

# **Flood Emergency Management Plan.**

**UTS Lindfield Facility**

**100 Eton Road**

**Lindfield NSW 2070**



**EWFw**  
CONSULTING ENGINEERS



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Project:	UTS Lindfield Facility 100 Eaton Road Lindfield
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## **EXECUTIVE SUMMARY**

EWFW is pleased to provide you with this Flood Emergency Management Plan (FEMP) report, which have investigated all pertinent aspects, to the extent that can be identified, for proposed school

The purpose of this FEMP is to promote a situational awareness of expected flooding behaviour and risks, identify measures to become flood prepared, and recommended 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.

Within the report, your attention is drawn to the calculated stormwater runoff values using ARR2016. The current report still complies with the DCP 47 (April 2005) and Part 24R.7 of Ku-ring-gai Council.

The primary objective of the FEMP was to define the flood behaviour within the Lindfield Facility and surrounding catchments through the establishment of an appropriate numerical model. The principal outcome of this report is an understanding of flood behaviour surrounding school that will be used to assess appropriate flooding and evacuation risk.

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# 1. INTRODUCTION

## 1.1. PURPOSE

The preparation of this Flood Emergency Management Report are based on our understanding of the existing topography and our understanding of the local conditions of council DCP Part 24R.7 and constraints surrounding this property.

Our FEMP investigation report is based on the following assumptions and exclusions, which must be carefully considered.

In undertaking the preparation of this report, EWWF hereby advised that it has no control over any approvals, additional 3rd party requirements, competitive development costs, nor does it have any control over any increase in statutory fees or future availability of external drainage services capacity.

This flood report produced by EWWF will therefore be provided on a as is basis of its best judgement as an experienced and qualified engineering consultant, familiar with the stormwater industry.

## 1.2. CURRENT SITE LOCATION

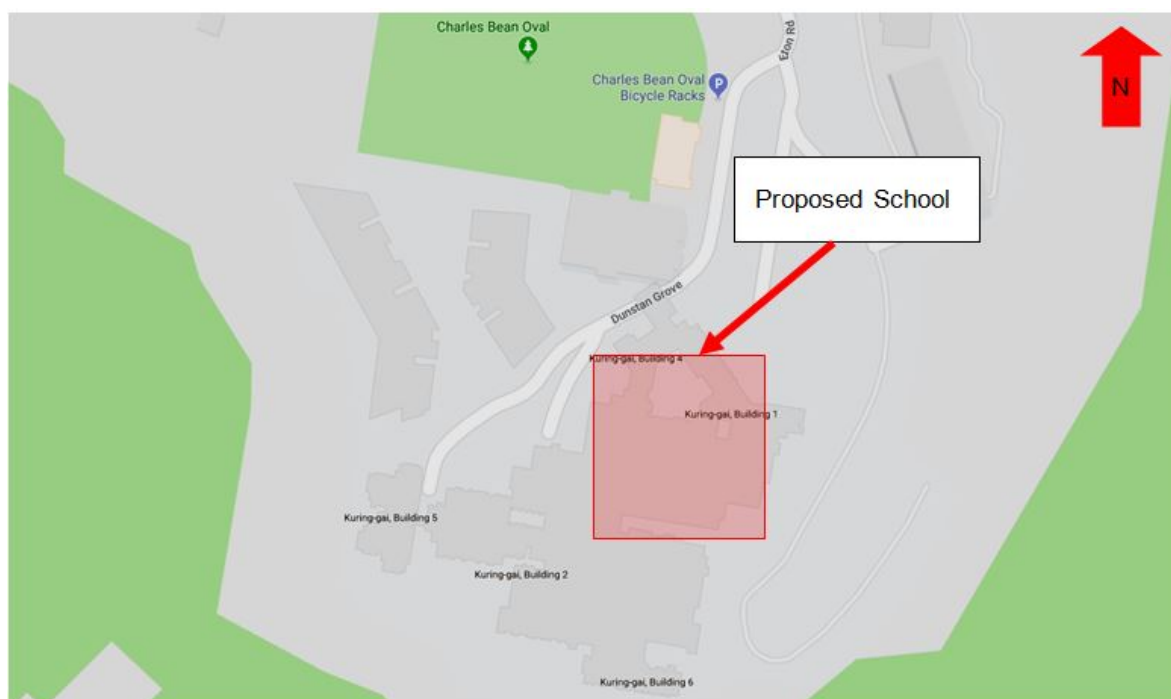
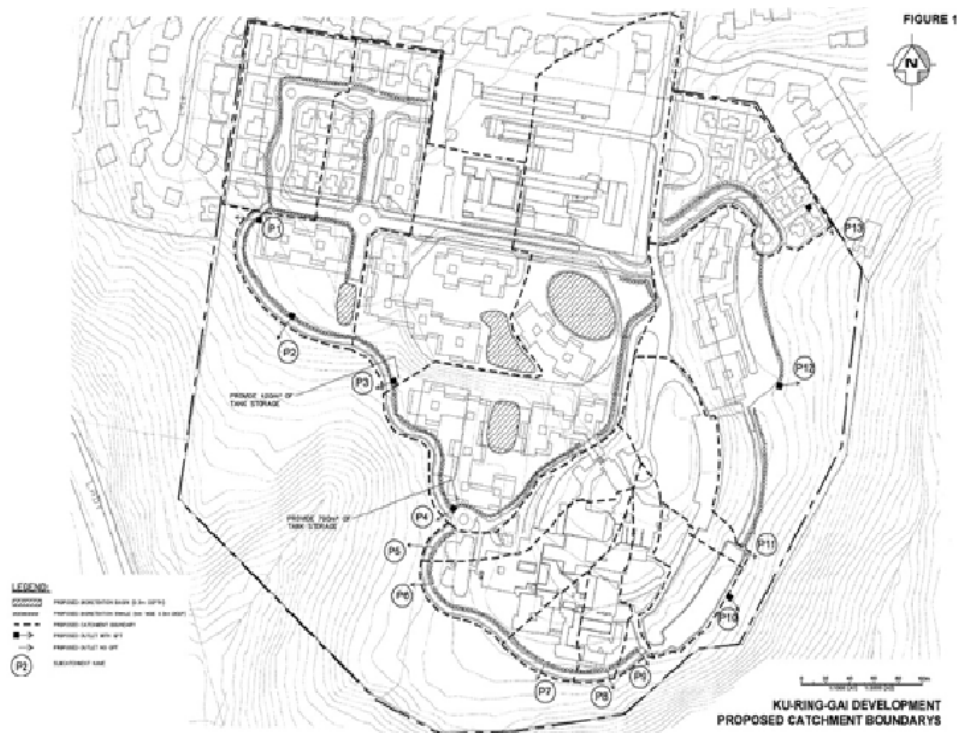


