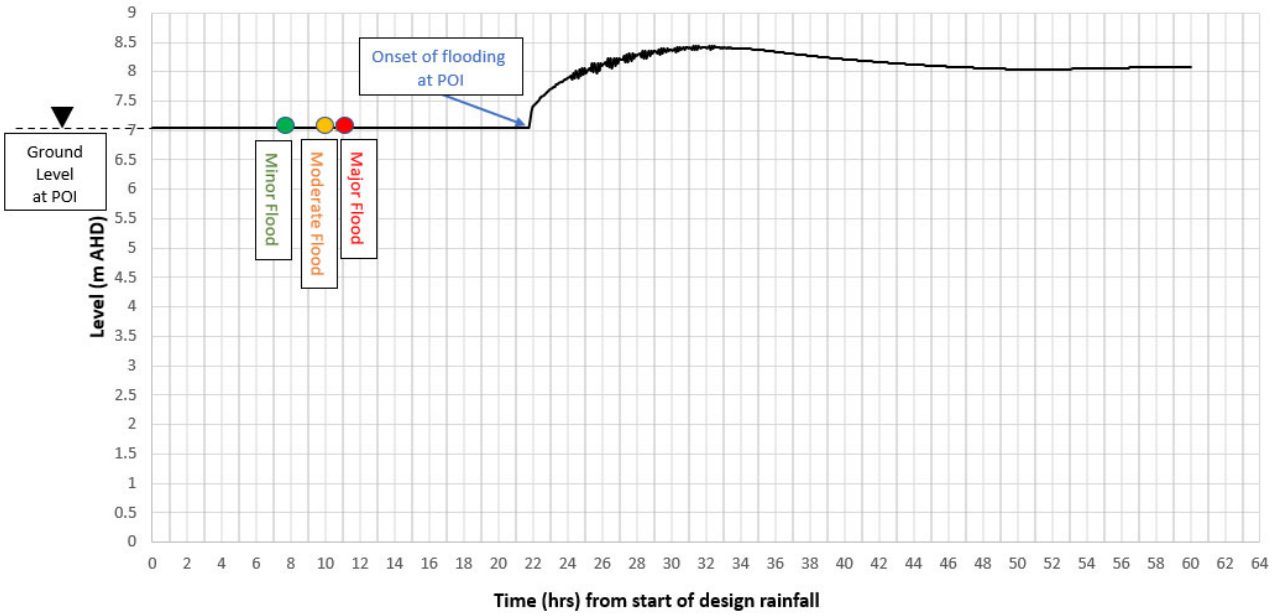

Figure 2.11 PMF water level hydrograph at Point of Interest "C" with indicated timeframe when flood levels thresholds are reached at Raymond Terrace gauge station

2.4.6 Point of Interest D (POI D) – Adelaide Street @ Windeyers Creek Bridge

POI D is located along the evacuation route from the Site, towards the north along Adelaide Street, and is subjected to flooding from the 1% AEP and rarer events. The water level hydrograph at point of Interest "D" for the 1% AEP+CC, 0.02% AEP flood and PMF are shown in Figure 2.12 to Figure 2.14. Figure 2.12 shows that the road is not cut prior to the major flood level being reached at the Raymond Terrace gauge. Beyond this point, incipient flooding is expected at the road making it inaccessible for evacuation purposes. In the 1% AEP+CC event, there are around 10 hours between the Minor Flood level being reached at the Raymond Terrace gauge to the moment Location "D" is inundated and no longer trafficable. This time reduces to 7 hours in the 0.02% AEP and 3.5 hours in the PMF event. Adelaide Street is also flooded at a number of other locations travelling north.

An average rate of flood rise of 0.22m/hr, 0.27m/hr and 0.39m/hr is predicted in the 1% AEP+CC AEP flood, 0.02% AEP flood and PMF respectively and long durations of flooding are expected. In both the 0.02% AEP and PMF event, this location is predicted to be inundated for a period in excess of 48 hours.

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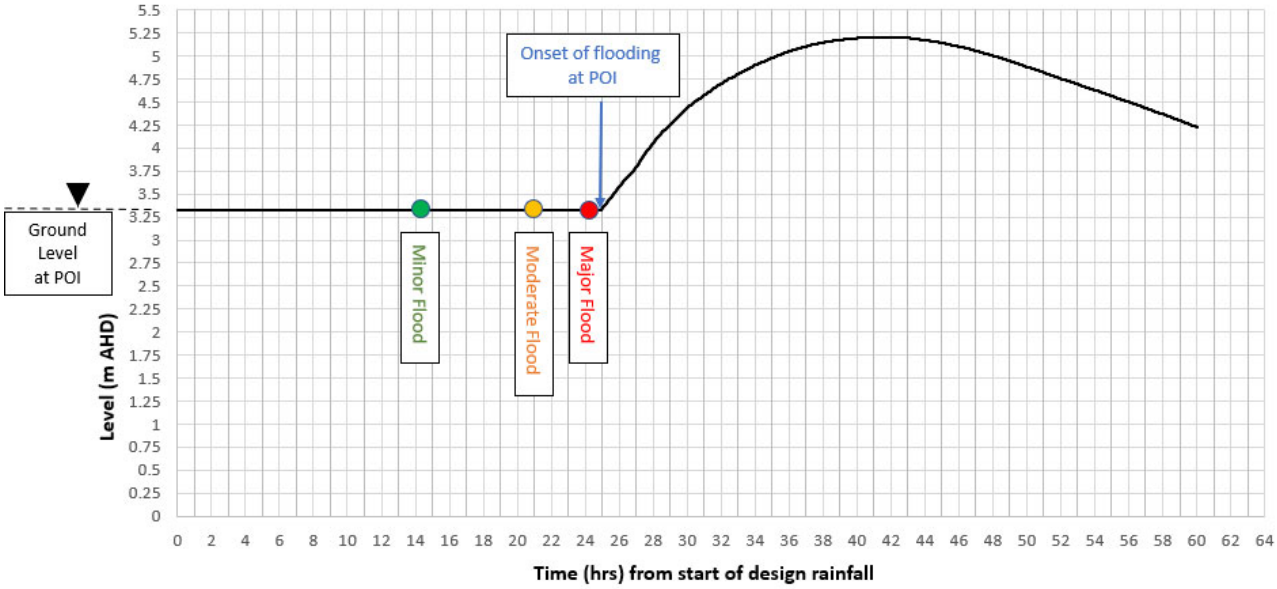

Figure 2.12 1%AEP+CC water level hydrograph at Point of Interest "D" with indicated timeframe when flood levels thresholds are reached at Raymond Terrace gauge station

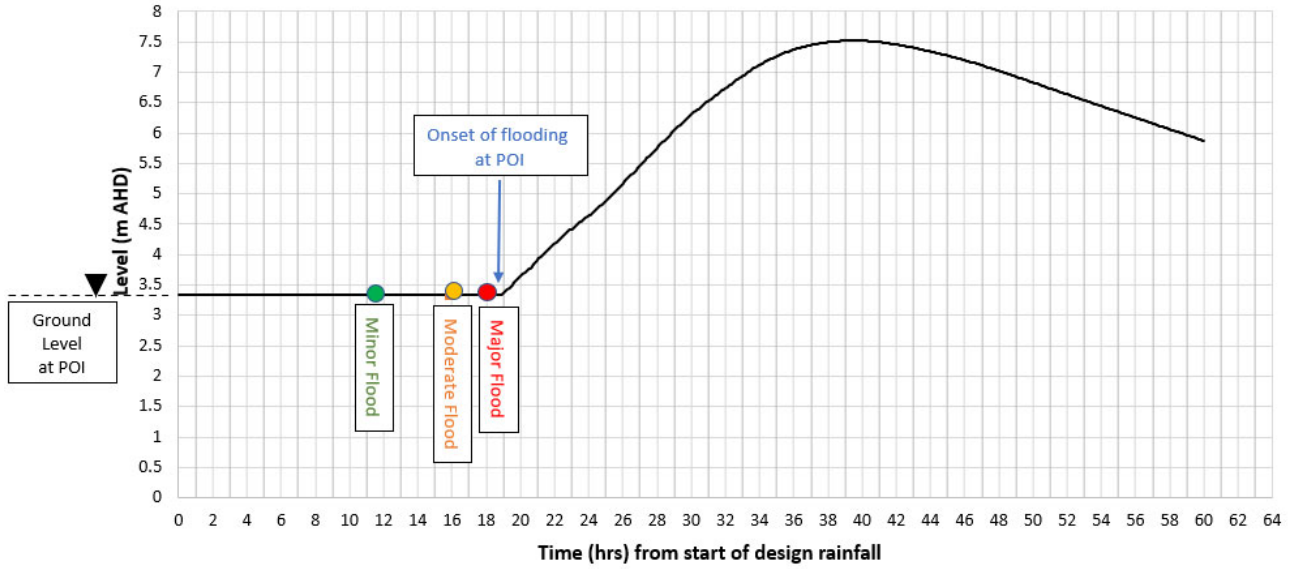

Figure 2.13 0.02% AEP water level hydrograph at Point of Interest "D" with indicated timeframe when flood levels thresholds are reached at Raymond Terrace gauge station

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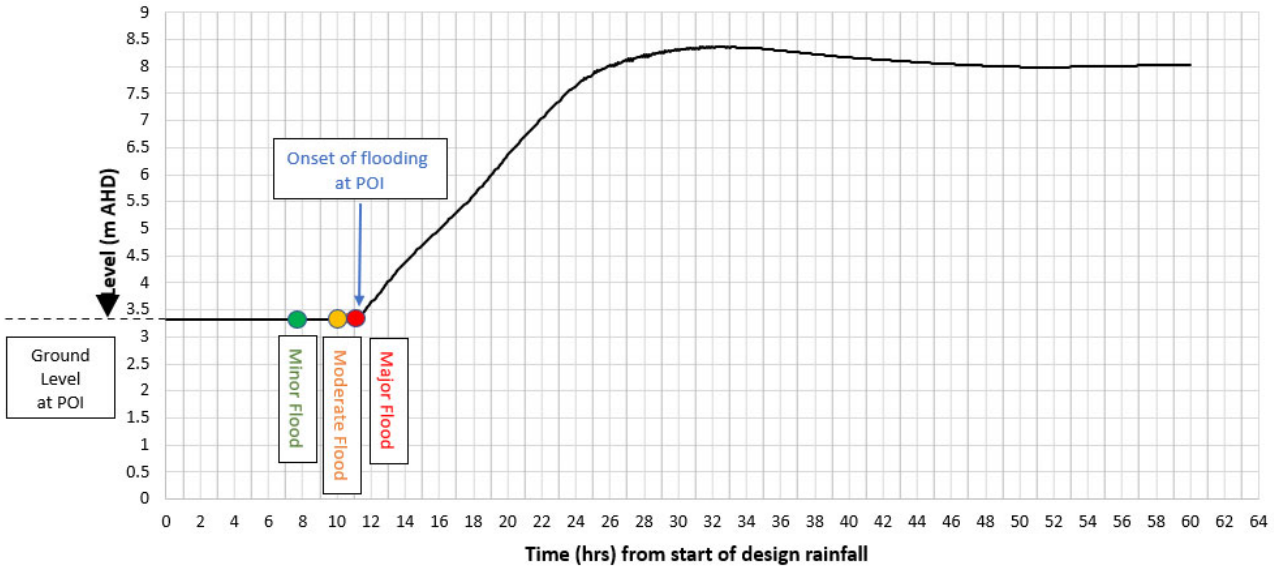

Figure 2.14 PMF water level hydrograph at Point of Interest "D" with indicated timeframe when flood levels thresholds are reached at Raymond Terrace gauge station

2.4.7 Point of Interest (POI E) – Pacific Highway @ Windeyers Creek Bridge

POI E is located along the evacuation route in the northern direction from the Site via the Pacific Highway and is cut by floodwaters in the 1% AEP event. Figure 2.15 shows that in the 1% AEP+CC event there are around 13 hours from the time that the Minor Flood level is reached a the Raymond Terrace gauge and POI E becoming inundated and no longer trafficable. This time reduces to around 9.5 hours in the 0.02% AEP and 5.5 hours in the PMF event. An average rate of flood rise of 0.17m/hr, 0.20m/hr and 0.27m/hr is predicted in the 1% AEP+CC AEP flood, 0.02% AEP flood and PMF respectively and long durations of flooding are expected.

In the 1% AEP event, the Pacific Highway is flooded along a 2km extent north of the Site.

In both the 0.02% AEP and PMF event, this location is predicted to be inundated for a period in excess of 48 hours.

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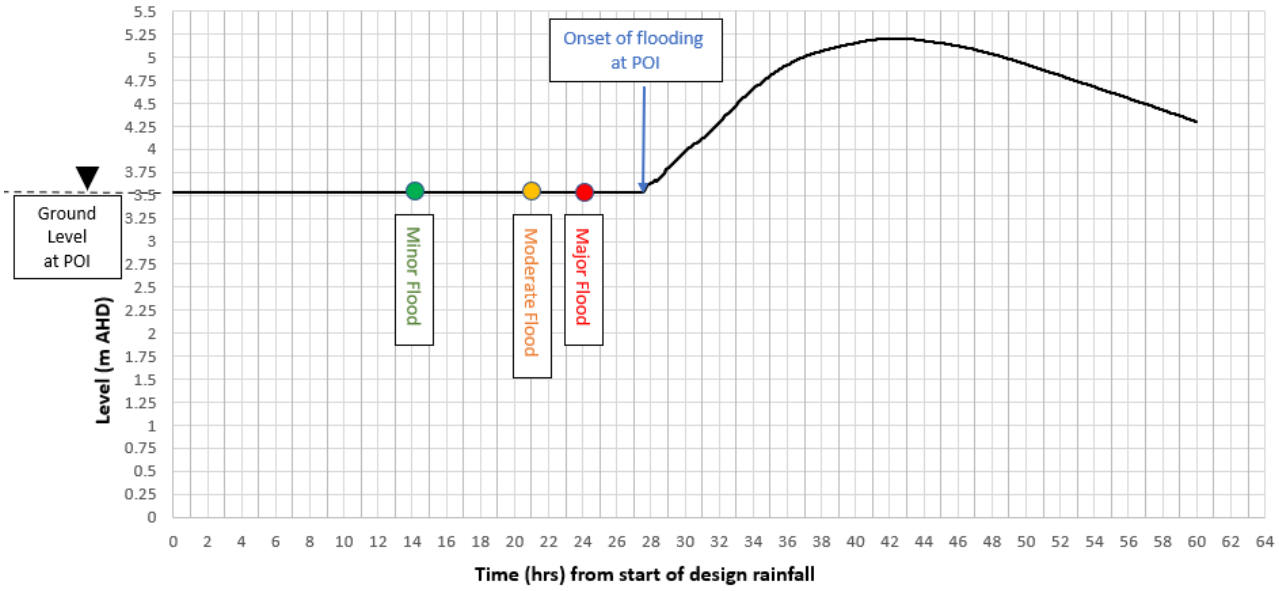

Figure 2.15 1% AEP +CC water level hydrograph at Point of Interest "E" with indicated timeframe when flood levels thresholds are reached at Raymond Terrace gauge station

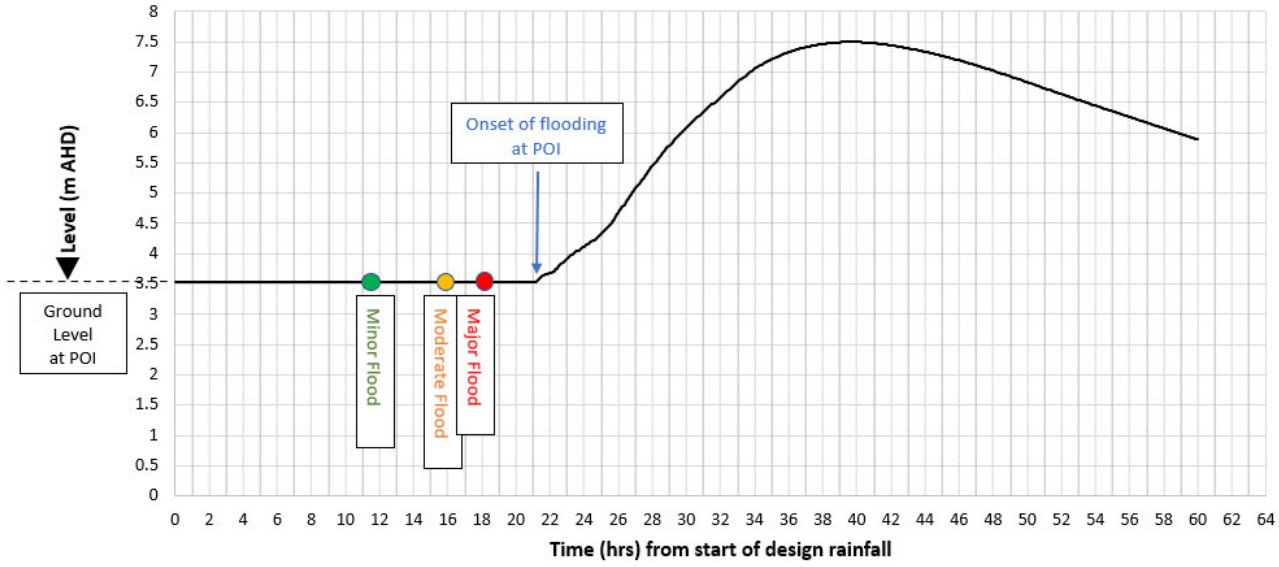

Figure 2.16 0.02% AEP water level hydrograph at Point of Interest "E" with indicated timeframe when flood levels thresholds are reached at Raymond Terrace gauge station

