

GLENWOOD HIGH SCHOOL

PRELIMINARY FLOOD EMERGENCY MANAGEMENT PLAN



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GLENWOOD HIGH SCHOOL

PRELIMINARY FLOOD EMERGENCY MANAGEMENT PLAN

ISSUE AUTHORISATION

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Executive Summary

enstruct Group have been engaged by Schools Infrastructure NSW (SINSW) to provide a PRELIMINARY Flood Emergency Management Plan (FEMP) for the development of the Glenwood High School (hereafter GHS). This plan is in response to correspondence from the NSW Department of Planning and Environment and their requirements for understanding flood evacuation, namely:

1. A risk assessment for the safe evacuation prior to potential PMF events,
2. A safe evacuation route/s based on the school catchment area including the total estimated time available in which the surrounding streets are safe to use as evacuation route/s,
3. If evacuation of students by caretakers in part, will be required, then identify the timeline for parents to arrive and depart the site ahead of potential PMF events,
4. the flood warning time for safe evacuation, including the depth and time that flood waters would typically rise per hour the total estimated time taken for the PMF flood level:
 - i. to reach a depth where the roads used for the identified evacuation route/s are no longer safe to use, and
 - ii. to recede to a level which allows for the evacuation route/s roads to be safely used again.

The aim of the PRELIMINARY Flood Evacuation Management Plan (hereafter FEMP) is to assess the impact of a 1% Annual Exceedance Probability (AEP) storm and larger events up to and including the Probable Maximum Flood (PMF) and recommend appropriate procedures for all staff and students onsite to follow to maximise their safety and reduce risk of death and injury due to flooding. This report will raise awareness of the risk of flooding and will include flood warnings, safe evacuation routes, designated safe assembly areas, and evacuation management plans.

The FEMP will also discuss the flooding conditions in the vicinity of the site, proposed methods of detecting flooding, proposed routes for refuge, and details of management of all personnel on site during a flooding event.

It is anticipated that when extreme weather conditions associated with a PMF event are forecast that the Emergency Planning Committee of GHS will be aware of the prediction with sufficient time to cancel school and any planned extracurricular events outside of school hours. Cancelling school ahead of extreme weather conditions is the primary strategy. If the site were occupied in a 1% AEP or PMF storm event, the safety strategy is to walk out of the area at risk of flooding along pathways. The proposed building will have an evacuation from the Northern end of the building up via Level 1 (if required) to the Southern end of the building and to the designated assembly point from there. It is important that any guests on the school site outside of school hours are provided access to the upper levels of the proposed buildings in the case that flood safety is unexpectedly required. When there is no need for an immediate evacuation, an evacuation route is available via the building exits in the south of the site onto Glenwood Park Drive and Forman Avenue.

In addition, in the more likely event that flooding is occurring in the wider community/precinct where homes and buildings are at risk of inundation with roads cut and emergency response compromised, it is recommended that on warning from SES/Bureau of Metrology/NSW Government, the school is closed and **evacuated** of staff and students.

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I. Definitions

For the purpose of this Plan, the definitions below apply:

Assembly area(s)

The designated place or places where people assemble during the course of an evacuation.

Emergency

An event that arises which may adversely affect the occupants or visitors in a facility, and which requires an immediate response.

Emergency plan

The written documentation of the emergency arrangements for a facility, generally made during the planning process. It consists of the preparedness, prevention and response activities and includes the agreed emergency roles, responsibilities, strategies, systems and arrangements.

Emergency Planning Committee (EPC)

Elected persons from the school community who are responsible for the documentation and maintenance of the flood risk management plan and strategy at the MEEPSP.

Emergency Control Organiser (ECO)

A person or persons appointed by the emergency planning committee to direct and control the implementation of the facility's emergency response procedures.

Evacuation

The orderly movement of people from a place of danger.

Evacuation Order

An order given by emergency services including the SES to close and evacuate the campus.

Refuge

An area that is specifically designed to protect people from flood and provides direct access to an exit (SES).

