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BLAKEBROOK PUBLIC SCHOOL

Flood Emergency Response Plan

Prepared for: School Infrastructure New South Wales

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Revisions

Revision	Description	Date	Prepared by	Approved by	Signature
00	Internal		Karl Umlauff		
01	Final	17/02/23	Karl Umlauff	Jarrod Novosel	
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Table of Contents

Appendices

List of Figures

List of Tables

1 Introduction

1.1 Purpose of Flood Emergency Response Plan

The definition of a Flood Emergency Response Plan is provided below (Australian Institute for Disaster Resilience, 2020):

Flood emergency response (management) plan - A flood emergency plan is a set of agreed arrangements that provide a framework for the management of a flood. A flood emergency plan provides a robust and adaptable framework that outlines the progression of emergency management functions and the parts that each actor will play. This includes defining the roles and responsibilities of different agencies and outlining the strategies for the performance of key flood management capabilities.

The State Emergency and Rescue Management Act 1989 (SERM Act), s 5, defines the stages of an emergency (known as the comprehensive approach), as follows:

(a) prevention in relation to an emergency includes the identification of hazards, the assessment of threats to life and property and the taking of measures to reduce potential loss to life or property, and

(b) preparation in relation to an emergency includes arrangements or plans to deal with an emergency or the effects of an emergency, and

(c) response in relation to an emergency includes the process of combating an emergency and of providing immediate relief for persons affected by an emergency, and

(d) recovery in relation to an emergency includes the process of returning an affected community to its proper level of functioning after an emergency.

This site-specific Flood Emergency Response Plan primarily relates to the preparation and response stages as far as school emergency management is concerned and provides only limited information and procedures to assist the school in the recovery stage.

The NSW SES has no statutory authority to review, assess or approve private flood emergency response plans (Department of Planning and Environment, 2022).

1.1.1 Limitations

It is important to understand there are limitations associated with this site-specific Flood Emergency Response Plan. During an unfolding rainfall or flood event, site-specific FERPs may not be able to provide:

- access to the scale of the event
- knowledge of rapidly changing conditions
- uncertainty of predictions and consequences
- actions and timing necessary on a community scale that considers local flood conditions.

The school community may or do not have:

- an awareness of the uncertainties of flooding
- capacity to undertake training for flood emergency response
- access to the information and resources available to the NSW SES during flooding
- access to new information as it becomes available.

This FERP may not capture the foregoing information.

It is important to note that Local Flood Plans are updated as new information becomes available and as lessons are learnt from flood events, therefore when the Local Flood Plan is updated, a formal review of this FERP should

be undertaken and the FERP updated. The NSW SES should advise the school when the Local Flood Plan is updated and if the FERP requires formal review, updating and approval by the NSW SES.

1.2 Guideline documents

The structure of this FERP has been formulated from guidelines and other Flood Emergency Response Plans.

The primary document adopted as guidance for content of the FERP is:

- *Support for Emergency Management Planning. Flood Risk Management Guide EM01* (Department of Planning and Environment, 2022). The document is structured as follows:
  - Part A – Flood risk management and emergency management planning
  - Part B – Emergency management information from the flood risk management process
  - Part C – Flood emergency response classification of communities
  - Part D – Considering flood emergency management constraints in decision-making.

The following guidelines have also been utilised in preparation of this FERP:

- Australian Disaster Resilience Handbook Collection
  - *Flood Emergency Planning for Disaster Resilience*
  - *Evacuation Planning – Handbook 4.*
- Lismore Development Control Plan – Part A. Chapter 8 Flood Prone Lands (2012)
- Lismore Development Control Plan – Part A. Chapter 8 Flood Prone Lands. *Draft Revised Flood Prone Lands DCP for exhibition (2023).*

1.3 Location

Blakebrook Public School is located at 417 Rosehill Road, Blakebrook, NSW 2480 on Lot 2 DP859866. Goolmangar Creek is to the west of the school and Terania Creek is to the east, as shown on the figure below.

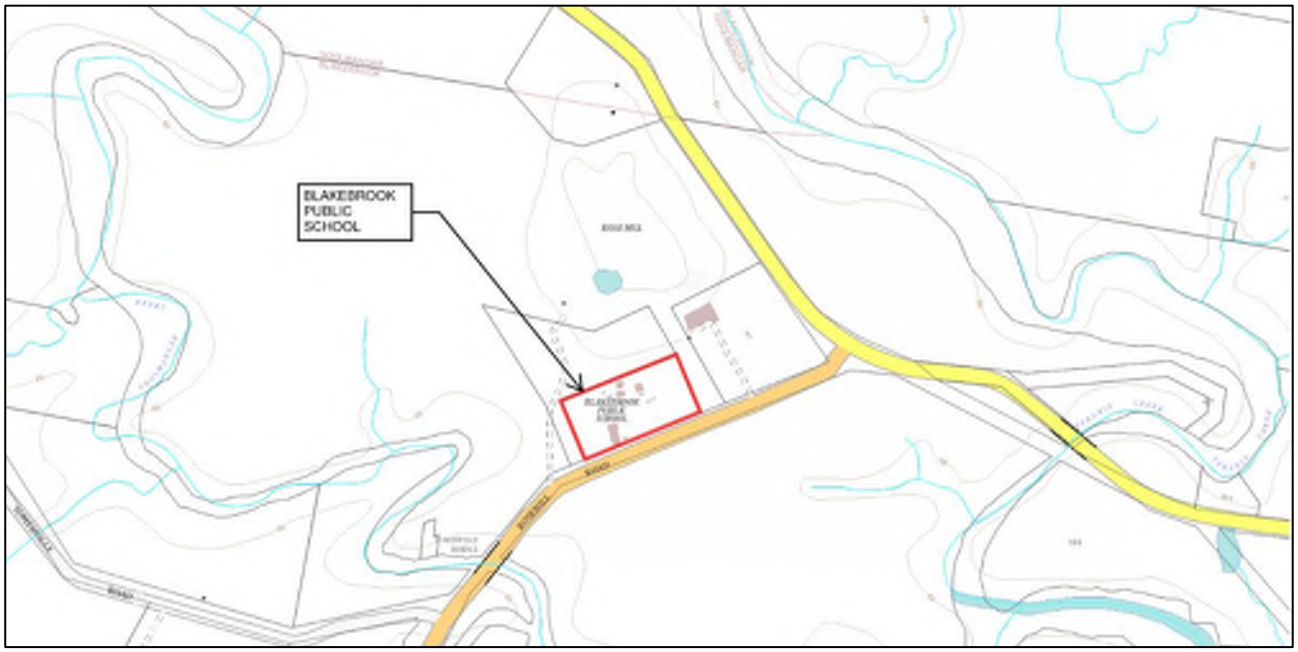


Figure 1-1 School location (NSW Government Spatial Map Viewer)

1.4 Preliminary Masterplan school re-development design

Preliminary Masterplan school re-development site layouts and elevations were developed in 2022 and 2023 by project team consultants for consideration and comment by SINSW. The solution creates a usable undercroft for the school, which provides:

- greater resilience against future flood events with floor levels higher than the minimum habitable floor level required by Council, flood level of 2022 (flood of record), and the Probable Maximum Flood (PMF) level and,
- optimal school amenity and maximises usable spaces.

The proposed floor level for Blakebrook Public School is 19.2 m AHD, which is above the Probable Maximum Flood level of 18.38 m AHD.

The school re-development layout for Blakebrook Public School is shown in the figure below.

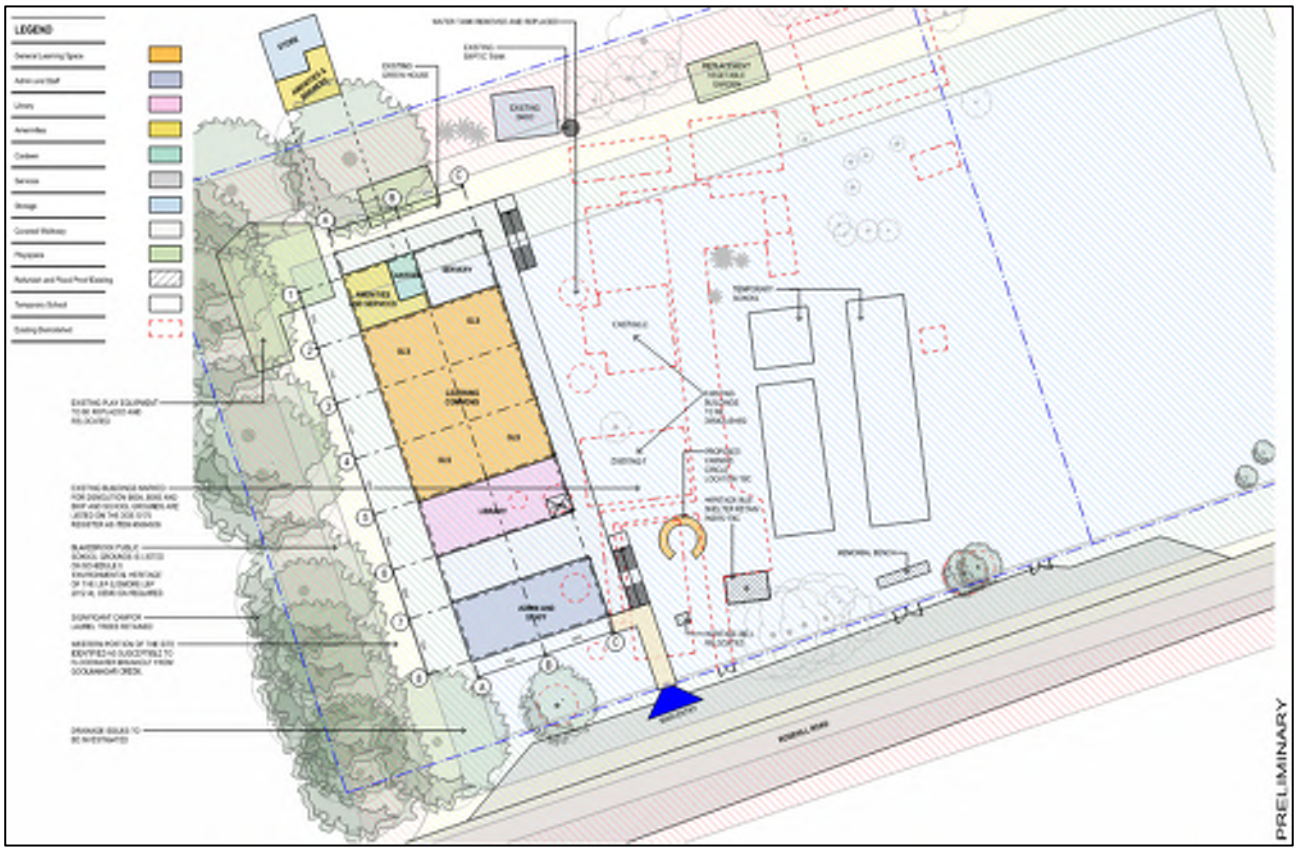


Figure 1-2 Preliminary Masterplan school re-development site layout (Revision F dated 17/07/2023)

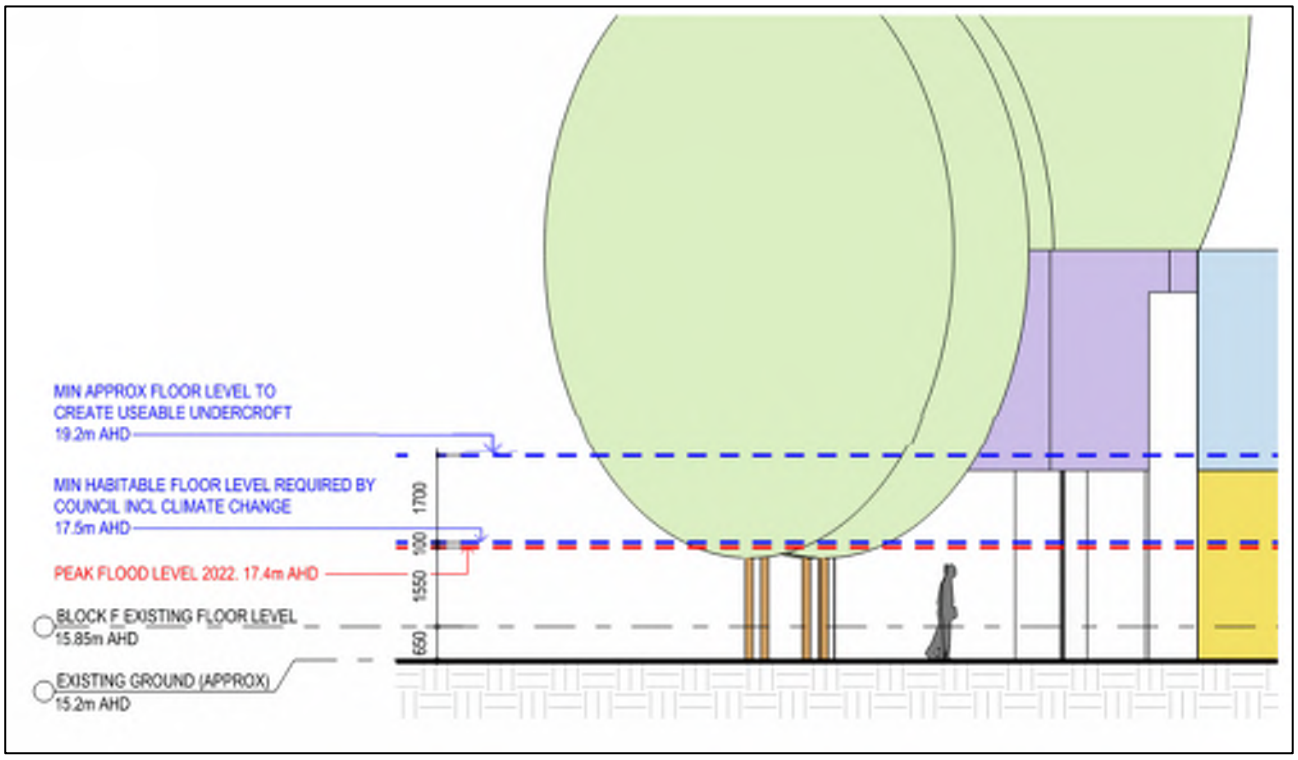


Figure 1-3 Indicative section for Blakebrook Public School

1.5 Compliance with Council Development Control Plans (DCP)

1.5.1 Current Chapter 8 Flood Prone Lands (2012)

Blakebrook Public School is not within a flood risk area defined in the current Chapter 8 Flood Prone Lands (2012) DCP. Lismore City Council officers advised during a meeting that in the absence of a detailed flood study for the school that the minimum floor level for Blakebrook Public School should be at least 17.5 m AHD. This level applies the 1% AEP flood level of 16.0 m AHD (flood contour level upstream of school) quoted in BMT WBM (2013) plus 1 metre freeboard (as advised in BMT WBM (2013)), plus 0.5 metres freeboard to allow for the 0.2% AEP event. A mezzanine level above the 0.2% AEP flood level as an emergency flood refuge was also required.

The preliminary masterplan shows the new school building floor level of 19.2 m AHD is above the Probable Maximum Flood level of 18.38 m AHD stated by Engeny (2023), and therefore complies with the DCP.

1.5.2 Draft Revised Flood Prone Lands DCP for exhibition (2023)

Correspondence from Lismore City Council has advised that following feedback on the draft Flood Chapter, Council has moved educational establishments from being a “sensitive and hazardous' land use to a ”commercial, industrial and community" land use. The minimum habitable floor level for schools is identified as the 0.2% AEP plus 0.5 m freeboard.

The preliminary masterplan shows the new school building floor level of 19.2 m AHD is above the Probable Maximum Flood level of 18.38 m AHD stated by Engeny (2023), and therefore complies with the DCP.

The proposed re-built school meets the development controls for ‘emergency response’ listed in the Draft Revised Flood Prone Lands DCP for exhibition (2023), as follows:

- Emergency response development control 1 – An evacuation plan is provided in this report.
- Emergency response development control 2 – The proposed re-built school has a road evacuation route to land above the Probable Maximum Flood level (refer to Appendix B Appendix D).

- Emergency response development control 3 – The proposed re-built school will have the minimum floor level above the Probable Maximum Flood level. Details for evacuation by boat can be undertaken in detailed design. This report's evacuation strategy is to evacuate the school prior to flooding. The re-built school does not propose a 'shelter in place' strategy during flooding.
- Emergency response development control 4 – Reliable egress to an area above the Probable Maximum Flood level (during flooding) is by foot to high ground at 427 Rosehill Road, Blakebrook (to the north of the school). Refer to Appendix B Appendix D . This refuge area is accessible by boat.

1.6 Glossary of terms

Abbreviation/acronym or term	Definition
Annual Exceedance Probability (AEP)	The chance of a flood event can be described using a variety of terms, but the preferred method is the Annual Exceedance Probability (AEP). A flood with a 1% AEP has a 1% chance (or 1 in 100 odds) of being exceeded in any year. Currently, the 1% AEP event is designated as having an 'acceptable' risk for planning purposes nearly everywhere in Australia. However, good planning needs to consider more than just the 1% AEP flood.
Areas with overland escape route	Are those areas where escape from rising floodwater is possible by traversing overland to higher ground (Figure 14). The area may also have access roads to flood-free land that cross lower-lying flood prone land. Evacuation can take place by road only until access roads are closed by floodwater. Escape from rising floodwater after roads are cut is possible but involves traversing overland to higher ground. Anyone not able to walk out before access roads are cut must be reached by using boats and aircraft. If people cannot get out before inundation, rescue will most likely be from rooftops.
Australian Height Datum (AHD)	The Australian Height Datum (AHD) is the official national vertical datum for Australia. The datum that sets mean sea level as zero elevation. The level of 0.0 metres AHD is approximately mean sea level. All levels are based around this benchmark that is recognised as the Australian standard. AHD is a measurement used in Council flood studies.
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.
Effective warning time	The effective warning time available to a flood-prone community is equal to the time between the delivery of an official warning to prepare for imminent flooding and the loss of evacuation routes due to flooding. The effective warning time is typically used for people to self-evacuate, to move farm equipment, move stock, raise furniture, and transport their possessions.
Flash flooding	Flood that is sudden and unexpected. It is often caused by sudden local or nearby heavy rainfall. It is generally not possible to issue detailed flood warnings for flash flooding. However, generalised warnings may be possible. It is often defined as flooding that peaks within six hours of the causative rain. Local overland flooding, or flash flooding, occurs within 6 hours of rain falling and can happen after a short burst of heavy rain such as from a thunderstorm. It is generally short in duration but can be dangerous, as high intensity rainfall events can lead to high velocity floods. These can result in safety issues as there is often little warning of such floods because gauges, which are typically placed in river systems, may not pick up localised drainage issues.
Flood awareness	An appreciation of the likely effects of flooding, and a knowledge of the relevant flood warning, response and evacuation procedures. In communities with a high degree of flood awareness, the response to flood warnings is prompt and effective. In communities with a low degree of flood awareness, flood warnings are liable to be ignored or misunderstood, and residents are often confused about what they should do, when to evacuate, what to take with them and where it should be taken.
Flood hazard	A measure of the floodwaters potential to cause harm or loss. Full definitions of hazard categories are provided in: ▪ Australian Disaster Resilience Handbook Collection. *Flood hazard guideline 7-3*. ▪ NSW Government. Department Of Environment & Climate Change. *Flood Emergency Response Planning Classification Of Communities* ▪ NSW Government. Department of Infrastructure, Planning and Natural Resources. Floodplain Development Manual. The management of flood liable land. April 2005.
Flood Watch (Bureau of Meteorology)	The Bureau issues a Flood Watch to provide early advice of a developing situation that may lead to flooding. A Flood Watch is not a warning of imminent flooding. A Flood Watch provides information about a developing weather situation including forecast rainfall totals, catchments at risk of flooding, and indicative severity where required. The product also provides links to weather warnings, other Bureau flood-related products, and contact details and information of relevant emergency services. Although there is uncertainty attached to a Flood Watch, its early dissemination can help individuals and communities to be better prepared should flooding eventuate.

Abbreviation/acronym or term	Definition
Flood Warning (Bureau of Meteorology)	Flood Warnings are issued by the Bureau to advise that flooding is occurring or expected to occur in a geographical area based on defined criteria. Flood Warnings may include either qualitative or quantitative predictions or may include a statement about future flooding that is more generalised. The type of prediction provided depends on the quality of real-time rainfall and river level data, the capability of rainfall and hydrological forecast models and the level of service required. A quantitative or qualitative flood warning of Minor, Moderate or Major flooding is provided in areas where the Bureau has specialised warning systems. They provide advanced warning about the locations along river valleys where flooding is expected, the likely class of flooding and when it is likely to occur. Predictions of expected water levels and the timing of flood peaks are provided at key forecast locations.
Gauge height	The height of a flood level at a particular gauge site related to a specified datum. The datum may or may not be the AHD (see also Australian Height Datum).
High Flood Island (HFI)	The flood island has land higher than the limit of flooding for the event being considered. During a flood these high islands are isolated from other areas of the community by floodwater, terrain, development, or infrastructure. However, there is an opportunity for people to retreat to higher ground within the island, and therefore, the direct risk to life is reduced. The area may require resupply by boat or air if not evacuated before the road is cut. If it is not possible to provide adequate support (such as community and medical facilities) during the period of isolation, evacuation will have to take place before isolation occurs. Isolation without these services is more likely to result in fatal decisions to cross floodwaters.
Likelihood	Likelihood is the terminology that is used to describe the annual chance of flooding from river, creek and storm tide.
Minor flooding (Bureau of Meteorology)	Causes inconvenience. Low-lying areas next to watercourses are inundated which may require the removal of stock and equipment. Minor roads may be closed and low-level bridges submerged.
Moderate flooding (Bureau of Meteorology)	In addition to the above, the evacuation of some houses may be required. Main traffic routes may be cut by flood waters. Some buildings may be affected above the floor level.
Major flooding (Bureau of Meteorology)	In addition to the above, extensive areas are inundated. Many buildings may be affected above the floor level. Properties and suburbs are likely to be isolated and major traffic routes likely to be closed. Evacuation of people from flood-affected areas may be required. Utility services may be impacted.
Probable Maximum Flood (PMF)	The PMF is the largest flood that could conceivably occur at a particular location, usually estimated from PMP and, where applicable, snow melt, coupled with the worst flood-producing catchment conditions. Generally, it is not physically or economically possible to provide complete protection against this event. The PMF defines the extent of flood-prone land – that is, the floodplain. The extent, nature and potential consequences of flooding associated with a range of events rarer than the flood used for designing mitigation works and controlling development, up to and including the PMF event, should be addressed in a floodplain risk management study.
Riverine flooding (from heavy rainfall)	Riverine flooding happens when widespread, prolonged rain falls over the catchment of a river. As the river channel reaches capacity, excess water flows over its banks causing flooding. River flooding downstream can occur hours or days after the rainfall has finished. River flooding may coincide or exacerbate flooding in adjacent creeks and tributaries and may itself be exacerbated by higher than normal high tide conditions. Riverine flooding can: ▪ contain fast flowing, high velocity elements which create a risk to life ▪ rise quickly causing specific areas to become isolated ▪ create challenges for evacuating people safely ▪ create standing or slow-moving water that lasts for days to weeks ▪ cause infrastructure to malfunction further contributing to community scale disruption (e.g. water and sewer systems not functioning, power supply interrupted, road pavements damaged, land slips, etc.) ▪ cause environmental health issues due to contaminated water from overflowing sewers/septic tanks, and floating debris including animal carcasses.