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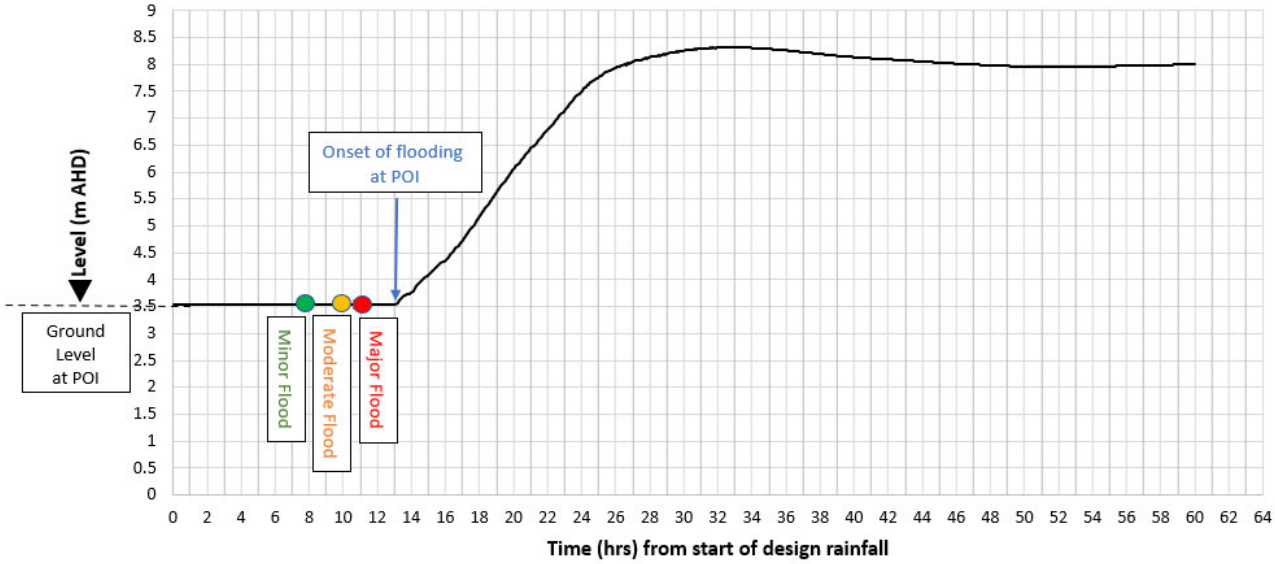

Figure 2.17 PMF water level hydrograph at Point of Interest “E” with indicated timeframe when flood levels thresholds are reached at Raymond Terrace gauge station

2.4.8 Point of Interest F (POI F) – Masonite Road @ Low point

POI F is located along the evacuation route in a southern direction from the Site via Masonite Road and is cut by floodwater in the 1% AEP event. Figure 2.18 shows that in the 1%+CC AEP event there is around 18 hours from the moment that the Minor Flood level is reached at the Raymond Terrace gauge to the moment that road flooding begins. This time reduces to around 15 hours in the 0.02% AEP and 10 hours in the PMF event. An average rate of flood rise of 0.27m/hr, 0.57m/hr and 0.70m/hr is predicted in the 1% AEP+CC AEP flood, 0.02% AEP flood and PMF respectively and long durations of flooding are expected.

In the 1%AEP event, Masonite Road is flooded for a length of approximately 2.8 km to the junction to Main Trail (Trl) road, which is flood free in the north-western direction (towards Newcastle Airport).

In both the 0.02% AEP and PMF event, this location is predicted to be inundated for a period in excess of 48 hours.

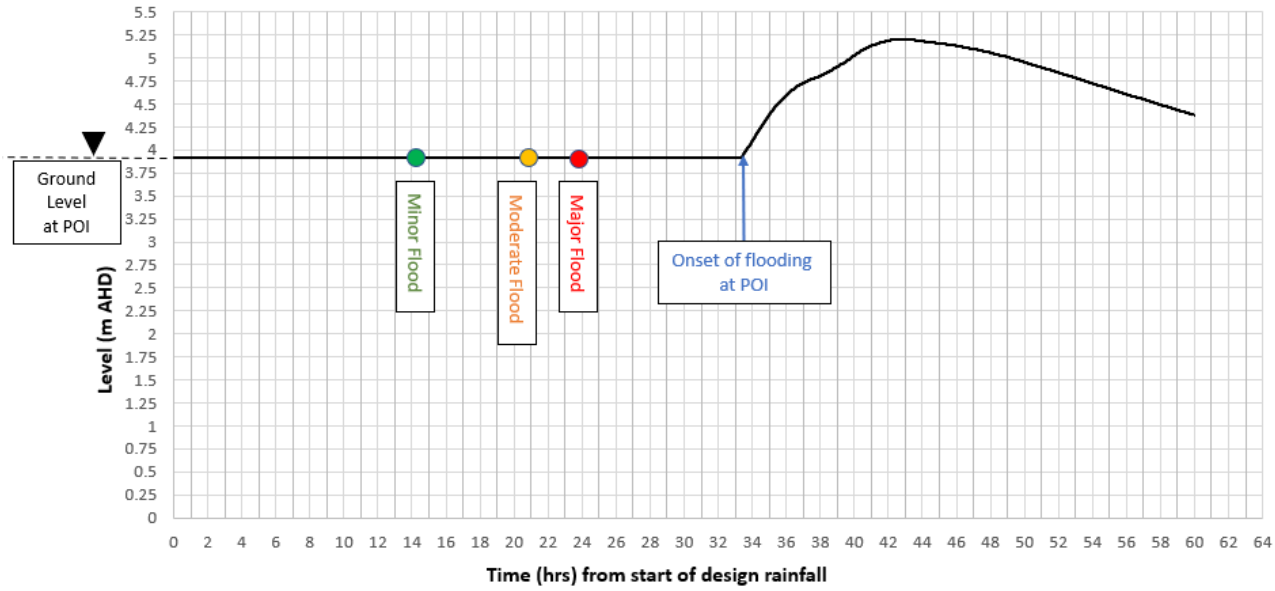

Figure 2.18 1% AEP+CC water level hydrograph at Point of Interest “F” with indicated timeframe when flood levels thresholds are reached at Raymond Terrace gauge station

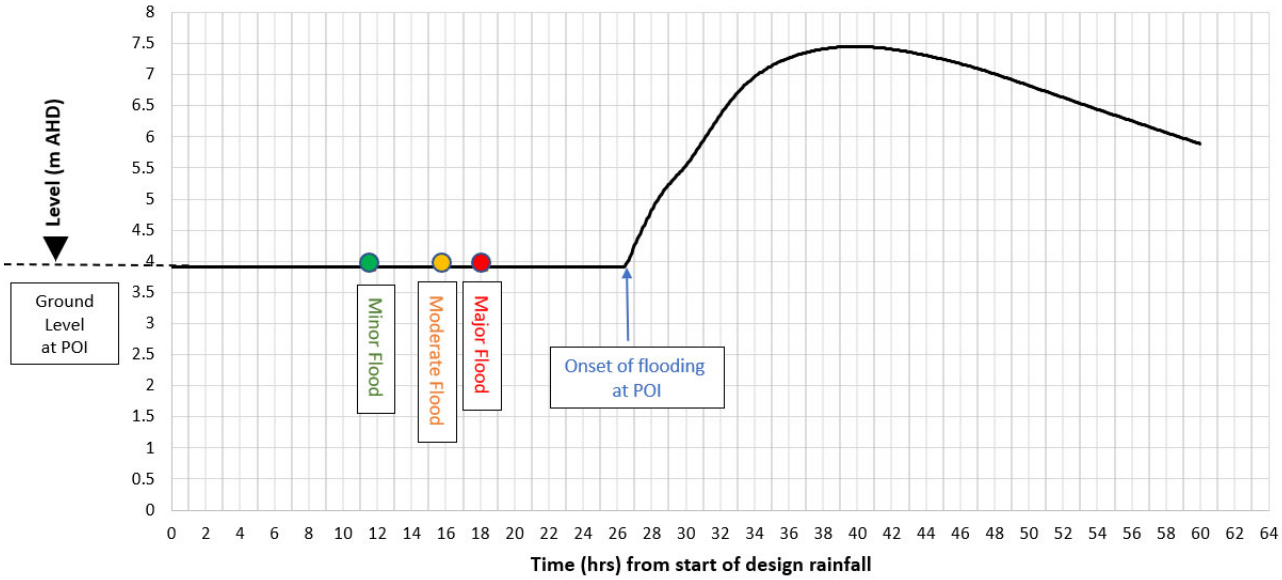

Figure 2.19 0.02% AEP water level hydrograph at Point of Interest "F" with indicated timeframe when flood levels thresholds are reached at Raymond Terrace gauge station

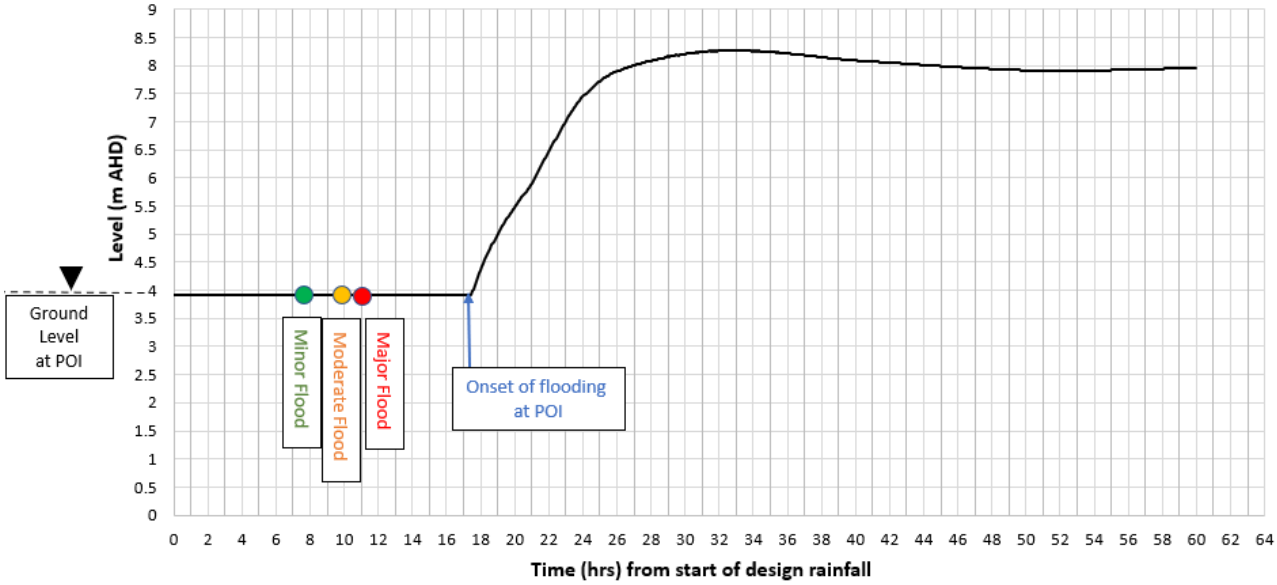

Figure 2.20 PMF water level hydrograph at Point of Interest "F" with indicated timeframe when flood levels thresholds are reached at Raymond Terrace gauge station

2.4.9 Location G – Pacific Highway @ Hunter Region Botanic Gardens

POI G forms part of the evacuation route in a southern direction via the Pacific Highway, and is cut by floodwater: first at the Hunter River Botanic Garden, and then along extended road sections further south. On the basis of the rate of rise figures presented below, it is not advisable to evacuate in the southern direction due to the scarcity of flood-free areas. An average rate of flood rise of 0.22m/hr, 0.20m/hr and 0.43m/hr is predicted in the 1% AEP+CC AEP flood, 0.02% AEP flood and PMF respectively and long durations of flooding are expected.

In both the 0.02% AEP and PMF event, this location is predicted to be inundated for a period in excess of 48 hours.

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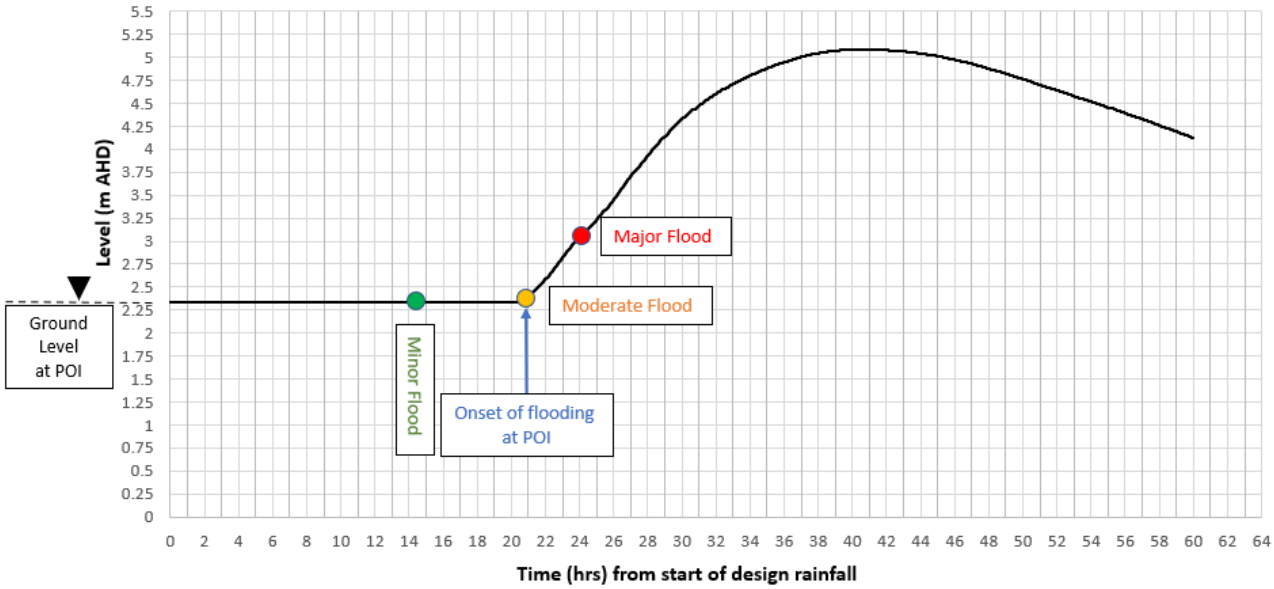

Figure 2.1 1% AEP +CC water level hydrograph at Point of Interest "G" with indicated timeframe when flood levels thresholds are reached at Raymond Terrace gauge station

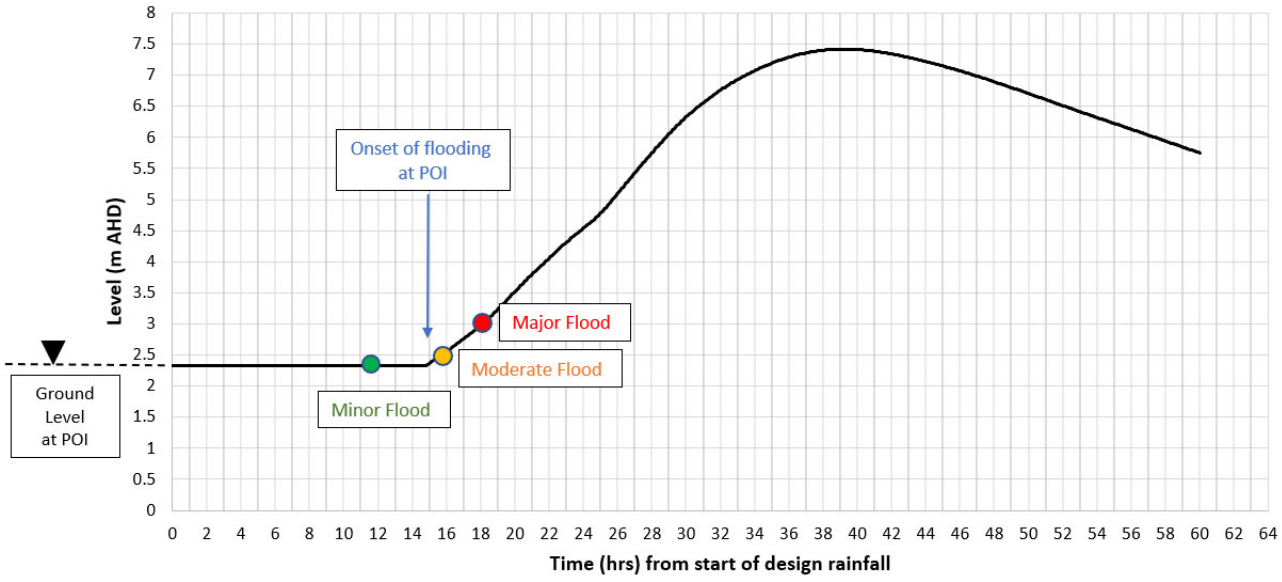

Figure 2.2 0.02% AEP water level hydrograph at Point of Interest "G" with indicated timeframe when flood levels thresholds are reached at Raymond Terrace gauge station

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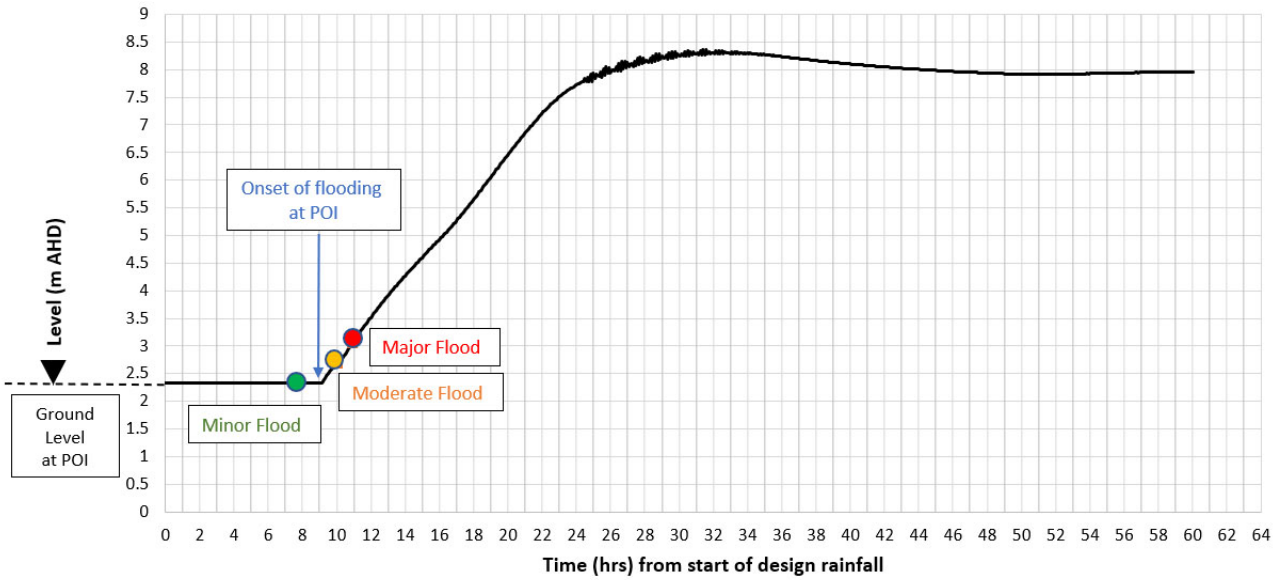

Figure 2.3 PMF water level hydrograph at Point of Interest "G" with indicated timeframe when flood levels thresholds are reached at Raymond Terrace gauge station

2.5 Summary of Flood Behaviour and Available Flood Warning Time

A summary of potential flood depths and flood timing across the locations of interest is included below in Table 2.3.

