Flood Emergency Management Plan

for

Temporary O'Connell Street Primary School

at

24 O'Connell St, Parramatta

Job No: NL166964
Revision: C
Date: 16/03/2017

	BY	DATE
Prepared	GB	16/03/2017
Checked	AB	16/03/2017
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Report Details

Project: Temporary O'Connell Street Primary School
24 O'Connell Street, Parramatta
Project Ref: NL166964_E01
File Location: Y:\YEAR 2016 Jobs\NL166964\E - Reports\E01 - Flood Emergency Management Plan\NL166964_E01.gb[C].docx

Revision History

Revision	Report Status	Prepared	Reviewed	Issue Date
1	Draft Only	A Brien	-	17/01/2017
2	For Client Review	A Brien	B.Clark	20/01/2017
A	For Approval	A Brien	B Clark	31/01/2017
B	Revised for Approval	A Brien	B Clark	24/02/2017
C	Revised for Approval	A Brien	A Brown	16/03/2017

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Table of Contents

1 Introduction

Northrop Consulting Engineers have prepared a Flood Emergency Management Plan (FEMP) for the proposed demountable classrooms at Temporary O'Connell Street Primary School (the subject site). The subject site is located at 24 O'Connell Street on the northern side of the Parramatta River and is bounded by O'Connell and Marist Streets and the existing school to the north.

The purpose of this FEMP is to promote a satisfactory awareness of expected flood behaviour and risks, identify measures to become flood prepared, and recommend a course of action during and after flood events.

Contained herein is a description of the methodology used to prepare this report, a summary of the likely flooding behaviour, recommendations for flood preparation and response during a flood event.

2 Methodology

This report was based on flood information obtained from the City of Parramatta through a Flood Enquiry Application and subsequent correspondence with Council officers. An XP-STORM model using the TUFLOW hydraulic engine was also built for the 1%AEP and PMF events to compare velocity profiles and behaviour at all locations across the subject site.

Correspondence with WHS officers from the Department of Education has been undertaken regarding their standard emergency management protocols and evacuation drills for the site.

Dialogue with St Patricks Catholic church has also been commenced to obtain their approval for refuge on their property.