Abbreviation/acronym or term	Definition
Severe Weather Warning (Bureau of Meteorology)	The Bureau of Meteorology issues Severe Weather Warnings whenever severe weather is occurring in an area or is expected to develop or move into an area. The warnings describe the area under threat and the expected hazards. Warnings are issued with varying lead-times, depending on the weather situation, and range from just an hour or two to 24 hours or sometimes more. In relation to rainfall and flooding, Severe Weather Warnings are issued for very heavy rain that may lead to flash flooding (as well as other severe weather types).
Sunny day dam failure	Dam failure as a result of factors other than flood i.e. other than flood flow into the reservoir. Causes of "Sunny Day" dam failure can include internal erosion, landslide, piping, earthquake or sabotage.

2 Flood Behaviour

2.1 Catchment

The school is within the Terania Creek catchment and floodplain of Goolmangar Creek and Terania Creek. The two dominant land uses of the Terania Creek catchment are forest and rural (open grassland) areas. The school location relative to Goolmangar Creek and Terania Creek is shown in the figure below.

Figure 2-1 Location of Blakebrook Public School between Goolmangar Creek and Terania Creek

The catchment area of Terania Creek (including Goolmangar Creek catchment) is approximately 417 km^2. The location of Blakebrook Public School in the catchment is shown in the figure below. Goolmangar Creek is a tributary of Terania Creek. Terania Creek then joins with Leycester Creek, which then ends at the Wilsons River at Lismore City. Refer to Figure 2-2 for illustration.

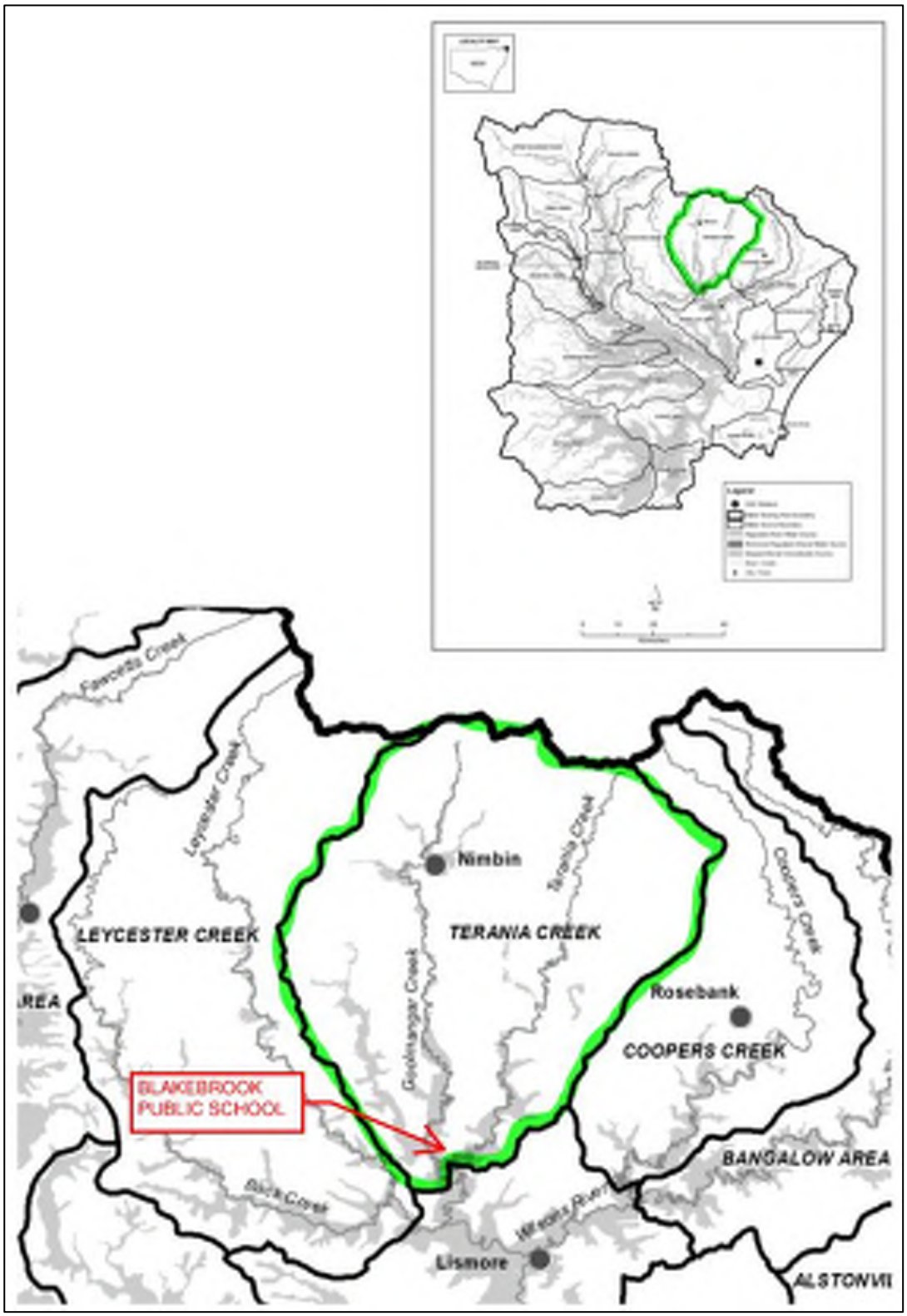


Figure 2-2 Terania Creek catchment (Background image source: NSW Government, 2010)

2.2 Flood sources and mechanism

Blakebrook Public School can be impacted by three types of flooding, overland flow, creek flooding and riverine flooding. The school is not within the area covered by the Lismore Floodplain Risk Management Plan 2014 (Lismore City Council, 2014).

2.2.1 Overland flow

Overland flow (surface runoff) from the hillside to the north of the school could cross the school's northern boundary, traversing the school grounds (developed building area and playing fields) towards Rosehill Road and the school's western boundary. It is noted that a farm dam is located on Lot 4 DP1127161 to the north of the school. Discharge from the farm dam may have the potential to enter the school grounds. Based on contours, this appears unlikely, however can only be confirmed by a hydrological and hydraulic study. The overland flow is depicted by indicative arrows in the figure below.

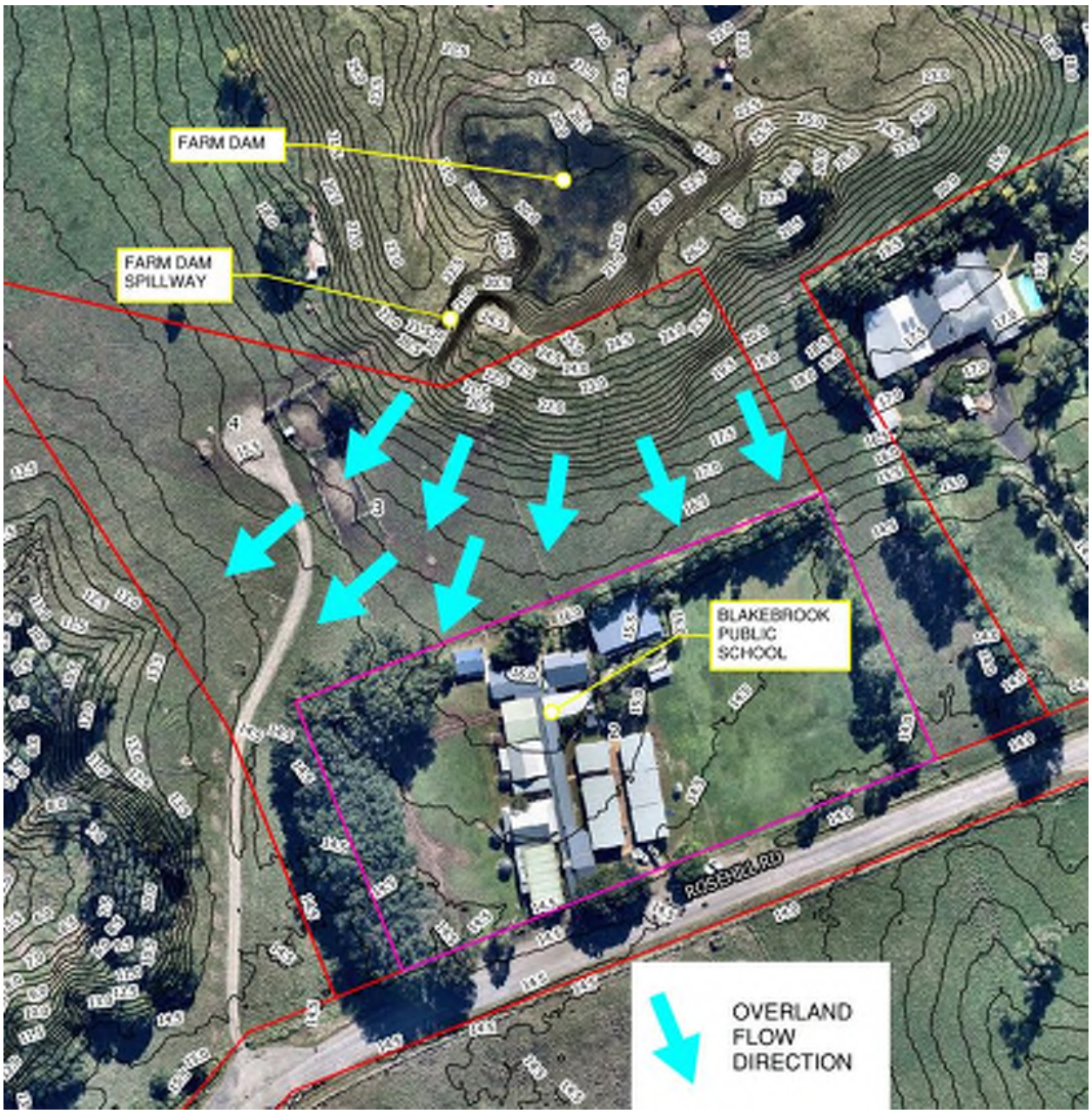


Figure 2-3 Indicative direction of overland flow

2.2.2 Creek flooding

Blakebrook Public School is located between Goolmangar Creek and Terania Creek, and just upstream of their confluence. The school grounds are subject to impact by floodwater that breaks the banks of Goolmangar Creek or Terania Creek. In the February 2022 flood event, flood water in Goolmangar Creek to the west of the school appears to have broken its banks and entered the school at the western boundary. This was evident at the site inspection by grass debris that was caught on the wire fence at this boundary as shown in the plate below.

Plate 2-1 Grass debris on fence at western boundary of school from February 2022 flood event

The indicative direction of flow of floodwater breakout from Goolmangar Creek is depicted in the figure below.

Figure 2-4 Indicative direction of flow of floodwater breakout from Goolmangar Creek

Refer to the Appendices for a figure showing the flood extent in the 1% AEP event.

2.2.3 Riverine flooding

Coincident long duration, high rainfall over the upper Richmond River catchment causing flooding of Leycester Creek and Wilsons River, combined with flooding of Terania Creek and Goolmangar Creek, can impact the school grounds and local area. The raised tailwater (backwater) from rare flooding in Leycester Creek and the Wilsons River creates a longer duration of flooding at the school. This is the mechanism that essentially occurred in the February 2022 flood event.

2.2.4 Dambreak flooding

Rocky Creek Dam is a declared dam in New South Wales as of December 2022. Rocky Creek Dam is a water supply dam with a 28 metre high, rock fill, clay core embankment. The full supply capacity is 14 000 megalitres (Rous County Council, 2023).

In the unlikely event of dambreak of Rocky Creek Dam, stored water would be released in an uncontrolled flood wave downstream along Rocky Creek then Terania Creek and the vicinity of Blakebrook Public School. Refer to section 2.4.4, section 2.6.4 and Appendix D for more information.

The location of Rocky Creek Dam is shown in the figure below.

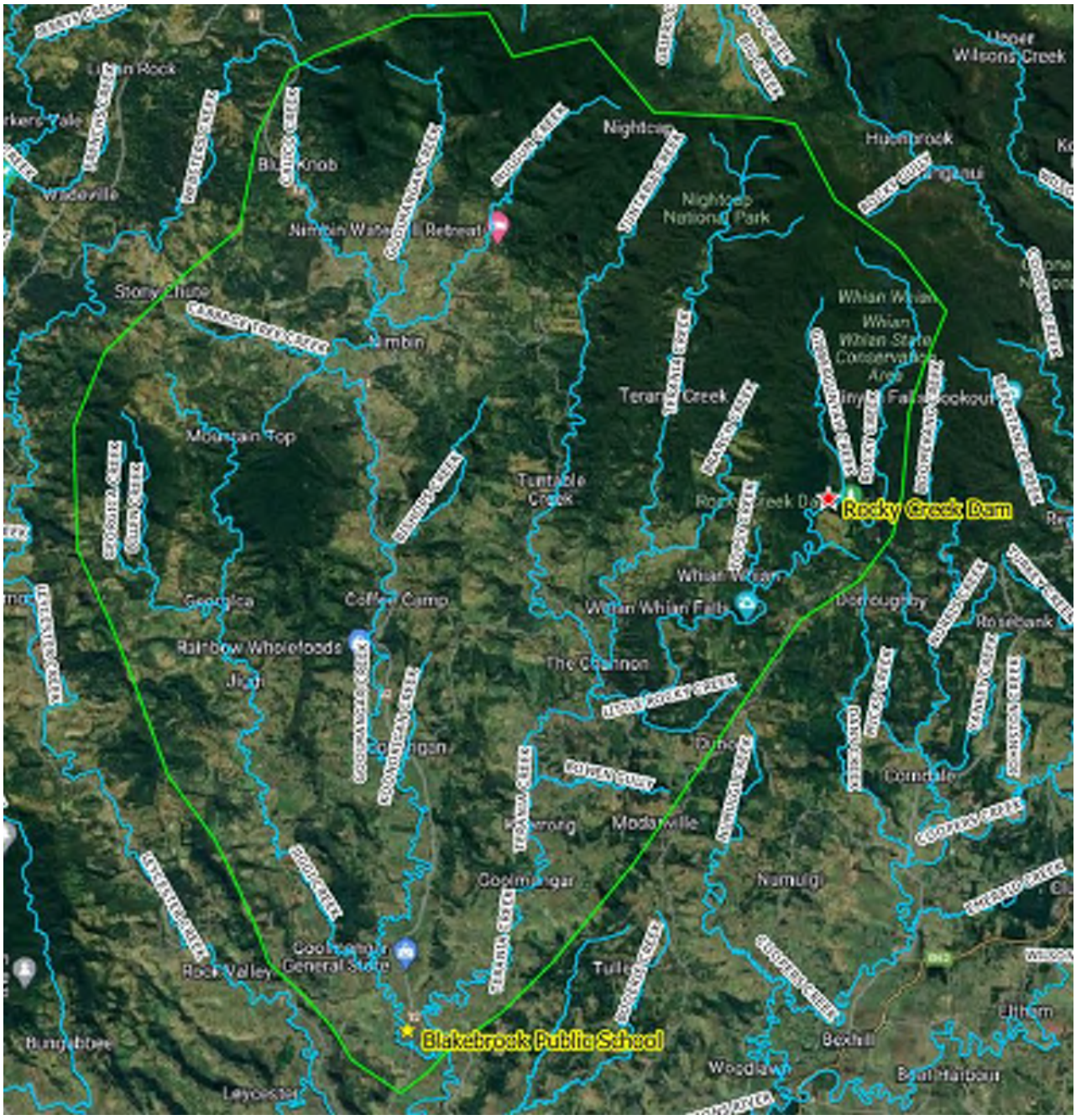


Figure 2-5 Rocky Creek Dam upstream of Blakebrook Public School

2.3 Meteorological conditions leading to major flooding

Flooding at Lismore shows strong seasonality, with the majority of recorded floods occurring between February and September. The area is subject to severe weather such as low-pressure systems and cyclones, which result in heavy rains and flooding. These depressions may develop at any time, but the flood rain events are most likely during that part of the year when sea surface temperatures are high and the air is humid.

The worst floods are typically due to multi-day high rainfall events that occur when rain-bearing weather systems stall over a region and occur during a temporally compounding event (one where heavy rainfall events occur too rapidly in succession for a catchment to dry in between). The February – March 2022 rainfall was a temporally compounding event, whereby each successive storm intensified the impact of the previous storms. The intensity

of the resultant flooding event was amplified because the rain fell in a saturated catchment and in locations with terrain and landscape characteristics conducive to flooding.

Local storms in the upper catchment can also produce high intensity rainfall for durations long enough (short intense rainfall bursts, or longer duration heavy rainfall) to produce runoff that could exceed the capacity of creek systems, thereby causing flooding of the school site.

2.4 Flood risk to school

2.4.1 Overland flow

A hydrological or hydraulic analysis of overland flow from the catchment to the north of the school grounds has not been undertaken to determine the likelihood or characteristics of overland flow entering and traversing the school grounds. The flood hazard to people from overland flow is expected to be low (shallow depths and low velocity), and risk of damage to school property/ground surface is expected to be low also.

Overland flow through the school due to direct rainfall over the catchment to the immediate north of the school is not expected to cut road access and isolate the school.

2.4.2 Creek flooding

Detailed flood studies and flood mapping for a range of flood recurrence events for creek flooding have not been undertaken by Lismore City Council or Rous County Council, as the area is rural and population density is low.

Engeny (2023) undertook a flood study for the school vicinity. The likelihood of flooding (of Goolmangar Creek or Terania Creek) that could impact the school grounds is the 10% AEP event. Flooding of Goolmangar Creek or Terania Creek could cut road access and isolate the school. Refer to section 3.7.3.3 for locations on school access roads in the vicinity of the school that could be cut by creek floodwater. The school could be isolated for a period of time dependent on the intensity, spatial distribution and duration of rainfall and duration of flooding. The figure below presents the 10%, 5% and 1% AEP flood depths in the vicinity of the school.

Figure 2-6 Flood depths in the vicinity of the school (Engeny, 2023)

Flood emergency response to creek flooding is described in sections 3 and 4.

2.4.3 Riverine flooding

The mechanism of widespread upper catchment flooding (confluence of upper catchment waterways of Leycester Creek and Wilsons River at Lismore City) as previously described can directly impact the school grounds in rare (1 in 500 AEP and rarer) floods (approximately).

The school could be isolated for a period dependent on the intensity, spatial distribution and duration of rainfall and duration of flooding.

2.4.4 Dambreak flooding

There is a very low but present risk that Rocky Creek Dam could fail, under 'Sunny Day' conditions (no rainfall) or under dam inflow and concurrent downstream flood conditions.

The school is not directly impacted by Sunny Day dambreak of Rocky Creek Dam ([1]Pers. Comm Rous County Council, 2023). Refer to Appendix D for a flood map for the vicinity of Blakebrook Public School for the Rocky Creek Dam Sunny Day dambreak flood. In the unlikely event of a Sunny Day dambreak flood, it is not expected that the school would be isolated. Refer to section 3.7.3 for more information.

Rous County Council advised that updated flood modelling is being undertaken currently and not all information is available (at the time of writing this report) in regard to flood risk along the breach path for dambreak under flood conditions.

2.5 Flood characteristics

Engeny (2023) undertook a flood study for the school vicinity. The flood likelihood and corresponding flood characteristics for the school site (at the proposed new school building) are as follows:

Table 2-1 Flood characteristics at proposed new school building (Engeny, 2023)

TABLE 3.1: POST-REBUILD CASE FLOOD RESULTS AT REPORTING LOCATION 1 – ALL AEPS

AEP	Flood Depth (m)	Flood Height (m AHD)	Flood Velocity (m/s)	Flood Hazard (m^2/s)	Flood Hazard Classification (ZAEM1)
10 %	0.00	N/A	0.00	0.00	N/A
5 %	0.00	N/A	0.00	0.00	N/A
1 %	0.43	15.53	0.30	0.13	H2
0.5 %	0.75	15.84	0.35	0.26	H3
1 in 1000	0.92	16.02	0.36	0.34	H3
1 in 2000	1.06	16.16	0.38	0.40	H3
1 in 10000	1.19	16.29	0.39	0.46	H3
1 in 100000	1.93	17.03	0.46	0.89	H4
PMF	3.29	18.38	0.58	1.91	H5

The flood hazard category for the school is considered to be 'Areas with overland escape route' as outlined in *Flood Emergency Response Planning Classification Of Communities*. Refer to section 1.6 for definition.

Flood likelihood definitions are as follows:

- 1% AEP - A flood of this size or larger has a 1 in 100 chance or a 1% probability of occurring in any year.

2.6 Flood warning time

2.6.1 Overland flow

Discharge of overland flow runoff from the higher ground to the north of the school towards the school's northern boundary could occur within a short timeframe of less than 30 minutes. Saturated ground will reduce the time for runoff to occur compared to drier ground.

2.6.2 Creek flooding

As detailed flood studies have not been undertaken for Terania Creek catchment, there is no flood warning time information available at the time of this report preparation. Based on the catchment characteristics, the time of concentration for catchment discharge in either Goolmangar Creek or Terania Creek to reach the vicinity of the school is approximately 9 to 10 hours. Flood water in either creek, however, could reach flow rates that could

isolate the school by cutting of access roads in less time than the time of concentration. It is therefore anticipated that creek flooding in the vicinity of the school could occur in under 6 hours, which is defined as 'flash flooding'. Refer to section 1.6 for definition.

Localised warnings can be set up to alert subscribed users of heavy rainfall that may lead to flash flooding, or flash flood conditions by live monitoring of catchment rainfall gauges and river height gauges upstream of Blakebrook Public School. Refer to section 4.1.3 for subscription service information. Catchment rainfall and river height gauge locations and internet links for gauge levels are presented in section 3.5.