Figure 1.1 Site Location image



**Figure 1.2 Existing Site Survey & Catchments**

(Original from Patterson Britton Report)

### 1.3. AUTHORITY

Authority to undertake this report was provided by Design Inc..

### 1.4. GOVERNING AUTHORITIES

The following Governing Authorities and Regulations shall have jurisdiction over the services:

#### Authority

Local Council – Ku-ring-gai Council  
 Department of Education  
 Emergency Services - SES – Police – Fire - Ambulance  
 Department of Environment Climate Change and Water



## 1.5. GLOSSARY OF TERMINOLOGY

**Table 1.1 Glossary Table**

Annual Exceedance Probability (AEP)	The chance of a flood of a given size (or larger) occurring in any one year, usually expressed as a percentage. For example, if a peak flood discharge of 500 m <sup>3</sup> /s has an AEP of 5%, it means that there is a 5% chance (i.e. a 1 in 20 chance) of a peak discharge of 500 m <sup>3</sup> /s (or larger) occurring in any one year. (see also average recurrence interval)
Australian Height Datum (AHD)	National survey datum corresponding approximately to mean sea level.
Astronomical Tide	Astronomical Tide is the cyclic rising and falling of the Earth's oceans water levels resulting from gravitational forces of the Moon and the Sun acting on the Earth.
Attenuation	Weakening in force or intensity.
Average recurrence interval (ARI)	The long-term average number of years between the occurrence of a flood as big as (or larger than) the selected event. For example, floods with a discharge as great as (or greater than) the 20 year ARI design flood will occur on average once every 20 years. ARI is another way of expressing the likelihood of occurrence of a flood event. (see also annual exceedance probability)
Calibration	The adjustment of model configuration and key parameters to best fit an observed data set.
Catchment	The catchment at a particular point is the area of land that drains to that point.
Design flood event	A hypothetical flood representing a specific likelihood of occurrence (for example the 100 year ARI or 1% AEP floods).
Development	Existing or proposed works that may or may not impact upon flooding. Typical works are filling of land, and the construction of roads, floodway's and buildings.
Discharge	The rate of flow of water measured in terms of volume per unit time, for example, cubic meters per second (m <sup>3</sup> /s). Discharge is different from the speed or velocity of flow, which is a measure of how fast the water is moving for example, meters per second (m/s).
Flood	Relatively high river or creek flows, which overtop the natural or artificial banks, and inundate floodplains and/or coastal inundation resulting from super elevated sea levels and/or waves overtopping coastline defences.
Flood behaviour	The pattern / characteristics / nature of a flood.
Flood fringe	Land that may be affected by flooding but is not designated as floodway or flood storage
Flood hazard	The potential risk to life and limb and potential damage to property resulting from flooding. The degree of flood hazard varies with circumstances across the full range of floods.
Flood level	The height or elevation of floodwaters relative to a datum (typically the Australian Height Datum). Also referred to as "stage".
Flood liable land	see flood prone land

Floodplain	Land adjacent to a river or creek that is periodically inundated due to floods. The floodplain includes all land that is susceptible to inundation by the probable maximum flood (PMF) event.
Floodplain management	The co-ordinated management of activities that occur on the floodplain.
Floodplain risk management plan	A document outlining a range of actions aimed at improving floodplain management. The plan is the principal means of managing the risks associated with the use of the floodplain. A floodplain risk management plan needs to be developed in accordance with the principles and guidelines contained in the NSW Floodplain Management Manual. The plan usually contains both written and diagrammatic information describing how particular areas of the floodplain are to be used and managed to achieve defined objectives.
Flood planning levels (FPL)	Flood planning levels selected for planning purposes are derived from a combination of the adopted flood level plus freeboard, as determined in floodplain management studies and incorporated in floodplain risk management plans. Selection should be based on an understanding of the full range of flood behaviour and the associated flood risk. It should also take into account the social, economic and ecological consequences associated with floods of different severities. Different FPLs may be appropriate for different categories of land use and for different flood plans. The concept of FPLs supersedes the “standard flood event”. As FPLs do not necessarily extend to the limits of flood prone land, floodplain risk management plans may apply to flood prone land beyond that defined by the FPLs.
Flood prone land	Land susceptible to inundation by the probable maximum flood (PMF) event. Under the merit policy, the flood prone definition should not be seen as necessarily precluding development. Floodplain Risk Management Plans should encompass all flood prone land (i.e. the entire floodplain).
Flood source	The source of the floodwaters.
Flood storage	Floodplain area that is important for the temporary storage of floodwaters during a flood.
Floodway	A flow path (sometimes artificial) that carries significant volumes of floodwaters during a flood.
Freeboard	Factors of safety usually expressed as a height above the adopted flood level thus determine the flood planning level. Freeboard tends to compensate for factors such as wave action, localised hydraulic effects and uncertainties in the design flood levels.
Geomorphology	The study of the origin, characteristics and development of land forms.
Gauging (tidal and flood)	Measurement of flows and water levels during tides or flood events.
Historical flood	A flood that has actually occurred.
Hydraulic	Relating to water flow in rivers, estuaries and coastal systems; in particular, the evaluation of flow parameters such as water level and velocity.
Hydrodynamic	Pertaining to the movement of water.
Hydrograph	A graph showing how a river or creek’s discharge changes with time.
Hydrographic survey	Survey of the bed levels of a waterway
Hydrologic	Pertaining to rainfall-runoff processes in catchments