Table 2.3 Peak Flood Depths and flood timings at Points of Interests

Points of Interest		1% AEP Event (year 2100)				0.02% AEP				PMF Event			
ID	Description	Peak Flood Depth (m)	Rate of Rise (m/hr)	Onset of flooding after start of design rain (hours)	Onset of flooding after Minor Flood level is reached at Raymond Terrace gauge (hours)	Peak Flood Depth (m)	Rate of Rise (m/hr)	Onset of flooding after start of design rain (hours)	Onset of flooding after Minor Flood level is reached at Raymond Terrace gauge (hours)	Peak Flood Depth (m)	Rate of Rise (m/hr)	Onset of flooding after start of design rain (hours)	Onset of flooding after Minor Flood level is reached at Raymond Terrace gauge (hours)
A	Low point in Subject Site	3.3	0.08	<0.75	Already flooded when minor flood level is reached at Raymond Terrace gauge	6.4	0.05	7.5	Already flooded when minor flood level is reached at Raymond Terrace gauge	6.6	0.77	5.5	Already flooded when minor flood level is reached at Raymond Terrace gauge
B	Elkin Avenue Site Entrance	N/A	N/A	N/A	N/A	1.07	0.23	32.5	20.5	1.96	0.44	21	13
C	Adelaide Street Site Entrance	N/A	N/A	N/A	N/A	0.52	0.12	33.75	22	1.38	0.19	22	14
D	Adelaide Street @ Windeyers Creek Bridge	1.91	0.22	25	10	4.19	0.27	19	7	5.03	0.39	11	3.5
E	Pacific Highway @ Windeyers Creek Bridge	1.67	0.17	27	13	3.96	0.20	21.0	9.5	4.78	0.27	3	5
F	Masonite Road @ Low point	1.28	0.27	33	18	3.53	0.57	26	15	4.35	0.70	17.5	10
G	Pacific Highway @ Hunter Region Botanic Gardens	2.28	0.22	21	7	5.10	0.20	15	3	6.06	0.43	8.5	<1

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Flood levels at the nearest BoM gauge at Raymond Terrace (around 3.5km upstream the Site) have been related to flood levels at the Site and at the main evacuation routes to determine available flood warning times. These are shown in Table 2.4 to Table 2.6 for the 1% AEP+CC event, 0.02% AEP and PMF.

Table 2.4 Correlation of water level measured at Raymond Terrace Gauge and at Point of Interests (POI) in the 1% AEP+CC event

	Minor Flood Level (mAHD)	Moderate Flood Level (mAHD)	Major Flood Level (mAHD)
Raymond Terrace Gauge	2.50	3.10	3.50
POI - A	1.95	2.53	3.21
POI - B	6.51	6.51	6.51
POI - C	7.05	7.05	7.05
POI - D	3.33	3.33	3.33
POI - E	3.53	3.53	3.53
POI - F	3.91	3.91	3.91
POI - G	2.32	2.38	3.05

Note: the above table is the time-based correlation of water levels measured at Raymond Terrace gauge and at the POI. The correlation is based on the 1%AEP+CC event.

Table 2.5 Correlation of water level measured at Raymond Terrace Gauge and at Point of Interests (POI) for the 0.02% AEP event

	Minor Flood Level (mAHD)	Moderate Flood Level (mAHD)	Major Flood Level (mAHD)
Raymond Terrace Gauge	2.50	3.10	3.50
POI - A	1.49	2.74	3.2
POI - B	6.51	6.51	6.51
POI - C	7.05	7.05	7.05
POI - D	3.33	3.33	3.33
POI - E	3.53	3.53	3.53
POI - F	3.91	3.91	3.91
POI - G	2.32	2.90	3.17

Note: the above table is the time-based correlation of water levels measured at Raymond Terrace gauge and at the POI. The correlation is based on the 0.02% AEP event.

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Table 2.6 Correlation of water level measured at Raymond Terrace Gauge and at Point of Interests (POI) for the PMF

	Minor Flood Level (mAHD)	Moderate Flood Level (mAHD)	Major Flood Level (mAHD)
Raymond Terrace Gauge	2.50	3.10	3.50
POI - A	1.36	2.95	3.3
POI - B	6.51	6.51	6.51
POI - C	7.05	7.05	7.05
POI - D	3.33	3.33	3.33
POI - E	3.53	3.53	3.53
POI - F	3.91	3.91	3.91
POI - G	2.32	2.90	3.18

Note: the above table is the time-based correlation of water levels measured at Raymond Terrace gauge and at the POI. The correlation is based on the PMF.

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3 Consideration of Evacuation Requirements

3.1 Existing Flood Emergency Response Plan

The existing HRHS is subject to flooding as discussed in Section 2. The HRHS management is aware of the potential for flood affectation at the Site. The existing arrangement adopted by HRHS management during flood events is to visually monitor encroachment of water from the Hunter River in combination with monitoring of Local ABC radio, Live Traffic NSW app, BOM Flood Warnings and BOM Rain and River Data for water levels, evacuation alerts and road closures.

In the event of a flood, the preliminary response stategy is to evacuate the Site. Once the Chief Warden has issued the evacuation order, the Existing FERP nominates the emergency numbers and calls that need to be made to alert the relevant authorities and coordinate evacuation.

The evacuation order is issued via sound alarm and communication via Facebook, School Bytes and SMS messages.

All students are gathered in their designated classrooms ready for evacuation and then accompanied by their teacher to the buses.

A copy of the existing FERP is enclosed to this report in Annex A.

3.2 Consideration of Available Best Practice Evacuation Strategies

3.2.1 Overview

Physical protection of buildings of a site through considered design to exclude floodwaters for all events up to and including the PMF is generally not practical and/or cost effective. It also does not consider the risks arising from isolation of occupants nor the risk to emergency services personnel who may be required to assist isolated occupants to evacuate in emergencies. As such, an emergency management plan is required to assist in mitigation of the residual flood risk to people during relevant flood events with consideration of the factors listed below:

- The likely Site occupants;
- The number of potential occupants;
- Potential isolation periods and conditions (including but not limited to a lack of electricity power, water and food);
- The lack of access to emergency care or provisions; and
- The potential placement of emergency service personnel or other community members at risk if assistance is required.

The following outlines the flood emergency response strategies proposed as part of this FERP:

- Principal Strategy – Non-attendance of the school (i.e. closure of the school) based on flood warnings, emergency storm warning or the on-site water level gauges
- Secondary Strategy – Evacuation off-site (i.e., horizontal evacuation) by vehicle before any roads are cut by floodwaters

These strategies have been identified through consideration and assessment of available evacuation routes, evacuation centres and shelter-in-place (SIP). These are discussed in the following section.

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3.2.2 Off-site Evacuation Considerations

Consideration was given to Site access constraints and opportunities to inform the evacuation strategy for the school during operational hours. The proposed assembly point for evacuation via bus is the bus pick-up zone in the loop along Elkin Avenue (north-east corner of the Site) (located between POI B and C) whilst the proposed assembly point for parent pick-up is the new link road near Adelaide Street and Elkin Avenue (POI C). The following evacuation routes were considered in the analysis:

1. Pacific Highway in a southerly direction (through Location G in Figure 2.1 and 1.1).
2. Adelaide Street in a northerly direction toward the junction with Swan Street (through Location D in Figure 2.1), then in an easterly direction to join the Pacific Highway;
3. Pacific Highway in a northerly direction (through Location E in Figure 2.1);
4. Masonite Road in a south-easterly direction (through Location F in Figure 2.1), then east along the Main Trail in the direction of the Newcastle Airport.

It is noted that, while all nominated evacuation routes are flooded in the 1% AEP event, evacuation is possible from the Site prior to inundation based on detailed flood modelling from the 2017 Williamtown FRMS&P. From the analysis of flood behaviour and available warning time (reference Section 2.4), the following is noted:

1. Evacuation along the Pacific Highway in a southerly direction is the least preferrable option since it does not lead towards flood-free areas in the 1% AEP event. For this reason, this option has been discarded.
2. Evacuation along Adelaide Street in a northerly direction is not recommended as it requires travelling for around 2 km in the direction of the Hunter River. Furthermore, it requires travelling towards densely inhabited (and potentially highly trafficked) areas;
3. Evacuation along the Masonite Road route is an acceptable option as it allows for around 18 hours of evacuation time in a 1% AEP+CC event (10 hours in the PMF), from the time that Minor Flood level is reached at the Raymond Terrace gauge to the onset of flooding of the road. It leads towards areas that are flood-free for all events up to and including the PMF;
4. Evacuation along the Pacific Highway in a northerly direction is also an acceptable option as it allows for around 13 hours of evacuation time in a 1% AEP+CC event (5 hours in a PMF), from the time that Minor Flood level is reached at Raymond Terrace gauge to the onset of flooding of the road. It leads towards areas that are flood-free for all events up to and including the PMF.

With consideration of Options 3 and 4, evacuation along the Pacific Highway in a northerly direction is the preferred route because:

- Although potentially more trafficked, it is a main route and as such it is more likely that it will be patrolled by helicopter and other emergency services during the evacuation.
- The condition of the Masonite Road following a significant rainfall event might not be optimal.
- The Masonite Road route might be interrupted at some points by private gates and fences.
- The Pacific Highway north route directs students to Raymond Terrace which contains more evacuation centres and facilitates collection of students by parents.

Further information including a review of flood behaviour and flooding timings across all modelled events for the Pacific Highway (north route) is provided in Section 4.4.1.

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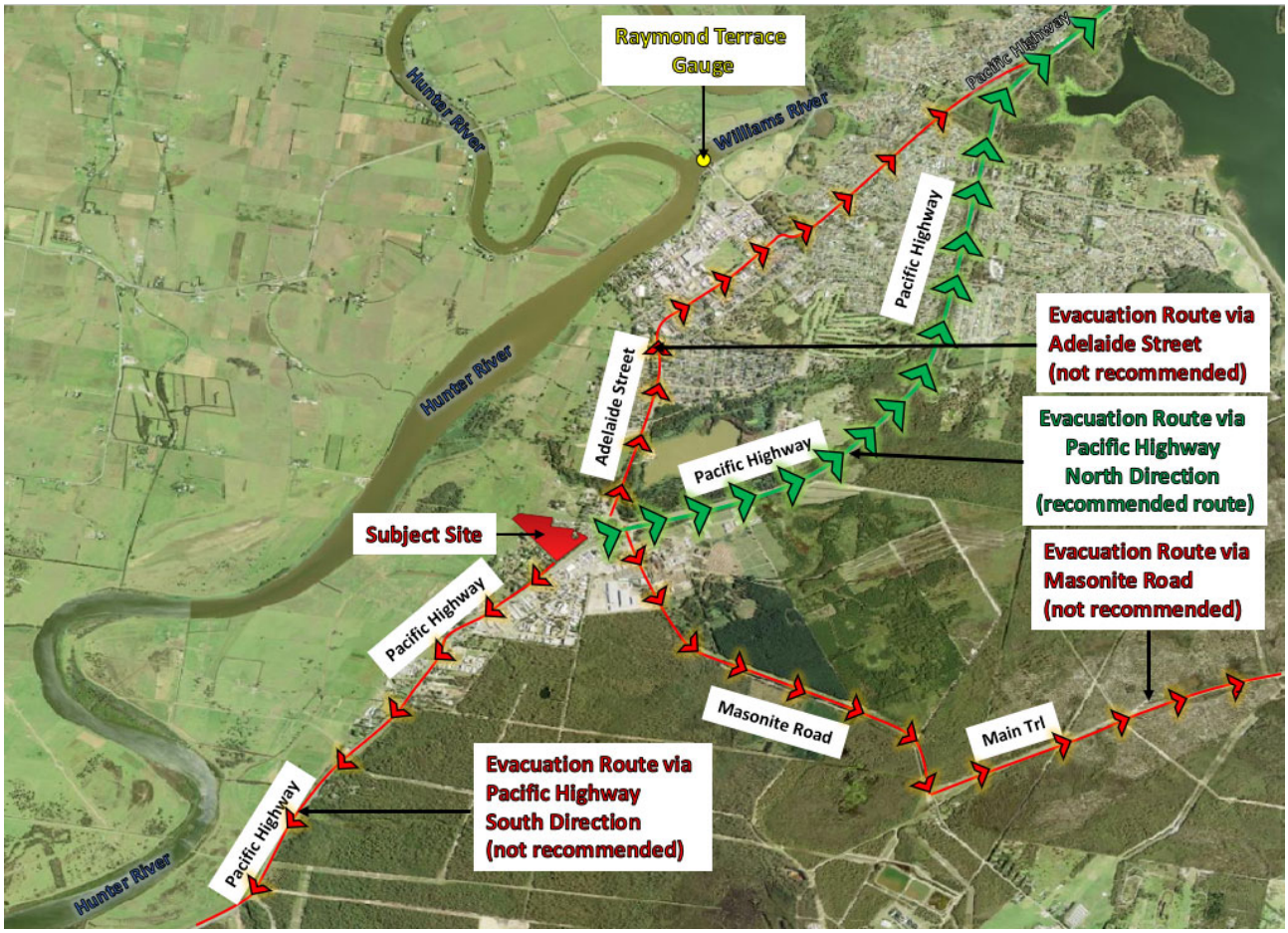

Figure 3.1 Off-Site evacuation routes options

3.2.3 Consideration of Evacuation Centres

Proposed evacuation centres have been assessed as part of this evacuation assessment. The existing school FERP nominates the Bunnings Heatherbrae at No. 8 Griffin Street as the evacuation refuge. The SES Port-Stephens Flood Emergency Sub Plan[4] (SES,2012) nominates the HRHS as a location suitable for sheltering in place. However as noted in this report, Heatherbrae is considered to be a Low Flood Island (all roads become cutoff during a PMF event before the remaining suburb becomes entirely inundated in a PMF event). As such, there are no suitable evacuation centres/shelters within Heatherbrae.

With consideration of the nominated evacuation route being the Pacific Highway in the northerly direction (towards Raymond Terrace), the following potential sites were identified from available flood emergency plans and other flood-related documents:

- Section 3.18.41 of the Port Stephens Flood Emergency Sub Plan 2012 (SES, 2012) identifies suitable flood evacuation centres. The three (3) locations in Raymond Terrace are Irrawang Primary School, St Brigids School and Grahamstown Public School.

[4] plan-port-stephens-flood-emergency-sub-plan-2012-endorsed.pdf (nsw.gov.au)

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- No evacuation centres were identified in the Williamtown - Salt Ash Floodplain Risk Management Study & Plan (BMT, 2017)
- Irrawang High School Flood Risk Assessment (BMT, 2023) outlines the following:
  - Flood risk: High local elevations at the Irrawang High School (IHS) site result in a high level of flood immunity, with the Site not predicted to be affected by mainstream flooding in any event up to and including the PMF. The location of IHS means that, from a flooding perspective, IHS is a potential flood evacuation centre location where it is possible to shelter during extreme floods, but at the same time the Site can be independently abandoned by its occupants or reached by emergency vehicles.
  - Access to IHS from HRHS is approximately 9.9km via road following the Pacific Highway and then local roads which remain flood free from mainstream flooding in all events up to the 0.2% AEP event.

A summary of the flood behaviour at each evacuation centre and typical access route from HRHS based on flood mapping from the 2024 FIA is provided in Table 3.1.

Table 3.1 Flood behaviour at considered evacuation centres

Evacuation Centre	Flood Behaviour
Irrawang Primary School	A portion of the school site is inundated although buildings are not located within predicted flood extents. Access roads to the site become cutoff in a PMF event with peak flood depths of up to 1.0m.
St Brigids School	A portion of the school site is inundated although buildings are not located within predicted flood extents. It is noted this school is located in a High Flood Island. Roads to the site become cutoff in a 1% AEP event.
Grahamstown Public School	A portion of the school site is inundated although buildings are not located within predicted flood extents. It is noted the local access roads become cutoff by depths of up to 0.8m during a PMF.
Irrawang High School	School site is not predicted to be impacted by mainstream flooding. Access to the Site becomes cutoff in a PMF with peak flood depths of up to 1.8m.