2.6.3 Riverine flooding

For riverine flooding to impact Blakebrook Public School, it is likely that major flooding of Goolmangar Creek and Terania Creek is required, as the Terania Creek subcatchment is a significant contributor of inflows to Leycester Creek and Wilsons River. Major flooding of Goolmangar Creek and Terania Creek would impact the school grounds prior to backwater from Leycester Creek and Wilsons River impacting the school. This is the mechanism that is likely to have occurred in the February 2022 flood event.

Flood warning time for riverine flooding to impact the school is longer than that for creek flooding, and is therefore not relevant for flood emergency response planning.

2.6.4 Dambreak flooding

The Sunny Day dambreak time to reach the school is not available. The 1% AEP dambreak scenario flood warning time to the school is approximately 4.1 hours, and the 1:10 000 AEP is approximately 3.6 hours ([2]Pers. Comm Rous County Council, 2023). It is expected that flow rates that could isolate the school by cutting of access roads could occur in less time than the dambreak time.

2.7 Flood maps

Refer to the Appendix D for figures in the vicinity of Blakebrook Public School showing the Rocky Creek Dam Sunny Day dambreak flood extent.

Refer to Appendix D or Engeny (2023) for flood maps for various flood likelihood events in the vicinity of the school.

2.8 Historical floods

Historical flood levels at the school site are not available. It is possible that the school has never experienced inundation in its history prior to what occurred in the February 2022 flood event. The February 2022 flood is considered to be the flood of record at the school, as this was the flood of record in the Wilsons River at Lismore CBD.

Record breaking rainfall in the Wilsons River catchment led to record breaking flooding of the Wilsons River at Lismore in late February and early March 2022. The Rowing Club river height gauge on the Wilsons River at Lismore recorded a peak flood level of 14.4 m AHD, exceeding the previous floods of record (1954 and 1974) by over 2 metres.

The peak flood level in the February and early March 2022 event at the school was measured on site from the visible flood line adjacent to several buildings and adding it to the approximate ground surface elevation obtained from LiDAR at that location. The peak flood level determined by this method was approximately 17.4 m AHD.

3 Flood Emergency Response Preparation

3.1 Effectiveness of Flood Emergency Response Preparation

The effectiveness of this FERP is based on the reliance of evacuation for the school, and the plan is owned, understood and practised by the school operational management and school community. The uncertainties of flooding are also a factor in determining the effectiveness of the FERP.

Evacuation can be an effective strategy if there is sufficient time available and evacuation is properly planned and executed. Evacuation is dependent on flood warning time and effective warning time (refer foregoing) and time to enact the evacuation before evacuation routes are cut or emergency services are no longer able to rescue the occupants due to unsafe weather or flood conditions or because they are overwhelmed.

3.2 Declaration of emergency

The Premier can declare a state of emergency in NSW under the SERM Act if satisfied that particular circumstances exist. However, under the State Emergency Service Act 1989 (SES Act) the emergency powers may be exercised where a flood (or other hazards) occurs without the need for any declaration ([2]Fuller M. and O'Kane M, 2022).

3.3 Roles, responsibilities and contact details

3.3.1 School

Blakebrook Public School has the following administration staff in addition to teachers. The table provides a suggested title for roles and responsibilities under the *Flood Emergency Response Plan (FERP)* provided in section 4, and their office days.

Table 3-1 Blakebrook Public School administration staff professional title and FERP title

Professional title	FERP title	Office days
School Principal	Flood Warden	Mon – Fri
Teacher	Backup Flood Warden	Mon – Fri
Teacher	Assistant to Flood Warden	Mon – Fri
Rel. SAM (Relief School Administrative Manager)	Assistant to Flood Warden	Mon – Fri

The following roles and responsibilities have been identified and created for the purposes of the implementation and updating of the Flood Emergency Response Plan. Additional responsibilities can be added by the FERP Flood Warden. Regular updating of the table is recommended as information changes.

Table 3-2 Roles and responsibilities for Blakebrook Public School

Name	Role and responsibilities	Contact details	
Samuel Bowkett	▪ **School Principal 'Flood Warden'** ▪ Consultation and communication with the NSW SES local unit and the Local Council *Local Emergency Management Committee (or Local Disaster Management Group)* during non-flood periods ▪ Delegates tasks to **Backup Flood Warden** and **School administration staff** and follows up on progress/completion ▪ Arrangement of flood evacuation drills ▪ Updating of the relevant contact information in this FERP ▪ Subscribe to alerts and warnings across various media platforms ▪ Monitor alerts and warnings regarding severe weather, catchment rainfall and flood levels ▪ Communication of flood warnings and notifications to school community ▪ Arranging evacuation of school prior to flooding ▪ Communicating with NSW SES and QFES for potential evacuation by emergency services ▪ Preparing school grounds for expected flood inundation ▪ Arranging alternative schools to take students during flood recovery period ▪ Refer to Section 4 for more responsibilities.	Mob:	0407 575 205
		Landline:	02 6629 3263
		Email:	
Julie Perren	▪ **Teacher 'Backup Flood Warden'** ▪ Completes tasks assigned by Flood Warden and updates them on progress/completion ▪ Refer to Section 4 for more responsibilities.	Mob:	0428 518 447
		Landline:	02 6629 3263
		Email:	
Jade Hampstead Shakira Allen	▪ **Teacher or Relief SAM (School Administrative Manager) 'Assistant to Flood Warden'** ▪ Completes tasks assigned by Flood Warden and updates them on progress/completion ▪ Maintains parent's/carer's and citizen's contact information for flood emergency warning communication purposes ▪ Updating trades companies and equipment suppliers register ▪ Refer to Section 4 for more responsibilities.	Mob:	0487 449 229 (Jade) 0437 766 694 (Shakira)
		Landline:	02 6629 3263
		Email:	

3.3.2 Authorities

The following table presents the relevant Authorities, their role/responsibility and contact details, for the purposes of the implementation of the Flood Emergency Response Plan. Additional Authorities can be added by the Flood Warden. Regular updating of the table is recommended as information changes.

Table 3-3 Role/responsibility and contact details of relevant Authorities

Organisation	Service provided and role/responsibility	Contact number	Local contact name if available	Website
Police/Fire/Ambulance	Life threatening emergencies. Local Emergency Operations Controller (LEOCON) - senior police officer stationed within the LGA with experience in emergency management	000 (mobiles 000 and 112)	-	-
State Emergency Service (NSW SES)	Lead agency for flood emergency management and flood combat. Establishment of flood warning systems. Development of flood plans. Flood warning and evacuation notifications. Flood evacuation services. Flood recovery services. The NSW SES can establish a Flood Rescue Area of Operations (FRAO), giving it the authority to coordinate and control flood rescues.	132 500	-	https://www.ses.nsw.gov.au/
Bureau of Meteorology	Responsibility to issue severe weather warnings, Flood Watches and Flood Warnings.	For automated Warnings 1300 659 210	-	http://www.bom.gov.au/nsw/warnings/
Lismore City Council	Local road network. Providing flood information via the online Disaster Dashboard. Assistance with setting up evacuation centres and providing flood advice to NSW SES. Flood recovery.	02 6625 0500	-	Refer to Table 3-7 for Disaster Dashboard weblinks.
Lismore Police Station	Not for emergency calls	02 6626 0599	-	-
Lismore Fire Station	Not for emergency calls	02 6690 6162	-	-
<Electricity distributor>	Electricity supply		-	

Organisation	Service provided and role/responsibility	Contact number	Local contact name if available	Website
<Security company>	-	1300 880 021	-	-
School safety and response	-	1300 363 778	-	-
Assisted school transport	-	1300 338 278	-	-
Disaster Welfare Services	If you have been affected by floods and require assistance.	1800 018 444		

Council flood alert 'SMS' platforms

Lismore City Council does not provide a flood alert 'SMS' platform for dissemination of flood alerts for rural area.

Council, however, being the SMS alerts when they receive official word that the Wilsons River at Lismore will reach the minor flood level of 4.2 metres. It is important to understand that Goolmangar Creek and Terania Creek adjacent to Blakebrook Public School flow to the Wilsons River and the SMS alters may be issued too late to be of use to the school.

The sign-up form for the Wilsons River SMS flood alerts is available at https://forms.lismore.nsw.gov.au/forms/17082

Council flood alert 'SMS' platforms

Lismore City Council does not provide a flood alert 'SMS' platform for dissemination of flood alerts for rural areas.

Council, however, begins the SMS alerts when they receive official word that the Wilsons River at Lismore will reach the minor flood level of 4.2 metres. It is important to understand that Goolmangar Creek and Terania Creek adjacent to Blakebrook Public School flow to the Wilsons River and the SMS alerts may be issued too late to be of use to the school.

The sign-up form for the Wilsons River SMS flood alerts is available at https://forms.lismore.nsw.gov.au/forms/17082.

3.3.3 HazardWatch

The Hazardwatch Web App provides warnings and information about riverine flooding currently occurring within NSW. Refer to Table 3-6 for internet link.

3.3.4 'Hazards Near Me' NSW App

The 'Hazards Near Me NSW' App is available as of 14 February 2023. The user can view emergency warnings and advice for fires and floods in NSW. Refer to section 3.6.9 for internet link.

3.3.5 Notification and subscription services for alerts

3.3.5.1 Bureau of Meteorology

The BOM Weather App (Android or iPhone) allows up to three (3) locations (suburbs) to receive alerts to a smartphone with the App installed ([1]BOM, 2023). Alerts available that are related to potential flooding include warnings for 'Flood', 'Severe thunderstorm', 'Severe weather' and 'Tropical cyclone'. The locations to receive alerts for are suburbs in the upper catchment to Blakebrook Public School and are provided in the table below. Smartphone mobile devices belonging to school administration staff (refer to Table 3-1) should have the BOM Weather App installed, and alerts turned on for the previously mentioned warnings for the following suburbs.

Locations for multiple smartphone devices are provided to cover a combined large area of the upper catchment. Refer to Table 3-6 for weblinks to download the App.

Table 3-5 Locations in upper catchment to Blakebrook Public School to receive BOM Weather App alerts to mobile devices

Creek catchment	Mobile device #1 alert locations (suburbs)	Mobile device #2 alert locations (suburbs)	Mobile device #3 alert locations (suburbs)	Mobile device #4 alert locations (suburbs)
Jiggi Creek	-	-	-	▪ Georgica, NSW 2480 ▪ Jiggi, NSW 2480
Goolmangar Creek	▪ Nimbin, NSW 2480 ▪ Coffee Camp, NSW 2480	▪ Nimbin, NSW 2480	▪ Coffee Camp, NSW 2480 ▪ Koonorigan NSW, 2480	▪ Koonorigan NSW, 2480
Terania Creek	▪ Tuntable Creek, NSW 2480	▪ Terania Creek, NSW 2480 ▪ The Channon, NSW 2480	▪ The Channon, NSW 2480	-

3.3.5.2 Early Warning Network

The Early Warning Network is available and can be subscribed to for:

- location specific warnings https://www.earlywarningnetwork.com.au/services-location-alerting, and
- regional warnings https://www.earlywarningnetwork.com.au/regional-alerting.

Refer to Appendix E for subscription services and indicative fees.

3.3.5.3 weatherzone and weatherzonepro

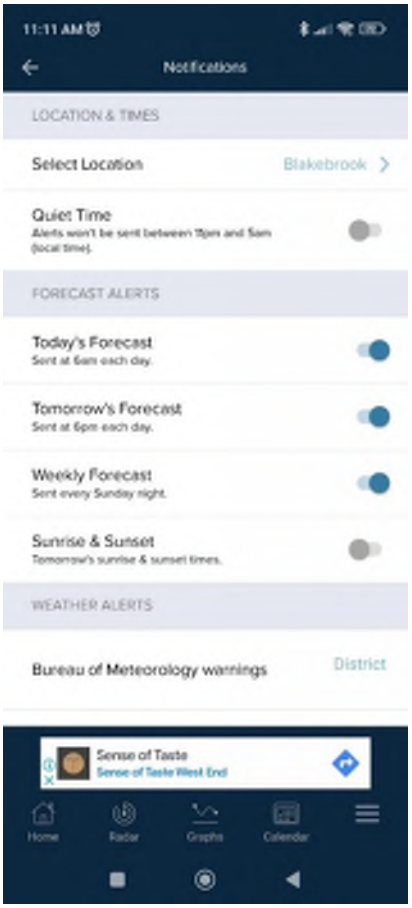
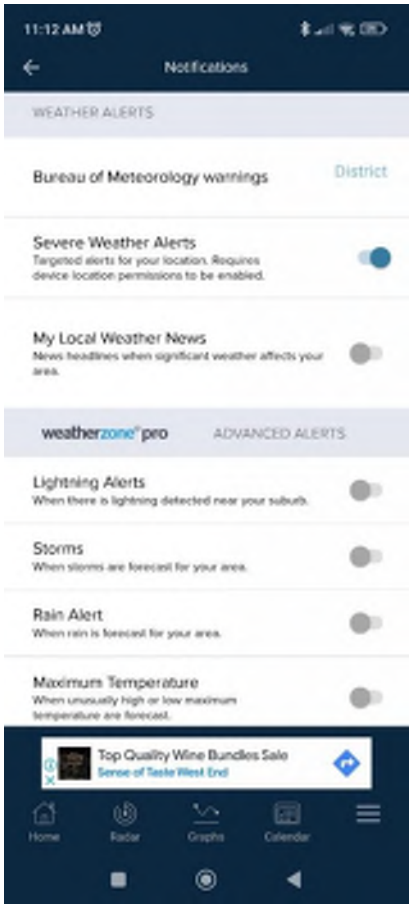
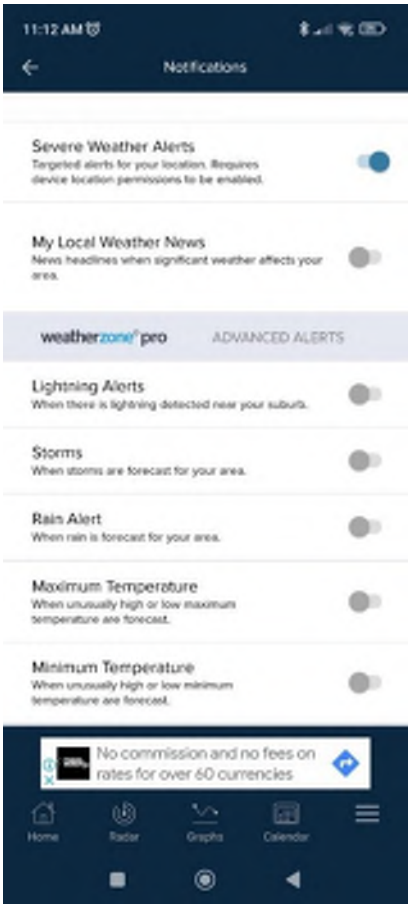
The weatherzone smartphone App sources some data from the Bureau of Meteorology ([2]BOM, 2023). A location can be set in the App to receive weather forecasts and alerts for that location (today, tomorrow and weekly forecasts).

The free version allows warnings from the Bureau of Meteorology to be received at District or State level. Additionally, Severe Weather Alerts from the Bureau of Meteorology for the target location can be received in the App.

The paid version allows advanced alerts for storms and rain to be received in the App.

Refer to the table below for App notification settings for forecasts, BOM weather alerts and advanced weather alerts.

Table 3-6 weatherzone and weatherzonepro smartphone App forecasts and alerts

weatherzone forecast alerts (free version)	weatherzone BOM weather alerts (free version)	weatherzonepro advanced weather alerts (paid version)
		

3.3.5.4 Weatherwatch

Weatherwatch provides a subscription service where they can provide tailored forecasts for a target location or district including severe weather and thunderstorms, rainfall and flooding. Forecasts and warnings can be sent directly to smartphones via SMS. Meteorologists are available for 24-hour support.

More information and quotes can be obtained by contacting weatherwatch at https://www.weatherwatch.net.au/contact.

3.3.6 Emergency Authority platforms

Warnings may be disseminated in a variety of ways including through mass media (ABC Radio), on agency websites and social media platforms.

Formal warnings may not always be received, so it is important to be aware of the situation by listening to the radio. If it feels unsafe, act early and move away from the threat to a safe location.

The NSW SES provides advice using any combination of the below methods:

- Flood warnings through official NSW SES website - https://www.ses.nsw.gov.au/
- Emergency Alert (via mobile phone SMS +61 444 444 444')
- Mobile and fixed public address systems
- Two-way radio
- Telephone/Fax

- Door knocking
- Mobile and fixed sirens
- Distribution through established community liaison networks/partnerships:
  - ABC Radio
  - ABC Emergency ‘Incident Map’
  - Local Council
  - Authorised social media sites.

The Early Warning Network is also available and can be subscribed to for:

- location specific warnings https://www.earlywarningnetwork.com.au/services-location-alerting, and
- regional warnings https://www.earlywarningnetwork.com.au/regional-alerting.

Table 3-7 Notification platforms

App or Website or Media (Platform)	Description	Weblink
ABC Emergency Incident Map	Provides locations and general details of incidents Australia-wide. Provides general information.	https://www.abc.net.au/emergency/
Android smartphones	Open Settings, search 'Wireless emergency alerts', turn on 'Allow alerts', select 'Extreme threats', 'Severe threats' and 'Test alerts'.	-
BOM Weather App	Available warnings: ▪ Flood ▪ Severe thunderstorm ▪ Severe weather ▪ Tropical cyclone	Android: https://play.google.com/store/apps/details?id=au.gov.bom.metview iPhone: https://apps.apple.com/au/app/bom-weather/id1100096880
BOM website and mobile phone browser link	Severe weather warnings	http://www.bom.gov.au/nsw/warnings/ Mobile phone browser link: http://m.bom.gov.au/
BOM Twitter	The Bureau tweets about current and impending weather, especially significant weather events, including cyclones, tsunami and floods. Tweets generally link to information on the website which remains the most up-to-date and comprehensive official source of information.	https://twitter.com/BOM_au https://twitter.com/BOM_NSW
NSW SES	'Advice' level warnings through official NSW SES website using the Australian Warning System (AWS).	https://www.ses.nsw.gov.au/
HazardWatch Web App	HazardWatch Web App provides warnings and information about riverine flooding currently occurring within NSW.	https://www.hazardwatch.gov.au/
'Hazards Near Me NSW' App	The user can view emergency warnings and advice for fires and floods in NSW.	https://www.nsw.gov.au/emergency/hazards-near-me-app
Emergency Alert	DO NOT BLOCK +61 444 444 444. This number is related to Emergency Alert service. If the caller ID number or message header on your phone displays the number '+61 444 444 444' it is genuine. Emergency Alert is the national telephone warning system used by emergency services to send voice messages to landlines and text messages to mobile phones within a defined area about potential emergencies. i.e. "Floods, fires and other significant events can impact pose significant threat to members of the community in impacted area. Emergency Alert allows telephony notifications to be distributed to these areas, through both mobile and land line services, to provide warning of these events. Subscription to this service is not required.	For more information: https://www.emergencyalert.gov.au/home

App or Website or Media (Platform)	Description	Weblink
Emergency + (Plus)	The Emergency+ app is a free app developed by Australia's emergency services and their Government and industry partners. The app uses GPS functionality built into smart phones to help a Triple Zero (000) caller provide critical location details required to mobilise emergency services.	https://www.emergencyplus.com.au/
Lismore City Council Disaster Dashboard	Provides map view or list view information for: ▪ Flood incidents ▪ Road and bridge conditions ▪ Rain and waterways	https://disaster.lismore.nsw.gov.au/dashboard/overview
Local Radio Frequencies	▪ Radio ZZZ FM (Goonellabah) ▪ Radio 2LM (Goonellabah) ▪ 2NCR FM (Lismore) ▪ Radio ABC North Coast ▪ NIM FM (Nimbin)	Blakebrook Public School
Road closures	Northern Rivers NSW road closures (incidents, flooded roads).	https://northernrivers.myroadinfo.com.au/search.asp
Road closures	Transport NSW	https://www.livetraffic.com/ or 132 701
Social Media sites (official)	▪ NSW Flood Update ▪ Northern NSW Severe Weather ▪ NSW Incident Alerts ▪ NSW Incidents ▪ NSW SES Lismore City Unit	https://auslanemergency.com.au/index.php/deaf-deafblind/nsw-resources/social-media/
Social Media sites (other)	▪ NSW SES ▪ NSW Police Force ▪ NSW Rural Fire Service ▪ EWN (Early Warning Network) Alerts - New South Wales	https://auslanemergency.com.au/index.php/deaf-deafblind/nsw-resources/social-media/

3.3.7 School notification platforms

The increase in the use of technology and social media is now an important communication tool, which enables real time communication and played a critical role in the 2022 floods. The school platform can be used to share weather updates, flood warnings, evacuation orders and road access to/from the school by the flood warden and school community. The school community should be subscribed to this page.

Table 3-8 School notification platform

School	Description	Weblink
Blakebrook Public School	Facebook social media page	https://www.facebook.com/BlakebrookPublicSchool/
Jiggi Public School (adjacent to Jiggi Creek, which flows to Goolmangar Creek)	Facebook social media page	Search 'Jiggi Public School'
Coffee Camp Public School (adjacent to Goolmangar Creek)	Facebook social media page	Search 'Coffee Camp Public School'
Goolmangar Public School (adjacent to Goolmangar Creek)	Facebook social media page	Search 'Goolmangar Public School'

3.4 Flood warning notice signage and placement locations

Flood warning notice signage is recommended be installed within the school grounds at a prominent location near the main school entry point for the information of the school community. The following flood warning notice has been devised for implementation.

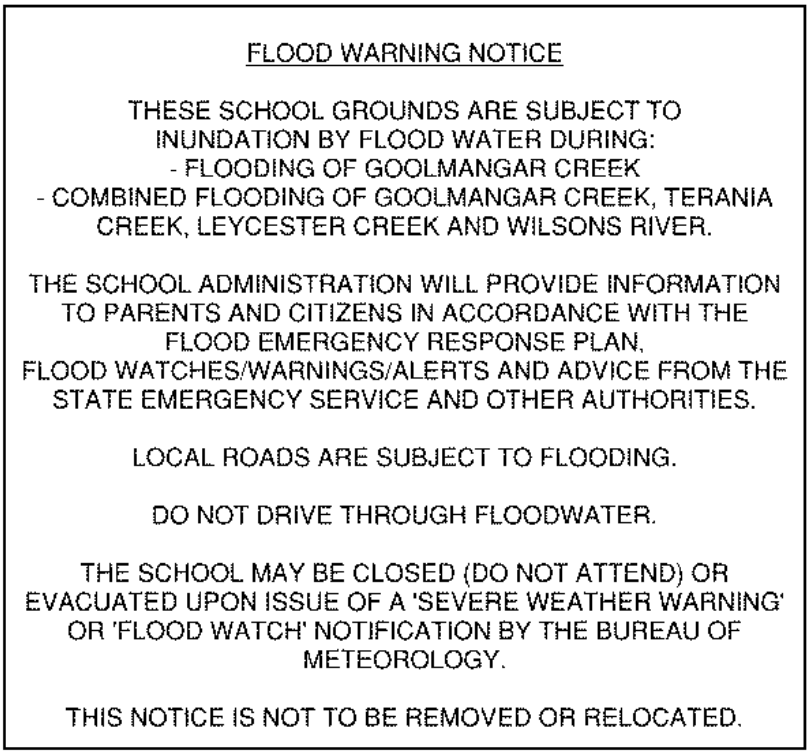


Figure 3-1 Blakebrook Public School flood warning notice sign

3.5 Catchment rainfall gauges and river height gauges

There are several rainfall and river height gauges upstream of Blakebrook Public School in Terania Creek catchment. The figure below shows the locations of rainfall and river height gauges in the catchment.