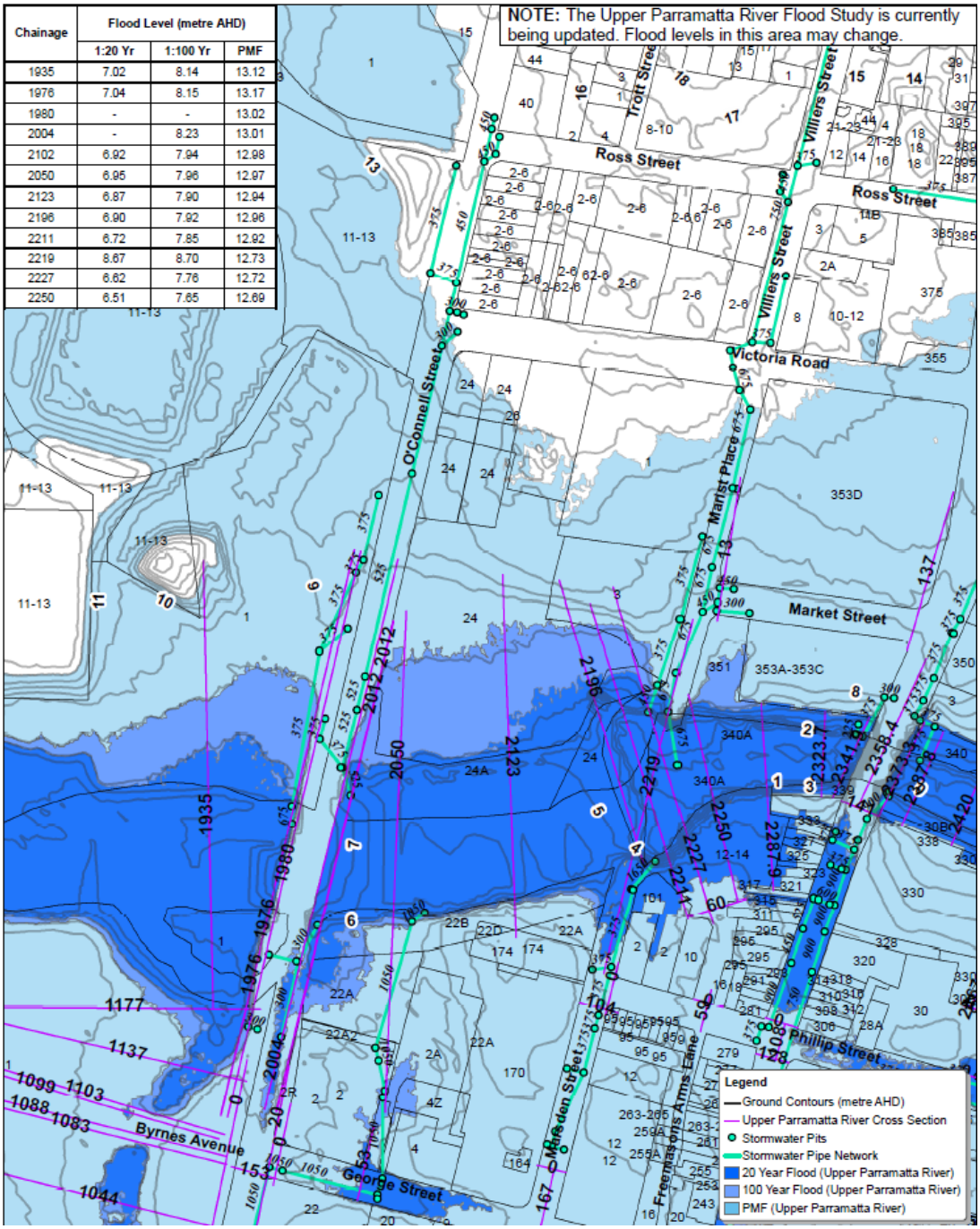
3 Flood Behaviour

3.1 Flood Source

Flooding of the site occurs from the Parramatta River. The catchment of the Upper Parramatta River extends to Seven Hills and Prospect in the west and contains tributaries of the river Toongabbie Creek and Darling Mills Creek. In the vicinity of the site there are a number of hydraulic controls including the O'Connell Street bridge and the Marsden Street weir.

3.2 Peak Flood Levels and Velocities

Peak flood levels have been adopted from the City of Parramatta Flood Map, reproduced below.



Chainage	Flood Level (metre AHD)		
	1:20 Yr	1:100 Yr	PMF
1935	7.02	8.14	13.12
1976	7.04	8.15	13.17
1980	-	-	13.02
2004	-	8.23	13.01
2102	6.92	7.94	12.98
2050	6.95	7.96	12.97
2123	6.87	7.90	12.94
2196	6.90	7.92	12.96
2211	6.72	7.85	12.92
2219	8.67	8.70	12.73
2227	6.62	7.76	12.72
2250	6.51	7.65	12.69

Figure 1 - Estimated flood levels

This shows the 1%AEP levels onsite range from approximately 7.76m AHD to 7.96m AHD. Velocities obtained from further correspondence with Council indicate a maximum of approximately 0.6m/s.

The PMF is expected to be in the order of 12.96m AHD representing significant inundation on-site. Velocities were not available from Council for this event, however preliminary modelling indicates they would be in the order of 1.2m/s.

The classrooms are arranged around the perimeter of the site, apart from the lowest section in the south east. The resultant depths adjacent to the classrooms is a maximum of 600mm in the 1%AEP and 5.7 metres in the PMF.

3.3 Flood Behaviour and Hazard Category

Water will enter the site from the south west as the Parramatta River rises and breaks its banks. Given the hydraulic control of the O'Connell Street bridge upstream, water is expected to flow to the north as it expands before flowing to the east and returning to the river in the vicinity of the Marsden Street weir.

Due to the depth and velocity depth product, the south eastern corner of the school is defined as a high hydraulic hazard area in the 1%AEP – resulting in a **High Flood Risk Precinct**. Due to depths under 800mm and velocity depth products less than 0.4m²/s, the rest of the 1%AEP is considered low hydraulic hazard and as such, **Medium Flood Risk Precinct**. The rest of the site, and immediately to the north is affected by the PMF and falls within the **Low Flood Risk Precinct**. It is noted in the PMF, due to depths and velocities, the site is subjected to a high hydraulic hazard.

Response time from beginning of rain to the peak water level is expected to be in the order of two to six hours. **It is imperative prompt action is taken to avoid adverse exposure to flood hazards.**

4 Flood and Evacuation Warnings

A network of rainfall gauge stations is maintained throughout the greater Parramatta River catchment. These provide information to the Bureau of Meteorology as one source of information informing their flood warning system. The Bureau should issue one of five types of warnings through local radio, television and through their website *http://www.bom.gov.au*. In addition, the SES may issue a flood bulletin, evacuation warning or evacuation order. Due to the sensitive nature of this location, the Department will also register for automatic text and email notifications from the Early Warning Network which filters and passes on BoM warnings, and install a Dipstick Flood Alert System onsite to alert designated staff when flooding has reached a certain level.

The warning types are as follows;

4.1 Severe Weather Warning

Severe weather warnings are issued by the Bureau for potentially dangerous weather conditions. A description of the threat will be included in the warning along with the time for next issue. It is noted that a severe weather warning does not imply that flooding will eventuate. Warnings are generally updated every six hours, or as the event dictates.