Hydrology	The term given to the study of the rainfall-runoff process in catchments
Hyetograph	A graph showing the distribution of rainfall over time.
Intensity Frequency Duration (IFD) Curve	A statistical representation of rainfall showing the relationship between rainfall intensity, storm duration and frequency (probability) of occurrence.
Isohyets	Equal rainfall contour.
Morphological	Pertaining to geomorphology
Peak flood level, flow or velocity	The maximum flood level, flow or velocity that occurs during a flood event.
Pluviometer	A rainfall gauge capable of continuously measuring rainfall intensity
Probable maximum flood (PMF)	An extreme flood deemed to be the maximum flood likely to occur.
Probability	A statistical measure of the likely frequency or occurrence of flooding.
Riparian	The interface between land and waterway. Literally means “along the river margins”
Runoff	The amount of rainfall from a catchment that actually ends up as flowing water in the river or creek
Stage	See flood level.
Stage hydrograph	A graph of water level over time.
Sub-critical	Refers to flow in a channel that is relatively slow and deep.
Topography	The shape of the surface features of land
Velocity	The speed at which the floodwaters are moving. A flood velocity predicted by a computer flood model is quoted as the depth averaged velocity, i.e. the average velocity throughout the depth of the water column or velocity across the whole river or creek section, or roadway.
Validation	A test of the appropriateness of the adopted model configuration and parameters (through the calibration process) for other observed events.
Water level	See flood level.

## **2. METHODOLOGY**

### **2.1. SCOPE OF METHODOLOGY**

This FEMP report was based on flood information obtained from the Ku-ring-gai Council through a Flood Enquiry Application and subsequent correspondence with Council.

A HECRAS model 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.

Approvals should be obtained from WHS officers from the Department of Education has to be obtained in regarding their standard emergency management protocols and evacuation drills for this site.

Dialogue with Lindfield Primary School also been commenced to obtain their approval for the external refuge on their property.

### 3. FLOOD BEHAVIOR

#### 3.1. FLOOD SOURCE

The UTS FACILITY catchment is split into 11 sub catchments within the Eaton Road site. The upper section is relatively flat and primarily comprises of low to high density residences and the Lane Cove National Park. The lower portion consists of bushland and has steeper terrain, which is susceptible to high flooding velocities contained within the roadways.

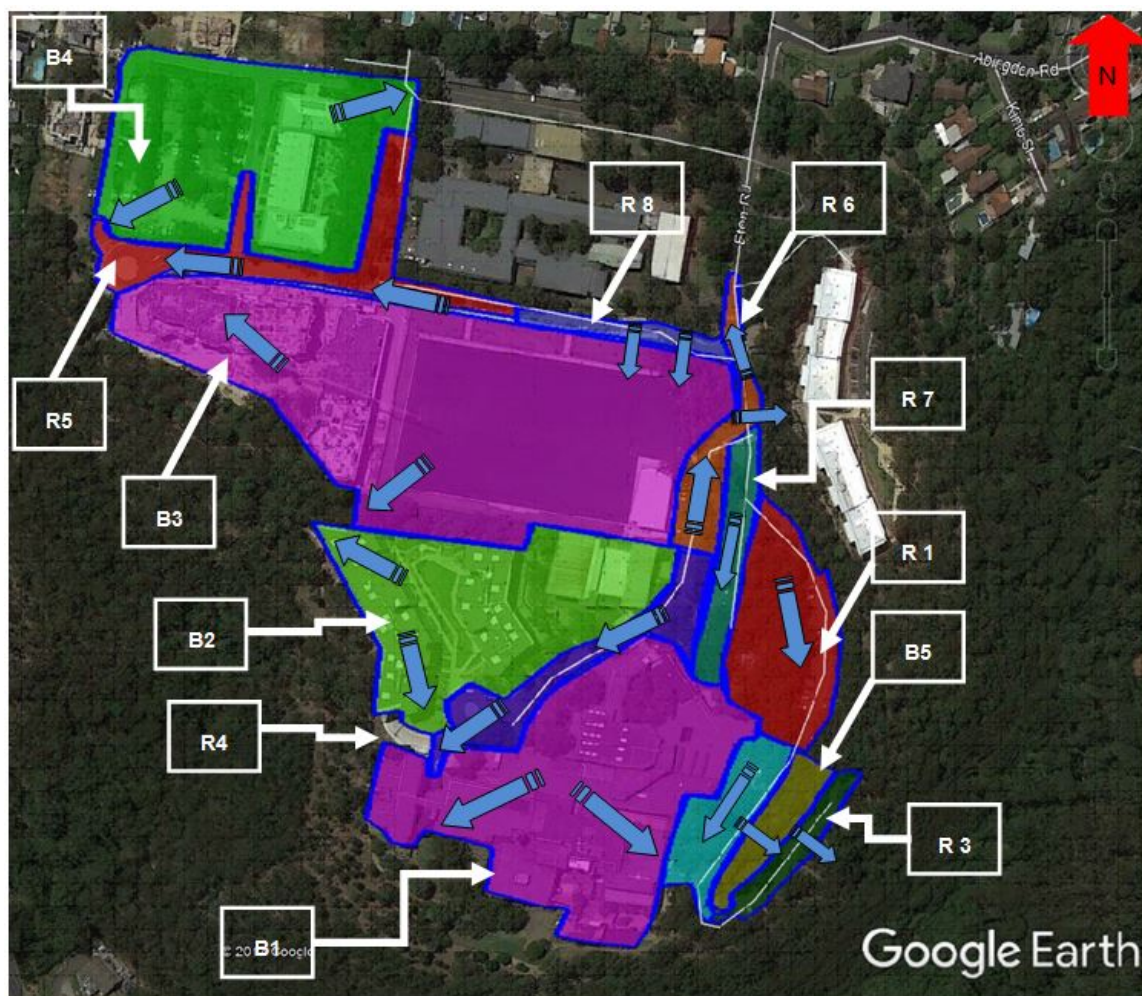


Figure 3.1 Slope Directions of Catchments

Tables 3.1, 3.2 and 3.3

#### 3.2. EXISTING DRAINAGE SYSTEM

The original natural drainage system comprised pits and pipes that in this study are assumed all of them would be blocked in a 1% AEP.