Based on the above assessment and locations listed by the SES (2012), Grahamstown Public School is considered to be the most suitable evacuation centre for HRHS from a flooding perspective (considering the level of flood immunity of access routes and predicted time to inundation). However, it is noted that the suitability of this site (and potentially Irrawang Public School and Irrawang High School) requires further consideration by SINSW in terms of the proposed transportation arrangements, available site access, accommodation, amenity and any other relevant issues. Consultation with HRHS Management and SES on this matter is also recommended.

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3.2.4 Shelter-in-place (SIP)

Consideration of SIP

Draft Shelter-in-place guidelines have recently been released by the Department of Planning and Environment (DPE, 2023). The guidelines are intended to help Councils and other certifying authorities determine appropriate emergency management strategies for areas affected by flash flooding i.e., when flood warning time and flood duration are both less than six hours.

According to the draft SIP guidelines, SIP is considered appropriate when:

- The duration for flood inundation is less than six hours.
- The development is not located in an area of high-risk (e.g., floodways and H5 or H6 flood hazard areas).
- Access to on-site systems to provide power, water and sewerage services is available during and beyond the event for the full range of flooding.
- The location of storage of food, water and medical emergency for SIP purposes is above the PMF level and available during and beyond the event for the full range of flooding.
- The SIP floor level is above PMF.
- The development provides a minimum floor space per person for SIP purposes.
- The development is structurally safe and accessible during floods up to the PMF.

Applicability of SIP

The applicability of SIP at the Site has been assessed in terms of both the existing buildings considered to be used as a flood refuge under the current FERP, and the proposed buildings which form part of this development. The duration of inundation, flood behaviour, floor levels, floor space per person and structural adequacy have been considered.

Duration of inundation

In the 0.02% AEP event, the Site (with consideration of POI B) is predicted to be inundated for in excess of 24 hours whilst the PMF predicts the period of inundation to be in excess of 48 hours.

As such, the predicted duration of inundated does not meet SIP requirements as defined in the draft SIP guidelines.

High-Risk Flood Behaviour

Flood function and flood hazards have been determined as part of the 2024 FIA (refer to Section 4.2 and mapping provided in Annex D of the 2024 FIA) and are summarised in Table 3.2 below.

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Table 3.2 Flood-risk associated with the existing and proposed buildings

Flood Risk	Existing Buildings (Building G, H, I, J and K)	Proposed Buildings (Block X and Z)
Flood Hazard (Floodplain Development Manual (2005))	• 0.02% AEP flood – intermediate to high hazard • PMF – high hazard	• 0.02% AEP flood – low hazard • PMF – high hazard
Flood Hazard (AIDR (2017) / FRMM (2023))	• 0.02% AEP flood – H4 and H5 • PMF – H5	• 0.02% AEP flood – is H1, H2 and H3 • PMF – H5
Flood Function	• 0.02% AEP flood – flood storage • PMF – floodway/ flood storage	• 0.02% AEP flood – flood fringe • PMF – floodway/ flood storge

Floor Levels of SIP Buildings

These buildings have floor levels set at or above the PMF Level. Sheltering in place has been considered for:

- Existing upper levels of buildings Blocks G, H, I, J and K whose upper floor levels sit above the PMF flood level
- Proposed buildings Block X and Block Z whose first-floor level is set to the PMF Level

As such, the buildings considered for SIP meet the requirements defined in the draft SIP guidelines

Floor-space per person

The locations of the buildings considered for SIP including the existing two-storey buildings and the two proposed buildings (Block X and Z) and are shown in Figure 3.2.

With respect to the number of people on Site, the actual number (considering students, teachers and staff) is assumed to be 836: this is based on a current number of enrolled students equal to 741 plus teaching (66) and non-teaching (23) staff members. School Infrastructure NSW is expecting a decrease in the number of students in the next couple of years. Table 3.3 is a projection of student numbers from 2024 to 2027.

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Table 3.3 Hunter River High School students number projection (source: SINSW)

YEAR	Projected Number of Students
2024	747
2025	725
2026	709
2027	691

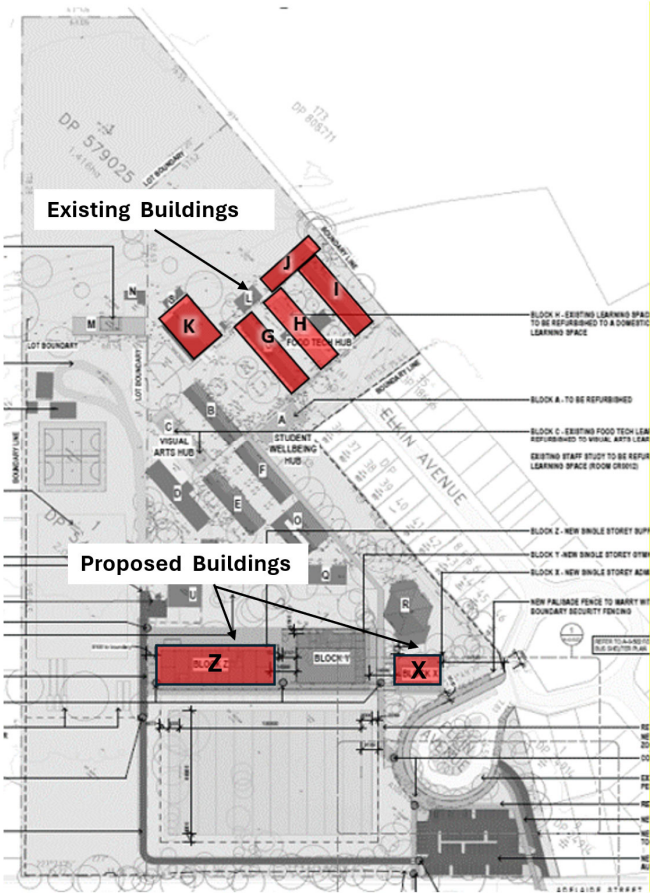

Figure 3.2 Existing two-storey buildings and proposed buildings on Site considered for SIP (red marked)

The total available space for sheltering in place (sum of available space for all buildings) in existing buildings is equal to 1,543m² and is distributed as follows:

- Block G = 265m²
- Block H = 243m²
- Block I = 264m²
- Block J = 183m²
- Block K = 588m²

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The total available space for sheltering in place (sum of available space for all buildings) in the proposed buildings is equal to 1,330m² and is distributed as follows:

- Block X = 1010m²
- Block Z = 320m²

Furthermore, it is noted that for:

- Existing buildings:
  - All buildings at the upper floor level are connected by an external covered walkway to allow access between classrooms if required (walkway is also set above the PMF)
  - All areas (except the external walkways) have climate control/fans (if electricity is available) and windows for ventilation if required;
- Proposed buildings:
  - External covered areas surrounding the proposed buildings are not considered as part of this assessment as the floor levels are set below the PMF.
  - All areas have climate control/fans (if electricity available) and windows for ventilation if required.

The total number of people that could reasonably be expected on-site at any one time is equal to 836[5] people. The total area for sheltering-in-place equal to 1,543m² for existing and 1,330m² for the proposed buildings. As such, the calculated per-capita available space for sheltering-in-place is:

- Existing and Proposed Buildings – 3.5m²/pp

It is considered that the available space for sheltering-in-place is adequate for the total number of people on Site given that the estimation of the total number expected on Site is conservative (based on maximum projected number of enrolled students).

Structural Soundness

The structural integrity of the existing buildings considered for sheltering-in-place (buildings G, H, I, J and K) has been confirmed by a structural engineer that considers depths of water up to 2m and velocities up to 1.0m/s. In addition, the structural integrity of the proposed buildings (Block X and Z) has been confirmed by a structural engineer that considers depths of water up to 2m and velocities up to 1.0m/s. Please refer to Annex B for a copy of the structural integrity letter for both existing and proposed buildings.

[5] Calculated adding the projected number of students for year 2024 (747) to the current number of teaching (66) and non-teaching (23) staff members. The calculation assumes that the number of staff members will not change over time.

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Strategy Selection

Based on the assessment of consideration of SIP above, SIP is not recommended as a flood emergency response strategy for HWRS as it does not comply with the Draft SIP guidelines. Specifically:

- The duration of inundation is predicted to be larger than 6 hours; a duration of inundation in excess of 24 and 48 hours is predicted in a 0.02% AEP and PMF event respectively.
- The location of the existing buildings (G, H, I, J and K) and proposed buildings (Block X and Z) are within an area of high-risk (e.g., floodways and H5 or H6 flood hazard areas) in a PMF Event.

It is however noted that:

- The buildings considered for SIP are set to or above the PMF level.
- provide sufficient floor space and are structurally safe during floods up to and including the PMF.
- The structural adequacy of existing buildings (G, H, I, J and K) and proposed buildings (Block X and Z) have been confirmed for the PMF Event.

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4 Flood Emergency Response Plan

An operational Flood Emergency Response Plan (OFERP) is to be prepared by the school operator to formalise flood evacuation planning and strategy with respect to flood intelligence, the flood behaviour presented in this report, and relevant procedures. The OFERP will be expected to build on the strategy and intent presented in this report.

The SES recommends that all flood prone properties prepare their own emergency management plans as SES resources are scarce during emergencies and it is often the case that they cannot service all affected parties in case of flood, particularly given mobilisation time. The OFERP shall be used as a guide for building wardens and other responsible parties nominated in the evacuation strategy. The aim of the OFERP is to inform the existing and future operators of the Site of the appropriate response measures required in the event of an extreme flood. In addition, the OFERP will include a summary of the actions required in the form of warning systems and signage that is to be displayed at common muster points such as a ground floor entries, stairways, carpark and visible points across the Site. Maintenance activities must also be nominated in the OFERP to ensure that all emergency management systems are in full working order at all times.

Key elements to be included in the OFERP are outlined in the following sections.

As noted in Section 5, the principal emergency management strategy for the school is early closure before the start of the school day and prior to the commencement of flooding. However, due to the possibility that a severe rainfall event may not be foreseen sufficiently in advance, site end users must be informed about flood risk and behaviours to adopt during a flood.

4.1 Emergency Warning System Overview

Warning in case of a flood event is required to alert wardens and other people on-site that an extreme flood event may be imminent. Flood levels can rise rapidly, and it is necessary to ensure that sufficient warning time is given so that personnel could implement off-site evacuation effectively and safely. The flood warning system for the Site is proposed to include the following:

- BoM's Existing Flood Warning;
- BoM's Rainfall and Severe Storm Forecast; and
- On-site Flood Warning or Water Level sensor.

4.1.1 BoM's Existing Flood Warning System

Flood warning information such water levels can be accessed via the BoM webpage as per the following link:

- Flood Warning: http://www.bom.gov.au/nsw/warnings/

The BoM's Flood Warning System should provide effective flood warning to facilitate safe evacuation. The Bureau of Meteorology (BoM) provides flood forecasting and warning services based on a number of rainfall and stream level gauges scattered throughout the catchment. The nearest flood forecasting location to the Site is Raymond Terrace (Bureau ID number 561037), located near Seham Road bridge at the junction between Hunter River and Williams River, approximately 3.5km upstream of the Site.

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BoM flood level classifications[6] for the Raymond Terrace Gauge are summarised in Table 4.1 and shown in Figure 4.1. It is noted that BoM also issue target warning lead times which are the minimum lead time that will be provided before a specific flood level/flood class is reach or exceeded. For the Raymond Terrace gauge, the minimum lead warning time is 6 hours for minor flood classifications (i.e. floods which reach or exceed 2.5 mAHD at the gauge) and 18 hours for a major flood classifications (i.e. floods which reach or exceed 3.5 mAHD at the gauge).

Table 4.1 BoM Flood Classification Level at Raymond Terrace gauge (Bureau ID number 561037)

Gauge Location	BoM Flood Classification Level (m AHD)		
	Minor	Moderate	Major
Raymond Terrace	2.5	3.1	3.5

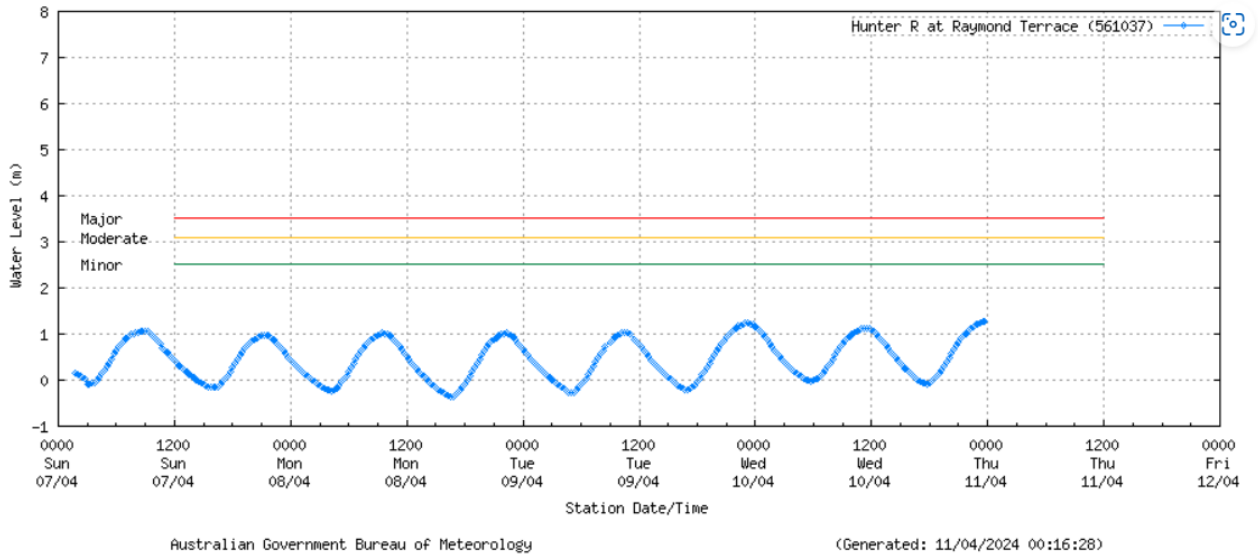

Figure 4.1 BoM's Flood Warning at Raymond Terrace Flood Warning Gauge (Source: BoM's Flood Warning, River Height data for Hunter R at Raymond Terrace (bom.gov.au))

4.1.2 BoM's Rainfall Forecast System

Rainfall forecast information can be accessed via the BoM webpage as per the following links:

- Rainfall Forecast: New South Wales Forecasts (bom.gov.au)
- BoM's Rainfall Radar: http://www.bom.gov.au/australia/radar/
- Rainfall Gauge Totals: New South Wales Rainfall and River Conditions (bom.gov.au)
- MetEye: http://www.bom.gov.au/australia/meteye/

Council have the Williamtown Raaf gauge and Seaham gauge listed as the two closest rainfall gauges to the Site on the Disaster Dashbord[7]. It is noted that the Seaham gauge is the closest rainfall gauge which is the most appropriate means by which to inform potential flooding events at the school. The gauge is located approximately 3.5km north of the Site. Forecast rainfall and storm conditions at the gauge should be used to prepare for the possibility of flooding or to make the decision to close the

[6] http://www.bom.gov.au/nsw/NSW_SLS_Current.pdf
[7] Weather Conditions | Disaster Dashboard (disasterdashboards.com)

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school prior to opening. Preferably, notification of flood warning should be provided prior to the commencement of school day where possible and communicated to any potential students, visitors, carers and staff. It is also recommended to monitor the severe thunderstorm warning issued by the Bureau of Meteorology in the period prior to rainfall commencing.

4.2 Flood Response Personnel

Positions and responsibilities will need to be assigned to on-Site personnel for managing the flood response. A chief or head flood warden will need to be nominated to manage the evacuation of the Site during a flood. Individual building wardens will also need to be nominated for each of the buildings on site.

Warden responsibilities shall include evacuation of students, staff and any visitors. Contact details of the head warden and all individual building wardens shall be presented in the OFERP to facilitate contact with the SES.

The wardens will be identified by wearing reflective safety vests and coloured hard hats so that visitors to the site will be able to recognise the wardens with ease. The wardens will need to be familiar with the details in the OFERP and will direct people to safety via the evacuation routes.

The warden's responsibilities may involve checking classrooms, vehicles and other spaces to ensure there are no personnel remaining, before directing all parties towards the Site's exits. Wardens will coordinate evacuation of students, staff and visitors from this point via private car and/or bus as appropriate.

If the SES takes control of the Site, then they may override the provisions of the OFERP. Further coordination of the proposed OFERP will need to be undertaken with the SES. Regular drills will be required of the wardens to ensure flood/emergency awareness and preparedness of the wardens and employees.

Table 4.2 Hunter River High School Flood Response Personnel

Position	Responsibilities
Director of the Campus	Coordinate preparation of specific Emergency Management Plan implementing the recommendations of this report. Order school closure should severe rainfall is predicted.
Chief/Head Flood Warden	Coordinate flood evacuation drills - one on the first day of operation each year and a second drill throughout the year Monitor weather at 4pm daily for upcoming extreme rainfall events Liaise with Director of Campus to decide school closure Liaise with SES or Emergency Services personnel if they attend the Site
Building Flood Wardens	Liaise with the Chief Flood Warden Monitor weather at 4pm daily for upcoming extreme rainfall events Coordinate Site evacuation

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Position	Responsibilities
	Coordinate assistance for staff, students and visitors with mobility difficulties.
First Aid Officers	Prepare and maintain Flood Emergency Kit Manage Individual Health Care Plans where applicable
Staff	Maintain calm and direct students and visitors through evacuation process.