This type of warning should be accompanied with predicted extreme rainfall depth as discussed in Section 10, as well as observed values from around the state.

4.2 Severe Thunderstorm Warning

A severe thunderstorm warning will be issued if there is strong evidence that a severe thunderstorm will develop, or if a severe thunderstorm is reported. Flash flooding may occur during severe thunderstorms. Warnings are generally updated every three hours or shorter as required.

4.3 Flood Alert/Watch/Advice

A flood alert/watch/advice will be issued if flood producing rain is expected. This provides an early warning that flooding may occur.

4.4 Generalised Flood Warning

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

This is the most likely warning type for the subject site should evacuation need to occur.

4.5 Minor/Moderate/Severe Flood Warning

A more detailed flood warning may be issued based on any additional information available. Three hours warning time is expected from issue of warning to peak flood level.

Real time river and harbour height data is available from the Bureau of Meteorology website. As at January 2017, this link was *http://www.bom.gov.au/nsw/flood/*.

All warnings will be issued through the website, radio and television. Radio frequencies include ABC Sydney (702AM, 92.9FM, 206.352MHz digital), Triple J (105.7FM), 2DayFM (104.1FM), Triple M (104.9FM), Nova (96.9FM), KIIS (106.5FM), 2GB (873AM), 2UE (954AM). All public and commercial television stations should broadcast warnings.

4.6 SES Flood Bulletins

The SES may issue a flood bulletin providing information of the likely flood consequences and recommended actions.

4.7 Evacuation Warning

The SES may issue an evacuation warning which allows time to prepare for evacuation.

4.8 Evacuation Order

The SES will issue an Evacuation Order if evacuation is required. If this occurs evacuation must be undertaken. Broadcast will be via radio/TV, door knock, automated telephone message or SMS.

4.9 On-site Emergency Tone

The PA system will have an uninterrupted power supply and be configured to sound an emergency tone meaning all visitors, staff and students shall assemble in the designated assembly point (the COLA) under the direct of staff and flood wardens.

This tone will be tested every drill, or once a term. Should it be inoperable in the event of an emergency, an air horn and hand held loudspeaker is located within the Flood Emergency Kit.

4.10 Early Warning Network Automated Text and Email Service

The school is to register for automatic alerts with the Early Warning Network (www.ewn.com.au) which will filter the above BoM warnings and send texts and emails to the Chief Flood Warden and all Floor Flood Wardens to notify them of the situation.

4.11 Dipstick Flood Alert System

The Dipstick Flood Alert System by Tuftec (http://tuftec.com.au) will provide a failsafe for notification on-site in the event that no warnings are issued by either the Bureau or the SES. This device senses when water reaches a pre-determined level (5m AHD in this case) and sends a text with an alert and rate of river rise to nominated stakeholders including Council and all Flood Wardens.

5 Flood Response Personnel

Summarised below in Table 1 are school personnel, their location and responsibilities in managing flood response.

Table 1 - School Flood Response Personnel

	Location	Responsibilities
Department of Education WHS Directorate	Blacktown	Coordinate preparation of school specific Emergency Management Plan implementing recommendations of this report.
Chief Flood Warden - Principal	On-site	- Coordinate flood evacuation drills - one on the first school day, - Monitor weather at 4pm daily for upcoming extreme rainfall events, - Receive notifications from Early Warning Network and Dipstick Flood Alert System, - Decide when Evacuation required, - Liaison with SES or Emergency Services personnel if they attend site.
First Aid Officer	On-site	- Prepare and maintain Flood Emergency Kit, - Manage student Individual Health Care Plans, - Coordinate assistance for staff and students with mobility difficulties.
Deputy Chief Flood Warden	On-site	- Undertake Chief Flood Warden duties when Chief Warden unavailable, - Receive text notifications from EWN and Dipstick.
Floor Wardens	On-site	- Receive text notifications from EWN and Dipstick. - Assist Chief Flood Warden with evacuations.
Staff	On-site	- Maintain calm and direct students through evacuation process.
Mili Lee – St Patricks Cathedral	1 Marist Place - Parramatta	- Nominated contact for refuge point.

6 Assembly Point and Evacuation Routes

6.1 Emergency Assembly Point

The COLA has been nominated as the emergency assembly point. Levels in this area range from approximately 8.1m AHD to 9.1m AHD, above the 1%AEP flood level.

The most vulnerable students should be positioned at the top of the stairs at the highest point, including kindergarten and students with mobility limitations. Year 6 students will assemble at the southern side of the COLA.

This location is central and provides a functional response for the widest variety of situations – both in class or during lunch or recess breaks.

Once everyone is accounted for, evacuation will be undertaken to the agreed refuge under the control of the Flood Wardens and guidance of staff. Two emergency egress points have been nominated for flooding which are located on the high side of the site as shown in Appendix A.