Notes:

1. An area of refuge is intended to facilitate a safe delay in egress from the floor or area, thus constituting a space for people to await assistance for their evacuation.
2. Refuges are normally nominated by the relevant warden.

Warden intercommunication point (WIP)

The location on a floor or evacuation zone that includes a handset provided through which instructions can be received from the intercommunication panel via the emergency intercom system.

II. Abbreviations

The following abbreviations are used in this Emergency Plan document:

AHD	Australian Height Datum
AEP	Annual Exceedance Probability
AP	Assembly Point
ARI	Average Recurrence Interval
DDA	Disability Discrimination Act
ECO	Emergency Control Organisation
EPC	Emergency Planning Committee
FERP	Flood Emergency Response Plan
FEMP	Flood Emergency Management Plan
FFL	Finished Floor Level
PMF	Probable Maximum Flood
SES	State Emergency Service
WIP	Warden Intercommunication Point

1 Introduction

The site is located within the Blacktown City Council Local Government Area (LGA). This report is based on flood information obtained from:

- WMA Water (engaged by Sydney Water) as part of the Rouse Hill Flood Study in 2014;
- enstruct prepared SSDA Civil Engineering Flood Study Report dated 18 October 2021
- enstruct prepared Stormwater Overland Flow SEARs Letter dated 16 February 2022
- NSW Department of Planning and Environment requirements for understanding flood evacuation (refer to **Section 11** for specific responses)

1.1 Site Location

Glenwood High School is located at 85 Forman Avenue, Glenwood. An existing childcare centre is also located within the site. The site is located in the Blacktown Local Government Area (LGA) in the suburb of Glenwood. It is situated within a well-established residential area approximately 4.7 km north-east of Blacktown Train Station.

The site is bound by residential development and Forman Street to the south; Glenwood Reserve to the north and west with residential development beyond; and Glenwood Park Road to the east, with a drainage channel and residential development beyond. Refer to **Figure 1** and **Figure 2** below.

Bus stops are located on Forman Avenue and Glenwood Park Drive for public bus services. A dedicated school bus pull-in loop road is provided on the school's frontage to Glenwood Park Drive. Bella Vista Metro station is approximately 600m to the east of the site.

A dedicated school student car drop off/pick up facility is provided along Forman Avenue. This takes the form of a slip lane and kerbside lane parking. The combined pick up / drop off facility is approximately 180 metres long.

Glenwood High School is located approximately 520m south of Parklea Public School, 1.5km to the south west of Bella Vista Public School, and 3.5km to the east of Quakers Hill High School.

The built form and land use character surrounding the site is predominantly low scale, 1-2 storey dwelling houses. The site has a total area of 60,790m². The site is legally described as Lot 5227 in Deposited Plan 868693.



Figure 1: Entire Site (Source: Six Maps)



Figure 2: Design Plan L3 (Source: PTW Architects)

2 Flood Risk

A few hundred metres north of the school site is Glenwood Lake. Glenwood Lake acts as a detention basin that holds water and discharges flows to Caddies Creek. Caddies Creek is a tributary of Cattai Creek. The watercourse adjacent the school site is a tributary of Caddies Creek and is a Class 1 stream order as classified by the NSW Department of Planning, Industry and Environment publication: Determining stream order Fact sheet. Refer to **Figure 3** for the location of Glenwood Lake with respect to the school campus.



Figure 3: Glenwood Lake and School Site

Flood modelling indicates that the school site is generally free from the 1% AEP overland flows which are contained within the roadways. The flood extents are generally contained within the roadways for all storms with some overflow occurring for the rare event of the 0.2% AEP event within the lower part of the site, where the proposed building is located. The lower corner of the site is inundated by the PMF event. The extent of the PMF overland water can be seen in **Figure 4**.



Figure 4: PMF Flood Extent

2.2 Flood Characteristics

Results from TUFLOW modelling indicate the following flood characteristics in various storm events. Overland flow flooding is contained within the extents of the drainage channel during the 20% AEP storm event as seen in **Figure 5**. Overland flow water from the 1% AEP stormwater event starts to accumulate on the bridge over the drainage channel making it dangerous for vehicle and pedestrians to cross along Glenwood Park Drive. **Figure 6** below shows the extent of the PMF flood water and where flooding is occurring on the Glenwood Park Drive bridge over the drainage channel and through the school site as riverine flooding.