The following information can be accessed online to observe rainfall and flood conditions upstream of the school to gain an understanding of potential flood conditions that may eventuate in the creeks in the vicinity of the school:

- Recent rainfall depths (last 1 hour; rain since 9am; and 24 hour rainfalls)
- 'Real time' flood levels recorded by the river height gauges.

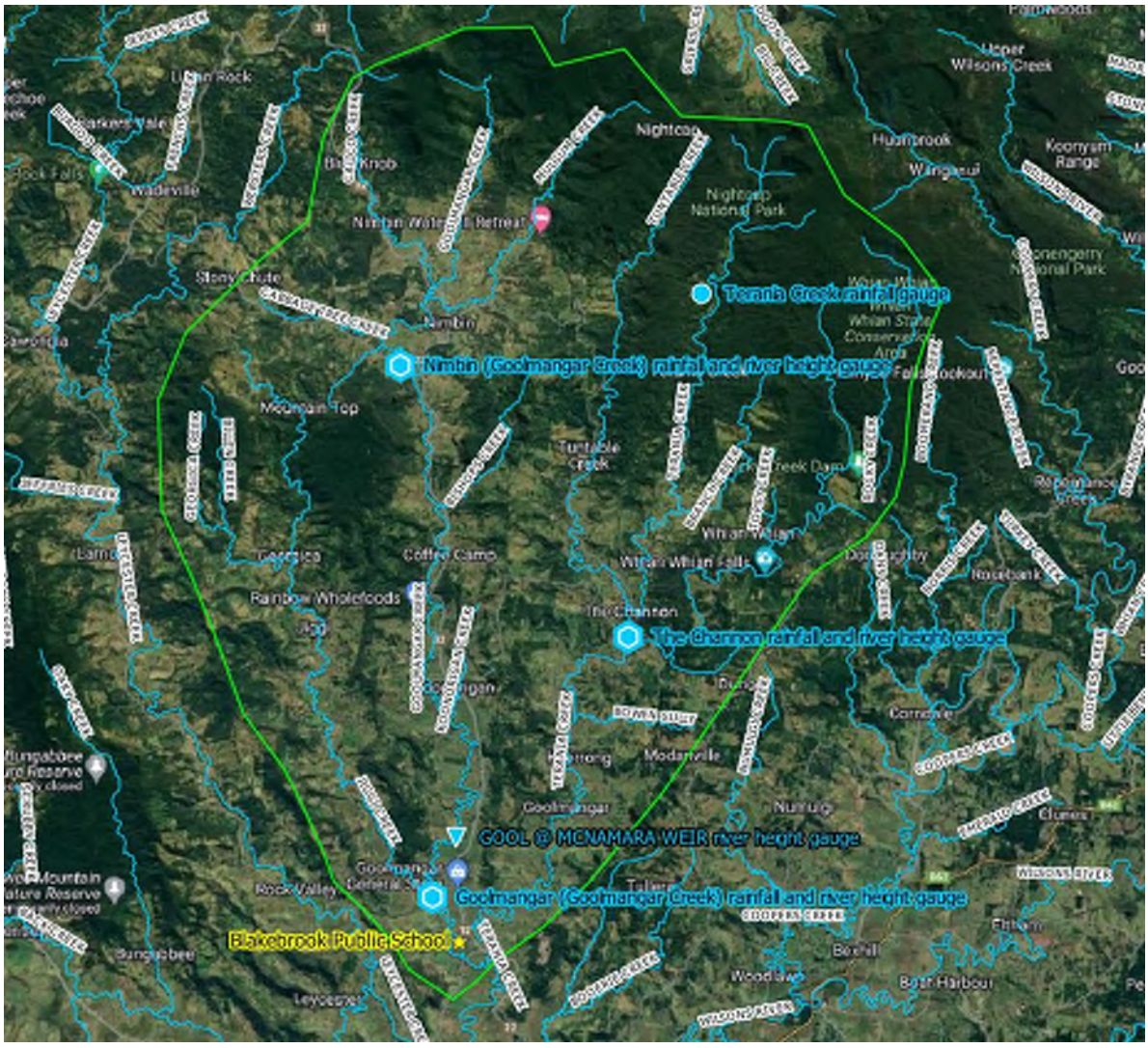


Figure 3-2 Figure showing the location of rainfall and river height gauges in the catchment relative to the school location

The following table lists applicable rainfall and river height gauges upstream of Blakebrook Public School to be accessed to be informed of upstream flood conditions and potential local flood conditions in the vicinity of the school.

Table 3-4 Rainfall and river height gauges upstream of Blakebrook Public School

Rainfall or river height gauge	Gauge description	Weblink for gauge levels
Rainfall	Terania Creek Located upstream of school in Terania Creek catchment near Terania Creek Farm. https://www.google.com/maps/search/?api=1&query=-28.588,153.2989	https://disaster.lismore.nsw.gov.au/dashboard/waterways and http://www.bom.gov.au/nsw/flood/northcoast.shtml
Rainfall	Nimbin (Goolmangar Creek) Located upstream of school in Goolmangar Creek catchment near Stony Chute Road. https://www.google.com/maps/search/?api=1&query=-28.6069,153.2083	https://disaster.lismore.nsw.gov.au/dashboard/waterways and http://www.bom.gov.au/nsw/flood/northcoast.shtml
River height	Nimbin (Goolmangar Creek) Located upstream of school in Goolmangar Creek near Stony Chute Road. https://www.google.com/maps/search/?api=1&query=-28.6069,153.2083	https://disaster.lismore.nsw.gov.au/dashboard/waterways and http://www.bom.gov.au/fwo/IDN60231/IDN60231.058180.plt.shtml
Rainfall	The Channon Located upstream of school in Goolmangar Creek catchment near Boyle Road. https://www.google.com/maps/search/?api=1&query=-28.6792,153.2775	https://disaster.lismore.nsw.gov.au/dashboard/waterways and http://www.bom.gov.au/nsw/flood/northcoast.shtml
River height	The Channon Located upstream of school in Goolmangar Creek near Boyle Road. https://www.google.com/maps/search/?api=1&query=-28.6792,153.2775	https://disaster.lismore.nsw.gov.au/dashboard/waterways and http://www.bom.gov.au/fwo/IDN60231/IDN60231.058147.plt.shtml
Rainfall	Goolmangar (Goolmangar Creek) Located upstream of school in Goolmangar Creek catchment near Jiggi Road. https://www.google.com/maps/search/?api=1&query=-28.7488,153.218	https://disaster.lismore.nsw.gov.au/dashboard/waterways and http://www.bom.gov.au/cgi-bin/wrap_fwo.pl?IDN60168.html
River height	Goolmangar (Goolmangar Creek) Located upstream of school on Goolmangar Creek near Jiggi Road. https://www.google.com/maps/search/?api=1&query=-28.7488,153.218	https://disaster.lismore.nsw.gov.au/dashboard/waterways and http://www.bom.gov.au/fwo/IDN60231/IDN60231.558075.plt.shtml
River height	GOOL @ MCNAMARA WEIR Located upstream of school on Goolmangar Creek near Boyle Road. https://www.google.com/maps/search/?api=1&query=-28.73287658,153.225306	https://disaster.lismore.nsw.gov.au/dashboard/flood

3.6 Forecast, warning and alert services

3.6.1 Public warning process

The NSW SES works with the Bureau of Meteorology and Councils to develop warning systems and ensure consistent warning products and messaging across the state. The NSW SES uses gauge information to prepare flood intelligence, issue warnings and respond to flooding. However, there are many assets, such as flood and weather gauges, which are owned by the community, private organisations and government agencies, that are currently not used by the NSW SES to inform public warnings. The Bureau of Meteorology, NSW SES and Councils all issue different warning products ([2]Fuller M. and O'Kane M, 2022).

In the event of potential dambreak or actual dambreak of Rocky Creek Dam, Lismore City Council and/or Rous County Council will consult with the different groups involved to establish and notify NSW SES to initiate the warnings.

3.6.2 Lessons learnt from February/March 2022 flood event notifications

In regard to the February/March 2022 flood event, the 2022 Flood Inquiry ([2]Fuller M. and O'Kane M, 2022) summarised that the Bureau of Meteorology extensively forecast and communicated to Government and the community the risk of severe weather and identified and communicated the risk of intense localised rain, life threatening flash flooding and potential for rapid river rises. However, the risk of such severe weather was not adequately communicated through the NSW SES Flood Bulletins and other warning products.

The 2022 Flood Inquiry records that there were numerous inadequacies in the flood warnings issued by the State Emergency Service in regard to flooding in the Northern Rivers.

The 2022 Flood Inquiry was told:

- the Bureau forecasts are based on river height as measured by gauges, and that most residents are unable to translate this information to their own risk of being flooded
- existing flood forecasts and warnings that provide users with estimates of river height are not effective in communicating, either to communities or emergency services, when and where flooding is expected
- warnings also need to include both what could happen to water levels, and what action the community needs to take.

The NSW SES is working on initiatives to improve the distribution of warning messages, including aligning to the Australian Warning System, which is a nationally consistent hazard-agnostic approach to emergency warnings (refer to Section 3.6.4 of this report).

There should also be better use of Community broadcasters (community-owned and operated independent radio services).

3.6.3 Bureau of Meteorology

The Bureau of Meteorology has the responsibility to issue severe weather warnings, Flood Watches and Flood Warnings. This information is processed by the NSW SES and can be re-issued by the State Emergency Service and other Authorities.

It is noted that the Bureau of Meteorology does not issue Flood Watch or Flood Warnings for flash flooding, which is a flood source applicable to Blakebrook Public School.

Warnings issued by the Bureau of Meteorology are described below:

- Severe thunderstorm warnings - range in character from short-lived events to systems producing widespread damage across broader areas. Weather phenomena accompanying these storms include any combination of large hail, damaging or destructive winds, tornadoes and intense rainfall leading to local flash flooding.

- Severe weather warning - are provided for potentially hazardous or dangerous weather and are issued (in a flooding context) for very heavy rainfall or intense rainfall that may lead to flash flooding.
- Flood Watch - Flood Watch provides early advice of potential riverine flooding to emergency services and communities at risk of flooding. Flood watches are issued (up to four days in advance of large-scale weather systems) when the combination of forecast rainfall and catchment or other hydrological conditions indicate that there is a significant risk of potential flooding.
- Flood Warning - Flood Warnings are issued by the Bureau to advise that flooding is occurring or expected to occur in a geographical area based on defined criteria. Flood Warnings may include either qualitative or quantitative predications or may include a statement about future flooding that is more generalised. The type of prediction depends on the quality of real-time rainfall and river level data, the capability of rainfall and hydrological forecast models and the level of service required.
- Minor Flooding, Moderate Flooding, Major Flooding – refer to Section 1.6 for descriptions. Major riverine systems have Minor, Moderate and Major flood levels defined for at-risk areas.

Refer to section 3.6.8 for notifications and alerts.

3.6.4 NSW State Emergency Service (NSW SES) and Australian Warning System (AWS)

The NSW SES moved to the Australian Warning System (AWS) for flood notifications on 30 September 2022. The AWS is a nationally consistent, three-tiered approach designed to make warnings clearer and lead people to take action ahead of severe weather events. The warning system comprises warning levels, action statements, hazard icons, colours and shapes. Warnings are now based on impacted community with increased localised information. More information is available at https://www.ses.nsw.gov.au/about-us/our-warnings/.

In addition to existing channels, warnings will be published to the:

- HazardWatch platform at http://hazardwatch.gov.au,
- NSW SES website at https://www.ses.nsw.gov.au/,
- The ‘Hazards Near Me NSW’ App at https://www.nsw.gov.au/emergency/hazards-near-me-app.

Refer to Table 3-6 for descriptions and weblinks.

The warning levels, action statements and icons are presented below.

Warning levels and action statements

There are three levels within the AWS - Advice, Watch & Act and Emergency Warning. For each level, there are a series of clear action statements to guide positive action by the community. These include 'stay informed', 'prepare to evacuate' and 'move to higher ground' as shown below:

- **Advice** - an incident has started. Stay up to date in case the situation changes.
  - Stay informed
  - Monitor conditions
  - Reduced threat: return with caution
- **Watch and Act** - conditions are changing and you need to start taking action now to protect you and your family.
  - Do not enter floodwater
  - Prepare to evacuate
  - Prepare to isolate
  - Avoid the area
- **Emergency Warning** - the highest level of warning. You may be in danger and need to take action immediately.
  - Evacuate now / Evacuate before [time]
  - Shelter now
  - Move to higher ground

Figure 3-3 AWS - Advice, Watch and Act and Emergency Warning ([1]NSW SES, 2022)

3.6.5 Council flood alert 'SMS' platforms

Lismore City Council does not provide a flood alert 'SMS' platform for dissemination of flood alerts for rural areas.

Council, however, begins the SMS alerts when they receive official word that the Wilsons River at Lismore will reach the minor flood level of 4.2 metres. It is important to understand that Goolmangar Creek and Terania Creek adjacent to Blakebrook Public School flow to the Wilsons River and the SMS alerts may be issued too late to be of use to the school.

The sign-up form for the Wilsons River SMS flood alerts is available at https://forms.lismore.nsw.gov.au/forms/17082.

3.6.6 HazardWatch

The Hazardwatch Web App provides warnings and information about riverine flooding currently occurring within NSW. Refer to Table 3-6 for internet link.

3.6.7 'Hazards Near Me' NSW App

The 'Hazards Near Me NSW' App is available as of 14 February 2023. The user can view emergency warnings and advice for fires and floods in NSW. Refer to section 3.6.9 for internet link.

3.6.8 Notification and subscription services for alerts

3.6.8.1 Bureau of Meteorology

The BOM Weather App (Android or iPhone) allows up to three (3) locations (suburbs) to receive alerts to a smartphone with the App installed ([1]BOM, 2023). Alerts available that are related to potential flooding include warnings for 'Flood', 'Severe thunderstorm', 'Severe weather' and 'Tropical cyclone'. The locations to receive alerts for are suburbs in the upper catchment to Blakebrook Public School and are provided in the table below. Smartphone mobile devices belonging to school administration staff (refer to Table 3-1) should have the BOM Weather App installed, and alerts turned on for the previously mentioned warnings for the following suburbs. Locations for multiple smartphone devices are provided to cover a combined large area of the upper catchment. Refer to Table 3-6 for weblinks to download the App.

Table 3-5 Locations in upper catchment to Blakebrook Public School to receive BOM Weather App alerts to mobile devices

Creek catchment	Mobile device #1 alert locations (suburbs)	Mobile device #2 alert locations (suburbs)	Mobile device #3 alert locations (suburbs)	Mobile device #4 alert locations (suburbs)
Jiggi Creek	-	-	-	▪ Georgica, NSW 2480 ▪ Jiggi, NSW 2480
Goolmangar Creek	▪ Nimbin, NSW 2480 ▪ Coffee Camp, NSW 2480	▪ Nimbin, NSW 2480	▪ Coffee Camp, NSW 2480 ▪ Koonorigan NSW, 2480	▪ Koonorigan NSW, 2480
Terania Creek	▪ Tuntable Creek, NSW 2480	▪ Terania Creek, NSW 2480 ▪ The Channon, NSW 2480	▪ The Channon, NSW 2480	-

3.6.8.2 Early Warning Network

The Early Warning Network is available and can be subscribed to for:

- location specific warnings https://www.earlywarningnetwork.com.au/services-location-alerting, and
- regional warnings https://www.earlywarningnetwork.com.au/regional-alerting.

Refer to Appendix E for subscription services and indicative fees.

3.6.8.3 weatherzone and weatherzonepro

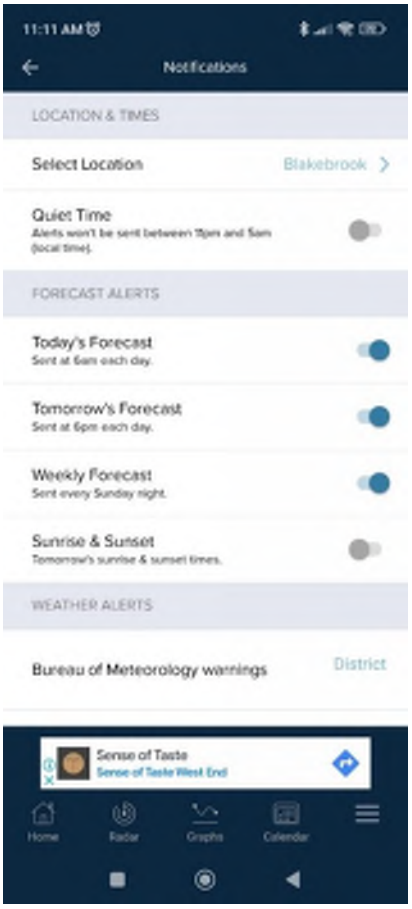
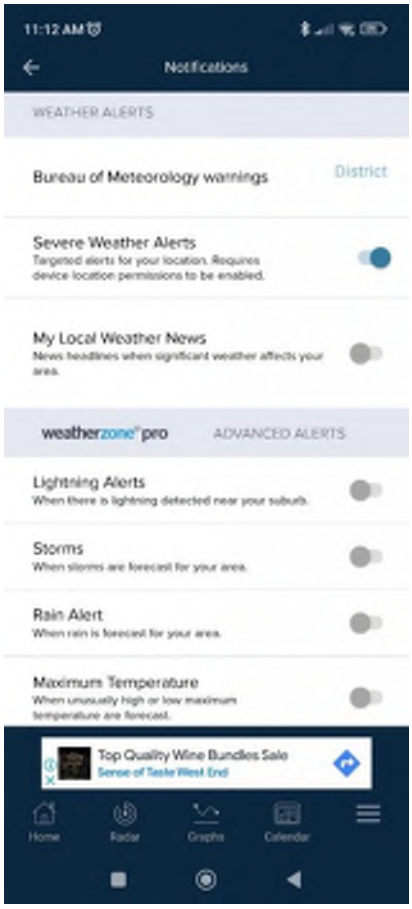
The weatherzone smartphone App sources some data from the Bureau of Meteorology ([2]BOM, 2023). A location can be set in the App to receive weather forecasts and alerts for that location (today, tomorrow and weekly forecasts).

The free version allows warnings from the Bureau of Meteorology to be received at District or State level. Additionally, Severe Weather Alerts from the Bureau of Meteorology for the target location can be received in the App.

The paid version allows advanced alerts for storms and rain to be received in the App.

Refer to the table below for App notification settings for forecasts, BOM weather alerts and advanced weather alerts.

Table 3-6 weatherzone and weatherzonepro smartphone App forecasts and alerts

weatherzone forecast alerts (free version)	weatherzone BOM weather alerts (free version)	weatherzonepro advanced weather alerts (paid version)
		

3.6.8.4 Weatherwatch

Weatherwatch provides a subscription service where they can provide tailored forecasts for a target location or district including severe weather and thunderstorms, rainfall and flooding. Forecasts and warnings can be sent directly to smartphones via SMS. Meteorologists are available for 24-hour support.

More information and quotes can be obtained by contacting weatherwatch at https://www.weatherwatch.net.au/contact.

3.6.9 Emergency Authority platforms

Warnings may be disseminated in a variety of ways including through mass media (ABC Radio), on agency websites and social media platforms.

Formal warnings may not always be received, so it is important to be aware of the situation by listening to the radio. If it feels unsafe, act early and move away from the threat to a safe location.

The NSW SES provides advice using any combination of the below methods:

- Flood warnings through official NSW SES website - https://www.ses.nsw.gov.au/
- Emergency Alert (via mobile phone SMS +61 444 444 444')
- Mobile and fixed public address systems
- Two-way radio
- Telephone/Fax
- Door knocking
- Mobile and fixed sirens
- Distribution through established community liaison networks/partnerships:
  - ABC Radio
  - ABC Emergency 'Incident Map'
  - Local Council
  - Authorised social media sites.

The Early Warning Network is also available and can be subscribed to for:

- location specific warnings https://www.earlywarningnetwork.com.au/services-location-alerting, and
- regional warnings https://www.earlywarningnetwork.com.au/regional-alerting.