In rainfall events where flows exceed the piped system capacity, surface water runoff is generally conveyed within the road system as uncontrolled flow. When this occurs, there is potential for high hazard flooding conditions resulting from combined high flow velocities and depths.

There were no open channels within the study area to assist with drainage.

### 3.3. CATCHMENT SPECIFICATIONS & PEAK FLOOD LEVELS AND VELOCITIES

Below is a table of catchments, attention should be drawn catchments R4 & R8 as these catchments are the potential hazard catchments for the proposed school, 7 escape routes. (refer Figure 3.1).

Catchment No.	Name	Area (ha)	Upstream Level (m)	Downstream Level (m)	Length of biggest runoff (m)	General Slope (%)
1	R 1	0.53	66	61	135	3.7
2	R 2	0.26	61	54	105	6.7
3	R 3	0.17	54	52	75	2.7
4	R 4	0.28	66	53	165	7.9
5	R 5	0.37	69	63	210	2.9
6	R 6	0.2	67	65	150	1.3
7	R 7	0.19	67	66	125	0.8
8	R 8	0.1	67	63	100	1.0
9	B 1	1.54			-	
10	B 2	1.1			-	
11	B 3	2.41			-	
12	B 4	1.25			-	
13	B 5	0.18			-	

**Table 3.1 Catchment Specifications**

Peak flood levels have been adopted from the HECRAS developed model result table reproduced below. The property is located between Eaton Road (upstream) and Blue Gum Creek (downstream).

Catchment No.	Name	Area (ha)	Upstream Level (m)	Downstream Level (m)	Length of biggest runoff (m)	General Slop (%)	AEP 1% (Cu.m/s)
1	R 1	0.53	66	61	135	3.7	0.378
2	R 2	0.26	61	54	105	6.7	0.185
3	R 3	0.17	54	52	75	2.7	0.121
4	R 4	0.27	66	53	165	7.9	0.193
5	R 5	0.37	69	63	210	2.9	0.264
6	R 6	0.2	67	65	150	1.3	0.143
7	R 7	0.19	67	66	125	0.8	0.136
8	R 8	0.1	67	63	100	1.0	0.071
9	B 1	1.54	-	-	-	-	0.989
10	B 2	1.1	-	-	-	-	0.552
11	B 3	2.41	-	-	-	-	1.12
12	B 4	1.25	-	-	-	-	0.584
13	B 5	0.18	-	-	-	-	0.084

**Table 3.2 Runoff Values**

Catchment No.	Name	Area (ha)	AEP 1% (Cu.m/s)	Maximum Depth (mm)	Maximum Velocity (m/s)
1	R 1	0.53	0.378	134	1.9
2	R 2	0.26	0.185	159	3.1
3	R 3	0.17	0.121	198	1.9
4	R 4	0.27	0.193	184	3
5	R 5	0.37	0.264	216	2.2
6	R 6	0.2	0.143	110	1.2
7	R 7	0.19	0.136	118	0.9
8	R 8	0.1	0.071	92	0.9

**Table 3.3 Runoff vs. Velocity**

### 3.4. FLOOD BEHAVIOUR AND HAZARD CATEGORY

Water will travel along catchment R4 that flows along Dunstan Grove. The water is expected to flow from Eaton Road to Blue Gum Creek.

Due to the depth and velocity depth product, the North face of property is defined as a high hydraulic hazard area in the 1%AEP – resulting in a **Low Flood Risk Precinct, but with a high hydraulic hazard with velocities in excess of 3m/sec.**

Response time from beginning of rain to the peak water level is expected to be in the order of 1 to 3 hours. **It is imperative prompt action is taken to avoid adverse exposure to flood hazards.**

Evacuation, should be the last priority, due to water velocities is likely to cause a loss of footing, and being swept downstream. Velocities greater than 2m/sec is in the High Hazard range

Figures below Provisional flood hazard categorisations

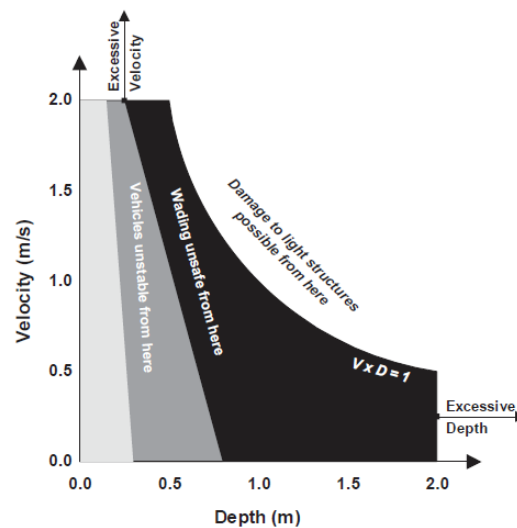


Figure 3.2 Velocity Depth Relationships

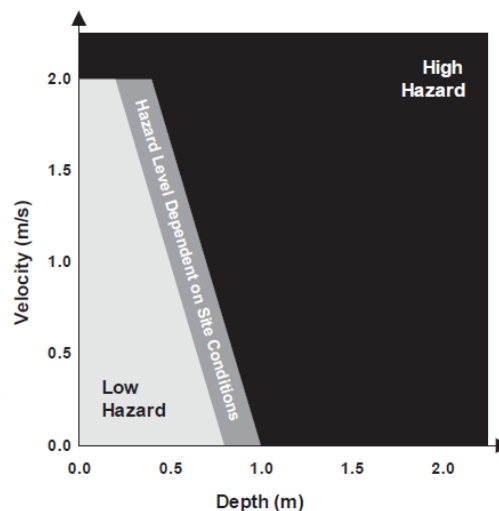


Figure 3.3 Provisional Hazard Categories



## **4. FLOOD AND EVACUATION WARNINGS**

A network of rainfall gauge stations is maintained throughout the greater Watsons Bay 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. The 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/Police 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. EARLY WARNING NETWORK AUTOMATED TEXT AND EMAIL SERVICE**

The property can register for automatic alerts with the Early Warning Network ([www.ewn.com.au](http://www.ewn.com.au)) which will filter the above BoM warnings and send texts and emails to the Chief Flood Warden or property owners to notify them of the situation.