Figure 5: 1% AEP event water accumulating on the Glenwood Park Drive bridge



Figure 6: PMF event water accumulating on the Glenwood Park Drive bridge as riverine flooding

2.3 Precinct Flooding

Except in rare storm events, the school campus is largely unaffected by flooding. During rare events access to the school is likely to be cut during flooding in surrounding areas which do not physically affect the school campus. Flooding in surrounding areas, mostly in rare storm events, will impact the ability to get to the school due to roads being cut by flood water, interruptions to public transport leading to diversion or cancellation of bus or train services.

Therefore, when flooding in nearby areas occurs or is forecast to occur, closure and evacuation of the school will be required. Refer to **Section 7.1** for further information.

3 Flood and Evacuation Warnings

There are a number of official flood warnings issued by the Bureau of Meteorology, NSW State Emergency Service (SES) and NSW Police which can assist in the preparation of a potential flood and shall be monitored by the Emergency Planning Committee of the school and NSW School Infrastructure. The warning types are:

Severe Weather Warnings (Bureau of Meteorology):

Severe Weather Warnings are provided for potentially hazardous or dangerous weather that is not directly related to severe thunderstorms, tropical cyclones or bushfires. They are issued for sustained winds of gale force; wind gusts of 90km/h or more; very heavy rain that may lead to flash flooding and abnormally high tides.

Severe Thunderstorm Warnings (Bureau of Meteorology):

A Severe Thunderstorm Warning is issued if the severe phenomena are directly caused by the thunderstorm and include wind gusts of 90km/h or more; gale force winds; tornados; blizzards\ heavy rainfall that is conducive to flash flooding; hail with a diameter of at least 2cm; abnormally high tides and unusually large surf waves expected to cause dangerous conditions on the coast.

Flood Watch (Bureau of Meteorology):

A Flood Watch is issued by the Bureau of Meteorology if flood producing rain is expected to happen in the near future and flooding is expected to be above Minor level. A Flood Watch covers a river basin or catchment. The general weather forecasts can also refer to flood producing rain.

Flood Warning (Bureau of Meteorology):

A Flood Warning is issued by the Bureau of Meteorology when flooding is expected to occur or is happening. Flood Warnings provide a predicted flood level and time at which a river will reach that level. Flood Warnings are issued in relation to flood gauges which are situated at a certain point on a river. Flood Warnings may contain observed, peak or predicted river heights.

NSW SES Flood Bulletins (SES):

NSW SES Flood Bulletins provide information on likely flood consequences and what actions are required to protect yourself and your property.

Evacuation Warning (SES):

When flooding is likely to cut evacuation routes or inundate property, the NSW SES issues an Evacuation Warning to indicate that you should get prepared to evacuate. Being prepared will allow you to respond quickly if an Evacuation Order is issued.

Evacuation Order (SES):

NSW SES (or other emergency service) issues an Evacuation Order requiring the closer of the school and the evacuation of the campus.

Other warnings will be:**Monitor the flood situation:**

In addition to receiving an official warning, monitoring the situation before flooding begins to impact the site is important. Monitoring the situation can be undertaken by personally witnessing the height and rate at which floodwaters are rising; maintaining contact with other people in the building and local and government radio stations to receive and share updates on the flood situation.

The likelihood of flash flooding:

Severe Weather Warnings and Severe Thunderstorm Warnings issued by the Bureau of Meteorology warn of the possibility of flash flooding.

When flash flooding is likely, leaving low-lying businesses (evacuation) well before flash flooding begins is the best action to take, but only if it is safe to do so. If you are trapped by rising floodwater, seek refuge in the nearest building within the school site. Stay there and call '000' (triple zero) if you need rescue.