Table 3-7 Notification platforms

App or Website or Media (Platform)	Description	Weblink
ABC Emergency Incident Map	Provides locations and general details of incidents Australia-wide. Provides general information.	https://www.abc.net.au/emergency/
Android smartphones	Open Settings, search 'Wireless emergency alerts', turn on 'Allow alerts', select 'Extreme threats', 'Severe threats' and 'Test alerts'.	-
BOM Weather App	Available warnings: ▪ Flood ▪ Severe thunderstorm ▪ Severe weather ▪ Tropical cyclone	Android: https://play.google.com/store/apps/details?id=au.gov.bom.metview iPhone: https://apps.apple.com/au/app/bom-weather/id1100096880
BOM website and mobile phone browser link	Severe weather warnings	http://www.bom.gov.au/nsw/warnings/ Mobile phone browser link: http://m.bom.gov.au/
BOM Twitter	The Bureau tweets about current and impending weather, especially significant weather events, including cyclones, tsunami and floods. Tweets generally link to information on the website which remains the most up-to-date and comprehensive official source of information.	https://twitter.com/BOM_au https://twitter.com/BOM_NSW
NSW SES	'Advice' level warnings through official NSW SES website using the Australian Warning System (AWS).	https://www.ses.nsw.gov.au/
HazardWatch Web App	HazardWatch Web App provides warnings and information about riverine flooding currently occurring within NSW.	https://www.hazardwatch.gov.au/
'Hazards Near Me NSW' App	The user can view emergency warnings and advice for fires and floods in NSW.	https://www.nsw.gov.au/emergency/hazards-near-me-app
Emergency Alert	DO NOT BLOCK +61 444 444 444. This number is related to Emergency Alert service. If the caller ID number or message header on your phone displays the number '+61 444 444 444' it is genuine. Emergency Alert is the national telephone warning system used by emergency services to send voice messages to landlines and text messages to mobile phones within a defined area about potential emergencies. i.e. "Floods, fires and other significant events can impact pose significant threat to members of the community in impacted area. Emergency Alert allows telephony notifications to be distributed to these areas, through both mobile and land line services, to provide warning of these events. Subscription to this service is not required.	For more information: https://www.emergencyalert.gov.au/home

App or Website or Media (Platform)	Description	Weblink
Emergency + (Plus)	The Emergency+ app is a free app developed by Australia's emergency services and their Government and industry partners. The app uses GPS functionality built into smart phones to help a Triple Zero (000) caller provide critical location details required to mobilise emergency services.	https://www.emergencyplus.com.au/
Lismore City Council Disaster Dashboard	Provides map view or list view information for: ▪ Flood incidents ▪ Road and bridge conditions ▪ Rain and waterways	https://disaster.lismore.nsw.gov.au/dashboard/overview
Local Radio Frequencies	▪ Radio ZZZ FM (Goonellabah) ▪ Radio 2LM (Goonellabah) ▪ 2NCR FM (Lismore) ▪ Radio ABC North Coast ▪ NIM FM (Nimbin)	Blakebrook Public School
Road closures	Northern Rivers NSW road closures (incidents, flooded roads).	https://northernrivers.myroadinfo.com.au/search.asp
Road closures	Transport NSW	https://www.livetraffic.com/ or 132 701
Social Media sites (official)	▪ NSW Flood Update ▪ Northern NSW Severe Weather ▪ NSW Incident Alerts ▪ NSW Incidents ▪ NSW SES Lismore City Unit	https://auslanemergency.com.au/index.php/deaf-deafblind/nsw-resources/social-media/
Social Media sites (other)	▪ NSW SES ▪ NSW Police Force ▪ NSW Rural Fire Service ▪ EWN (Early Warning Network) Alerts - New South Wales	https://auslanemergency.com.au/index.php/deaf-deafblind/nsw-resources/social-media/

3.6.10 School notification platforms

The increase in the use of technology and social media is now an important communication tool, which enables real time communication and played a critical role in the 2022 floods. The school platform can be used to share weather updates, flood warnings, evacuation orders and road access to/from the school by the flood warden and school community. The school community should be subscribed to this page.

Table 3-8 School notification platform

School	Description	Weblink
Blakebrook Public School	Facebook social media page	https://www.facebook.com/BlakebrookPublicSchool/
Jiggi Public School (adjacent to Jiggi Creek, which flows to Goolmangar Creek)	Facebook social media page	Search 'Jiggi Public School'
Coffee Camp Public School (adjacent to Goolmangar Creek)	Facebook social media page	Search 'Coffee Camp Public School'
Goolmangar Public School (adjacent to Goolmangar Creek)	Facebook social media page	Search 'Goolmangar Public School'

3.7 Flood evacuation

3.7.1 Authority to evacuate

In an emergency, a direction to evacuate is made by the Incident Controller (NSW SES) in consultation, where possible, with the NSW Police Force ([2]Fuller M. and O'Kane M, 2022).

Blakebrook Public School administration or the Department of Education can decide to close or evacuate the school upon issuance of forecast adverse weather conditions, 'Severe Weather Warnings', or 'Flood Watch' notifications (refer to section 3.7.3 below for more information).

3.7.2 Co-ordination during emergency

The Department of Education is responsible for remote co-ordination of the flood emergency at the school for an evacuation event. Blakebrook Public School administration (the Principal 'Flood Warden' and staff) are responsible for onsite co-ordination of a potential flood emergency at the school.

3.7.3 Evacuation strategy

3.7.3.1 Evacuation strategy and methods

It was advised by the NSW State Emergency Service at a meeting on 11 April 2023 with the consultant project team that that an 'evacuation strategy' could be adopted by Blakebrook Public School such that the school is closed or evacuated (until the potential for flooding has passed) upon issue of a 'Severe Weather Warning' or 'Severe Thunderstorm Warning' for very heavy rain or intense rain in the region (catchment) by the Bureau of Meteorology (which may be relayed by the NSW SES).

It is possible that the Bureau of Meteorology may issue a 'Flood Watch' notification for Lismore City (noting the notification may be relayed by the NSW SES), as it is possible for flooding to occur in Lismore City due to rainfall in Coopers Creek catchment, Bangalow Area catchment, or Leycester Creek catchment, without significant rainfall in the Terania Creek catchment that the school is located within.

Closing (do not attend) or evacuating the school upon issue of a 'Severe Weather Warning' or 'Severe Thunderstorm Warning' alert notification provides longer effective warning times to allow evacuation to take place, as an alternative to waiting for a 'Flood Watch' or 'Flood Warning' notification for Lismore City.

Note (Refer to section 1.6 for more information):

- A 'Flood Watch' provides early advice of a developing situation that may lead to flooding, and is not a warning of imminent flooding,
- A 'Flood Warning' is advice that flooding is occurring or expected to occur in a geographical area,
- 'Severe Weather Warnings' can be issued for very heavy rain or intense rain that may lead to flash flooding.

The evacuation strategy for the school for the purposes of evacuation prior to flood inundation of local roads, the school and the wider area is as follows:

- School administration to have a database of names, phone numbers (mobile and landline) of parents and citizens/carers (emergency contacts)
- School administration to implement a messaging system to communicate to parents and citizens/carers (emergency contacts) that closure of the school (do not attend) or evacuation of the school may be or is required. Methods include (more than one can be used):
  - Bulk 'SMS' messaging to all mobile phones on a list
  - Messaging via social media channels
  - Telephone

- Email

- School administration to be subscribed to Bureau of Meteorology (BOM Weather App) 'Severe Weather Warnings', 'Flood Watch' and 'Flood Warning' notification alert systems.
- School administration to be subscribed to Early Warning Network paid subscription service to send the BOM alerts to the school administration, in addition to BOM Weather App notification alert systems. EWN sends alerts by multiple channels (SMS, email and text-to-voice for landlines), providing confidence that the school will know an alert has been issued. This subscription service provides more channels for alerts than notifications/alerts sent via the BOM Weather App and reduces the potential for subscribers to 'turn off' notifications.
- Closure (do not attend) or evacuation of Blakebrook Public School should be undertaken by the school administration or Department of Education when a **'Severe Weather Warning'** notification for very heavy rainfall or intense rainfall is issued by the Bureau of Meteorology (using Early Warning Network location services alerts for the catchment that Blakebrook Public School is within (Terania Creek catchment)).
- The decision to close or evacuate should be made early using information at hand.
- Timely relaying of Bureau of Meteorology 'Severe Weather Warnings', 'Flood Watch' and 'Flood Warning' notifications, or NSW SES 'Advice' or 'Watch and Act' or 'Emergency Warning' warnings to parents and citizens/carers.
- Evacuation is to be undertaken as early as possible, which is aided by monitoring of warnings and weather conditions in the upper catchment and upstream flood conditions.
- **It is not advised** that the decision to close or evacuate the school should wait until a:
  - 'Flood Watch' or 'Flood Warning' notification for Lismore City (Leycester Creek or Wilsons River) is issued by the Bureau of Meteorology (or relayed by the NSW SES), or
  - an **'Evacuate Now - Emergency Warning'** notification for Lismore City is issued by the NSW SES.
- Students are largely unable to self-evacuate and require assistance from parents/carers and multiple methods of evacuation must be available for the FERP to be effective, such as:
  - arrangement with a local bus service to be on-call and available for the evacuation of all students to a pre-determined evacuation location is required
  - by parents and carers
  - by teachers and school staff
- Distribution of the evacuation route map to higher ground and a pre-determined evacuation location
- Evacuation must not require people to drive or walk through flood water
- Parents and citizens/carers or responsible adults are to evacuate the students under local traffic arrangements from the school via managed evacuation routes
- Evacuees are to go to home with their parents, or to friends or relatives, or else be taken to the nearest accessible evacuation centre. The homes of students, friends or relatives may also be subject to flood inundation, therefore these destinations may not be safe to stay at for extended periods if a major flood event occurs.
- The NSW SES will advise when return to evacuated areas is safe after flood waters have receded and reliable access is available.
- The process for making decisions by the school in the event of a flood emergency should be consistent with the process in section 1.3 of the school's *emergency management plan*.

The evacuation process is illustrated in the following figure.

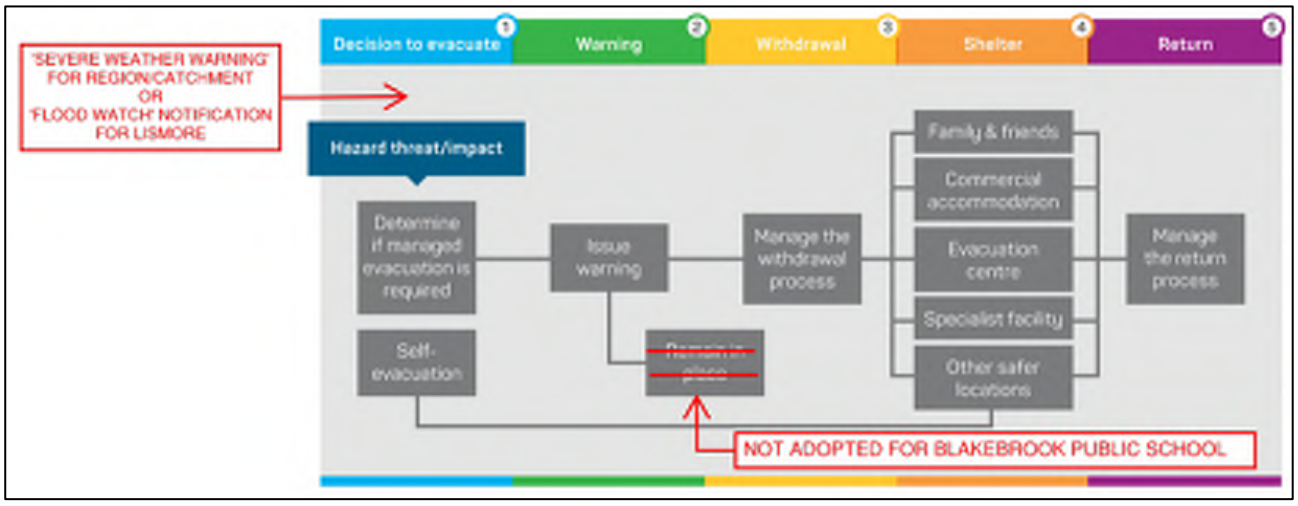


Figure 3-4 Evacuation process for Blakebrook Public School administration (Australian Institute for Disaster Resilience, 2017)

3.7.3.2 Warning messages

The school administration should relay 'Severe Weather Warning' and 'Flood Watch' notifications issued by the Bureau of Meteorology and NSW SES to the school community (parents and carers/citizens) through the electronic communications systems (email, SMS, social media) without delay upon receiving them.

The school community should be notified of the decision to close/evacuate the school and why it was made (e.g. potential flooding of local roads and school grounds) immediately and as early as possible. The school should arrange for students to be collected or for a local bus service to take students to a pre-determined location for students to be collected by their parents.

The school administration should regularly keep the school community notified of changing weather/flood conditions and decisions made.

3.7.3.3 School access routes and flood hazards

Creek flooding

There are numerous local roads in the region with multiple locations along them that could turn into floodways during overland flow or flood events. It is presumed that these roads would be used as access roads to and from Blakebrook Public School by the school community.

Appendix A presents figures that show potential floodway locations where road access could be cut. These roads are listed in the table below. Note – not all floodways that could occur are marked on the figures and all access roads are not necessarily shown.

Due to the shorter warning time of flooding associated with the local catchment and the creek runoff, the proposed 'best for school' re-development of Blakebrook Public School will have an evacuation strategy that involves early evacuation or school shutdown upon receiving of severe weather warning from BOM. Parents and citizens/carers or responsible adults are to evacuate the students under local traffic arrangements from the school via managed evacuation routes

Table 3-9 Local roads that may be affected by overland flow or creek floodwater

Origin or destination to/from Blakebrook Public School	Roads affected by flooding
North Lismore	Nimbin Road
Tuncester	Rosehill Road
Keerrong	Nimbin Road Keerrong Road
Goolmangar and The Channon	Nimbin Road Pinchin Road The Channon Road Terania Street Keerrong Road Koonorigan Road
Jiggi	Nimbin Road Jiggi Road
Nimbin	Nimbin Road Boyle Road
Chelmsford/Rock Valley	Rosehill Road Rock Valley Road Cawongla Road

Rocky Creek dambreak

The following road access routes between the school and The Channon are adjacent to Terania Creek and Rocky Creek, and could be cut by dambreak floodwater in the Sunny Day dambreak event:

- via Nimbin Road <> Pinchin Road <> Koonorigan Road <> Tuntable Creek Road
- via Nimbin Road <> Pinchin Road <> Keerong Bridge Road <> The Channon Road.

3.8 Flood response training

The most effective form of flood response training is for the school administration to read and be familiar with this report, the risks, and the roles, responsibilities and actions contained within them.

Flood awareness and response training by the school administration should essentially be focussed on:

- Roles and responsibilities in the *Flood Emergency Response Plan*
- Familiarisation with upper catchment, contributing rivers and creeks and locations of rainfall and river height gauges
- Familiarisation with road access routes and that there are multiple floodways along school access routes
- Being subscribed to SMS or social media alerts (Bureau of Meteorology (BOM), State Emergency Service (NSW SES) and Early Warning Network)
- School administration to undertake annual ‘evacuation’ preparations prior to the wet season (typically November to April)
- An annual discussion (refresher training) before the wet season (typically November to April) between the school administration and the parents and citizens committee should be undertaken about flood awareness, the ‘evacuation’ strategy, and content of the FERP.
- Educating the school community in newsletters or meetings about flood awareness
- Informing the school community through multiple forms of communication.

3.9 Flood educational awareness

The following online flood education resources for schools is available for education of students and the school community.

3.9.1 NSW SES flood education resources for primary schools

The NSW provides online flood education resources for Primary school students including:

- 'Water in the Valley' is a primary school resource that supports the NSW Geography syllabus, as well as integrated approaches to literacy, numeracy and science for Stages 1, 2 and 3. It is designed to support teachers across NSW to educate school students about flood risk, using the example of flooding in the Hawkesbury-Nepean Valley
- Children's activities.

The information and resources are available at https://www.ses.nsw.gov.au/for-schools/.

3.9.2 Flood resilience

Cool Australia (assisted by the Australian Institute for Disaster Resilience (AIDR) and National Recovery and Resilience Agency) provides a free course titled 'How to teach a unit on fire and flood resilience'. The course is described as:

A roadmap for how to approach teaching a unit on fire and flood resilience in their own classroom. While primarily focused on fire and flood resilience, it will reference the importance of an all-hazards approach to disaster resilience education.

The course is available at https://learn.coolaustralia.org/course/teach-fire-flood-resilience-cc062/.

3.9.3 Flood conditions and impacts on the environment and community

The Australian Institute for Disaster Resilience (AIDR) has produced:

- Natural hazards education series for lower and middle primary (e.g. emergency plan, emergency kit, driving in floodwater, flash floods). The series is available at https://schools.aidr.org.au/disaster-resilience-education/teaching-resources/#/.
- a *Flood lesson plan* where students investigate major historical flood events in their local area and identify protective actions to prepare for and respond to a flood event, including flood management strategies. The plan is available at https://schools.aidr.org.au/media/5593/aidr-flood-lesson-plan.pdf.

4 Flood Emergency Response Plan

4.1 School operational phase

4.1.1 Existing Local Flood Plans

The NSW SES has produced the Lismore City Local Flood Plan ([4]NSW SES, 2018). Blakebrook Public School is not within an area covered by the plan. An update of the plan may consider Blakebrook Public School due to flood affectation in the February 2022 flood.

The Local Flood Plan has been reviewed and relevant information applied to this FERP.

4.1.2 Existing school emergency management plan

The Blakebrook Public School *Emergency Management Plan* (effective 27 July 2022) was reviewed so the content of this FERP is consistent with the existing emergency management plan. The emergency management plan should be utilised in parallel with the FERP in the event of a pending flood or isolation by flood.

4.1.3 Procedures during non-flood periods

The following tasks are recommended for the School Principal ('Flood Warden'), Backup Flood Warden, teachers and P&C committee members. This section is re-produced in Appendix F Flood Emergency Response Plan.

Table 4-1 Procedures during non-flood periods

Task	Description	Responsibility
Familiarisation with FERP	Reading the FERP and being familiar with its contents (flood mechanisms, upstream rainfall and river height gauges) and procedures. Discussing the FERP with P&C committee members at least annually, and confirming roles and responsibilities.	▪ School Principal ('Flood Warden') ▪ Backup Flood Warden ▪ Assistant to Flood Warden
Subscribing to notifications, flood warning and alert systems	Subscribe to relevant notification and alert systems as listed in this FERP. Parents and citizens should be notified of the availability of relevant notification and alert systems. Add the weblinks listed in this FERP to computer and mobile phone 'Favourites'. Set up subscription (fees apply) to Early Warning Network (https://www.earlywarningnetwork.com.au/) for severe weather warnings. Refer to Appendix E for fee structure.	▪ School Principal ('Flood Warden') ▪ Backup Flood Warden ▪ Assistant to Flood Warden ▪ P&C committee members
Monitoring flood alerts and warnings.	Monitor the weather warnings and forecasts for the catchment regarding the potential for, or occurrence of high catchment rainfall.	▪ School Principal ('Flood Warden') ▪ Backup Flood Warden ▪ Assistant to Flood Warden

Task	Description	Responsibility
Education of school community	Parents/carer to nominate at least two responsible adults (can be parent or carer of another student) to be added to the school database who can collect their child from the school or evacuation destination point. Sharing relevant flood awareness, the evacuation strategy, appropriate content of FERP and educational resources with teachers, parents and citizens, students, and responding to their questions. Incorporating flood awareness and appropriate content of FERP into school curriculum.	▪ School Principal ('Flood Warden') ▪ Backup Flood Warden ▪ Assistant to Flood Warden ▪ Teachers
Alternative schools	Arranging alternative schools to take students during flood recovery period.	▪ School Principal ('Flood Warden') ▪ Department of Education
Alternative accommodation	Parents and citizens should be encouraged to look into the potential for alternative accommodation (friends, relatives) if their home is flood-prone or disrupts power supply or other utilities. This is if school operations are not disrupted long-term in the event that flooding inundates the school grounds but does not cause above-floor flooding of school buildings (classrooms, administration).	▪ School Principal ('Flood Warden') ▪ Backup Flood Warden ▪ P&C committee members
Parents and citizens contact information	Maintain a database of the contact details of parents and citizens (name/s, landline, mobile, email addresses) for communication purposes. Text message system to be set up so School Principal ('Flood Warden') can send emergency messages (such as flood warnings, alerts and evacuation orders) at short notice to all parents and citizens. **This method of communication should not be solely relied upon in emergency situations.**	▪ School Principal ('Flood Warden') ▪ Backup Flood Warden ▪ Assistant to Flood Warden
Social media group	Create one or more social media platforms 'private group' for parents and citizens to subscribe. Platforms to be utilised for flood warning and alert notifications and general communication.	▪ School Principal ('Flood Warden') ▪ Backup Flood Warden ▪ Assistant to Flood Warden ▪ P&C committee members
Register of structural engineers	Maintain a database of the contact details of structural engineers to inspect building undercroft slabs, structural columns, staircases after a flood event that inundates the school grounds but does not cause above-floor flooding of school buildings.	▪ School Principal ('Flood Warden') ▪ Backup Flood Warden ▪ Assistant to Flood Warden
Register of trades companies and equipment suppliers	Maintain a database of the contact details of trades companies and equipment suppliers for flood recovery phase i.e. ▪ Electricians ▪ Plumbers/Drain cleaners ▪ Landscapers ▪ Specialised trades (fencing contractors) ▪ Generator supply companies	▪ School Principal ('Flood Warden') ▪ Backup Flood Warden ▪ Assistant to Flood Warden ▪ P&C committee members

Task	Description	Responsibility
Recovery equipment	Plan a location for generators in the event school is operational after a flood event but power has not been restored. Generators to be adequate for: ▪ Lighting ▪ Air conditioning ▪ Computers ▪ Refrigeration.	▪ School Principal ('Flood Warden') ▪ Backup Flood Warden ▪ Assistant to Flood Warden

4.1.4 Procedures before floods (Flood preparation)

The following tasks are recommended for the School Principal ('Flood Warden'), Backup Flood Warden, teachers and P&C committee members. This section is re-produced in Appendix F Flood Emergency Response Plan.

The following phases of activation for response to a flood event have been adopted according to the levels used by the NSW SES (Australian Warning System).

Table 4-2 Procedures before pending floods (Flood preparation)

Task	Description	Responsibility
ADVICE LEVEL **(HIGH RAINFALL EVENT IS FORECAST)** An incident is forecast.		
Close or evacuate school	The school is to close or evacuate the school prior to flood water rising and cutting road evacuation routes, upon issue of a: ▪ 'Severe Weather Warning' for very heavy or intense rainfall in the region (catchment) by the Bureau of Meteorology (using Early Warning Network location services alerts). Contact bus company for evacuation of school. Undertake roll call to check all students have been evacuated. Follow instructions from Emergency Services. Monitor HazardWatch Web App. Monitor other social media platforms for warnings and information.	▪ School Principal ('Flood Warden') ▪ Backup Flood Warden ▪ Assistant to Flood Warden
Communication with NSW SES, Lismore City Council and Department of Education	Set up line of communication with NSW SES, Lismore City Council and Department of Education. Advise them of school's satellite phone number. Inform the NSW SES of: ▪ the number of people at the school being evacuated ▪ any emergency/medical requirements. Follow instructions from Emergency Services.	▪ School Principal ('Flood Warden') ▪ Backup Flood Warden
Communication with school community	Communicate to school community that school will be closed and not to attend due to the 'Severe Weather Warning' (very heavy rainfall or intense rainfall) forecast for the region. Communicate to school community that school is being evacuated and to collect children due to the 'Severe Weather Warning' (very heavy rainfall or intense rainfall) forecast for the region. Determine where Evacuation Centres are located for information of student families. Follow instructions from Emergency Services.	▪ School Principal ('Flood Warden') ▪ Backup Flood Warden ▪ School administration staff
If safe to do so, prepare school grounds and buildings for flooding	Move all ground level assets to upper access walkways if possible. Rubbish – Remove rubbish and recycle bins to upper access walkways if possible.	▪ School Principal ('Flood Warden') ▪ Backup Flood Warden ▪ Teachers

WATCH AND ACT LEVEL (FLOODING IS OCCURRING UPSTREAM AND FLOODING IN SCHOOL LOCAL AREA IS LIKELY) Conditions are changing and you need to start taking action now.		
Communication with school community	The school is to relay the NSW SES notifications and Early Warning Network notifications/alerts to the school community. Keep school community up to date as to changing rainfall and flood conditions.	▪ School Principal ('Flood Warden') ▪ Backup Flood Warden
Electricity supply	Electricity utility provider will power down the local power grid if river levels are predicted to inundate low lying dwellings.	▪ Electricity utility provider

4.1.5 Procedures during floods (Flood response)

The following tasks are recommended for the School Principal ('Flood Warden'), Backup Flood Warden, teachers and P&C committee members. This section is re-produced in Appendix F Flood Emergency Response Plan.