6.2 Evacuation Refuge and Routes

The nominated refuge point is**St Patricks Cathedral,** located at **1 Marist Place, Parramatta.** This location is above the PMF level and provide safe refuge until the flood event has passed. The locations and routes are shown in Figure 2 below.

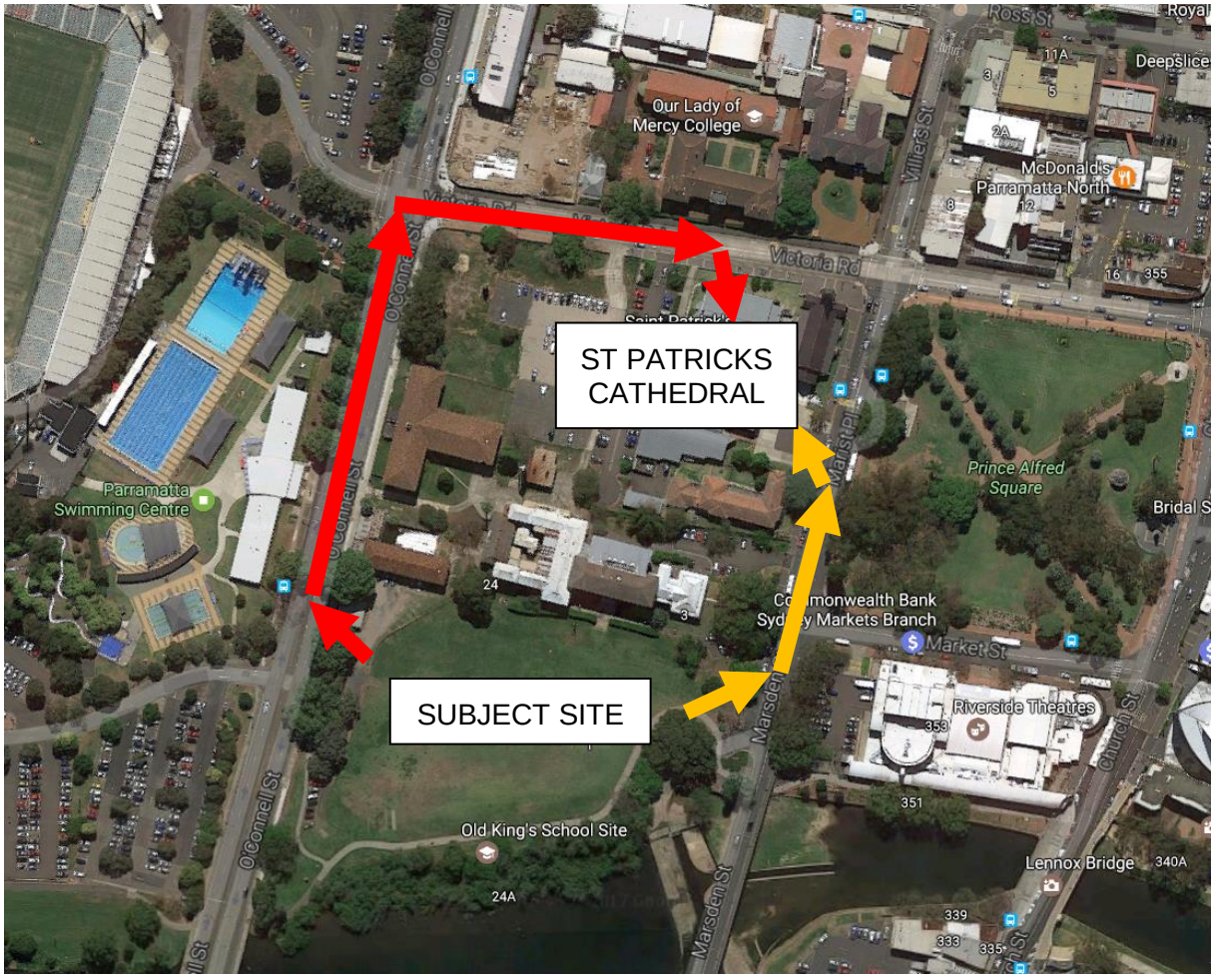


Figure 2 - Evacuation routes

7 Floor Levels and On-site Refuge

Minimum floor levels on this site have been nominated at **9.15m AHD** which is approximately **1.15m above the 1%AEP flood level.** The second storey has a finished floor level of **12.605m AHD** which is approximately **350mm below the PMF level.**

Notwithstanding the above, **on-site refuge is not recommended for this site.** Evacuation will be undertaken in accordance with Section 11 well in advance of the flood peak.

Should you be isolated on-site, move to the second storey units and do not try to evacuate by foot or vehicle through rising flood water. **Call 000 immediately.**

8 Emergency Contact

For emergency assistance during flood events, please call the SES on 132 500.

If you are in a life-threatening situation please call Police, Fire or Ambulance on 000.