All warnings will be issued through the Bureau of Meteorology website, television and local radio stations for weather warnings such as 702 ABC SYDNEY 702 AM, 2CH 1170 AM, 2DAY FM 104.1 FM, 2GB 873 AM, 2ME 1638 AM, 2SM/GORILLA 1269 AM, 2UE 954 AM, C91.3 FM 91.3 FM, MIX 106.5 106.5 FM, NOVA 96.9 FM, RADIO 2MORO 1620 AM, RADIO 2RDJ 88.1 FM, SBS RADIO 97.7 FM, SYDNEY'S 95.3 95.3 FM, TRIPLE M 104.9 FM and WFSM 101.7 FM.

4 Flood Response Preparation

It is the responsibility of the Emergency Planning Committee as part of the site Emergency Management Plan that they prepare the building for a flood event. This will be achieved through induction training, nomination of flood wardens reporting to the Chief Warden during emergency events, education of flood risks and behaviour, and the preparation and maintenance of a Floodsafe Emergency Kit.

The Emergency Planning Committee is also to organise evacuation drills and flood emergency kits to prepare all staff and students for flood risks.

4.1 Evacuation Drills

Evacuation drills run through the flood management procedure onsite and are designed to increase flood awareness for all students, staff, and visitors of the campus. These drills are to be undertaken annually to familiarise staff and students of the procedures when responding to a flood event.

4.2 Flood Emergency Kit

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

- A copy of the building Emergency Management Plan;
- A torch with spare batteries;
- A first aid kit;
- Waterproof bag for valuables;
- A copy of emergency numbers; and
- Battery operated radio with AM and FM frequency access (with spare batteries).

The kit should be kept in each classroom or office area for efficient deployment in the event of an emergency. The contents of the kit and management during a flood event will be the responsibility of the Chief Warden. This storage area should also be used for protecting hazardous materials and valuable goods from flood water.

5 Flood Response Personnel

Summarised below are the personnel involved in the management of the flood response at the school, and corresponding responsibilities.

Table 1: Personnel and Responsibilities

Personnel	Responsibility
Emergency Control Organisation (ECO)	<ul style="list-style-type: none"> • Coordinate flood evacuation drills • Ensure that the FEMP is current and up to date
Chief Warden	<ul style="list-style-type: none"> • Monitor weather daily for upcoming extreme rainfall events; • Decide when evacuation is required; • Liaise and communicate with SES or Emergency Services personnel if they attend site; and • Manage the evacuation process in consultation with SES or Emergency Services.
Flood Wardens	<ul style="list-style-type: none"> • Undertakes flood risk mitigation • Provides direction to campus users and classes on evacuation • Executes and monitors shelter in place or campus evacuation procedures • Reports back to the Chief Warden events during emergency procedure operations • Provides input into the FEMP for modification to controls and procedures for future events.
NSW Department of Education Emergency Planning Committee (EPC)	<ul style="list-style-type: none"> • Provide official advice with regards to government evacuation procedures to the ECO • Coordinate with the ECO any outcomes or changes to flooding risk controls from other Department of Education risk groups such as SEOC


6 Emergency Contact

The Chief Warden is to be contactable via the WIP phone at all times to ensure they are ready to assist any students or staff.

- For emergency assistance during flood events, please call the SES on 132 500.
- If you are in a life-threatening situation please call Police, Fire or Ambulance on “000” (triple zero).
- Local Blacktown Police Station on (02) 9671 9199

7 Assembly Point (AP) and Evacuation Routes

As the site is flood affected in rare storm events, there is a risk to site occupants. The risk can be managed through staged controls for various levels of flooding.