The following phases of activation for response to a flood event have been adopted according to the levels used by the NSW SES (Australian Warning System).

Table 4-3 Procedures during floods (Flood response)

Task	Description	Responsibility
EMERGENCY WARNING LEVEL **(FLOODING IN SCHOOL LOCAL AREA IS IMMINENT)** You may be in danger and need to take action immediately.		
Monitoring flood alerts and warnings	**It may be too late to evacuate if the flood level has cut local roads and emergency evacuation by NSW SES may be required.** Monitor notification systems in 'ADVICE LEVEL' table above.	▪ School Principal ('Flood Warden') ▪ Backup Flood Warden ▪ Teachers
Communication with NSW SES, Lismore City Council and Department of Education	Maintain line of communication with NSW SES, Lismore City Council and Department of Education. Advise them of school's satellite phone number. If not already done so, inform above organisations of: ▪ the number of people that were evacuated ▪ any emergency/medical requirements. Follow instructions from Emergency Services.	▪ School Principal ('Flood Warden') ▪ Backup Flood Warden
Communication with school community during 'evacuation strategy' flood emergency response	Advise parents and citizens/carers or staff they must wait until advised that flood water has subsided, the area is safe, and when the school will reopen. Keep school community up to date as to changing rainfall and flood conditions.	▪ School Principal ('Flood Warden') ▪ Backup Flood Warden

4.1.6 Procedures after floods (Flood recovery)

The following tasks are recommended for the School Principal ('Flood Warden'), Backup Flood Warden, teachers and P&C committee members. This section is re-produced in Appendix F Flood Emergency Response Plan.

Table 4-4 Procedures after floods (Flood recovery)

Task	Description	Responsibility
'ADVICE LEVEL' notification by NSW SES **(REDUCED THREAT: ADVICE)** Flood water has receded from school grounds or local access roads are no longer flooded.		
Monitoring flood alerts and warnings	Upon issue of a 'Advice' notification by the NSW SES. Monitor notification systems in 'ADVICE LEVEL' table above. Monitor receding of flood water from school grounds.	▪ School Principal ('Flood Warden') ▪ Backup Flood Warden ▪ School administration staff
Re-opening of school after 'evacuation strategy' flood emergency response	Advise parents and citizens/carers or staff that they will be advised when flood water has subsided, the area is safe, and when the school will reopen.	▪ School Principal ('Flood Warden') ▪ Backup Flood Warden
Communication with NSW SES, Lismore City Council and Department of Education	Follow instructions from Emergency Services and Council regarding access to the area after flood water has subsided and roads have been reopened. Inform the organisations when the school will reopen (once damage assessments and repairs have been completed).	▪ School Principal ('Flood Warden') ▪ Backup Flood Warden
Contact tradespersons	Contact qualified electrician to check power points, electrical equipment, appliances, or electrical hot water systems for damage. They must be repaired and tested before use. Contact plumber to inspect onsite sewerage system.	▪ School Principal ('Flood Warden') ▪ Backup Flood Warden ▪ School administration staff
Contact trades companies and equipment suppliers	Contact trades companies and equipment suppliers to arrange inspections and repairs, for potential flood recovery services at the school.	▪ School Principal ('Flood Warden') ▪ Backup Flood Warden ▪ School administration staff
Contact structural engineer	Contact structural engineer to arrange inspection of building undercroft slabs, columns, fencing upon flood waters receding and roads being reopened.	▪ School Principal ('Flood Warden') ▪ Backup Flood Warden ▪ School administration staff
Clean up school grounds	Arrange cleaning contractor to undertake wash down of undercrofts. Arrange desilting of drainage and pits, remove silt from undercrofts. Wear suitable protective clothing, including boots and gloves, when cleaning up.	▪ School Principal ('Flood Warden') ▪ Backup Flood Warden ▪ School administration staff
Communication with school community	Regularly advise school community on progress of restoration of school and when school will reopen. Advise parents and citizens/carers or staff that they will be advised when flood water has subsided, the area is safe, and when the school will reopen.	▪ School Principal ('Flood Warden') ▪ Backup Flood Warden ▪ School administration staff
Review and update FERP	Review and update the FERP.	▪ School Principal ('Flood Warden')

4.2 Construction phase

4.2.1 Roles and responsibilities

The following tasks are recommended for the Head Contractor 'ADCO' during the construction phase.

Table 4-5 Roles and responsibilities for Head Contractor 'ADCO' at Blakebrook Public School

Name	Role and responsibilities	Contact details	
TBC	▪ **Head Contractor** ADCO ▪ Awareness that: – flash-flooding may isolate the school – the entire school grounds are at risk of inundation in rare flood events (February 2022 flood event). ▪ Communication of flood risk to sub-contractors at induction ▪ Subscribe to alerts and warnings across various media platforms previously stated in this report (including Early Warning Network subscription for Severe Weather Warning alerts) ▪ Monitor for issue of a: – 'Severe Weather Warning' notification/alert from the Bureau of Meteorology or Early Warning Network. – 'Advice' notification by the NSW SES that an incident has started (e.g. widespread severe rainfall event in the upper catchment, or major flooding in occurring in the upper catchment). ▪ Communication of alerts and warnings to sub-contractors	Mob:	TBC
		Landline:	TBC
		Email:	TBC
	▪ Arranging evacuation of tradespersons visitors prior to flooding upon issue of 'Severe Weather Warning' (very heavy rainfall or intense rainfall) ▪ Potentially arranging with local landowner (427 Rosehill Road, Blakebrook) to north of Blakebrook Public School for emergency storage of mobile plant, equipment, tools, fuel, and emergency evacuation of contractors in the event of the school being isolated by flooding (Refer to Appendix B ▪ Preparing school grounds and construction for expected flood inundation 'make safe' i.e. secure floatable debris or building materials prior to flooding ▪ Communicating with NSW SES for potential evacuation by emergency services (Refer to Appendix B ▪ Inform School Infrastructure NSW of preparations		

4.2.2 Contact list of relevant authorities

The following contact list of relevant Authorities have been identified for the purposes of the implementation of the Flood Emergency Response Plan. Additional Authorities can be added by the Flood Warden. Regular updating of the table is recommended as information changes.

Refer to section 3.3.2.

4.2.3 Flood risk to temporary site (construction) operations

The following risks to temporary site operations during construction are provided:

- Isolation of construction personnel due to flood water cutting local roads preventing egress of people from site and access to site by emergency services by vehicle
- Potential rescue of construction personnel by emergency services by boat or helicopter
- Total loss of mobile plant, equipment, tools, fuel, building materials and products due to flood inundation
- Environmental damage due to spilling of stored fuel and building materials.

5 Discussion and further considerations

The following items should be considered by School Infrastructure NSW and the Department of Education in relation to the flood emergency response strategy and identified implications for Blakebrook Public School:

- Be mindful that the nature of flooding is complex, every flood is different and there is potential for improvements to instruments and technology that may increase the speed a flood warning message may be delivered.
- The effective warning time for flooding at Blakebrook has been determined to be under 6 hours, which requires adoption of adverse weather forecasts as a means of providing longer warning time to support evacuation. To mitigate this, the NSW SES advised that closure (do not attend) or evacuation of Blakebrook Public School could be undertaken by the school administration or Department of Education when a:
  - 'Severe Weather Warning' for very heavy rainfall or intense rainfall in the region (catchment) by the Bureau of Meteorology using Early Warning Network location services alerts.
- There are several rural access roads to and from Blakebrook Public School. All of these can be cut by floodwater during localised storms or larger floods. It is noted that the school can be isolated by floodwater for a short duration (hours) or long duration (days).
- It is noted school buildings raised floor levels are likely to default to a community refuge in the event the evacuation route is cut and the community is afraid the flood level will rise above the floor level or to the roof level. The school building/s could become overwhelmed with people from the local area seeking refuge.

Other considerations are as follows:

- The school administration should engage Early Warning Network to set up a subscription service to provide alerts for 'Severe Weather Warnings'
- School administration to undertake annual 'evacuation preparations prior to the wet season (typically November to April)
- School administration to undertake responsibilities in Sections 3 and 4.1
- Install flood warning notice per Section 3.4 prior to operational status of re-developed school
- Department of Education to be aware of their responsibility per Section 3.7 and make preparations to implement this responsibility
- The Head Contractor undertake responsibilities in Section 4.2.

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May: https://www.ewn.com.au/alerts/bymonth.aspx?d=2022-05.
September: https://www.ewn.com.au/alerts/bymonth.aspx?d=2022-09.
October: https://www.ewn.com.au/alerts/bymonth.aspx?d=2022-10.
November: https://www.ewn.com.au/alerts/bymonth.aspx?d=2022-11.
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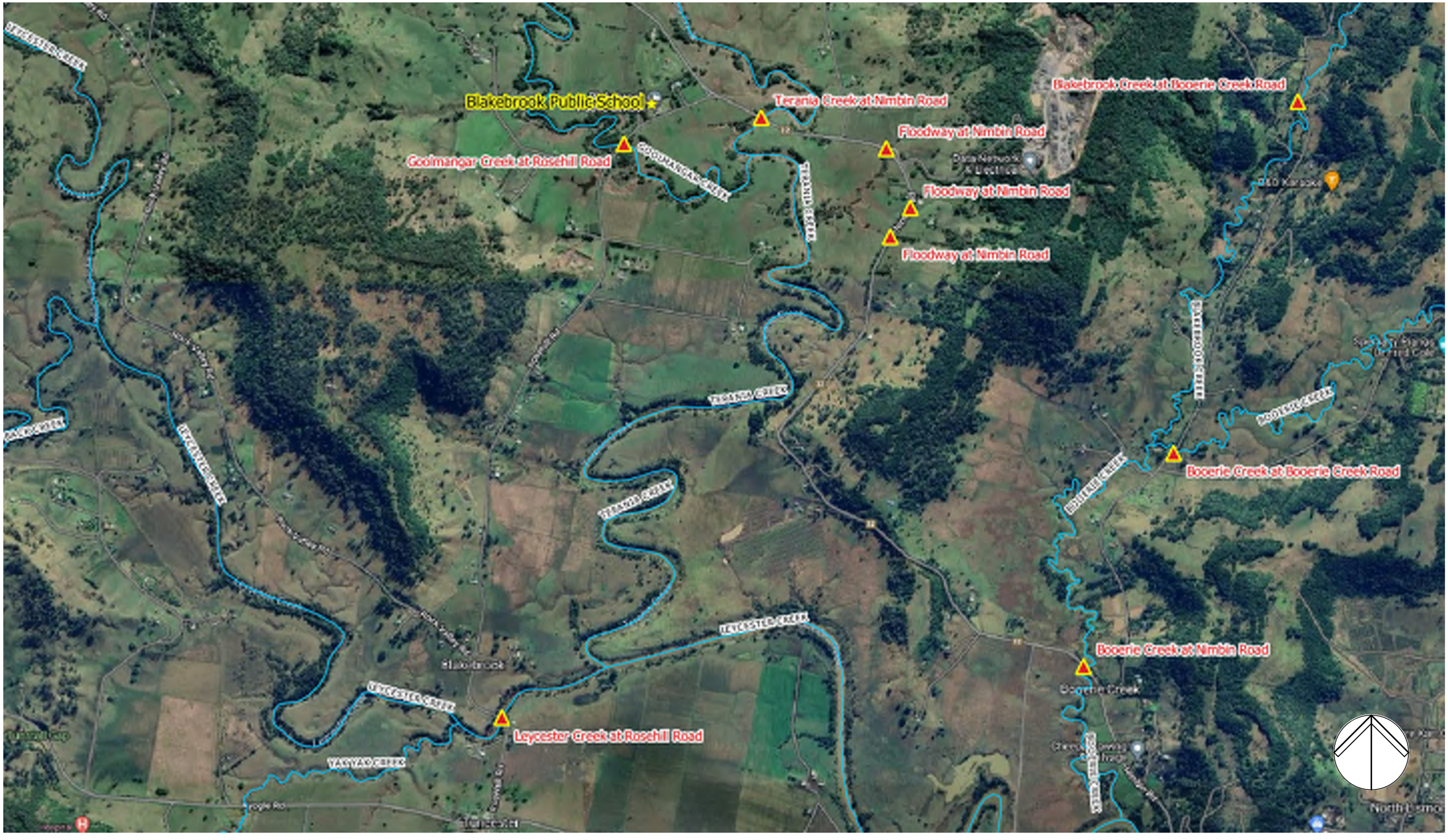
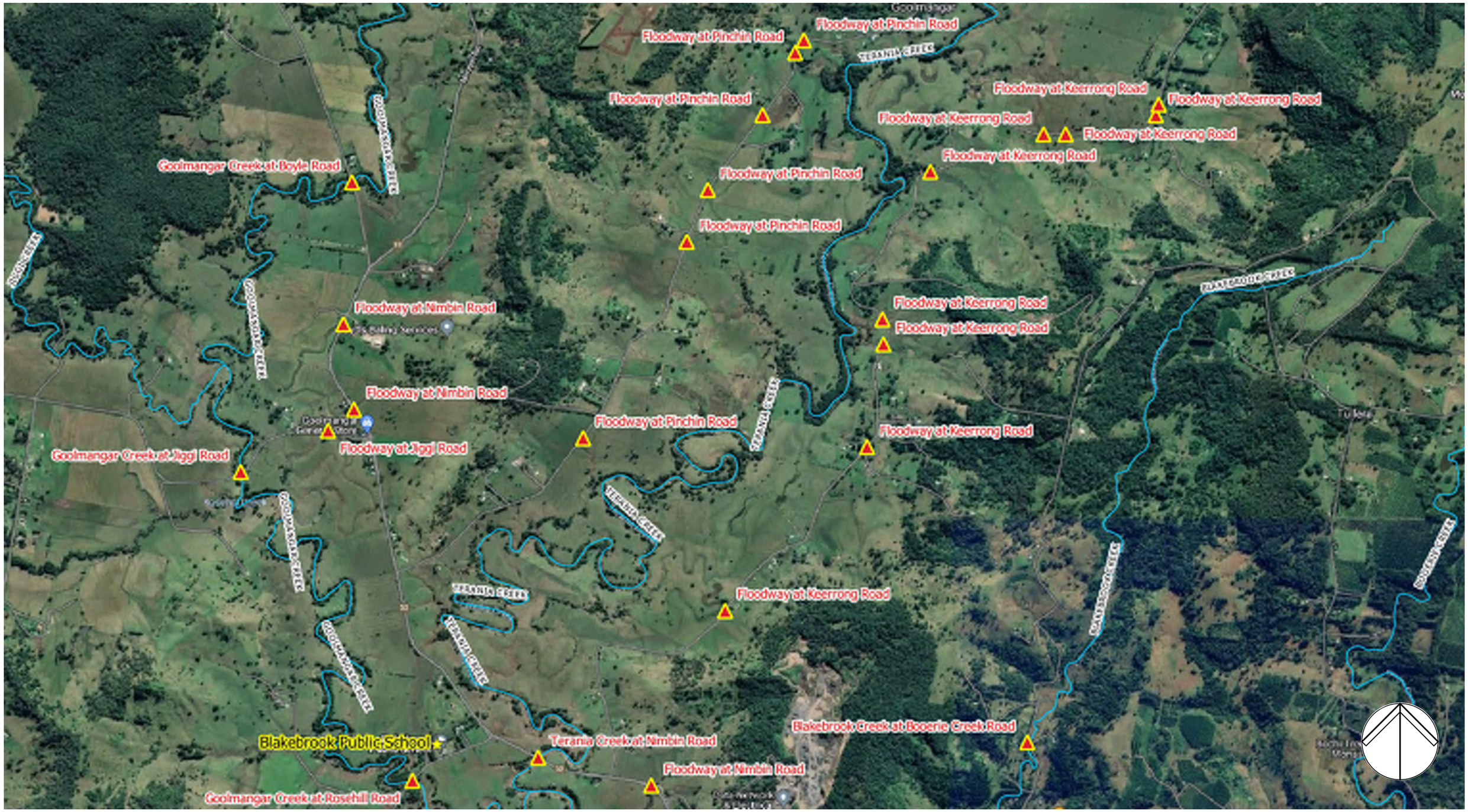
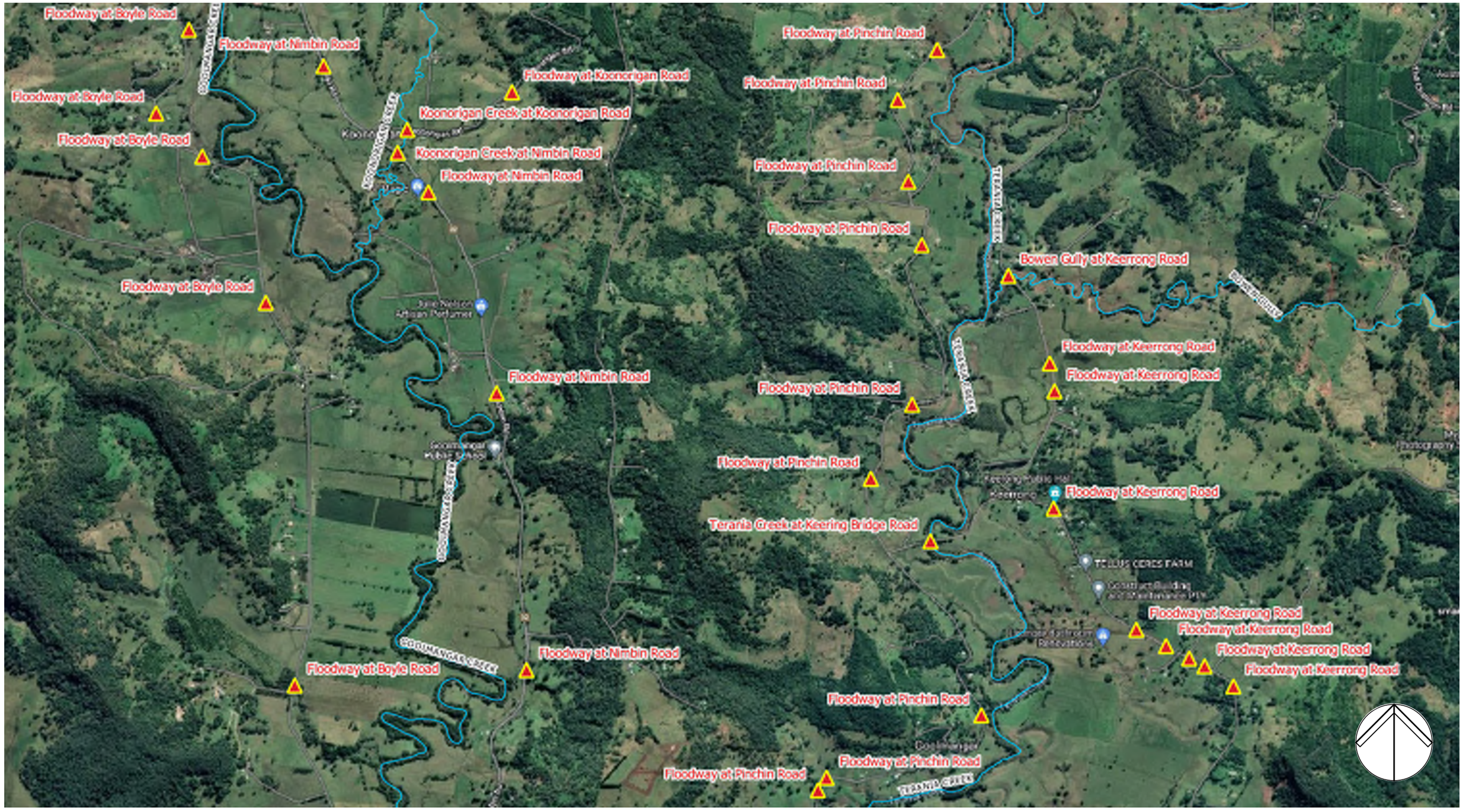
Appendix A Local roads with floodways


Blakebrook Public School
Goolmangar Creek at Rosehill Road
Terania Creek at Nimbin Road
Floodway at Nimbin Road
Floodway at Nimbin Road
Floodway at Nimbin Road
Blakebrook Creek at Booerie Creek Road
Booerie Creek at Booerie Creek Road
Booerie Creek at Nimbin Road
Leycester Creek at Rosehill Road
GOOLMANGAR CREEK
TERANIA CREEK
LEYCESTER CREEK
YAKYAD CREEK
BOOERIE CREEK
Blakebrook
Booerie Creek
POTENTIAL ROAD FLOODING LOCATION


Floodway at Cawongla Road
Floodway at Rock Valley Road
Leycester Creek at Rock Valley Road
Floodway at Rock Valley Road
Floodway at Rock Valley Road
Goolmangar Creek at Jiggi Road
Blakebrook Public School
Goolmangar Creek at Rosehill Road
POTENTIAL ROAD FLOODING LOCATION


Floodway at Pinchin Road
Floodway at Pinchin Road
Floodway at Pinchin Road
Floodway at Keerrong Road
Floodway at Keerrong Road
Floodway at Pinchin Road
Floodway at Keerrong Road
Floodway at Keerrong Road
Floodway at Keerrong Road
Goolmangar Creek at Boyle Road
Floodway at Pinchin Road
Floodway at Pinchin Road
Floodway at Keerrong Road
Floodway at Keerrong Road
Floodway at Nimbin Road
Floodway at Nimbin Road
Floodway at Pinchin Road
Floodway at Keerrong Road
Goolmangar Creek at Jiggi Road
Floodway at Jiggi Road
Floodway at Keerrong Road
Blakebrook Public School
Terania Creek at Nimbin Road
Blakebrook Creek at Booerie Creek Road
Floodway at Nimbin Road
Goolmangar Creek at Rosehill Road
POTENTIAL ROAD FLOODING LOCATION



POTENTIAL ROAD FLOODING LOCATION


Tuntable Creek at Koonorigan Road
Terania Creek at Terania Street
Floodway at The Channon Road
Rocky Creek at The Channon Road
Floodway at Keerrong Road
Floodway at Pinchin Road
Floodway at Pinchin Road
TERANIA CREEK
ROCKY CREEK
TERANIA CREEK
TERANIA CREEK
ROCKY CREEK
PINCHIN CREEK
The Channon Craft Market
Zaytuna Farm: Home of the Permaculture
POTENTIAL ROAD FLOODING LOCATION

Appendix B Construction phase - Potential vehicle evacuation route and helicopter landing site

Appendix C NSW SES flash flood guide

When flooding is likely

When flash flooding is likely the best action to take is to leave low-lying homes and businesses (evacuation) well before flooding begins, but only if it is safe to do so.