4.3 Proposed Emergency Warning System

As rare events are infrequent, a warning system in the form of an audible alarm is considered appropriate to communicate the urgency of the situation. An emergency siren and building Public Address (PA) system that is installed for other emergencies or day-to-day facility use is likely suitable for communicating with building occupants. These emergency warning systems are to be located above the PMF level.

Flood levels can rise rapidly, and it is necessary to ensure that sufficient warning time is given so that personnel may evacuate to safety. Triggers and notification are required to alert the head warden or others about the need to trigger the building emergency system. Triggers and notifications could include:

- Existing Flood Warning System, outlined in Section 4.3.2;
- On-Site Flood Warning System, outlined in Section 4.3.1;
- Regularly review the BoM's website for flood watch or flood warnings for generalised warnings ahead of time and to enable timely preparation.

These triggers could be communicated to the head warden and other key personnel using an automated SMS system. Back-up triggers, such as manually read flood markers, may be required to ensure redundancy in the warning system.

It is noted that the alert and trigger levels are to be based on regional flooding from the Hunter River. It is therefore advised to stay tuned to local media outlets or the local SES Centre to get an understanding of flooding and flood emergency situations across the broader area to verify that regional flooding is taking place. This will assist in minimising the potential for false triggers.

4.3.1 On-Site Flood Warning System

To maximise the available warning time and facilitate an orderly response, it is recommended that a flood warning system be installed. This system is to consist of the following components:

- Water level sensors;
- Monitoring control unit;
- Communications; and
- Power supply.

The system should be designed by an experienced supplier. Redundancy should be incorporated into the design such that failure of a single item does not result in failure of the overall warning system. The system supplier should also provide appropriate documentation to enable ongoing maintenance and calibration.

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Water Level Sensors and Trigger Levels

Placement of the water level sensor at the low point of the Site is aimed at informing Site occupants of rising floodwaters and (once a nominated level is reached) indicating that evacuation should commence. A trigger level of 1.50m AHD has been nominated for issuing the warning: this level approximately corresponds to the Minor Flood level at Raymond Terrace BoM station in a 0.02% AEP event. It is recommended that a minimum clearance of 0.1m is provided between ground level and the trigger level. Therefore, the location of the gauge should be located within the Site located at or below 1.40m. Suitable areas are located along the north-west boundary as shown in Figure 4.2 (refer to dark blue “Ground levels below 1.4m AHD”) .

There are a variety of sensors that can be used for this purpose and specific advice should be sought from the suppliers to indicate and confirm the most appropriate hardware. The sensors that are selected should be:

- Reliable – for example, the supplier should be able to demonstrate that the selected sensor has been used in similar installations.
- Stable – the calibration of the sensor should not unduly drift over time or be affected by external factors (such as changes in temperature).

There are a number of ultrasonic, pressure and capacitive sensors available that are able to meet these requirements. However, it is likely that periodic calibration and maintenance of the sensors will still be required. Facilities should be provided to calibrate the sensor (for example, by allowing adjustment to survey levels).

Typically, the sensor housing will be integrated into the surrounds in a discrete manner and protected the sensor from vandalism or other interference. However, easy access for maintenance and calibration should be provided.

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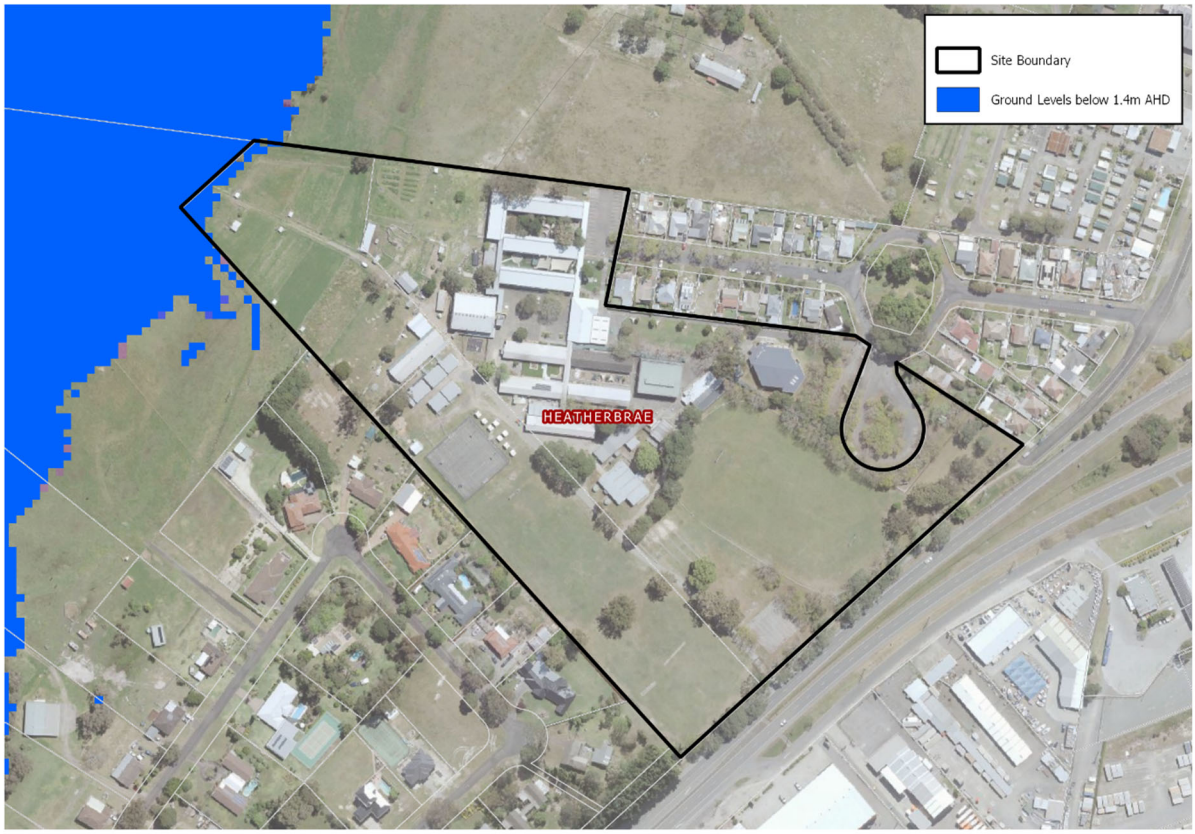

Figure 4.2 Water Level Sensor Location

Control Unit
To accompany the sensors, a control or measuring unit will be required. This unit will undertake the following functions:

- Making the measurements from the sensors;
- Issuing alerts once the defined thresholds are exceeded;
- Monitoring the power supply;
- Cross-checking the data from the multiple sensors to ensure consistency (and provide warning of a potential malfunction); and
- Periodically polling the communication channels so that key users can be alerted of a system failure.

There are a range of commercially available data loggers that can provide these functions (e.g. Campbell Scientific).

The control unit can be co-located with the sensor or installed in a separate housing. In either case the unit should be immune to inundation by floodwater (e.g. by locating the unit above the PMF).

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Communications

To communicate the warning to the occupants, the system will need to include a communications facility. Systems or processes will be required to identify and communicate the following events:

- Floodwater exceeding the identified thresholds;
- Sensor disagreements (indicating potential need for recalibration or failure);
- Power supply issues (including loss of primary power supply and low battery levels); and
- Failure of the loggers or communications systems.

This can be integrated into the on-Site emergency warning system. It may also be necessary to provide building wardens with more specific detail (for example, by SMS) so that they can co-ordinate an appropriate response. Some aspects, such as the failure of the loggers and communications systems, may require some degree of routine monitoring including confirmation that the system is active when a storm warning is issued.

Power Supply

The flood warning system will require a redundant power supply. Typically, the primary power would be drawn from the electricity grid. However, an independent back-up should be provided to enable the system to continue functioning in the event that power is cut.

Documentation

Accompanying the system design, appropriate documentation of the system should be provided by the system supplier. This documentation should cover:

- System components (including their location within the building);
- Use of the user interfaces;
- Software interfaces (including the use network connections and protocols);
- Wiring diagrams;
- Calibration procedures; and
- System maintenance requirements.

The documentation should be able to be understood by a suitably qualified professional and without requiring reference to additional documents that are not otherwise readily available. Diagrams and other graphics should be provided where appropriate.

4.3.2 Existing Flood Warning System

Observation of the Raymond Terrace gauge (561037), operated by BoM, is the most appropriate means by which to inform potential flooding events at the school. The gauge is located approximately 3.5 km upstream (north) of the Site along the Hunter River. Water Level forecasts and storm conditions at the gauge should be used to prepare for the possibility of flooding or to make the decision to close the school prior to opening.

The BoM has a target warning lead time of 6 hours for minor flood classifications at the gauge and 18 hours for a moderate flood classifications.

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4.4 Evacuation Routes and Timings

4.4.1 Evacuation Off-Site

Evacuation in a safe manner is dependent on warning time and availability of easily identifiable routes. If evacuation of the Site is required during a flood event, egress fron the Site is proposed along the Pacific Highway in the northerly direction, with access via the Adelaide Street roundabout (refer to Figure 3.1 for location).

Total flood warning time – consisting of the time from when the BoM's target warning lead time of flooding at the Raymond Terrace gauge OR the on-site warning sensor is triggered, to the time when the Pacific Highway @ Windeyers Creek Bridge will become inaccessible due to floodwaters will vary with event rarity. The road is inundated from the 2% AEP event. Peak flood depths, rate of rise and flood timings for all modelled events are shown in Table 4.3. Water level hydrographs for all modelled events are presented in Figure 4.3. The PMF presents the most hazardous event in terms of rate of rise, smallest available warning and evacuation time and flood depths at the Site and has been adopted for this timing assessment.

Table 4.3 Peak Flood Depths, rate of rise and flood timings for all modelled events at Pacific Highway @ Windeyers Creek Bridge

AEP event	Peak Flood Depth (m)	Rate of Rise (m/hr)	Onset of flooding after start of design rain (hours)	Onset of flooding after Minor Flood level is reached at Raymond Terrace gauge (hours)
10% AEP	Not Flooded			
5% AEP	Not Flooded			
2% AEP	0.34	0.03	38.3	15.7
1% AEP	1.10	0.17	30.3	9.8
0.5% AEP	2.07	0.26	26.8	10.9
0.02% AEP	3.96	0.20	21	9.5
PMF	4.78	0.27	3	5
1% AEP+CC	1.67	0.17	27	13

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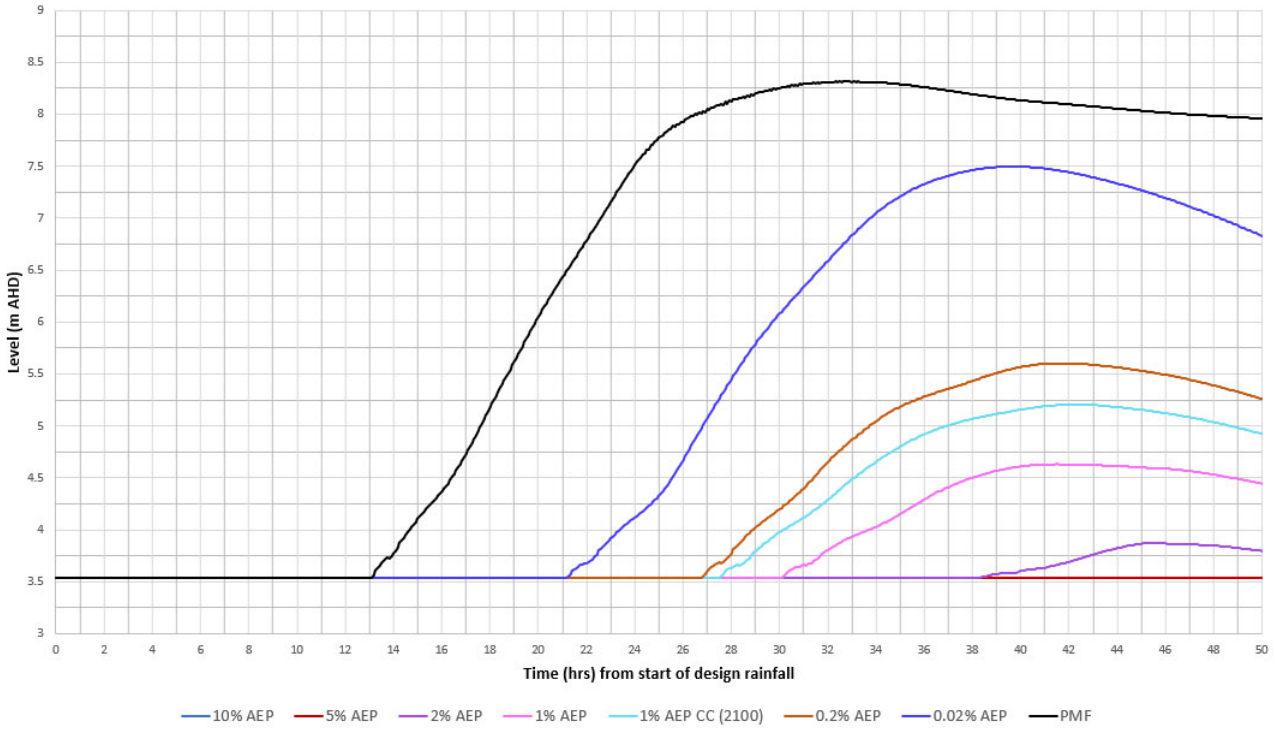

Figure 4.3 Water level hydrographs at the Pacific Highway @ Windeyers Creek Bridge (POI E) for all modelled events.

The water level hydrograph for the PMF is presented in Figure 4.4 for flooding at the Site (POI C) and the Pacific Highway @ Windeyers Creek Bridge (POI E). Flooding at the POI begins when the measured water level raises above the Ground level: therefore, the horizontal trend in the hydrographs indicates time spans during the storm event in which flooding at the POI has not yet occurred.

In a PMF, the Site (POI C) is inundated 21 hours following the onset of rainfall. However, the more relevant timing is that it is inundated:

- 13 hours following a minor flood level being reached at the Raymond Terrace Gauge
- 11 hours following a major flood level being reached at the Raymond Terrace Gauge

Assuming a scenario where the School was not closed prior to the need for evacuation, a key consideration is the total available time to evacuate the population of the school to Raymond Terrace between when the Site (POI C) is inundated by floodwaters and the Pacific Highway at Windeyers Creek (POI E) becomes cut-off by floodwaters. Inundation at the Pacific Highway at Windeyers Creek (POI E) occurs 8 hours before Site (POI C) is inundated (this is shown in Figure 4.4) and 5 hours after the minor flood level at Raymond Terrace Gauge is reached.

The total time required for evacuation of the HRHS is outlined in the 'Hunter River High School Upgrade Flood Evacuation Transport Assessment' (Stantec, 2024). The report indicates the worst-case evacuation time is estimated to be 3 hours under 2023 enrolment numbers (842 students). A 3-hr evacuation time falls within the predicted 5 hours of available time from when the minor flood level is Raymond Terrace Gauge is reached and when the road becomes cut-off by floodwaters in a PMF event.

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It is noted that the total evacuation time is likely to be larger than this 5 hour prediction due to the issuing of BoM flood warnings preceding the event. As outlined above, the BoM's target warning lead time for flood classifications at the Raymond Terrace Gauge is:

- 6 hours for a Minor Flood
- 18 hours for a Major Flood

Under a major flood classification (which would be expected in a PMF), there would be:

- A minimum of 11 hours warning time expected to evacuate (assuming a 6 hour BOM target warning lead time for the minor flood, and Pacific Highway @ Windeyers Creek Bridge (POI E) being inundated 5 hours after the minor flood level is reached).
- Likely 20 hours warning time expected to evacuate (assuming an 18 hour BOM target warning lead time for the major flood, and Pacific Highway @ Windeyers Creek Bridge (POI E) being inundated 2 hours after the major flood level is reached).

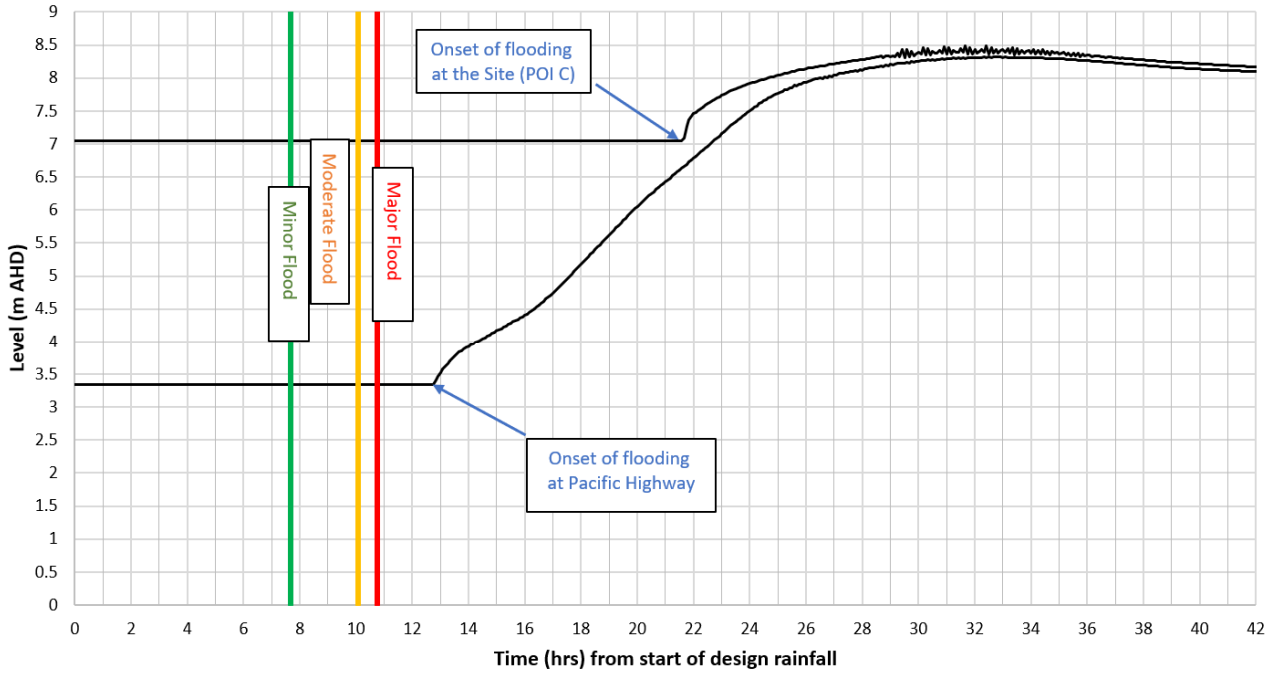

Figure 4.4 Water level hydrographs at the Site (POI C) and at the Pacific Highway @ Windeyers Creek Bridge (POI E) with indicated timeframe when flood levels thresholds are reached at Raymond Terrace gauge station in the PMF.