Once the decision has been made to activate call;

- **Mili Lee** from St Patrick's Cathedral on **(02) 8839 8415** or **0408 790 732**

to ensure they are ready to accept the school population.

9 Flood Response Preparation

It is the responsibility of the staff that they prepare the school for a flood event. This will be achieved through; induction training provided by DoE, nomination of a flood wardens reporting to the chief flood warden (the Principal), education of flood risks and behaviour, and the preparation and maintenance of a *Floodsafe Emergency Kit*.

The information presented above is a summary of the flood behaviour and considered key to understanding the risks associated with flooding. This should be displayed in conjunction with other emergency information (such as fire, etc) throughout the school.

9.1 Evacuation Drills

Evacuation drills are designed to increase flood awareness within the school population. These drills are to be undertaken twice yearly to familiarise students and staff of the procedures when responding to a flood event. It is expected, due to the sensitive nature of the site with respect to flooding, one of these will be held on the first day of operation and on the first day of the school year.

It is also an opportunity to outline expected flood levels and the dangers of entering flood water. Lessons held after drills could be based on material designed by the SES available from http://www.floodsafe.com.au/information-for-schools/school-program-overview.

For students transitioning from other schools, it is expected they will be familiar with the standard emergency tone and assembly response. For kindergarten students, a special assembly will be held in order to familiarise them with the emergency tone and response procedure.

9.2 Flood Emergency Kit

Potential items for a flood emergency kit are outlined at *www.floodsafe.com.au* and reproduced below.

- A copy of the school emergency management plan,
- Chemical register,
- Air horn and hand held loudspeaker,
- Portable radios with spare batteries,
- A torch with spare batteries,
- A first aid kit,
- Candles and waterproof matches,
- Waterproof bag for valuables,
- A copy of emergency numbers.

When leaving or evacuating add the following items;

- **Sign in book** for visitors and contractors,
- **Individual Health Care Plans** including asthma puffers, diabetes medication and epi pens,
- **Drinking water** and **non-perishable food items**.

The kit should be kept in the **Administration Block** in a roll trolley suitable for easy deployment in the event of an evacuation. The contents of the kit and management during a flood event will be the responsibility of the **First Aid Officer**.

TRIGGER FOR REVIEW AND EDUCATION; Three monthly checking of the emergency kit to ensure all items are in suitable working order. Twice yearly evacuation drill and reminder of the flood risks.

BY WHO; Chief Flood Warden and First Aid Officer

9.3 Monitoring of Weather Situation

It is the responsibility of the Chief Flood Warden (the Principal) to monitor the weather situation of be aware if a warning has been issued. This will be achieved through automatic text messages and emails from the Early Warning Network and checking of local radio station and the Bureau website.

If heavy rain has commenced they are also responsible for monitoring the river level adjacent to the school and coordinating a response accordingly should the Dipstick device be triggered.

TRIGGER FOR MONITORING; Continuous, 4pm daily

BY WHO; Chief Flood Warden

10 Flood Response Actions

10.1 Cancellation of School if Extreme Rainfall Predicted

In order to eliminate the risk to life of students and staff, it is recommended school be cancelled on any day there is a chance of rainfall up to 150mm (i.e. 30% chance of rain 100-150mm). This number represents approximately the amount of rainfall required to produce the 1%AEP flood.

The Chief Flood Warden is responsible reviewing the weather forecasts daily and distributing notification of cancellation to parents and guardians via text, email and to public radio

Consideration should also be given to;

- Blocking floor wastes and toilets,
- Securing objects that are likely to float and cause damage,
- Turning off mains power, water and gas,
- Relocating chemicals above the predicted water level,
- Packing Individual Health Care Plan requirements into the Emergency Kit,

TRIGGERS FOR CANCELLATION;

- Weather forecast of **150mm or more** of rain.

RESPONSIBLE FOR THE DECISION; Chief Flood Warden

10.2 Evacuation During School Hours

Once a Flood Warning or Flood Bulletin for the Parramatta has been issued, or the Dipstick has been triggered;

- **Sound** evacuation tone**.**
- **Chief Flood Warden** to the **Emergency Assembly Point.**
- **Staff direct** all students to the **Emergency Assembly Point**.
- **Flood wardens** clear all buildings.
- **Roll call** to ensure everyone is accounted for.
- **Call ahead** to make sure refuge point is ready to accept students, if not already done so.
- **Leave signage** undercover that evacuation has occurred, and to where.
- **Control** evacuation to higher ground.
- **Wait it out** at the designated refuge point.
- **Maintain regular communication** with staff and students providing updates to the situation.

TRIGGERS FOR EVACUATION;

- Issue of a **Generalised Flood Warning** for flooding of the Parramatta River.
- **Dipstick Flood Alert System** activated.