An Assembly Point (AP) is shown in in **Figure 7** in the south-eastern part of the site noted with the following symbol: 

It is anticipated that when extreme weather conditions associated with a PMF event are forecast that the Emergency Planning Committee will be aware of the prediction with sufficient time to cancel school and any planned extracurricular events outside of school hours. Cancelling school ahead of extreme weather conditions is the primary strategy. If the site were occupied in a 1% AEP up to the PMF storm event, the management strategy is to walk out of the area at risk of flooding along pathways. The proposed building will have an evacuation away from the northern end of the building up via Level 1 to the southern end of the building and to the designated assembly point from there. All students, staff or site visitors are to evacuate away from the north campus play areas, carparks, and ground floor rooms (on the north side of the school) as these are below the PMF flood level and relocate to rooms above this PMF level and towards the southern side of the campus. It is important that any guests on the school site outside of school hours are provided access to the upper levels of the proposed building in the case that flood safety is unexpectedly required. Where possible, should sufficient notice of possible flooding be given, an evacuation route is available via Forman Avenue and Glenwood Park Drive to the south of the site. These streets can be seen in **Figure 7**. Students are to be safely picked up by a guardian or parent under the supervision of a teacher set out in **Section 8.1** and taken south (in conjunction with emergency services advice). Refer to **Section 7.1** for precinct flooding and evacuation noting that the NSW Department of Planning and Environment request a safe evacuation route based on the school catchment area. For less extreme rainfall events, including regular storms and flood events up to 1% AEP (100-year), the following general procedure should be adopted:

- During a rainfall event, the open spaces and sports fields will be closed, with the two hall areas available for outdoor play. No COLA spaces are to be used
- During an overland flow event occur, students will be instructed to evacuate the ground floor rooms.
- The proposed building will have a proposed evacuation path from the northern end of the building via Level 1 to the southern end of the building and to the designated assembly point.

- Where students are outside during a flood event, proceeding directly to the Assembly Point will be required.

It is understood that NSW Department of Education Policy is to encourage community use of school facilities outside of school hours. For organised events under this community use policy, event organisers should be provided with a copy of the flood risk and flood emergency response plan and adapt the plan for the event on the campus. For casual users of the playground, it is anticipated that outdoor recreation will be limited during rainfall events, minimising the risk to these users.



Figure 7: Assembly Location and Site Entry/Exit

7.1 Precinct Evacuation

Flooding in the surrounding precinct will have safety risks in that affect the school. During a precinct flood event and the school being open, students travel to school possible being exposed to flooding and flood waters. Exposure from walking to and while waiting for bus services, riding bikes along flooded paths and roadways, the use of private vehicles encountering streets are a safety risk. To mitigate the flood risk, upon advice that flooding within the school precinct is imminent, it is recommended that the school is closed, and students and teachers are notified of the closure via correct channels.

Further, should the school be operating, and flooding warnings are issued for the wider precinct, it is possible that the school can be closed, and evacuation of the campus is undertaken.

It is not possible to provide timeframes or potential impacts on school during precinct flood warning, nor definite safe flood routes – these items are depended on the forecast, specific location at the time of the storm, and catchment response.

8 Flood Response Actions

8.1 Evacuation during school hours and after hours

This section relates to an evacuation procedure to be adopted in the event that immediate evacuation is not required but departure from the site is to be undertaken in preparation for a predicted large storm event. Once a Flash Flood Warning for the neighbouring area or Blacktown City Council LGA has been issued by the Bureau of Meteorology, the following procedure is to occur to manage safe exit of students and adults alike.

- Sound evacuation tone;
- Chief Flood Warden to be on hand if staff call or require guidance;
- Chief Flood Warden to make contact with Emergency Services to request assistance;
- Leave signage at site entrance that evacuation has occurred;
- Update the MEEPSP Facebook/Social Media pages and send an email/text message to all parents or users of the site to outline campus closure and that evacuation has been required;
- Instruct parents to follow announcements released on the NSW Government School Updates app (available to download here: <https://apps.apple.com/au/app/nsw-school-updates/id1494658146>);
- Staff to supervise all students in their care and take a roll of attendance before allowing them to leave the school campus;
- Staff to assist students in their care to organise a suitable relocation to a safe refuge;
- Students to move towards the Assembly Point and site entrance on Glenwood Park Drive in an orderly fashion under the supervision of a teacher when transport arrives;
- Chief Flood Warden to maintain regular communication with students, staff and visitors, providing updates on the situation;
- Site to be shut down, where possible of all but essential power; and
- Staff to leave the site following student evacuation.