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It is noted that total evacuation times are provided under the assumption that the storm/flood event occurs when the school is in operation. In reality:

- It is more likely that the event and/or warning would occur out of operational school hours (given the school is non-operable for a greater portion of the day);
- The significance of the warning and the total flood warning time would facilitate non-attendance/closure of the school in line with the principal flood emergency strategy outlined in this report.

4.5 Structural Soundness

Although the proposed new buildings are not affected by flooding until the 0.02% AEP, the buildings will need to be designed to ensure structural integrity will not be compromised for all flood events up to and including the PMF event.

The structural integrity of the proposed buildings (Block X and Z) has been confirmed by a structural engineer that considers depths of water up to 2m and velocities up to 1.0m/s, which would be suitable based on the predicted flood behaviour in a PMF event.

In addition, the structural integrity of the existing buildings G, H, I, J and K has been confirmed by a structural engineer that considers depths of water up to 2m and velocities up to 1.0m/s (suitable for a PMF event).

Please refer to Annex B for a copy of the structural integrity letter for both existing and proposed buildings.

4.6 Flood Signage

It is recommended that flood warning signage be installed around the Site, particularly in locations where a flood hazard (AIDR, 2017/ FRMM 2023) of H3 or higher hazard is predicted which would cover the entire Site in a PMF. Signs should be installed at key entrances/ exits to the Site and along high-trafficable footpaths. An example of a sign is shown in Figure 4.6.

Figure 4.5 Example of a Flood Zone sign (Flood Zone Sign - Flood Channel and Drain Danger Sign (nationalsafetysigns.com.au))

To accompany the flood warning system, the building should include appropriate signage indicating what actions are to be undertaken in the event of flooding. This should consist of instructions (including direction arrows) that can be interpreted if the flood wardens are not available.

The following signs are recommended:

- Flood depth indicators at visible locations such as the entry to the building;
- Entry/exit points to stairwells; and
- Evacuation routes (refer drawings in Section 4.4.1).

An example of the typical signage that might be displayed at key points is given in Figure 4.6.

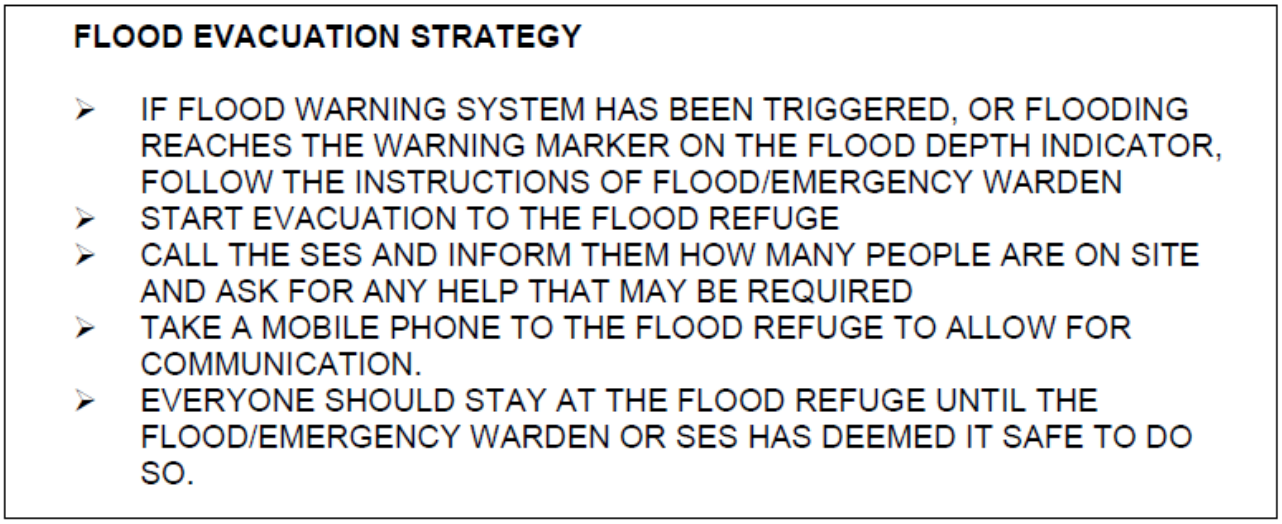

Figure 4.6 Typical Flood Evacuation Signage

4.7 Consultation with SES

The SES were consulted as part of the development of the FERP to ensure all recommendations and strategies presented were suitable as a stakeholder who may be involved during the event of a flood evacuation and will implement the most suitable evacuation procedures.

The 2023 FERP was provided to the SES for review and comment and two responses were provided; 14 June 2023 and 26 March 2024. A summary of the recommendations are provided below. The letters provided by SES have been included in Annex C and Annex D.

Response A: 14 June 2023

- Consider the impact of flooding on the infrastructure, and the users of the site, up to and including the PMF.
- The Williamtown Salt Ash FRMSP shows the Hunter River High School western side of the site is impacted by riverine flooding from the Hunter River. The proposed development will be close to a high hazard floodway at a 1% AEP flood event and becomes flooded and a high hazard floodway in a PMF. This is a significant risk to life and property, therefore all users of the site, particularly the school children, must not be exposed to the potential flooding.
- Pursue, if relevant, site design and stormwater management that minimises any risk to the community.

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- Ensure workers and people using the facility during and after the upgrades are aware of the flood risk, for example by using signage.
- Develop an appropriate business emergency plan to assist in being prepared for, responding to and recovering from flooding. The NSW SES has a template which can assist in this process: http://www.sesemergencyplan.com.au/.
- As the closest NSW SES Unit is approximately 6km from the school and the Pacific Highway may be cut off to the north, the access road from the NSW SES Unit to the school would be subject to riverine flooding. This may limit access for NSW SES personnel to attend to the school during a flood event and isolate the school (and therefore students and staff) from the community.
- The school may consider the need for a Flood Emergency Response Plan to assist in being prepared for, responding to, and recovering from flooding. Improved flood awareness is essential for your Hunter River High School community and will occur with flood emergency response planning.
- The preferred emergency strategy for schools or sections of schools that are at known risk of inundation or isolation is early closure prior to the commencement of the inundation or isolation and before the start of the school day.

Response B: 26 March 2024

- Recommend the Flood Emergency Response Plan (FERP) is regularly exercised, reviewed, and updated to ensure workers are aware of the procedure and that it remains current and relevant and ensure consistency with the contemporary emergency management arrangements relevant to the area, for example the Port Stephens Local Flood Emergency Sub Plan.
- Integrate the Hazards Near Me NSW App into the FERP for emergency information. School closure will need to be proactive and not rely on receipt of any warnings provided by NSW SES. Educate occupants about the Australian Warning System Warning Level (Emergency Warning, Watch and Act, Advice) definition and the implications for the Flood Emergency Response Plan.
- Support the recommendation to exercise the FERP twice a year: FERPs should be regularly exercised similar to building fire evacuation drills. The NSW SES recommends updating the FERP at regular intervals and whenever additional flood information is available or highlighted during the drills or flood events.
- The NSW SES recommends that all buildings are constructed to withstand any probably maximum flood (PMF) event plus debris load. Risk assessment should consider the full range of flooding, including events up to and including the PMF. The SES note that the upper floor levels of the proposed new buildings are above the PMF level.
- Due to the extensive and ongoing nature of construction at the site the SES recommend undertaking an evacuation capability assessment, particularly around the changing logistics on site during and after construction, the increase in student numbers, the availability of buses during a weather event, and the ability of buses and cars to evacuate the whole school to a flood-free location.
- The SES encourage consideration of additional flood risk management measures to ensure there is not considerable risk to life if the FERP is ignored by students, staff or parents. The FERP should address this, including for example the high likelihood that parents and carers will consider driving through flood waters to reach the children at the school.

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4.8 Education

The HRHS management should educate all occupants to be aware of and adequately trained in emergency response procedures and as such, advocate for the implementation of a training program to ensure all occupants receive appropriate training to enable them to act in accordance with this plan. It is anticipated that this plan includes necessary training requirements which will be reviewed and updated as a result of including the Flood Emergency Management Plan.

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5 Flood Emergency Response Procedure

This section describes some of the specific actions to be undertaken in anticipation of a flood event, as well as actions recommended during and after a flood event.

5.1 Overview

To achieve effective flood emergency management of the Site, the following procedures are proposed:

- **Priority 1** – Non-attendance (i.e. Closure) of the school based on BoM's flood warning of a minor (or any flood warning; Minor, Moderate or Major) flooding at the Raymond Terrace Gauge, emergency storm warning or the on-site water level sensor systems. School closure should be communicated with parents and staff to advise parents of possible flooding events the day before they occur and suggest that children be kept at home.
- **Priority 2 -** If non-attendance (i.e. Closure) was not possible as the school was already in operation and a minor (or any flood warning; Minor, Moderate or Major) flood warning/ rainfall warning is issued or the on-site water level sensor system is triggered, implement off-site evacuation based on the trigger levels specified in this FERP.

5.1.1 Proposed Evacuation Routes and Evacuation Centre

The proposed evacuation route and evacuation centre(s) and are shown on Figure 5.1. In summary:

- The Pacific Highway travelling north to Raymond Terrace is the nominated proposed evacuation route
- Grahamstown Public School is the primary nominated evacuation centre (with Irrawang High School as the Secondary option - this is to be confirmed with SES and HRHS management)

This information should be updated as required.

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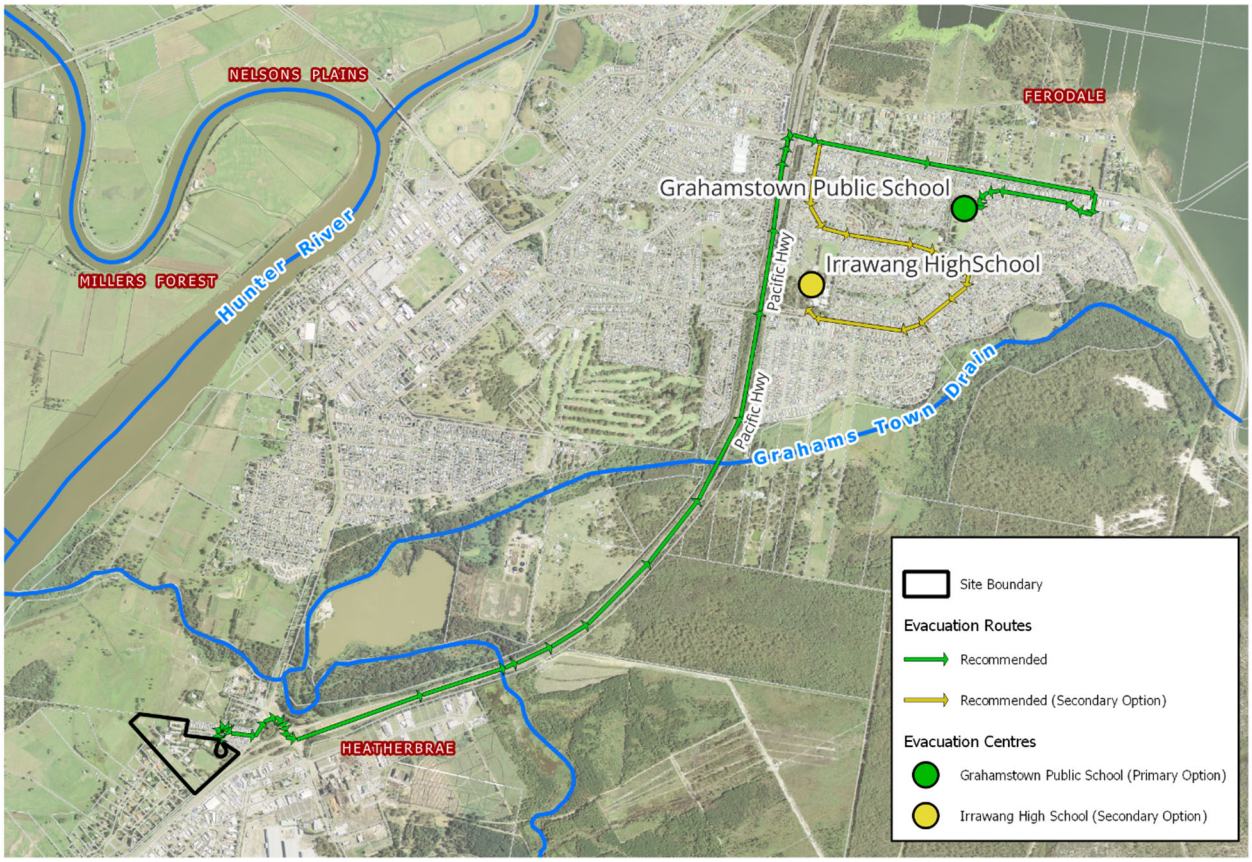

Figure 5.1 Proposed Evacuation Routes and Evacuation Centre(s)

5.1.1 Provision for Flood Emergency Drills

Establishing a regular schedule of flood evacuation drills is crucial for preparedness in case of a major flood. It is recommended that two evacuation drills be completed per year. While conducting a full evacuation drill (i.e. to the evacuation centre off-site) annually ensures that everyone is familiar with the entire process and evacuation centre, having a simplified second drill (i.e. to the pickup location on-Site) will still reinforce essential procedures without being as demanding. It's a practical approach that balances readiness with logistical considerations. Plus, it ensures that people stay engaged with the emergency protocols throughout the year. This should be confirmed with the HRHS Management.

5.2 Before A Flood

Outlined below are several flood safety actions to be followed by students, staff and visitors on Site in anticipation of a potential flooding event:

- Monitor Local ABC radio, Live Traffic NSW app, BOM Flood Warnings and BOM Rain and River Data for water levels, evacuation alerts and road closures. Prepare for a potential school closure should severe rainfall be forecasted by the BoM. Closure of the school should occur when a flood warning is issued for Raymond Terrace or Lower Hunter by the BoM.
- Review and be familiar with the applicable *SES Emergency Business Continuity Plan*.
- Ensure that the plan is up to date.

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- Check (or prepare) the contents of the Emergency Flood Kit(s) and ensure that it is at the correct location.
- Identify the needs of vulnerable persons likely to be on-Site during the flood emergency .
- Inspect the property for hazardous substances, furniture, equipment and sensitive belongings, and relocate to another flood free area if possible.
- Check communication devices such as internet connections, mobile phone, landline phone or radio. If a device has become inoperable, identify a suitable alternative (such as a back-up device or using the device of someone else in the building).
- Communicate to all students, parents, staff, and visitors of the premises the requirements of the applicable *SES Emergency Business Continuity Plan*, location of the Emergency Flood Kit, and discuss the risk of flooding to the site, contact/communication methods, and actions to take before, during and after a flood event.
- Appropriately train people in key roles (such as Chief Warden) and appropriately train/drill students and staff in flood evacuation procedures.
- Ensure that any electrical equipment located below the PMF level is disconnected or isolated from the electricity and gas supplies.

5.3 During a Flood

5.3.1 Priority 1: Non-attendance (i.e. Closure) of School

Non-attendance (i.e. Closure) of the school based on BoM's minor (or any flood warning; Minor, Moderate or Major) flood level warning at the Raymond Terrace Gauge, emergency storm warning or the on-site water level sensor system. The BoM has a target warning lead time of 6 hours for minor flood classifications at the gauge. It is noted that if a Major flood warning is issued, BoM has a target warning lead time of 18 hours.

Parents and caregivers should be kept informed about potential flooding based on BoM's forecast systems described above. School closure should be communicated with parents and staff to advise parents of possible flooding events the day before they occur and suggest that children be kept at home.

5.3.2 Priority 2: Off-Site Evacuation

If the BoM's minor (or any flood warning; Minor, Moderate or Major) flood level warning at the Raymond Terrace Gauge, emergency storm warning or the on-site water level sensor occurs during the school day, off-site evacuation should commence. HRHS currently allows parents to pick-up students during an evacuation, however, it is noted that travel to Site during a flood event may increase the risk within the vicinity of the Site, particularly given the number of routes being cut-off during floodwaters.

The Pacific Highway at Windeyers Creek will be inundated several hours before the Site (POI C). The total available warning time available in the PMF, would be:

- A minimum of 11 hours warning time expected to evacuate (assuming a 6 hour BOM target warning lead time for the minor flood, and Pacific Highway at Windeyers Creek (POI E) being inundated 5 hours after the minor flood level is reached).