If you are trapped by rising floodwater, seek refuge in the highest part of a sturdy building.

Stay there and call '000' (triple zero) if you need to be rescued.

Stay clear of possible flash flood areas when severe weather is forecast and reconsider non-essential travel. Schools and work places have emergency procedures for these situations to keep children and workers safe.

- Listen to your local radio station for information, updates and advice
- Locate and activate your Business or Home FloodSafe Plan and check your Emergency Kit
- Check on your neighbours and make sure they are aware of potential flooding
- Stack possessions, records, stock or equipment on benches and tables, placing electrical items on top
- Relocate waste containers, chemicals and poisons well above floor level
- Move animals, including agisted animals, to high ground and prepare pets for possible evacuation
- Secure objects that are likely to float and cause damage
- Stay away from and keep children clear of drains, culverts, creeks and low lying areas

How the NSW SES can help you

The NSW SES is responsible for responding to floods in NSW.

This includes planning for floods and educating people about how to protect themselves and their property.

During floods the NSW SES will provide flood information, safety advice and can arrange for the delivery of essential supplies to people isolated by floodwater. Where possible, the NSW SES will conduct evacuations and undertake flood rescue.

NSW GOVERNMENT

SES NSW STATE EMERGENCY SERVICE

Principal Partner

NRMA INSURANCE

FOR EMERGENCY HELP IN FLOOD, STORM AND TSUNAMI CALL

132 500

In life-threatening emergencies call 000 (triple zero)

For more information call the NSW SES on 1800 201 000

or visit: www.floodsafe.com.au

#NSWSES /NSW SES /NSWSES

Flash FloodSafe

SES NSW STATE EMERGENCY SERVICE

New South Wales

Cover image: Toowoomba Queensland. Image provided by Reuters.

FloodSafe

What is flash flooding?

Flash flooding is a rapid rise in water over a short period of time. It does not usually last more than a few hours.

Flash flooding can follow heavy rainfall, in places where the land is steep and close to the source of streams or watercourses.

Low-lying areas (under bridges or around culverts, drains, creeks and causeways) can be more susceptible to flash flooding. These are often dangerous places to be if it floods.

Water associated with flash flooding can also move quickly over land in either natural depressions or along roadways and parkland.

Flash floodwater can place lives at risk. It can be several metres deep, rise quickly and move fast.

If you live in an area with a potential for flash flooding, there will be less time for you to act to protect your family and property.

Prepare now. Put together an Emergency Kit consisting of a portable battery powered radio and torch, spare batteries, first aid kit, candles, waterproof matches, important papers, emergency plans and a waterproof bag.

Prepare your family and property now

Know your risk

- If you live or work close to a river, water course, creek, drain, culvert or in a low-lying area, you may be at risk from flash floods even if you have never experienced them. It is important to be aware of the possibility of flooding where you live, where you work, where you keep livestock and where you travel
- Find out about the local flood history. A copy of the local flood plan may be available from your council. Check with the local NSW SES unit or at www.floodsafe.com.au to find out if there is a local FloodSafe Guide. Contact your local council for specific information on how floods may affect your property
- Be aware of natural signs of flash flooding. These can include heavy rainfall and rushing or pooling water
- Talk with your neighbours and people who have lived in the area for a while about the local flood risk
- Knowing your flood risk will help you plan. It is important to plan now so that you know what to do when flooding occurs
- Even if your property is not inundated by floodwater, you could become isolated. Access to other areas may be cut and you might lose power, water and sewage

Know where to go

- Find the safest route to travel in the event that you might need to evacuate. Identify places where evacuation routes may be cut and locate alternate routes
- Check with friends or relatives outside the flood prone area to organise a place to go. Find out where potential evacuation centres could be in your area

Know who to call

- For emergency help in floods and storms, call the NSW SES on 132 500
- Keep local emergency numbers handy (near your phone or on your fridge)
- In a life-threatening emergency, call 000 (triple zero)

Know your plan

- To help households and businesses plan for flooding, the NSW SES has developed Home and Business FloodSafe Toolkits. These are available free of charge from your local NSW SES unit or at www.floodsafe.com.au
- Review your plan annually or after any floods to keep it current

Stay informed

The Bureau of Meteorology (www.bom.gov.au) issues Severe Thunderstorm Warnings and Severe Weather Warnings for a range of dangerous weather. These may include warnings for possible flash flooding.

Monitor weather conditions and be aware of environmental cues such as very heavy rainfall. In flash flood areas, this may be the only indication of possible flash flooding.

In some flash flood environments, Flood Watches are issued by the Bureau of Meteorology to advise people of the potential for flooding.

Flood Warnings may also be issued in some flash flood environments. Flood Warnings advise of predicted river heights and when these heights are likely to occur.

It is important to remember that most flash floods happen with little or no warning. Plan to act early. It is safer to stay well clear of flash floods.

- Flood information including safety advice, evacuations and road closures may be broadcast over local radio stations
- Keep listening to the radio for information, updates and advice
- Check with friends and neighbours to make sure they are aware of any warnings
- This brochure, and other general information on flash floods, can be found on the NSW SES FloodSafe website www.floodsafe.com.au

NEVER ENTER FLOODWATER

Never enter or travel through floodwater. This includes walking, driving, riding and playing in floodwater.

Entering floodwater is the leading cause of death during floods.

Appendix D Flood maps

D.1 10% AEP Flood depth map

522,000

523,000

6,818,000

SOMERVILLE RD

TERANIA CREEK

Nimbin Rd

ROSEHILL RD

Rosehill Rd

Blakebrook Public School

GOOLMANGAR CREEK

Goolmangar Creek

Somerville Rd

1 2 3 4 5 6 7 8

LEGEND

- Reporting Location
- Cadastre
- Site Boundary
- Proposed Building Location
- Model Extent

Flood Depth (m)

- 0.0 - 0.5
- 0.5 - 1.0
- 1.0 - 2.0
- 2.0 - 5.0
- >5.0

R	DETAILS	DATE
1	Final Issue	05-12-2023

DRAWN	RS	CHECKED	KM
APPROVED	MP	DATE	05-12-2023

NOTES:

N

0 0.07 0.14 km

SCALE @ A3 - 1:3,000
GDA94 / MGA zone 56

DISCLAIMER
Engeny has endeavoured to ensure accuracy and completeness of the data. Engeny assumes no legal liability or responsibility for any decisions or actions resulting from the information contained within this map.

DATA SOURCE
QLD Government Open Data Source

ENGENY

NSW GOVERNMENT

Figure B1

NSW Government - Department of Education
Blakebrook Public School
Flood Impact Assessment
Post-Rebuild Case 10% AEP Flood Depth

Drg Ref: QC3008_001-SKE-0001

Q:\Projects\QC3008 NSW Department of Education\QC3008_001 Blakebrook P School FIA\05 Design\GIS\Workspaces\QC3008_001 WOR-502-B-Blakebrook Flood_RS.qgz

D.2 5% AEP Flood depth map

522,000

523,000

6,818,000

SOMERVILLE RD

TERANIA CREEK

Nimbin Rd

ROSEHILL RD

Rosehill Rd

Blakebrook Public School

GOOLMANGAR CREEK

Goolmangar Creek

Somerville Rd

1 2 3 4 5 6 7 8

LEGEND

- Reporting Location
- Cadastre
- Site Boundary
- Proposed Building Location
- Model Extent

Flood Depth (m)

- 0.0 - 0.5
- 0.5 - 1.0
- 1.0 - 2.0
- 2.0 - 5.0
- >5.0

R	DETAILS	DATE
1	Final Issue	05-12-2023

DRAWN	RS	CHECKED	KM
APPROVED	MP	DATE	05-12-2023

NOTES:

N

0 0.07 0.14 km

SCALE @ A3 - 1:3,000
GDA94 / MGA zone 56

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DATA SOURCE
QLD Government Open Data Source

ENGENY

NSW GOVERNMENT

Figure B2

NSW Government - Department of Education
Blakebrook Public School
Flood Impact Assessment
Post-Rebuild Case 5% AEP Flood Depth

Drg Ref: QC3008_001-SKE-0001

Q:\Projects\QC3008 NSW Department of Education\QC3008_001 Blakebrook P School FIA\05 Design\QGIS\Workspaces\QC3008_001-WOR-502-B-Blakebrook Flood_RS.qgz

D.3 1% AEP Flood depth map

522,000

523,000

6,618,000

SOMERVILLE RD

TERANIA CREEK

Nimbin Rd

ROSEHILL RD

Rosehill Rd

GOOLMANGAR CREEK

Goolmangar Creek

Somerville Rd

1 2 3 4 5 6 7 8

Blakebrook Public School

LEGEND

- Reporting Location
- Cadastre
- Site Boundary
- Proposed Building Location
- Model Extent

Flood Depth (m)

- 0.0 - 0.5
- 0.5 - 1.0
- 1.0 - 2.0
- 2.0 - 5.0
- >5.0

R	DETAILS	DATE
1	Final Issue	05-12-2023

DRAWN	RS	CHECKED	KM
APPROVED	MP	DATE	05-12-2023

NOTES:

N

0 0.07 0.14 km

SCALE @ A3 - 1:3,000
GDA94 / MGA zone 56

DISCLAIMER
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DATA SOURCE
QLD Government Open Data Source

ENGENY

NSW GOVERNMENT

Figure B3

NSW Government - Department of Education
Blakebrook Public School
Flood Impact Assessment
Post-Rebuild Case 1% AEP Flood Depth

Dwg Ref
QC3008_001-SKE-0001

Q:\Projects\QC3008 NSW Department of Education\QC3008_001 Blakebrook P School FIA\05 Design\GIS\Workspaces\QC3008_001-WOR-502-B-Blakebrook Flood_RS.qgz

D.4 Probable Maximum Flood depth map

522,000

523,000

6,618,000

SOMERVILLE RD

TERANIA CREEK

ROSEHILL RD

GOOLMANGAR CREEK

Nimbin Rd

Rosehill Rd

Somerville Rd

Goolmangar Creek

Terania Creek

Blakebrook Public School

1 2 3 4 5 6 7 8

LEGEND

- Reporting Location
- Cadastre
- Site Boundary
- Proposed Building Location
- Model Extent

Flood Depth (m)

- 0.0 - 0.5
- 0.5 - 1.0
- 1.0 - 2.0
- 2.0 - 5.0
- >5.0

R	DETAILS	DATE
1	Final Issue	05-12-2023

DRAWN	RS	CHECKED	KM
APPROVED	MP	DATE	05-12-2023

NOTES:

N

0 0.07 0.14 km

SCALE @ A3 - 1:3,000
GDA94 / MGA zone 56

DISCLAIMER
Engeny has endeavoured to ensure accuracy and completeness of the data. Engeny assumes no legal liability or responsibility for any decisions or actions resulting from the information contained within this map.

DATA SOURCE
QLD Government Open Data Source

ENGENY

NSW GOVERNMENT

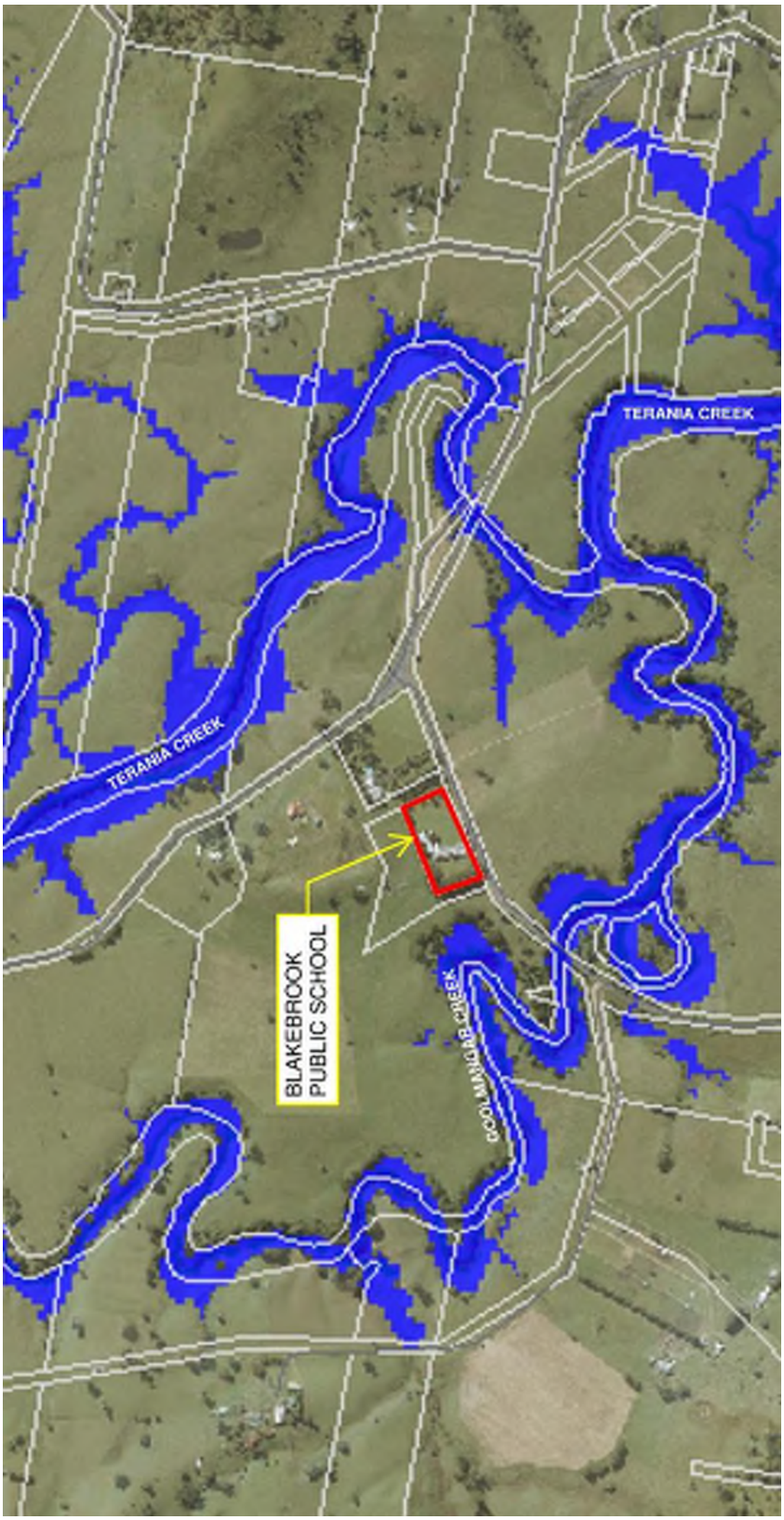
Figure B9

NSW Government - Department of Education
Blakebrook Public School
Flood Impact Assessment
Post-Rebuild Case PMF Flood Depth

Eng Ref: QC3008_001-SKE-0001

Q:\Projects\QC3008 NSW Department of Education\QC3008_001 Blakebrook P School FIA\05 Design\QGIS\Workspaces\QC3008_001-WOR-502-B-Blakebrook Flood_RS.qgz

D.5 Rocky Creek Dam Sunny Day dambreak flood extent map



Appendix E Early Warning Network Alerting Services

Weather & Hazard Alerting Solutions

About EWN

EWN has been providing Companies and Organisations across Australia and New Zealand with weather and hazard services for over 15 years. We have a dedicated team of in-house Meteorologists who specialise in severe weather and hazard event forecasting. We save our clients valuable time by sourcing and aggregating for them all the relevant data needed to create timely, accurate situational authority. This means your managers can focus on running operations while we look after your forecasting and alerting needs.

We will work with you to understand your specific requirements to deliver a bespoke service. We tailor the information to appear in the format of choice that's compatible with your systems and devices. We will deliver the intelligence you require with colour-coded, simple to read content and location-specific graphics to help your people make an immediate decision.

Our in-house Meteorologists use the most advanced high-resolution weather models available. Combined with local observational equipment and the very latest in radar, satellite and observational technologies, our service is the most advanced available. Hence, you can trust EWN to look after your interests 24x7 when you need decision superiority to stay one step ahead.

About Standard EWN Alerting

Our highly experienced in-house EWN Meteorologists and Alert Operators monitor weather events and natural hazards 24x7. We provide alerts to clients who need to know about events before they impact on their locations of interest. Our alert products have saved customers millions of dollars by providing timely, accurate intelligence to help them prevent potential loss or damage, as well as protecting their people.

The key to our alerting product is **our staff validate and filter the data before sending to registered users**. This value-add service makes sure that we **avoid false alarms and unnecessary duplication**, hence we can assure our clients they will receive only the information that matters to them.

This means when a client receives an EWN alert, they know it is **actionable intelligence** upon which they must act.

EWN archive every alert sent for post-incident audit and analysis where necessary.

We draw upon data from multiple sources and sensors across Australia and overseas as required. Our standard service includes data from the following sources:

- Official Bureau of Meteorology (BoM) warnings
- EWN internal forecasting
- Australian Tsunami Warning Centre
- Fire authorities from each State and Territory

We send our alerts by multiple channels including:

- SMS
- Email
- API
- Text-to-Voice for landlines.

Alert warnings we send for include:

- Severe Thunderstorm warnings (including possible Hail)
- Severe Weather warnings (including damaging winds and heavy rainfall)
- Flood Watches
- Tropical cyclone watches and warnings
- Tsunami warnings
- Fire Weather warnings
- Bushfire Watch & Act
- Bushfire Emergency warning
- Heatwave Alerts (NEW) Regional Alerts ONLY – additional charges apply

EWN Standard Alerting Services

Location Alerts

If you need to know about warnings for a specific location, our Location Alerts service is what you need. This service provides you with EWN Alerts for your specific street address location(s).

One of the advantages of EWN's Location Alert Service is our ability to geographically target the threat area so only users inside the threat polygon drawn will be advised of the threat. So rather than having to waste time sourcing and validating if the alert applies to you, we do all the hard work for you only sending the alert when your location is affected. We also remove all the re-issued warnings from being sent to you, removing the confusion with it, making the alert process clear and easy.

Simply let us know which location(s) you would like to receive alerts for plus the name and contact details for those within your organization to receive them and we take care of the rest.

The service operates 24/7, 365 days per year with alerts sent via either SMS, email or landline call.

Regional Alerts

If you need to know about alerts across a region or number of regions across Australia, our Regional Alerts service is your solution. This service provides you with EWN Alerts for any number of regions across Australia.

Rather than having to waste time on sourcing then validating if the alert applies to you, we do all the hard work for you only sending the alert when your location is affected. We also remove all the re-issued warnings from being sent to you, removing the confusion with it, making the alert process clear and easy.

Simply let us know which region(s) you would like to receive alerts for plus the name and contact details for those within your organization to receive them and we take care of the rest.

The service operates 24/7, 365 days per year with alerts sent via either SMS, email or landline call.

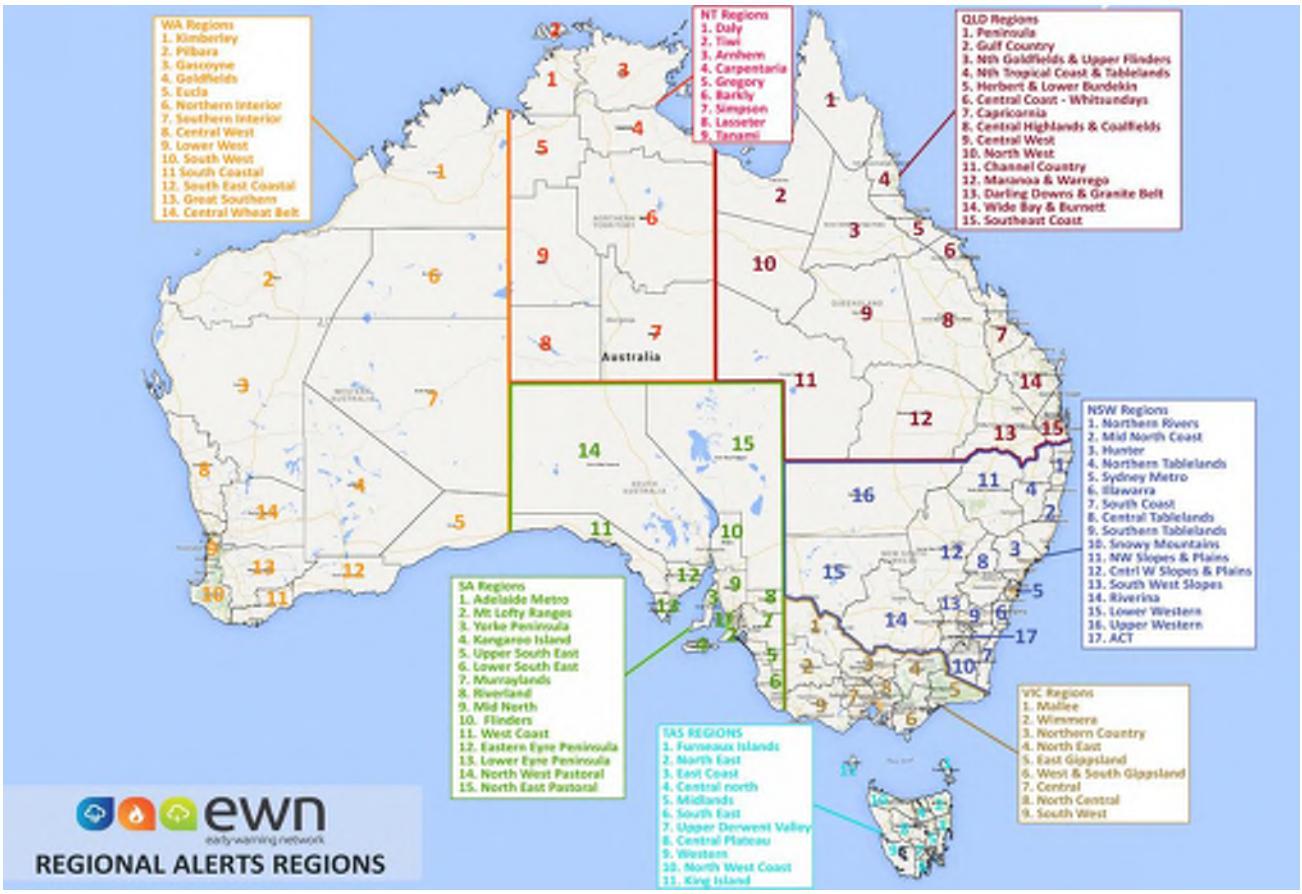
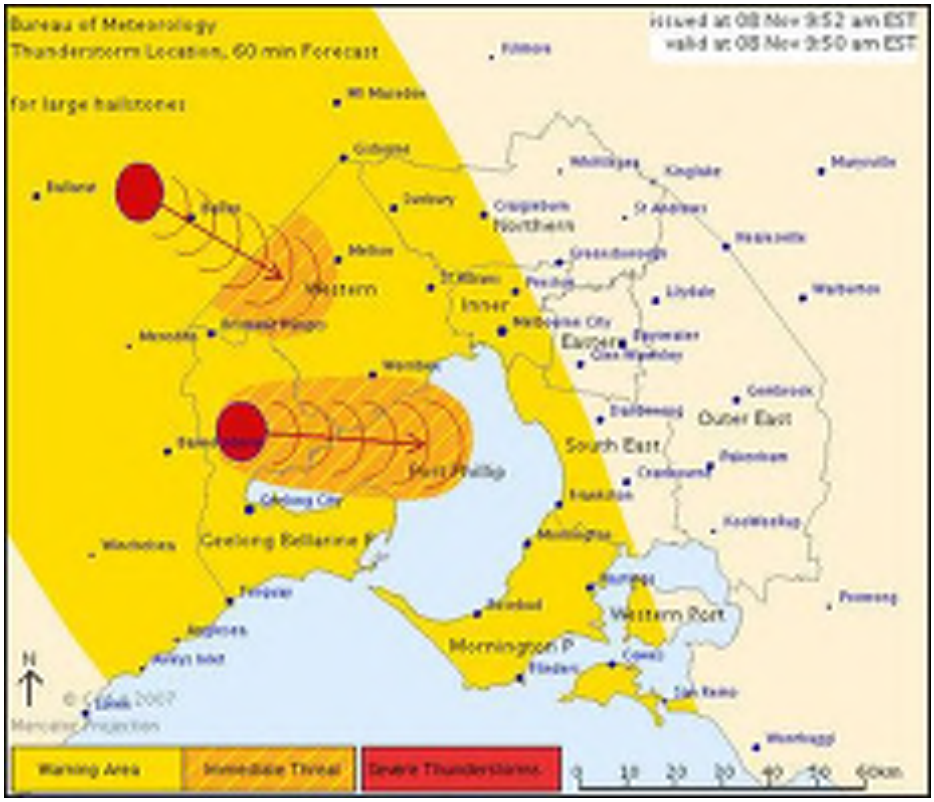


Fig 1.3 – Map overview of all the Regions available to receive alerts for using our Regional Alerts service.