#### **4.10. 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 Auditorium) 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.

#### **4.11. 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, and sends a text with an alert and rate of rise to nominated stakeholders including Council and all Flood Wardens.

## 5. FLOOD RESPONSE PERSONNEL

Summarised below in Table 5.1 are school personnel, their location and responsibilities in managing flood response.

Table 1 - School Flood Response Personnel

	Location	Responsibilities
<b>Department of Education WHS Directorate</b>	Blacktown	Coordinate preparation of school specific Emergency Management Plan implementing recommendations of this report.
<b>Chief Flood Warden – Principal</b>	On-site	<ul style="list-style-type: none"> <li>- Coordinate flood evacuation drills - one on the first school day,</li> <li>- Monitor weather at 4pm daily for upcoming extreme rainfall events,</li> <li>- Receive notifications from Early Warning Network and Dipstick Flood Alert System, (if installed).</li> <li>- Decide when Evacuation required,</li> <li>- Liaison with SES or Emergency Services personnel if they attend site.</li> </ul>
<b>First Aid Officer</b>	On-site	<ul style="list-style-type: none"> <li>- Prepare and maintain Flood Emergency Kit,</li> <li>- Manage student Individual Health Care Plans,</li> <li>- Coordinate assistance for staff and students with mobility difficulties.</li> </ul>
<b>Deputy Chief Flood Warden</b>	On-site	<ul style="list-style-type: none"> <li>- Undertake Chief Flood Warden duties when Chief Warden unavailable,</li> <li>- Receive text notifications from EWN and Dipstick.</li> </ul>
<b>Floor Wardens</b>	On-site	<ul style="list-style-type: none"> <li>- Receive text notifications from EWN and Dipstick.</li> <li>- Assist Chief Flood Warden with evacuations.</li> </ul>
<b>Staff</b>	On-site	<ul style="list-style-type: none"> <li>- Maintain calm and direct students through evacuation process.</li> </ul>
<b>Primary Refuge</b>	On-site	- School Auditorium
<b>Secondary Refuge</b>	On-site	- School Gym
<b>Off Site Refuge</b>	Lindfield Primary School	- Principal of Lindfield P/S - Nominated contact for offsite refuge point.

## 6. ASSEMBLY POINT AND EVACUATION ROUTES

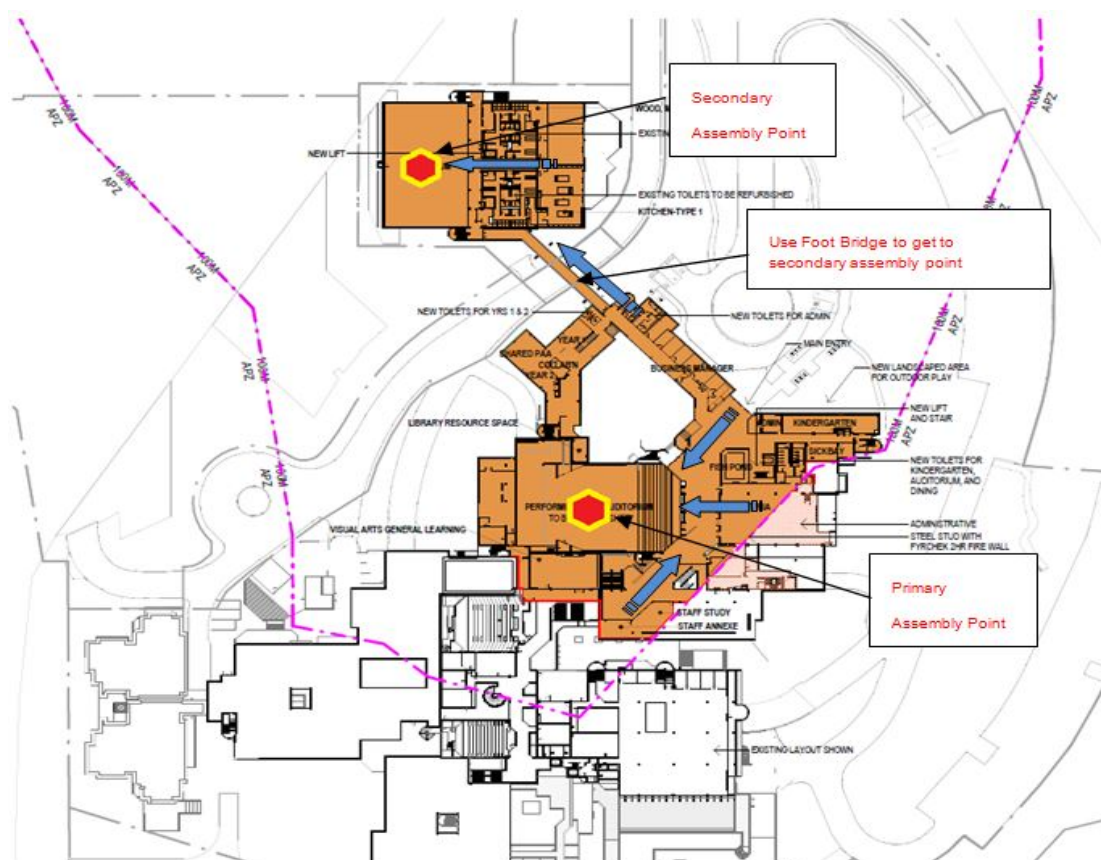
### 6.1. EMERGENCY ASSEMBLY POINT

The Auditorium has been nominated as the emergency assembly point. Levels in this area range from approximately 59m AHD to 63m AHD, above the 1%AEP flood level would be about 200 to 250mm above the exiting levels.