RESPONSIBLE FOR THE DECISION; Chief Flood Warden

10.3 Evacuation Outside School Hours

Should the school facilities be used outside school hours;

- **Maintain** register of all persons on-site**.**
- **Nominated Flood Warden** who receives all text message and email notifications to be present on-site at all times**.**
- **Sound Emergency Tone and Make Announcements Over PA System.**
- **Direct** everyone to **Emergency Assembly Point.**
- **Roll call** to ensure everyone is accounted for.
- **Call ahead** to make sure refuge point is ready.
- **Leave signage** undercover that evacuation has occurred, and to where.
- **Control** evacuation to higher ground.
- **Wait it out** at the designated refuge point.

TRIGGERS FOR EVACUATION;

- Issue of a **Generalised Flood Warning** for flooding of the Parramatta River.
- **Dipstick Flood Alert System** activated.

RESPONSIBLE FOR THE DECISION; Flood Warden On-site

10.4 Emergency Services Attending Site

It is noted self-motivated evacuation, such as that proposed in this plan, is consistent with the Parramatta DISPLAN, section 23. There is a possibility that emergency services such as Police, Fire, Ambulance or SES may attend site and assume control from the Chief Flood Warden. Once this has occurred, they are in control of the site and any response operations.

TRIGGERS FOR EMERGENCY SERVICES TAKE CONTROL;

- Police, Fire, Ambulance or SES attending site.

RESPONSIBLE FOR THE DECISION; Chief Flood Warden

10.5 After a Flood

Once a Final Flood Warning or SES “All Clear” has been received;

- Parents to collect students from refuge points.
- A thorough check of services such as electricity, sewer, water and gas should be undertaken by qualified persons.
- Advice should be sought from a suitably qualified engineer as to the structural integrity of buildings prior to their use.
- Personal protective equipment should be worn during the clean-up and disinfectant used.

TRIGGER FOR RETURN TO SCHOOL; All clear given by SES or emergency services and school inspected by representatives from Department of Education.

BY WHO; SES, Emergency services, Flood wardens

11 Revision of the Flood Emergency Response Plan

This plan should be revised if the flood study for the Parramatta River is revised to capture changes in the catchment since the last study and the new design rainfall patterns developed as part of Australian Rainfall and Runoff 2016.

The Chief Flood Warden shall be responsible for contacting Council every two months during the period of operation to ensure the latest flood data is being used.

12 Conclusion

The subject site at 24 O'Connell Street, Parramatta is currently susceptible to flooding from the Parramatta River. The proposed development is situated in a location outside the 5%AEP flood extent and high hazard area in the 1%AEP. The site is impacted by up to six metres of water in the PMF event and evacuation offsite to nominated refuge points is recommended if water is predicted to inundate or has begun entering the site.

The school nominates a number of flood wardens to monitor and control the flood situation as well as undertaking two evacuation drills per year. This will provide an opportunity to raise awareness of the flood behaviour around the site and what to do in the event of an emergency.

It is considered therefore the proposed development adequately minimises the flood risks. The recommendations contained herein are considered to assist in managing the risk to life of the staff, students and visitors to the subject site.