Hail-carrying thunderstorm warning plus forecast.

In Metro areas, EWN will issue more location-targeted SMS alerts of the actual predicted path of a severe weather event (red and orange areas) compared to the BoM warning area (yellow). This will avoid false alarms and unnecessary duplication and reduce the overall SMS cost to your business.



Custom Branding options

Customers can adjust the alerts for email and SMS to suit their requirements.
Below are guidelines of what can be customised from our standard alerts.

Standard SMS Alert Template

"SA Severe Weather: Heavy Rain. Renmark, Mount Gambier, Naracoorte, Lameroo, Bordertown, Keith at risk during Thursday afternoon and evening. Bit.ly/2alVSIs "

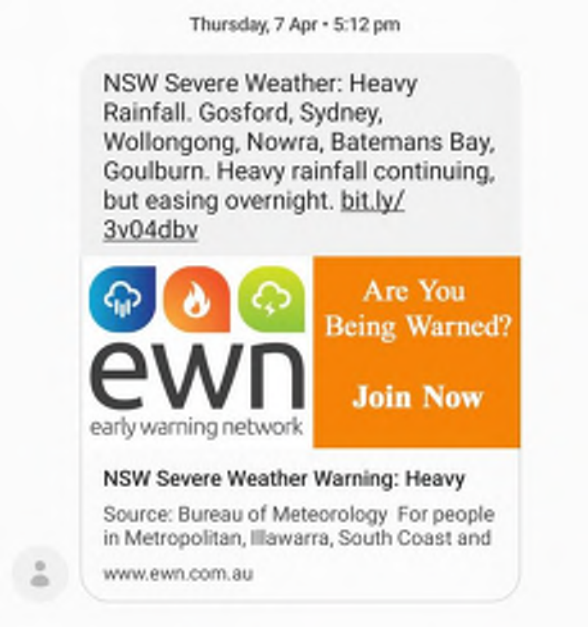
Customers can either:

- Add a custom SMS Sender ID (11-character limit) *
- Add a custom message at the end of the SMS content (15-character limit) *
- Leave the SMS as is (Standard EWN details)
- Include or Remove the current Bit.ly link from the SMS (link takes SMS recipient to a EWN webpage with further detail on the warning)

** The first two options are mutually exclusive*

Samples

Sample SMS and sample link content



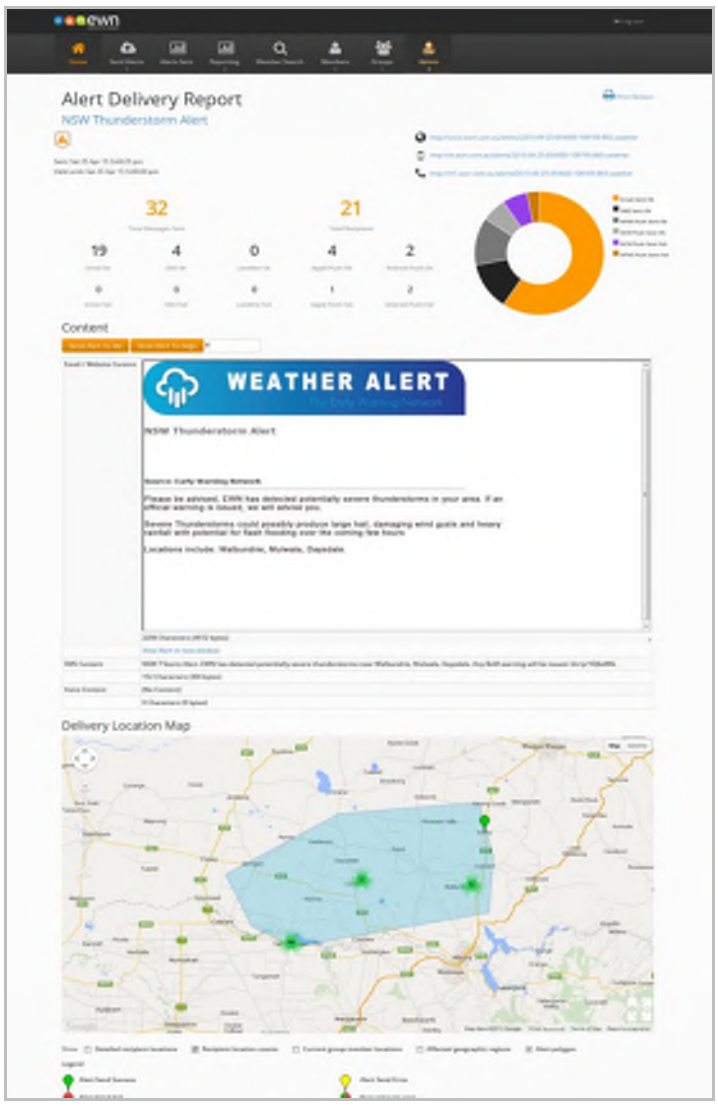


Fig 1.2 – View of EWN's Location Alert System (GNIS) with an alert showing shaded in blue. Only users with a street address inside this polygon will receive the alert.

Pricing
(ex GST in AUD)

Location Alerts: email and SMS

1 location: $49 ex GST / month

Regional Alerts: email and SMS
(includes Daily Significant Threat Map via email)

Monthly Access Fee $49 **(add $29 per month for Heatwave Alerts)**
PLUS
$3 per user per month (1 to 50 users)
$2 per user per month (51 to 100 users)
$1 per user per month (101+ users)

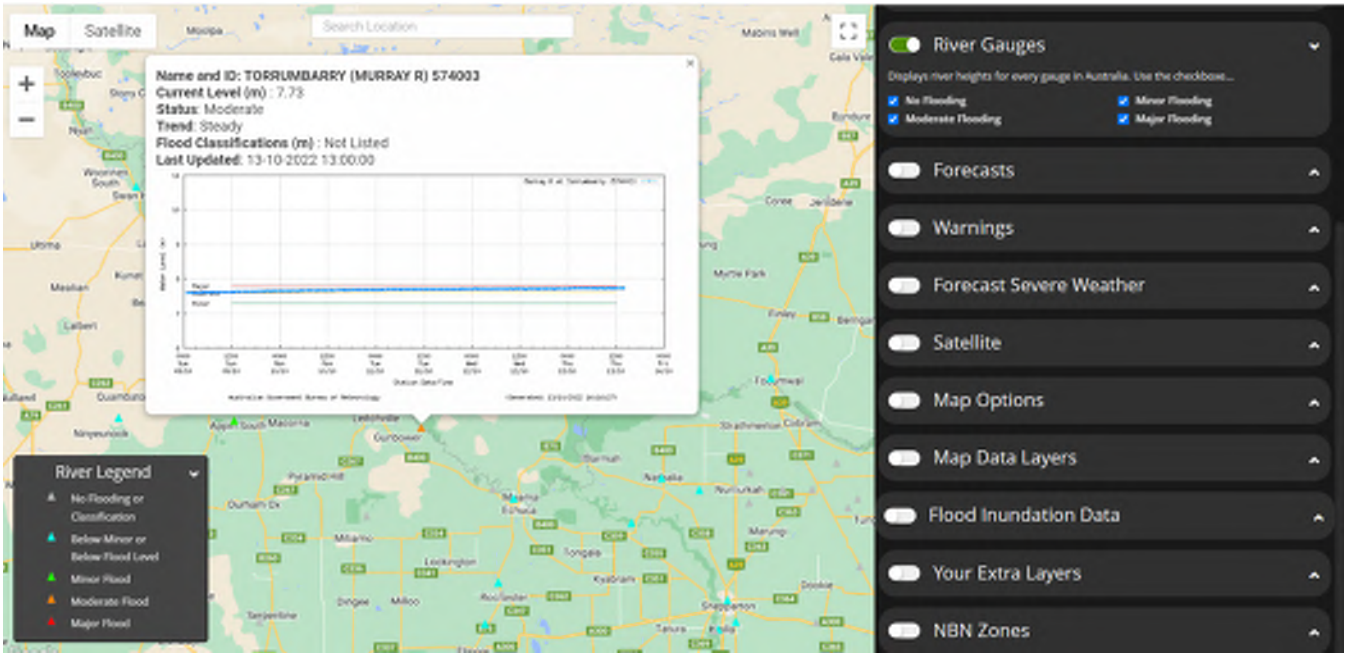
Custom Branding

One-Off Set Up Fee: $950

River Gauge / Flood Alerting

We monitor and alert of set (Minor, Moderate, Major) or custom triggers (up to two triggers per River Gauge). When a trigger is met, we will immidiately alert your allocated personnel (maximum 5 recipients per River Gauge) of a trigger being met via email and/or SMS.

Simply advise what River Gauges you would like to be alerted of and the triggers and staff we should alert, and we take care of the rest.



Pricing
(ex GST in AUD):

Initial Set-Up Fee:	$95
Monthly Access Fees	
1 River Gauge:	$39
2-5 River Gauges:	$29 each
6-10 River Gauges:	$19 each

Appendix F Flood Emergency Response Plan

F.1 Procedures during non-flood periods

The following tasks are recommended for the School Principal ('Flood Warden'), Backup Flood Warden, teachers and P&C committee members.

Table F-1 Procedures during non-flood periods

Task	Description	Responsibility
Familiarisation with FERP	Reading the FERP and being familiar with its contents (flood mechanisms, upstream rainfall and river height gauges) and procedures. Discussing the FERP with P&C committee members at least annually, and confirming roles and responsibilities.	▪ School Principal ('Flood Warden') ▪ Backup Flood Warden ▪ Assistant to Flood Warden
Subscribing to notifications, flood warning and alert systems	Subscribe to relevant notification and alert systems as listed in this FERP. Parents and citizens should be notified of the availability of relevant notification and alert systems. Add the weblinks listed in this FERP to computer and mobile phone 'Favourites'. Set up subscription (fees apply) to Early Warning Network (https://www.earlywarningnetwork.com.au/) for severe weather warnings. Refer to Appendix E for fee structure.	▪ School Principal ('Flood Warden') ▪ Backup Flood Warden ▪ Assistant to Flood Warden ▪ P&C committee members
Monitoring flood alerts and warnings.	Monitor the weather warnings and forecasts for the catchment regarding the potential for, or occurrence of high catchment rainfall.	▪ School Principal ('Flood Warden') ▪ Backup Flood Warden ▪ Assistant to Flood Warden ▪
Education of school community	Parents/carer to nominate at least two responsible adults (can be parent or carer of another student) to be added to the school database who can collect their child from the school or evacuation destination point. Sharing relevant flood awareness, the evacuation strategy, appropriate content of FERP and educational resources with teachers, parents and citizens, students, and responding to their questions. Incorporating flood awareness and appropriate content of FERP into school curriculum.	▪ School Principal ('Flood Warden') ▪ Backup Flood Warden ▪ Assistant to Flood Warden ▪ Teachers
Alternative schools	Arranging alternative schools to take students during flood recovery period.	▪ School Principal ('Flood Warden') ▪ Department of Education
Alternative accommodation	Parents and citizens should be encouraged to look into the potential for alternative accommodation (friends, relatives) if their home is flood-prone or disrupts power supply or other utilities. This is if school operations are not disrupted long-term in the event that flooding inundates the school grounds but does not cause above-floor flooding of school buildings (classrooms, administration).	▪ School Principal ('Flood Warden') ▪ Backup Flood Warden ▪ P&C committee members
Parents and citizens contact information	Maintain a database of the contact details of parents and citizens (name/s, landline, mobile, email addresses) for communication purposes. Text message system to be set up so School Principal ('Flood Warden') can send emergency messages (such as flood warnings, alerts and evacuation orders) at short notice to all parents and citizens.	▪ School Principal ('Flood Warden') ▪ Backup Flood Warden ▪ Assistant to Flood Warden

Task	Description	Responsibility
	This method of communication should not be solely relied upon in emergency situations.	
Social media group	Create one or more social media platforms 'private group' for parents and citizens to subscribe. Platforms to be utilised for flood warning and alert notifications and general communication.	▪ School Principal ('Flood Warden') ▪ Backup Flood Warden ▪ Assistant to Flood Warden ▪ P&C committee members
Register of structural engineers	Maintain a database of the contact details of structural engineers to inspect building undercroft slabs, structural columns, staircases after a flood event that inundates the school grounds but does not cause above-floor flooding of school buildings.	▪ School Principal ('Flood Warden') ▪ Backup Flood Warden ▪ Assistant to Flood Warden
Register of trades companies and equipment suppliers	Maintain a database of the contact details of trades companies and equipment suppliers for flood recovery phase i.e. ▪ Electricians ▪ Plumbers/Drain cleaners ▪ Landscapers ▪ Specialised trades (fencing contractors) ▪ Generator supply companies	▪ School Principal ('Flood Warden') ▪ Backup Flood Warden ▪ Assistant to Flood Warden ▪ P&C committee members
Recovery equipment	Plan a location for generators in the event school is operational after a flood event but power has not been restored. Generators to be adequate for: ▪ Lighting ▪ Air conditioning ▪ Computers ▪ Refrigeration.	▪ School Principal ('Flood Warden') ▪ Backup Flood Warden ▪ Assistant to Flood Warden

F.2 Procedures before floods (Flood preparation)

The following tasks are recommended for the School Principal ('Flood Warden'), Backup Flood Warden, teachers and P&C committee members.

The following phases of activation for response to a flood event have been adopted according to the levels used by the NSW SES (Australian Warning System).

Table F-2 Procedures before pending floods (Flood preparation)

Task	Description	Responsibility
ADVICE LEVEL **(HIGH RAINFALL EVENT IS FORECAST)** An incident is forecast.		
Close or evacuate school	The school is to close or evacuate the school prior to flood water rising and cutting road evacuation routes, upon issue of a: ▪ 'Severe Weather Warning' for very heavy or intense rainfall in the region (catchment) by the Bureau of Meteorology (using Early Warning Network location services alerts). Contact bus company for evacuation of school. Undertake roll call to check all students have been evacuated. Follow instructions from Emergency Services. Monitor HazardWatch Web App. Monitor other social media platforms for warnings and information.	▪ School Principal ('Flood Warden') ▪ Backup Flood Warden ▪ Assistant to Flood Warden
Communication with NSW SES, Lismore City Council and Department of Education	Set up line of communication with NSW SES, Lismore City Council and Department of Education. Advise them of school's satellite phone number. Inform the NSW SES of: ▪ the number of people at the school being evacuated ▪ any emergency/medical requirements. Follow instructions from Emergency Services.	▪ School Principal ('Flood Warden') ▪ Backup Flood Warden
Communication with school community	Communicate to school community that school will be closed and not to attend due to the 'Severe Weather Warning' (very heavy rainfall or intense rainfall) forecast for the region. Communicate to school community that school is being evacuated and to collect children due to the 'Severe Weather Warning' (very heavy rainfall or intense rainfall) forecast for the region. Determine where Evacuation Centres are located for information of student families. Follow instructions from Emergency Services.	▪ School Principal ('Flood Warden') ▪ Backup Flood Warden ▪ School administration staff
If safe to do so, prepare school grounds and buildings for flooding	Move all ground level assets to upper access walkways if possible. Rubbish – Remove rubbish and recycle bins to upper access walkways if possible.	▪ School Principal ('Flood Warden') ▪ Backup Flood Warden ▪ Teachers

WATCH AND ACT LEVEL (FLOODING IS OCCURRING UPSTREAM AND FLOODING IN SCHOOL LOCAL AREA IS LIKELY) Conditions are changing and you need to start taking action now.		
Communication with school community	The school is to relay the NSW SES notifications and Early Warning Network notifications/alerts to the school community. Keep school community up to date as to changing rainfall and flood conditions.	▪ School Principal ('Flood Warden') ▪ Backup Flood Warden
Electricity supply	Electricity utility provider will power down the local power grid if river levels are predicted to inundate low lying dwellings.	▪ Electricity utility provider

F.3 Procedures during floods (Flood response)

The following tasks are recommended for the School Principal ('Flood Warden'), Backup Flood Warden, teachers and P&C committee members.

The following phases of activation for response to a flood event have been adopted according to the levels used by the NSW SES (Australian Warning System).

Table F-3 Procedures during floods (Flood response)

Task	Description	Responsibility
EMERGENCY WARNING LEVEL **(FLOODING IN SCHOOL LOCAL AREA IS IMMINENT)** You may be in danger and need to take action immediately.		
Monitoring flood alerts and warnings	**It may be too late to evacuate if the flood level has cut local roads and emergency evacuation by NSW SES may be required.** Monitor notification systems in 'ADVICE LEVEL' table above.	▪ School Principal ('Flood Warden') ▪ Backup Flood Warden ▪ Teachers
Communication with NSW SES, Lismore City Council and Department of Education	Maintain line of communication with NSW SES, Lismore City Council and Department of Education. Advise them of school's satellite phone number. If not already done so, inform above organisations of: ▪ the number of people that were evacuated ▪ any emergency/medical requirements. Follow instructions from Emergency Services.	▪ School Principal ('Flood Warden') ▪ Backup Flood Warden
Communication with school community during 'evacuation strategy' flood emergency response	Advise parents and citizens/carers or staff they must wait until advised that flood water has subsided, the area is safe, and when the school will reopen. Keep school community up to date as to changing rainfall and flood conditions.	▪ School Principal ('Flood Warden') ▪ Backup Flood Warden

F.4 Procedures after floods (Flood recovery)

The following tasks are recommended for the School Principal ('Flood Warden'), Backup Flood Warden, teachers and P&C committee members.

Table F-4 Procedures after floods (Flood recovery)

Task	Description	Responsibility
'ADVICE LEVEL' notification by NSW SES **(REDUCED THREAT: ADVICE)** Flood water has receded from school grounds or local access roads are no longer flooded.		
Monitoring flood alerts and warnings	Upon issue of a 'Advice' notification by the NSW SES. Monitor notification systems in 'ADVICE LEVEL' table above. Monitor receding of flood water from school grounds.	▪ School Principal ('Flood Warden') ▪ Backup Flood Warden ▪ School administration staff
Re-opening of school after 'evacuation strategy' flood emergency response	Advise parents and citizens/carers or staff that they will be advised when flood water has subsided, the area is safe, and when the school will reopen.	▪ School Principal ('Flood Warden') ▪ Backup Flood Warden
Communication with NSW SES, Lismore City Council and Department of Education	Follow instructions from Emergency Services and Council regarding access to the area after flood water has subsided and roads have been reopened. Inform the organisations when the school will reopen (once damage assessments and repairs have been completed).	▪ School Principal ('Flood Warden') ▪ Backup Flood Warden
Contact tradespersons	Contact qualified electrician to check power points, electrical equipment, appliances, or electrical hot water systems for damage. They must be repaired and tested before use. Contact plumber to inspect onsite sewerage system.	▪ School Principal ('Flood Warden') ▪ Backup Flood Warden ▪ School administration staff
Contact trades companies and equipment suppliers	Contact trades companies and equipment suppliers to arrange inspections and repairs, for potential flood recovery services at the school.	▪ School Principal ('Flood Warden') ▪ Backup Flood Warden ▪ School administration staff
Contact structural engineer	Contact structural engineer to arrange inspection of building undercroft slabs, columns, fencing upon flood waters receding and roads being reopened.	▪ School Principal ('Flood Warden') ▪ Backup Flood Warden ▪ School administration staff
Clean up school grounds	Arrange cleaning contractor to undertake wash down of undercrofts. Arrange desilting of drainage and pits, remove silt from undercrofts. Wear suitable protective clothing, including boots and gloves, when cleaning up.	▪ School Principal ('Flood Warden') ▪ Backup Flood Warden ▪ School administration staff
Communication with school community	Regularly advise school community on progress of restoration of school and when school will reopen. Advise parents and citizens/carers or staff that they will be advised when flood water has subsided, the area is safe, and when the school will reopen.	▪ School Principal ('Flood Warden') ▪ Backup Flood Warden ▪ School administration staff
Review and update FERP	Review and update the FERP.	▪ School Principal ('Flood Warden')