9 Revision of Flood Emergency Response Plan

This plan should be reviewed if the Blacktown City Council requirements or The Cattai Creek – Floodplain Risk Management Plan and Maps are revised, and if the drainage surrounding the site is upgraded. The Emergency Planning Committee shall be responsible for ensuring the Flood Risk Management Plan is reviewed annually and updated as required or as SES protocols and requirements change. As part of the review, the Emergency Planning Committee shall contact Council annually to confirm if any new street drainage upgrades are planned or have been constructed.

10 Conclusion

It is anticipated that when extreme weather conditions associated with a PMF event are forecast that the Emergency Planning Committee will be aware of the prediction with sufficient time to cancel school and any planned extracurricular events outside of school hours. Cancelling school ahead of extreme weather conditions is the primary strategy. If the site were occupied in a 1% AEP PMF storm event, the management strategy is to walk out of the area at risk of flooding along pathways. The proposed building will have an evacuation from the northern end of the building via Level 1 to the southern end of the building and to the designated assembly point from there. Any students, staff or site visitors are to evacuate the northern school play areas, carparks, and COLA area as these are below the PMF flood level and relocate to the rooms and above this PMF level. It is important that any guests on the school site outside of school hours are provided access to the rooms in upper levels of the proposed building in the case that flood safety is unexpectedly required. When there is no need for an immediate evacuation, an evacuation route is available via the two building exits in the south of the site onto Forman Avenue.

It is the responsibility of the Emergency Planning Committee as part of the site Emergency Management Plan that they prepare the building for a flood event. This will be achieved through induction training, nomination of flood wardens reporting to the Chief Warden, education of flood risks and behaviour, and the preparation and maintenance of a Floodsafe Emergency Kit.

This FEMP is to be reviewed if Blacktown City Council requirements or Cattai Creek Floodplain Risk Management Plan and Maps are revised, and if the street drainage surrounding the site is upgraded.

Further, this FEMP is reviewed regularly (on a yearly basis) and updated if the school communication and parent contact methods change.

11 Department of Environmental and Planning Response

1. A risk assessment for the safe evacuation prior to potential PMF events;

*Response: the school campus is affected by the PMF as shown in **Figure 4**. As this school is located in a small flood catchment where time from storm burst to peak depth is under an hour duration, there is limited time for evacuation. However, should forecast for intense rain be predicted, closure of the school in line with procedures should be undertaken.*

2. A safe evacuation route/s based on the school catchment area including the total estimated time available in which the surrounding streets are safe to use as evacuation route/s;

*Response: It is predicted that maximum flood depth could occur within 1 hour of rain commencing, this includes rare storm events such as the PMF. The PMF extent is shown in **Figure 4** and affects the north-eastern corner of the school. As a result, evacuation would be south along Glenwood Park Drive. Being informed that the streets to south are flood free should be informed prior to evacuation.*

3. If evacuation of students by caretakers in part, will be required, then identify the timeline for parents to arrive and depart the site ahead of potential PMF events;

Response: Being a small catchment where the time from storm burst to peak depth could occur within 1 hour, no suitable notification is available to parents. It is recommended that forecast of intense weather from the Bureau of Metrology in conjunction is the SES is used to guide school closures.

4. the flood warning time for safe evacuation, including the depth and time that flood waters would typically rise per hour the total estimated time taken for the PMF flood level:

Response: refer answer 3 but generally, the estimated time from rainfall (of relevant intensity) commencing to peak flood depth could occur within 1 hour.

- i. to reach a depth where the roads used for the identified evacuation route/s are no longer safe to use, and

Response: Glenwood Park Drive to the south is generally open during a PMF event. However, overland flow within the roadway and gutters will still exist, this depth is likely be around 100-200mm deep.

- ii. to recede to a level which allows for the evacuation route/s roads to be safely used again.

Response: This depends on the downstream catchment however, assuming the downstream catchment is not flood affected, a period of 1 – 2 hours is applicable for water to recede once rain in the catchment has stopped.