The most vulnerable students should be positioned at the top of the stairs at the highest point, including kindergarten and students with mobility limitations.

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.



**Subject Site**

## 7. FLOOR LEVELS AND ONSITE REFUGE

Minimum floor levels on this site have been nominated at **RL66.28m AHD** which is approximately **500mm above the 1%AEP flood level (66.79m AHD)**. The second storey has a finished floor level of **RL75.43m AHD** which is approximately **8.54m below the PMF level (66.89 AHD)**.

Notwithstanding the above, **on-site refuge is 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;

**The Principal** of Lindfield public school on **(02) 94161903** to ensure they are ready to accept the school population.

## **9. FLOOD RESPONSE PREPARATION**

It is the responsibility of the residents that they prepare the property for a flood event. This will be achieved through; induction training provided by DoE, education of flood risks and behaviour, and the preparation and maintenance of a Flood safe 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 property.

### **9.1. EVACUATION DRILLS**

Evacuation drills are designed to increase flood awareness within the residents. These drills are to be undertaken twice yearly to familiarise residents of the procedures when responding to a flood event.

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](http://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 torches with spare batteries,
- A first aid kits,
- 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, diabetic medication and epi pens,
- **Drinking water** and **non-perishable food items**.

The kit should be kept in a location within the house in a high position 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 Owner / Resident.

### **9.3. MONITORING OF WEATHER SITUATION**

It is the responsibility of the Chief Flood Warden (the Principal) to monitor the weather situation of is 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.

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## 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,

### 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** goes to the Emergency Assembly Point.
- **Staff directs** all students to the **Emergency Assembly Point**.
- **Flood wardens** clear all class rooms within the 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.

### 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.

### 10.4. EMERGENCY SERVICES ATTENDING SITE

It is noted self-motivated evacuation, such as that proposed in this plan, is consistent with the plan. 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.

## **10.5. AFTER A FLOOD EVENT**

. 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.

## **11. REVISION OF THE FLOOD EMERGENCY RESPONSE PLAN**

This plan should be revised if the flood study for the Blue Gum Creek Catchment 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 three months during the period of operation to ensure the latest flood data is being used.

## 12. CONCLUSION

The subject site at UTS Facility is not currently susceptible to flooding from Blue Gum Creek. The proposed development is situated in a location outside the 1% AEP flood extent and low hazard area in the 1% AEP.

It would be safer to assemble in the nominated preferable assembly point's nominated within this report, until the threat has passed and stormwater flows has subsided.

The site is impacted by up to 360mm of water in the PMF event and evacuation offsite to nominated refuge points is recommended as a last resort.

Storm water flows is predicted, along Dunstan Grove. But not inundate or enter the building, with the water travelling along the roadway.

The high water velocities, travelling along the road would be hazardous, and dangers of being swept downstream.

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.

In reference to the Ku-ring-gai DCP 47 (April 2005) and DCP Part 24R.7 this report confirms has been assessed and meets the criteria within the framework of this DCP for this site.

### **Declaration**

We have examined the site, existing improvements and proposed development. In accordance with accepted engineering practices, we have undertaken a flood study of the drainage system and can confirm the accuracy of our calculated results.

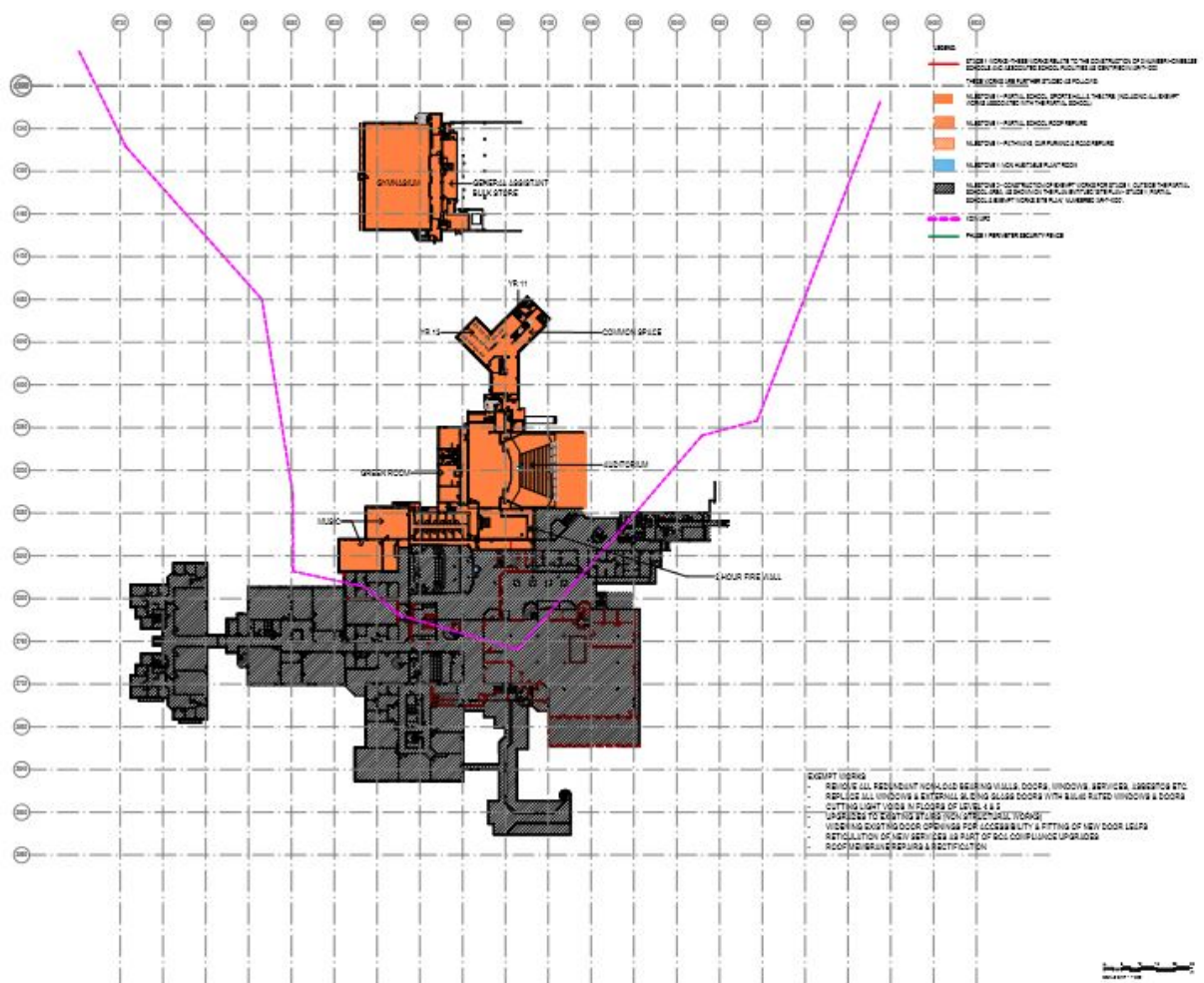
We declare that the proposed development will be safeguarded from flooding and flood damage associated with the design flood standard as defined in Ku-ring-gai DCP 47 (April 2005) and DCP Part 24R.7 of the and will not adversely affect any other structures or properties..