- Likely 20 hours warning time expected to evacuate (assuming an 18 hour BOM target warning lead time for the major flood, and Pacific Highway at Windeyers Creek (POI E) being inundated 2 hours after the major flood level is reached).

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It is noted that under the worst-case scenario, evacuation of the Site evacuation of the Site would take 3 hours (Stantec, 2024).

5.4 After a Flood

Outlined below are a few key flood safety measures to be followed by all occupants after a flood event has occurred:

- Check that electrical power and gas has been isolated to all flood affected areas of the building. If electrical systems or appliances (including items such as hot water systems) have become inundated, these should be inspected by a qualified electrician. Gas appliances and any gas bottles should also be inspected for safety before use.
- Check any flooded areas for safety hazards and structural stability. For example, items may have moved as a result of floodwater. Have flood sensors and alarm system professionally assessed to ensure they are still in working order following event.
- Review evacuation performance during the flood. Identify any areas for improvement and update flood emergency response plan if required.

Further information is provided in the SES "*After a flood*" fact sheet.

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6 Conclusion and Recommendations

This report outlines a flood emergency management strategy for the Hunter River High School that has been developed with consideration of the nature of flooding and flood hazard at the Site for mainstream Hunter River events up to the PMF, the proposed building designs and use of the Site, and relevant information contained in applicable floodplain risk management plans.

Flood emergency evacuation measures and requirements have been established for implementation with the redevelopment of the Site.

The differing nature of flooding at the Site in rare and extreme events means that multiple emergency management strategies must be considered. In rare events, the potential for both long warning times and potential long isolation periods means school closure is the best emergency management procedure (Priority 1). The assessment completed as part of this FERP indicates there should be enough warning time issued by the BoM (for a minor or major flood warning) to close the school prior to students attending.

If closure of the school cannot happen prior to the commencement, the flood emergency management strategy is off-site school evacuation prior to evacuation routes and buildings becoming flooded (Priority 2). As detailed within this FERP, the recommended evacuation route is the Pacific Highway towards Raymond Terrace to an evacuation centre. A review of potential evacuation centres was completed as part of this assessment, and it was found that Grahamstown Public School and Irrawang High School are the two most suitable locations. The SES Local Sub-Plan currently nominates Grahamstown Public School, although this should be confirmed by HRHS management and SES. The worst-case evacuation time is estimated to be 3 hours falls within the predicted 5 hours of available time from when the minor flood level is Raymond Terrace Gauge is reached and when the road becomes cut-off by floodwaters in a PMF event (the most hazardous event).

It is proposed to install an automatic flood level sensor at the low-lying areas at the north-west corner of the Site to monitor flooding conditions that will be utilised to set trigger levels for the evacuation with a warning alarm at the flood water trigger level of 1.49m AHD. This level corresponds to the Minor Flood level of 2.5m AHD at the BoM gauge at Raymond Terrace and will allow redundancy if either trigger fails to warn.

The following considerations to be made beyond this flood emergency strategy report:

- Confirmation with SES that the available warning time is sufficient for safe Site evacuation and which is the preferrable evacuation modality (private cars, emergency buses, parent's pick-up etc…)
- Review of the recommendations provided by SES.
- Updating of the existing Site FERP incorporating information available in this report. It is recommended that the school's management considers how they wish evacuation to take place.
- Confirmation of the proposed evacuation route and centre. This report highlights that the Pacific Highway in the north direction is the safest evacuation route towards flood free areas including the evacuation centre. Suitable evacuation centres have also been considered as part of this assessment which nominates Grahamstown Public School (and Irrawang High School as an alternative Site). However, HRHW management should liaise with SES to define the most suitable evacuation centre.
- Periodic review and revision of FERP shall be scheduled after it is finalised and implemented.
- Evacuation drills are recommended twice a year.

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- The Flood Emergency Response Plan (FERP) should be regularly exercised, reviewed, and updated to ensure workers are aware of the procedure and that it remains current and relevant and ensure consistency with the contemporary emergency management arrangements relevant to the area (i.e. the Port Stephens Local Flood Emergency Sub Plan.)
- Once the proposed development is completed, a concise operational flood emergency management plan (OFEMP) is recommended to be developed by the school in consultation of SES based on this FERP.
- It is noted that the closure or non-attendance (Priority 1) and off-site evacuation (Priority 2) following the issue of minor flood warning at the Raymond Terrace gauge is a conservative flood risk strategy, but is considered an appropriate preliminary approach given the potential for isolation and the size of the vulnerable population. However, frequent review of the FERP, and specifically the selected flood level triggers, should be undertaken on a regular basis to ensure that the proposed approach is fit for purpose and does not result in unnecessary frequent school closures and/or evacuation.

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7 References

Australian Institute for Disaster Resilience (2017) *Australian Disaster Resilience Handbook 7 Managing the Floodplain: A Guide to Best Practice in Flood Risk Management in Australia*.

BMT (2024) *Hunter River High School - Flood Impact Assessment*.

NSW Government (2022) *NSW Floodplain Development Manual*.

SES Port Stephens Flood Emergency Sub Plan (2013)

2022 Flood Inquiry Volume 2 Full Report (NSW Government, 2022).

New South Wales Department of Planning and Environment (NSW DPE) (2023) Flood Hazard - Flood Risk Management Guideline FB03.

New South Wales Department of Planning and Environment (NSW DPE) (2023) Flood Hazard - Flood Risk Management Guideline FB03.

Draft Shelter-in-place-guideline (NSW DPE) (2023)

Australian Institute for Disaster Resilience (AIDR) (2017), Handbook 7 Managing the Floodplain: A Guide to Best Practice in Flood Risk Management in Australia.

Australian Institute for Disaster Resilience (AIDR) (2017) Guideline 7-2 Flood Emergency Response Classification of the Floodplain.

Hunter River High School Upgrade Flood Evacuation Transport Assessment (Stantec, 2024).

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Annex A Existing Flood Emergency Response Plan

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Nature of emergency or hazard	Risk associated with hazard	Risk rating	Key prevention measures	Key response measures	Recovery measures
Flood	• Floods are a natural occurrence on low-lying land close to rivers and creeks. While the pattern of flooding varies, there are few communities that do not have some flood risk. • The State Emergency Service (SES) is responsible for responding to floods in NSW.	2	• Prepare a flood plan covering actions needing to be undertaken always, when a flood is likely, during a flood and after a flood. • Prepare an emergency kit consisting of at least a portable radio with spare batteries, a torch with spare batteries, a first aid kit and manual, waterproof bags, emergency contact numbers, waterproof footwear with non-slip soles, waterproof and puncture resistant gloves, cleaning products and boxes. • Inform staff and students of the flood risk.	• Notify staff and students of the flood warning. • Maintain situational awareness (Bureau of Meteorology, radio broadcasts) during severe weather conditions • Implement **Evacuation Procedures [OR Flood Response Plan if applicable]** and Temporarily Ceasing School Operations Procedures • During school hours: coordinate the safe return of students to their homes, in consultation with emergency services and school transport operators. In some cases this may be difficult because student's homes may also be affected or isolated by flooding. • Outside of school hours: close the school and notify students and staff of the temporary closure. • Implement communications to staff and school community in accordance with: – Emergency communication toolkit - severe weather warning and floods or – Temporarily Ceasing School Operations Procedures, page 6 • Avoid driving or walking through floodwaters (these are the main causes of death during flooding). • Return workplace to normal in accordance with **Recovery Procedures** (Section 1.4 of EMP) **[and/or Flood Recovery Plan if applicable]**. Ensure all buildings and utilities have been checked and clearance provided by Assets Management Unit prior to re-entering the premises	• Decide when to re-open the workplace, in consultation with local emergency services. • If workplace has been impacted by flood water, coordinate with local ASO to "Make Safe" your workplace i.e., loss assessment and clean-up, utilising SINSW contractors and local emergency services. • Following "Make Safe" process your local ASO will assist with "Make Good" processes i.e., repairs, refurbishment and replacement of assets. • Implement procedures to resume workplace activities, which include providing counselling and support to those affected by the incident (Section 1.4 of EMP). • Review the emergency management plan.

Flood Response Plan

At all times, the safety and well-being of students and staff is our highest priority

Chief Warden: Principal Deborah Dibley

Local SES Contact: Port Stephens Unit, Raymond Terrace 4980 7100 **Duty Officer 0404 828 525**

Primary Evacuation Refuge: Bunnings Heatherbrae, No. 8 Griffin Street Heatherbrae and PH; 4988 5500

- Classroom teachers need to complete a hard copy class roll, if the weather forecast is unfavourable. ***Please advise the office of any students who arrive late***
- After the Chief Warden has made the decision to evacuate the following calls need to be made:
    - Busways. 4983 1560 ***Ask for an estimated time of arrival***
    - Primary Evacuation Refuge
    - Patricia Bowen, Director of Educational Leadership M: 0438 384 870
    - Incident Report and Support Hotline 1800 811 523 (option 1)
    - Other local schools i.e. neighbouring schools or feeder schools
- Office staff to send METHOD OF COMMUNICATION will be Facebook, School Bytes, SMS message to all parents/carers, refer to approved communications.
    - Emergency communication toolkit - severe weather warning and floods
    - Temporarily Cease Operations for Schools Procedure, page 6
- Sound alarm and enact evacuation plan
- Take emergency evacuation kit
- Roll call of students prior to evacuation.
- Students (with their school bags) are to assemble in their designated classrooms ready for evacuation
- When the bus arrives students to walk to the bus accompanied by a teacher
- Staff can either follow the bus to town or travel on the bus with students
    - **Staff to take the student list and flood folder with them**
- **Monitor** Local ABC radio, Live Traffic NSW app, BOM Flood Warnings and BOM Rain and River Data for water levels, evacuation alerts and road closures
- At refuge, account for staff, students, visitors, contractors
- Await and follow advice of Emergency Services / SES
- Student release to parents/carers recorded
- **Notify** the following contacts to advise that the school has evacuated**:**
    - Busways and 4983 1560
    - Incident Report and Support Hotline 1800 811 523 (option 1)
    - Patricia Bowen, Director Educational Leadership M: 0434 384 870
    - Clarke Greedy, ASO M: 0459 873 314
    - Duty Officer , Local SES M: 0404 828 525 or 1325
- All staff have a duty of care to ensure that all students have returned home safely after the school has evacuated
- Do not re-enter site and or buildings until advised safe to do (this may include advice from emergency services and SINSW, including a **clearance certificate**)

Flood Response Plan

Example of Emergency Evacuation Kit – add to EMP after Testing of Equipment.

Emergency Evacuation Kit (Collect on day of event)	Additional items specific for flood event (stored in WHERE and readily accessible)
First Aid Kit (including epipen, puffers etc.) Emergency Blanket Class lists / rolls Sign in registers Emergency contact numbers Student Individual Health Care Plans / Medications	Portable analog radio and torches Spare batteries for above A whistle or bell or loud hailer Waterproof bags Gum boots Cleaning products

Flood management response guide and procedures

Prepare

- **Educate:** staff, students, community on risks and procedures
- **Emergency kit/s:** contents, location
- **Notifications:** prepared in advance for staff, students, community
- **Assets:** Identify and prioritise for action

Assess

- **Information sources:** Flood watch, flood warning, river height http://www.bom.gov.au https://www.ses.nsw.gov.au https://www.livetraffic.com Floods Near me App, ABC Radio for emergency broadcasts
- **Decision making:** Chief warden (Flood monitor) and/or deputy chief warden
- **Transport implications:** bus access, road closures

Analyse

- **Likely scenarios:** Type of impact likely
- **Flood levels:** based on past flooding information
- **Responses:** evacuate or temporary ceasing of operations
- **Triggers for action**

Communicate

- Inform **Students** of evacuation response.
- Inform **Staff** of student supervision, evacuation response, i.e., temporary ceasing of operations (if applicable).
- Inform **Community** of evacuation response.

Act

- **Evacuate:** Prioritise departures of students and staff
- **Notify:** Emergency services, DEL, Incident Report & Support hotline 1800 811 523 (opt 1) and other stakeholders of action taken.
- **Asset protection:** power shutdown, relocation of assets if time permits and if safe to do so.

DO NOT ENTER FLOOD WATERS

Return

- **Site assessment: Do not return to site until a clearance certificate has been issued by AMU (if school site impacted by flood waters)**
- **Recovery processes:** student wellbeing, staff wellbeing, resumption of educational programs.
- **Evaluate:** emergency procedures and revise if necessary.

Flood emergency

Prepare

Educate

Floods are a natural occurrence on low-lying land close to rivers and creeks. While the pattern of flooding varies, there are few communities that do not have some flood risk. The State Emergency Service (SES) is responsible for responding to floods in NSW. Most river catchments have a flood height prediction system consisting of flood watches and flood warnings. In these areas, a flood watch is issued when forecast weather conditions could result in flooding. Flood warnings are issued when rainfall shows flooding will occur and include predicted river heights at the local river gauge and their arrival time. A flood warning may be issued without a flood watch having first been issued.

Each workplace should attempt to establish the flood heights that may affect the site. The SES and local council can provide this information. Other information issued by the Bureau of Meteorology may indicate flooding is a severe weather warning or severe thunderstorm warning. These warn of sudden heavy rainfall that can cause flash flooding.

Warnings will typically be issued directly by the SES to schools, and communicated to the general community through radio broadcasts, door knocking and www.bom.gov.au. The predicted level of flooding and time available to undertake action will determine the course of action to be taken.

Emergency kits:

Administration Block

Notifications:

- Copies of prepared communications to be used on various and relevant platforms – **School Bytes, Facebook, SMS**

Assets

Annually: Undertake planning to identify school assets, critical non-electronic records and utilities.

Annually: Review procedures and nominate staff responsible for Asset Protection Priorities – implement Asset Protection Priority list and adequately consider preparation and response to a flood emergency i.e.,

How will farm animals be removed from site or to higher ground and who is responsible for moving farm animals? **All Cattle to be located on Southern Sports field on site.**

NOTE: Consider digitalisation of historic data.

Establish a testing program to validate the accuracy of estimated times to protect assets, protect critical non-electronic records and perform utility shutdown/isolation procedures. Amend the procedures where necessary.

Continuity of education

Annually: Undertake a workshop with School Executive to plan for continuity of teaching and learning. Consider a scenario where the school has experienced major damage and will be non-operational for a period of six months. To be discussed and agreed upon by the Director, Educational Leadership.

Staff and students

Start of school year and start of each term: Communicate school emergency procedures to all staff.

Annually: Conduct a scenario-based planning workshop with School Executive to determine:

- staff/teachers who may be affected by minor, moderate and major flooding. Consider deployment of staff.
- methods to contact staff/teachers before, during and after such flooding
- methods to contact students and parents/carers before, during and after such flooding.

Annually – Parent-Teacher Nights: Provide a booth/showcase to highlight the school's preparations for emergencies.

Community

- How are you raising awareness of flooding within your school community?
- What does the community need to know beforehand?
- How will the flood procedures be communicated to the community? (Parents, assisted travel, school cleaners, canteen staff, residential supervisors.)

Flooding information

Annually: Consult with Local Council and SES to determine:

- which river gauges should the school monitor
- likely impacts to the school in minor, moderate and major floods
- triggers for the school to consider issuing an immediate 'temp-cease' or order a 'temp-cease' for the following day.
    - Consider: flood maps for minor, moderate and major floods; road closures; evacuation routes (refer to flood extent maps from emergency planning workshops and https://www.ses.nsw.gov.au for maps and flood evacuation route information).
    - Recommend: To build in additional response time consider lowering the trigger level be one metre lower than the gauge height.

Annually: After consultation with Local Council and SES, revise planning then communicate revised plans to staff, students, parents and community.

Annually: Consult with out-of-school-hours/vacation care providers, contractors, suppliers and transport operators to consider the impacts of minor, moderate and major flooding upon them. Seek their input into the school's EMP and the consequences to the school's EMP. Obtain their business hours and after-hours contact details.

Confirm the sources of flooding information (Bureau of Meteorology – flood watch, flood warning, river levels; SES – flood bulletins, evacuation warnings and orders, and emergency alerts; RTA Live etc, Health and Safety Directorate.

Assess

Monitoring Information sources:

- Establish a monitoring process to be undertaken by the school and develop a checklist (including how the school will receive, interpret and act on information).

https://reg.bom.gov.au/cgi-bin/wrap_fwo.pl?IDN60143.html#Warragamba_Dam

https://www.ses.nsw.gov.au/hawkesbury-nepean-floods

https://www.ses.nsw.gov.au/

https://www.livetraffic.com/desktop.html

Decision making:

Roles of decision makers.

Principal: Assign a person (Flood Monitor) to monitor flooding information during both in school and out of school hours. Establish times for checkpoint meetings to review the most current information obtained by the Flood Monitor. Establish a trigger point for the monitor to immediately alert the Chief Warden if the situation becomes urgent. Live Traffic.

Flood Monitor: Access authoritative sources to determine both current and forecast conditions for weather and river levels and height of river at gauge within the catchment. Then compare current and forecast river conditions to the trigger points for the school's flood response. If appropriate brief the Principal.