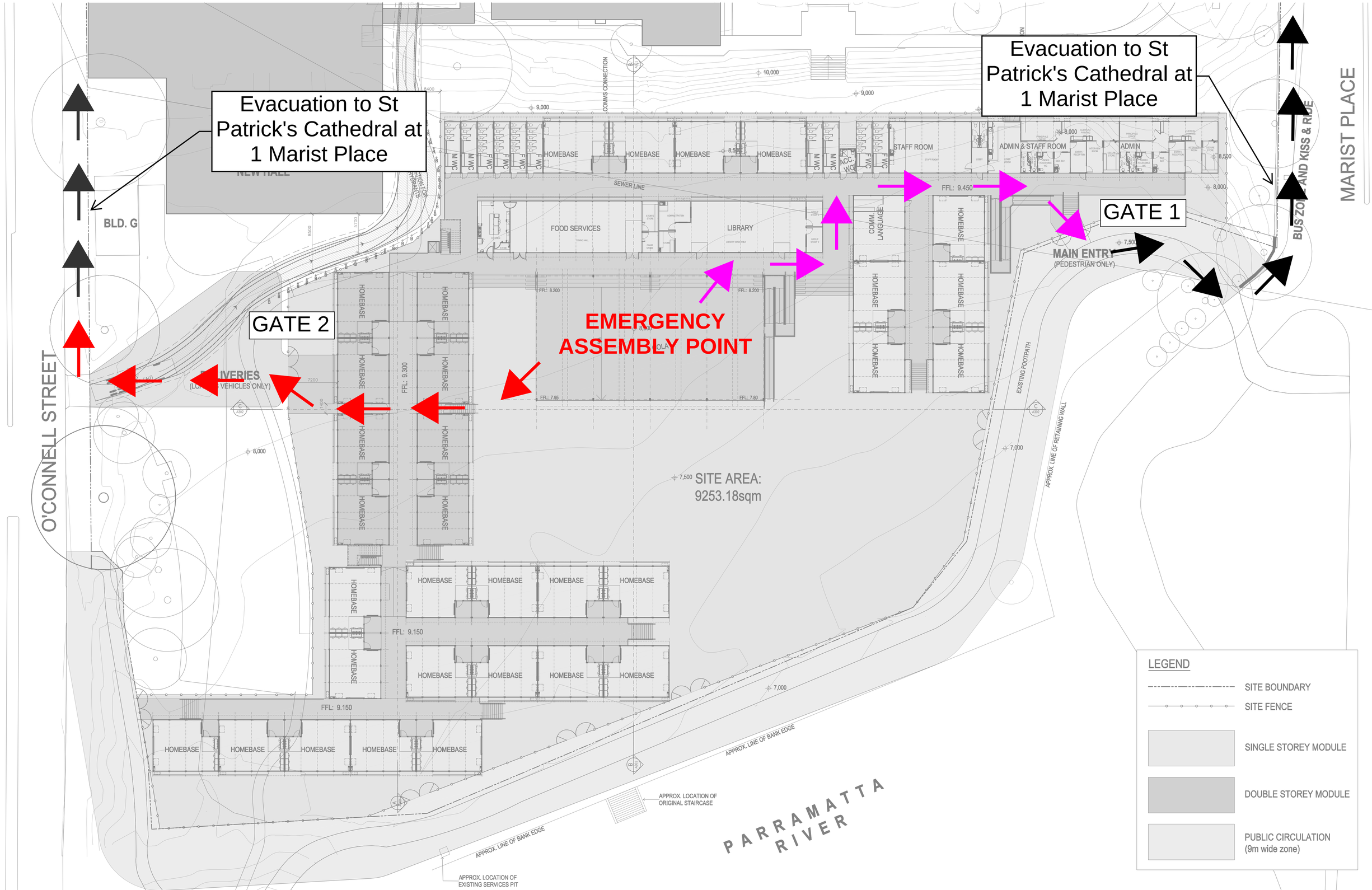
13 References

SES	(2016)	*Floodsafe Website* accessed from http://www.floodsafe.com.au 17th January 2017
SES	(2016)	*Emergency Business Continuity Plan* accessed from http://www.sesemergencyplan.com.au/business/index.php 17th January 2017
Parramatta Council	(2011)	Parramatta DCP 2011 – Chapter 2 Site Planning accessed from http://www.parracity.nsw.gov.au/__data/assets/pdf_file/0020/60365/DCP_2011_Part_2_Site_Planning.pdf 17th January 2017
Parramatta Council	(2016)	Flood Enquiry Application FL/128/2016
Bureau of Meteorology	(2013)	Service Level Specification for Flood Forecasting and Warning Services for New South Wales – Version 2.0

Appendix A : Example Flood Response Summary and Evacuation Routes to Off-site Refuge

Flood Response Summary [EXAMPLE ONLY]

WHEN	WHAT	BY WHO
Prior to Flooding	Assemble Emergency Kit	First Aid Officer
	Check Kit every three months	First Aid Officer
	Coordinate Evacuation Drills twice per year	Chief Flood Warden
	Post Evacuation drills and lesson on flood risks	Staff
	Monitor weather situation at 4pm every evening	Chief Flood Warden
	Apply to Council every two months for updated flood information	Chief Flood Warden
When Extreme Rainfall is Likely	Rainfall predicted to be **150mm or greater.**	Chief Flood Warden
	Make decision that **School is Cancelled.**	Chief Flood Warden
	Notify parents via email / text	Chief Flood Warden
During School Evacuation	**Text / Email from Early Warning Network received or Dipstick Flood Alert activated**	Chief Flood Warden
	Pack Individual Health Care Plan requirements into the Emergency Kit trolley	First Aid Officer
	Sound Evacuation Tone and Chief Warden to Emergency Assembly Point	Chief Warden
	Staff and students to Emergency Evacuation Point	Staff
	Flood wardens to **Clear Buildings**	Flood Wardens
	Roll Call. Ensure everyone is accounted for prior to leaving site.	Staff, Flood Wardens, Chief Warden
	Leave Signage undercover at main entries detailing refuge point	Chief Flood Warden
	Turn off mains gas, electricity and water	Chief Flood Warden
	Control evacuation to higher ground	Staff
	Wait it out at refuge point	All
	Maintain regular communication with staff and students	Flood Wardens
	Do not attempt to drive or walk through floodwaters. If stranded on-site, move to top level and call 000 immediately.	All
Once Risk has Passed / After a Flood	Parents to collect students from refuge points.	Parents
	Check all services and structural stability of school.	Qualified persons