## 13. REFERENCES

- |                                       |              |   |
|---------------------------------------|--------------|---|
| SES                                   | (2016)       | <i>Flood safe Website</i><br>accessed from <a href="http://www.floodsafe.com.au">http://www.floodsafe.com.au</a> 17 <sup>th</sup> January 2017  |
| SES                                   | (2016)       | <i>Emergency Business Continuity Plan</i><br>accessed from<br><a href="http://www.sesemergencyplan.com.au/business/index.php">http://www.sesemergencyplan.com.au/business/index.php</a> 17 <sup>th</sup> January 2017 |
| Bureau of Meteorology                 | (2013)       | Service Level Specification for Flood Forecasting and Warning Services for New South Wales – Version 2.0  |
| Ku-ring-gai Council<br>DCP Part 24R.7 | (2015)       | Flood Study Requirements  |
| Ku-ring-gai Council<br>DCP 47         | (April 2005) | Flood Plan Development  |

## 14. APPENDICIES

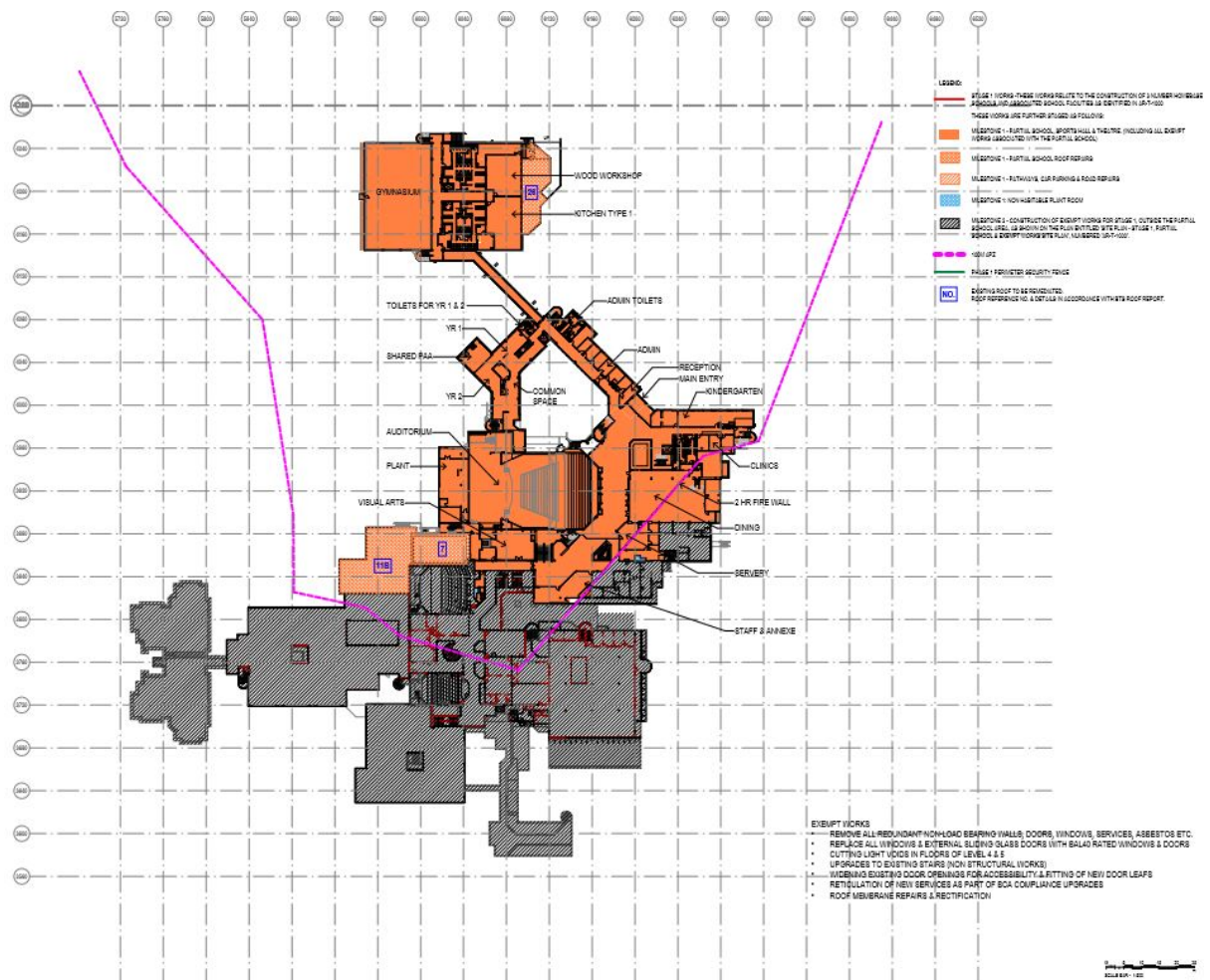
## 14.1. APPENDIX A



**Figure1.12 Ground Level Evacuation Plan**

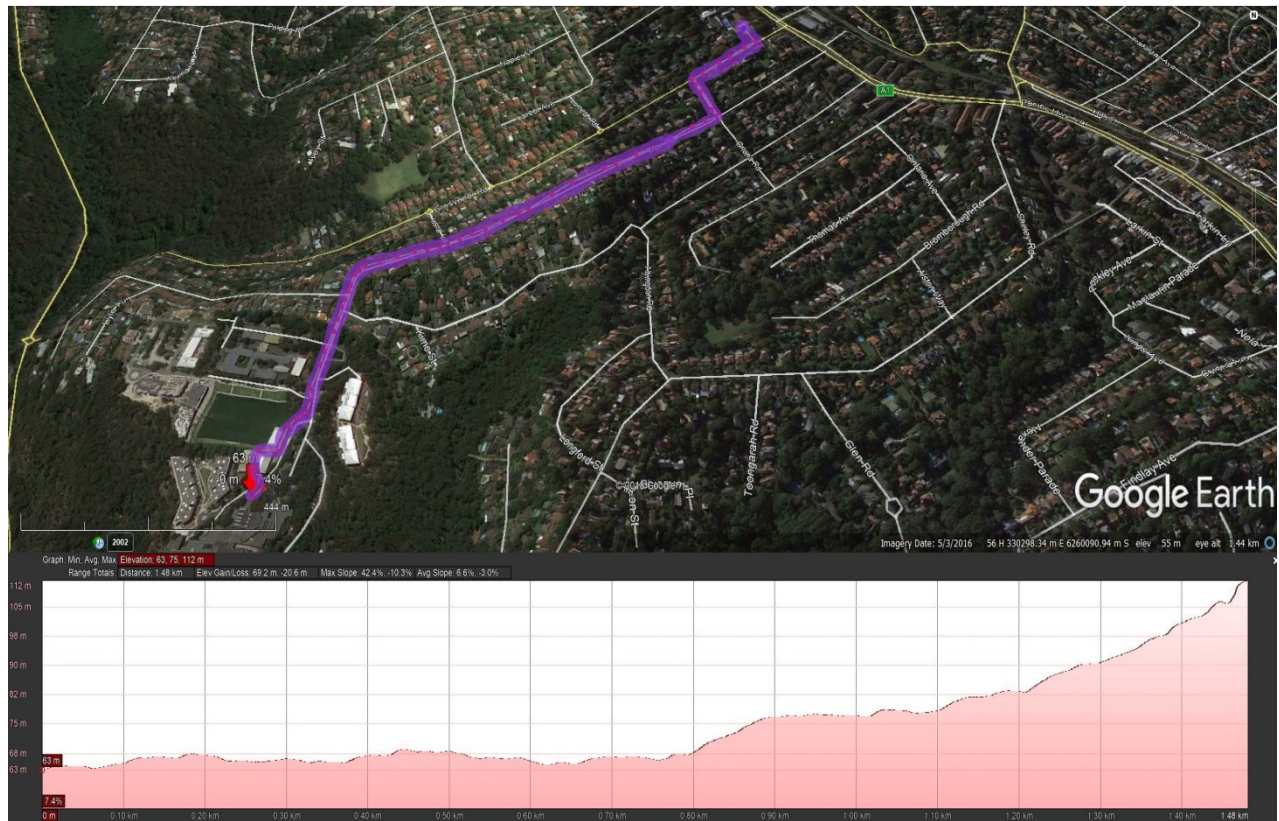


## APPENDIX B



**Figure2.12 Lower Ground Level Evacuation Plan**

### 14.3. APPENDIX C



**Figure 2.13 Flood Escape Route to Eaton St Plan**

The Flood Escape Route from the site would be from the assembly area to Eaton St being at the top of the ridge and on solid ground. The Flood Warden would have to final say and also the following of the North West Metropolitan Emergency Management District Plan (DISPLAN).

#### 14.4. APPENDIX D

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 three months for updated flood information	Chief Flood Warden