Transport:

- Names and numbers of bus companies – see Emergency Contact list. **Busways / (02) 4983 75**

Analyse

Scenarios

Triggers	Action	Who
Weather warnings issued by BOM	Delegate will be monitoring the BOM Website	Business Manager
River levels and height of river at gauge within the catchment are increasing	Delegate will be monitoring the rise and fall in the Hunter River	Business Manager
Flood watch has been issued by BOM	Delegate will be monitoring the BOM Website	Principal or delegate
Flood warning has been issued by BOM	If not considered safe to be on-site, staff will be deployed to flood safe schools near their homes. Director of Education Leadership to be notified of staff deployment. Notification made to H&S Directorate Incident Report and Support Hotline on 1800 811 523 Option 1 advising of school closure and staff redeployment.	Principal
Flood bulletin issued by SES	Follow recommendation under flood bulletin	Principal

Communicate

Who – *Principal:*

- Principal/ delegate communicate decision to Staff, community, contractors, canteen, assisted travel, Spotless, cleaners, Health & Safety Directorate, DEL
- Inform **Students** of evacuation response.
- Inform **Staff** of student supervision, evacuation response, i.e., temporary ceasing of operations (if applicable).
- Inform **Community** of evacuation response.

When

- Triggers identified above

Act - ENACT YOUR EMERGENCY EVACUATION PROCEDURES

Evacuate: Prioritise departures of students and staff

Notify: Emergency services, DEL, Incident Report & Support hotline 1800 811 523 (opt 1) and other stakeholders of action taken.

Asset protection: if time permits and if safe to do so
Asset protection: If safe to do so and time permits power shutdown, relocation of assets, assign a person to lead asset protection actions. Use *Asset Protection Priority list* to guide those actions.

Critical non-electronic records: If safe to do so and time permits, assign a person to lead actions to protect critical non-electronic records. Use *Critical non-electronic records* to guide those actions.

Utility shutdown and/or isolation: If safe to do so and time permits, assign a person to lead utility shutdown and/or isolation actions. Use *Utilities shut down/isolation procedures* to guide those actions.

DO NOT ENTER FLOOD WATERS

Return

Site Assessment
Do not return to site until a clearance certificate has been issued by AMU (if school site impacted by flood waters)

Recovery Processes
- What support systems will need to be implemented to resume teaching and learning programs? (Staff wellbeing, student wellbeing, community wellbeing, connecting with external agencies as required, alternate teaching and learning programs if required.)

Evaluate
- How effective was the flood plan?
- What needs to change?

Asset protection priority list

Relocate onsite consideration	Using resources immediately available to the school, if it is reasonably practicable to safely remove the asset from its usual location and relocate it securely do so. Animals' relocated onsite must have access to food, water and shelter for the duration of that relocation. Consider moving to higher ground if available

Asset	Location of asset	Estimated time to protect		Protection procedures	Ideal protection strategy (time permitting and if safe to do so)
Safety: School staff and students should only attempt to protect if safe to do so. If training is required to protect an asset, staff should perform tasks to the level of training provided. **Resources or equipment:** Include details of any specific support or equipment required to implement the recovery strategy in the 'Protection procedures' column.					**Flood**
1. School farm animals	School farm		School Executive	Arrange for staff carpark to be cleared. Relocate animals to staff carpark. Notify SES of the location of the animals and seek their directions.	Relocate onsite
2. Student major works (Art)	Art classroom		School Executive	Relocate to higher shelves in existing rooms	Abandon
3. Student major works (Construction)	Metal workshop Woodworking workshop		School Executive	Workshops are on ground level. Move to second floor classrooms.	Abandon
4. Library books	Library		School Executive	Library books are on first-floor level will have no impact.	Raise in current location
5. Printers/copiers	Admin / Staffrooms			All printers and copiers are located on first floor. Not to be moved.	Abandon
6. Historical artefacts	N/A	N/A	N/A	N/A	No Artifacts on site
7. School maintenance equipment (mowers etc)	Schools Maintenance work shop	N/A	N/A	All equipment to be left in place.	Abandon
8. Physical education equipment	Storerooms	N/A	N/A	N/A	Abandon
9. School owned vehicles	N/A	N/A	N/A	N/A	Relocate offsite
10. Electricity - mains	Block D	Prior to leaving site	School Executive	Isolation of main electrical supply prior to leaving the site.	Abandon
11. Gas	Gas Tank	Prior to leaving site	School Executive	Gas Tank fixed to existing concrete slab. Will isolate tank from school Main is near large gas bottles on highway fence. ES4 gate key is required for entry. Turn off green valve by hand and valve to the right of the green valve with a shifting spanner.	Isolate
12. Chemicals	Agricultural Plot	N/A	N/A	N/A	Abandon
13. Critical non-electronic documents	N/A	N/A	N/A	N/A	Abandon

Emergency contact list

School staff			
Name	*Role*	*Mobile #*	*Alternate contact #*
Deborah Dibley	Principal / Work Place Manger	0408 249 279	
Jane Fuller	Deputy Principal	0411 098 372	
Adam Trace	Deputy Principal	0436 664 600	0413 898 263
Melanie Clarke	Deputy Principal	0411 255 698	
School support / suppliers / user groups			
Service	*Provider name*	*Business hours contact*	*After hours contact*
Cleaners	Ventia – Kristy Lee Curry	5:30am – 9:00am	0400 145 402
Canteen / food	Deb Dibley	8:30 am – 2:30 pm	0408 249 279
Out of school hours care	N/A		
Long day care	N/A		
Vacation care	N/A		
Grounds keeper/s	Alan Simmons	7:30 am – 3::30pm	0429 497 868
Other			

Department of Education			
Department name	*Reason for contact*	*Main contact number*	*Instructions*
Media Unit	Any media enquiry or request for comment	9561 8501	Provide attending media with the following statement: “Please contact the NSW Department of Education Media Unit for official comment.”
Health & Safety Directorate	- All incident reports - Advice - Information	1800 811 523	Call main number, select Option 1
School Security	Report incidents involving: - malicious damage - break and enter - fire - security breaches	1300 880 021	

Annex B Structural Adequacy Assessment

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Level 1, 215 Pacific Highway
Charlestown NSW 2290
02 4943 1777
newcastle@northrop.com.au
ABN 81 094 433 100

3 April 2024

NL201218

Richard Crookes Constructions
Dylan Cross
Suite 18, Level 2, 50 Glebe Road
The Junction NSW 2291

Dear Dylan,

Re: Hunter River High School – Flood Refuge

Northrop Consulting Engineers have been engaged by Richard Crookes Constructions to review the suitability of the existing buildings G, H, I, J and K at Hunter River High School to be used as flood refuge during the probable maximum flood (PMF) event as defined in the flood emergency response plan.

We understand that to be considered appropriate for flood refuge the buildings will need to be remain structurally adequate when subjected to the PMF parameters of 2 metres of water depth at a velocity of up to 1 metres per second.

Based on observations on site, Buildings G, H, I, J and K buildings were typically observed to consist of primary structural frames of steel and concrete. We are of the opinion that the structural integrity of these buildings would not be detrimentally affected if subjected to the structural loads commensurate with a PMF event of 2 metres of water depth at a maximum velocity of 1m/s.

We advise that it is likely the non-structural elements such as windows, doors and non-load bearing façade walls would be compromised due to the moving water and/or hydrostatic loads associated with the flood, however these are not part of the primary structure and any damage would not cause a structural adequacy failure.

We trust this meets your requirements, however, do not hesitate to contact us to discuss further.

Yours sincerely,

Matthew Allen
Principal | Structural Engineer
BEng (Civil) MIEAust CPEng NER (Structural)

		Date
Prepared by	MA	03/04/2024
Checked by	CK	03/04/2024
Admin	HB	03/04/2024

Level 1, 215 Pacific Highway
Charlestown NSW 2290
02 4943 1777
newcastle@northrop.com.au
ABN 81 094 433 100

13 May 2024

NL201218

Richard Crookes Constructions
Dylan Cross
Suite 18, Level 2, 50 Glebe Road
The Junction NSW 2291

Dear Dylan,

Re: Hunter River High School – Flood Refuge Block X and Z

We understand that to be considered appropriate for flood refuge, select buildings at Hunter River School the buildings will need to be remain structurally adequate when subjected to the PMF parameters of 2 metres of water depth at a velocity of up to 1 metres per second.

Block X and Z are new structures which are designed by Northrop. The structural concept consists of reinforced core-filled masonry subfloor walls, with a suspended concrete slab and steel framed structure over.

Based on the design presented, the structural integrity of these buildings would not be detrimentally affected if subjected to the structural loads commensurate with a PMF event of 2 metres of water depth at a maximum velocity of 1m/s.

We trust this meets your requirements, however, do not hesitate to contact us to discuss further.

Yours sincerely,

Matthew Allen
Principal | Structural Engineer
BEng (Civil) MIEAust CPEng NER (Structural)

		Date
Prepared by	MA	13/05/2024
Checked by	CK	13/05/2024
Admin	HB	13/05/2024

Annex C SES Response to Proposed FERP (2022)

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Our Ref: ID 1975
Your Ref: 22NEW0073

14 June 2023

Samuel Liu
Project Planner
Barr Planning
PO Box 96
Carrington NSW 2294

email: SLiu@barrplanning.com.au
CC: rjohnston@barrplanning.com.au; lisa.ignatavicius1@ses.nsw.gov.au

Dear Samuel,

Notification under section 2.13 of the State Environmental Planning Policy (Transport and Infrastructure) 2021 in relation to the proposed new buildings and ancillary works at Hunter River High School 36 Elkin Avenue, Heatherbrae.

Thank you for the notification under section 2.13 of the *State Environmental Planning Policy (Transport and Infrastructure) 2021* in relation to the proposed upgrade of Hunter River High School, 36 Elkin Avenue , Heatherbrae. It is understood that the proposed works include:

- Construction of new Learning Hub Building
- Construction of new Administration Building
- Construction of new covered walkways
- Extension of services utilities including water, electricity, and sewerage
- Ancillary works including tree removal and landscaping

The NSW State Emergency Service (NSW SES) is the agency responsible for dealing with floods, storms and tsunami in NSW. This role includes, planning for, responding to and coordinating the initial recovery from floods. As such, the NSW SES has an interest in the public safety aspects of the development of flood prone land, particularly the potential for changes to land use to either exacerbate existing flood risk or create new flood risk for communities in NSW.

The NSW SES has reviewed the proposed upgrade and the flood risk information available to the NSW SES, including the Local Flood Plan, Williamtown Salt Ash Flood Study 2005, Williamtown Salt Ash Flood Study Review 2012, Williamtown Salt Ash Floodplain Risk Management Study and Plan (FRMSP). Based on this review, the NSW SES provides the following advice:

- Consider the impact of flooding on the infrastructure, and the users of the site, up to and including the PMF.

The Williamtown Salt Ash FRMSP[1] shows the Hunter River High School western side of the site is impacted by riverine flooding from the Hunter River. The proposed development will be close to a high hazard floodway at a 1% AEP flood event and becomes flooded and a high hazard floodway in a PMF. This is a significant risk to life and property, therefore all users of the site, particularly the school children, ***must*** *not be exposed to the potential flooding.*

- Pursue, if relevant, site design and stormwater management that minimises any risk to the community.
- Ensure workers and people using the facility during and after the upgrades are aware of the flood risk, for example by using signage.
- Develop an appropriate business emergency plan to assist in being prepared for, responding to and recovering from flooding. The NSW SES has a template which can assist in this process: http://www.sesemergencyplan.com.au/.

  As the closest NSW SES Unit is approximately 6km from the school and the Pacific Highway may be cut off to the north, the access road from the NSW SES Unit to the school would be subject to riverine flooding. This may limit access for NSW SES personnel to attend to the school during a flood event and isolate the school (and therefore students and staff) from the community.

  The school may consider the need for a Flood Emergency Response Plan to assist in being prepared for, responding to, and recovering from flooding. Improved flood awareness is essential for your Hunter River High School community and will occur with flood emergency response planning.

  The preferred emergency strategy for schools or sections of schools that are at known risk of inundation or isolation is early closure prior to the commencement of the inundation or isolation and before the start of the school day.

Please feel free to contact Gillian Webber via email at rra@ses.nsw.gov.au should you wish to discuss any of the matters raised in this correspondence. The NSW SES would also be interested in receiving future correspondence regarding the outcome of this referral via this email address.

Yours sincerely

Gill S. Webber

Gillian Webber
Planning Coordinator, Emergency Risk Management
NSW State Emergency Service

[1] BMT WBM Williamtown Salt Ash Floodplain Risk Management Study and Plan 2017

Annex D SES Response to Proposed FERP (2024)

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Our Ref: ID 2342
Your Ref: 22NEW0073

26 March 2024

Katrina Walker
BARR Planning
PO Box 96
Carrington NSW 2294

email: kwalker@barrplanning.com.au
Cc: lisa.ignatavicius1@ses.nsw.gov.au

Dear Katrina,

Notification under section 3.10 of the State Environmental Planning Policy (Transport and Infrastructure) 2021 in relation to the proposed Hunter River High School

Thank you for the notification under section 3.10 of the *State Environmental Planning Policy (Transport and Infrastructure) 2021* in relation to the proposed amendment to the proposed upgrade of Hunter River High School, 36-40 Elkin Avenue, Heatherbrae, NSW 2324. It is understood that the proposed amendment to the development is the alteration to the finished floor level of the new buildings which has been made to address impacts of flooding. The finished floor level of the Administration Building and Learning Hub Building have been raised from 7.3mAHD to 8.5m AHD. No other alterations have been made.

The NSW State Emergency Service (NSW SES) is the agency responsible for dealing with floods, storms and tsunami in NSW. This role includes, planning for, responding to and coordinating the initial recovery from floods. As such, the NSW SES has an interest in the public safety aspects of the development of flood prone land, particularly the potential for changes to land use to either exacerbate existing flood risk or create new flood risk for communities in NSW.

We refer to our previous correspondence dated 2nd August 2023. In addition, we provide the following advice:

- It is the preference of NSW SES that the emergency management strategy of all schools that are at known risk of inundation or isolation is early closure prior to the commencement of the inundation or isolation and before the start of the school day. For Hunter River High School, evacuation must commence sufficiently prior to inundation of surrounding roads, which occurs during minor flooding at the Raymond Terrace gauge. It is noted that the Bureau of Meteorology (BoM) has a target warning lead time of 6 hours for a minor flood classification at this gauge. The majority of the Hunter River High School population, including staff, are expected to be local residents, and therefore familiar with the area's potential flood risks and necessary emergency management procedures.

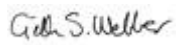
- We recommend the Flood Emergency Response Plan (FERP) is regularly exercised, reviewed, and updated to ensure workers are aware of the procedure and that it remains current and relevant and ensure consistency with the contemporary emergency management arrangements relevant to the area, for example the Port Stephens Local Flood Emergency Sub Plan.
- Integrate the Hazards Near Me NSW App into the FERP for emergency information. School closure will need to be proactive and not rely on receipt of any warnings provided by NSW SES. Educate occupants about the Australian Warning System Warning Level (Emergency Warning, Watch and Act, Advice) definition and the implications for the Flood Emergency Response Plan.
- We support the recommendation to exercise the FERP twice a year: FERPs should be regularly exercised similar to building fire evacuation drills. The NSW SES recommends updating the FERP at regular intervals and whenever additional flood information is available or highlighted during the drills or flood events.
- The NSW SES recommends that all buildings are constructed to withstand any probably maximum flood (PMF) event plus debris load. Risk assessment should consider the full range of flooding, including events up to and including the PMF. We note that the upper floor levels of the proposed new buildings are above the PMF level.
- Due to the extensive and ongoing nature of construction at the site we recommend undertaking an evacuation capability assessment, particularly around the changing logistics on site during and after construction, the increase in student numbers, the availability of buses during a weather event, and the ability of buses and cars to evacuate the whole school to a flood-free location.
- We encourage consideration of additional flood risk management measures to ensure there is not considerable risk to life if the FERP is ignored by students, staff or parents. The FERP should address this, including for example the high likelihood that parents and carers will consider driving through flood waters to reach the children at the school.

To provide additional support in doing the above, NSW SES directs you to the online resources which are available to the community on the www.ses.nsw.gov.au website which include helpful pages such as:

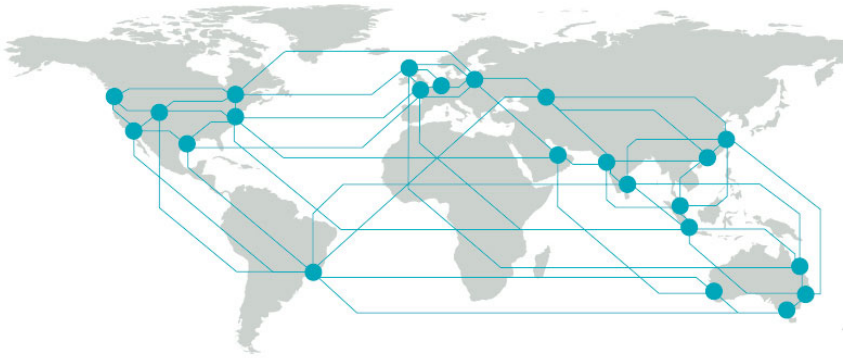
- Know Your Risk | NSW State Emergency Service (enter your town or postcode).
- Local Plans and Guides
- Flood Storm and Tsunami Plans which includes locally endorsed NSW SES Flood Emergency Sub Plans
- Emergency Business Continuity Plan online tool which steps you through the process of developing your own Business Emergency Plan.

Please feel free to contact Suede Stanton-Drudy via email at rra@ses.nsw.gov.au should you wish to discuss any of the matters raised in this correspondence. The NSW SES would also be interested in receiving future correspondence regarding the outcome of this referral via this email address.

Yours sincerely



Gillian Webber
Coordinator Emergency Risk Management Regional
NSW State Emergency Service



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Level 4
4-14 Foster Street
Surry Hills
NSW 2010
Australia
+61 2 8960 7755

Registered in Australia
Registered no. 010 830 421
Registered office
Level 5, 348 Edward Street,
Brisbane QLD 4000 Australia

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