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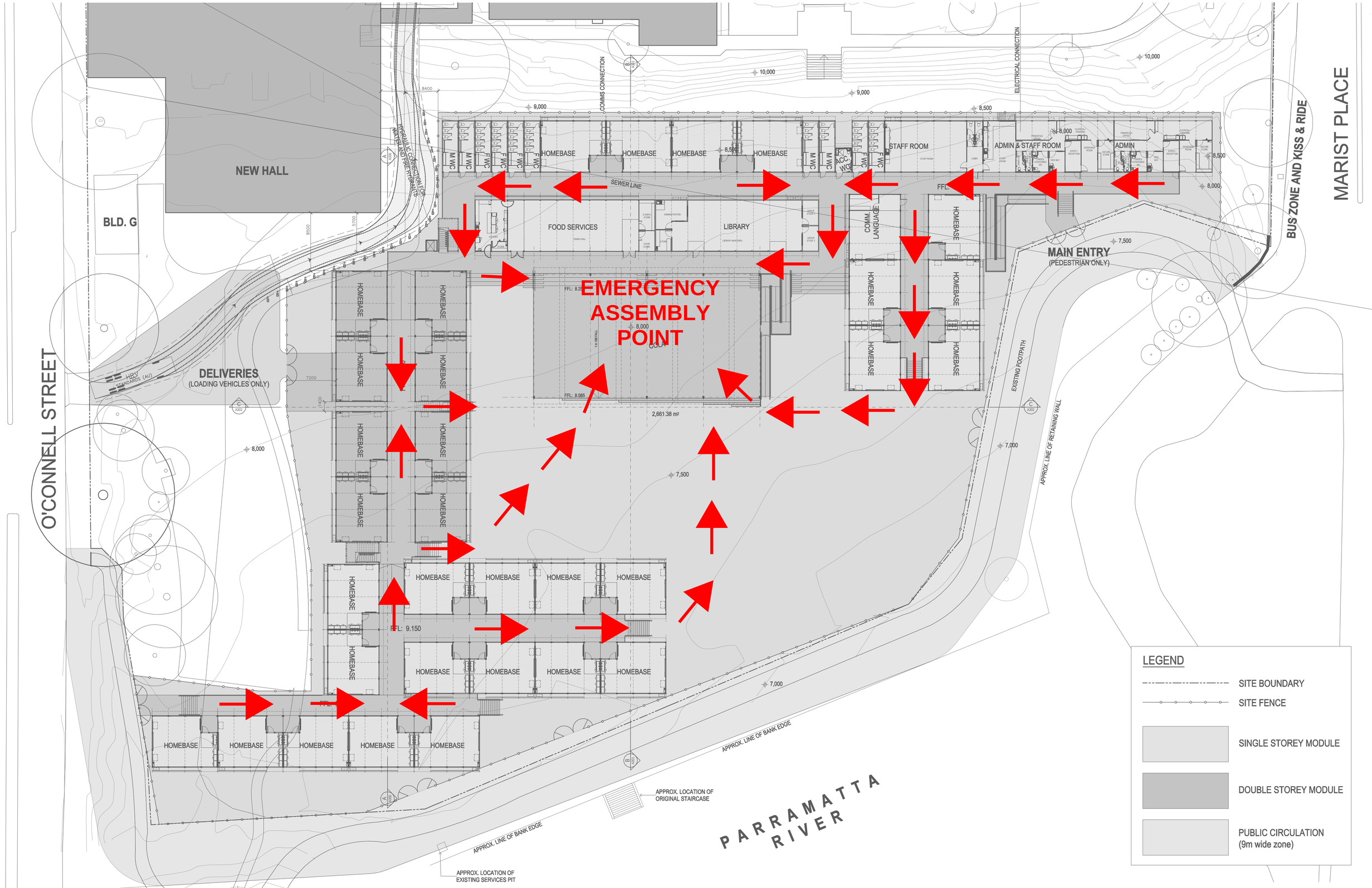
P +61 2 4929 2353 | F +61 2 4926 3069 | E mail@eje.com.au | W www.eje.com.au
A 412 KING STREET, NEWCASTLE, NSW 2300

0 25mm 100mm 200mm ON ORIGINAL A1

TEMPORARY O'CONNELL ST PRIMARY SCHOOL
EMERGENCY EVACUATION EXITS

Appendix B : Example In Classroom Evacuation Plan



LEGEND

- SITE BOUNDARY
- SITE FENCE
- SINGLE STOREY MODULE
- DOUBLE STOREY MODULE
- PUBLIC CIRCULATION (9m wide zone)

EJE ARCHITECTURE
ACN 002 912 843 | **ABN** 82 644 649 849
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TEMPORARY O'CONNELL ST PRIMARY SCHOOL

EMERGENCY ASSEMBLY POINT