When Extreme Rainfall is Likely	Rainfall predicted to be <b>150mm or greater.</b>	Chief Flood Warden
	Make decision that <b>School is Cancelled.</b>	Chief Flood Warden
	Notify parents via email / text	Chief Flood Warden
	If decision to Cancel school, was too late; or children were unable to be picked up. Prepare the non perishable food and water to be taken to the emergency assembly point.	Chief Flood Warden / First Officer
During School Evacuation	<b>Text / Email from Early Warning Network received or Dipstick Flood Alert activated</b>	Chief Flood Warden
	<b>Pack Individual Health Care Plan</b> requirements into the Emergency Kit trolley	First Aid Officer
	<b>Sound Evacuation Tone</b> and Chief Warden to Emergency Assembly Point	Chief Warden
	Staff and students to Emergency Evacuation Point	Staff
	Flood wardens to <b>Clear Buildings &amp; Class Rooms</b>	Flood Wardens
	<b>Roll Call.</b> Ensure everyone is accounted for prior to leaving site.	Staff, Flood Wardens, Chief Warden
	<b>Leave Signage</b> undercover at main entries detailing refuge point	Chief Flood Warden
	<b>Turn off</b> mains gas, electricity and water	Chief Flood Warden
	<b>Control</b> evacuation to higher ground	Staff
	<b>Wait it out</b> at refuge point	All
	Maintain regular communication with staff and students	Flood Wardens
Once Risk has Passed / After a Flood	<b>Do not attempt to drive or walk through floodwaters. If stranded on-site, move to top level and call 000 immediately.</b>	All
	Parents to collect students from refuge points.	Parents
	Check all services and structural stability of school.	Qualified persons

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