Preliminary Flood Assessment Report

Dalmeny Public School Upgrade

Prepared for Department of Education / 28 March 2025

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TTW (NSW) PTY LTD (ACN 649 974 112)
(ABN 74 649 974 112) I Consulting Engineers
Level 6, 73 Miller Street, North Sydney NSW 2060

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1.0 Introduction

TTW has been engaged on behalf of Department of Education (DoE) to prepare this Preliminary Flood Assessment Report for the proposed Dalmeny Public School Upgrade located in Prestons, NSW and within the Liverpool City Council's Local Government Area (LGA).

This Preliminary Flood Assessment Report has been prepared to accompany a Review of Environmental Factors (REF) prepared for the Department of Education (DoE) relating to the Dalmeny Public School Upgrade (the activity) under Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and *State Environmental Planning Policy (Transport and Infrastructure) 2021* (SEPP TI).

This document has been prepared in accordance with the *Guidelines for Division 5.1 assessments – Consideration of environmental health facilities and schools, Addendum October 2024* (the Guidelines) by the Department of Planning, Housing and Infrastructure.

This report examines and takes into account the relevant environmental factors in the Guidelines and *Environmental Planning and Assessment Regulations 2021* under Section 170, Section 171 and Section 171A of the EP&A Regulation**,** as outlined in Table 1.

Table 1: Summary of Relevant Section of the Part 5 Guidelines and EP&A Regulation

Regulation / Guideline Section	Requirement	Response
Guidelines for Division 5.1 (DPHI) Section 3.0	When considering the likely impact of an activity on the environment, the proponent and determining authority must take into account any risk to the safety of the environment	As the site is situated outside of the extent of flood prone land, the proposed activity will have no impact on flood behaviour in the area, nor will it adversely impact the risk to safety.
Guidelines for Division 5.1(DPHI) Section 4.0	The proponent will gather and record relevant information on potential environmental impacts including any episodic risks.	As above
Section 171.2 (a) and (b) and (j) EP&A Regulations	The determining authority must take into account the environmental impact on the community and the transformation of the locality, risk to the safety of the environment	As above

This report outlines the existing constraints of flooding and overland flow paths on this site. The details of this report are based on current available information and correspondence undertaken at the time of writing. This investigation forms part of a broader educational infrastructure improvement program based on the Election Commitment upgrade program.

1.1 Proposed Activity Description

The proposed activity for the Dalmeny Public School Upgrade includes the construction and occupation of a two-storey classroom building and associated covered walkways and landscaping.

Demolition

- Demolish part of existing fence on Dalmeny Drive;
- Remove two (2) trees; and
- Earthworks.

Construction and occupation

- Two-storey classroom building (Block H);
- Covered walkways (excluding between Block G and H),
- Footpath between block G and block H
- Landscaping (surrounding Block H),
- Fence and gate south of Block H;
- OSD tank;
- New Main Switch Board;
- Substation; and
- Fire Hydrant.

The classroom building will consist of the following floor layout:

- **Ground Floor Level:** Comprises eight (8) general learning spaces (GLS) and two (2) learning commons spaces (LCS). Also located on the ground floor level are amenities, services, storage spaces and a lift and two staircases to provide access to the first-floor level; and
- **First Floor Level**: The first-floor level will also comprise eight (8) GLS and two (2) LCS. Also located on the first-floor level are amenities, a mechanical plant room and other rooms for services.

Figure 1 shows the proposed site plan.

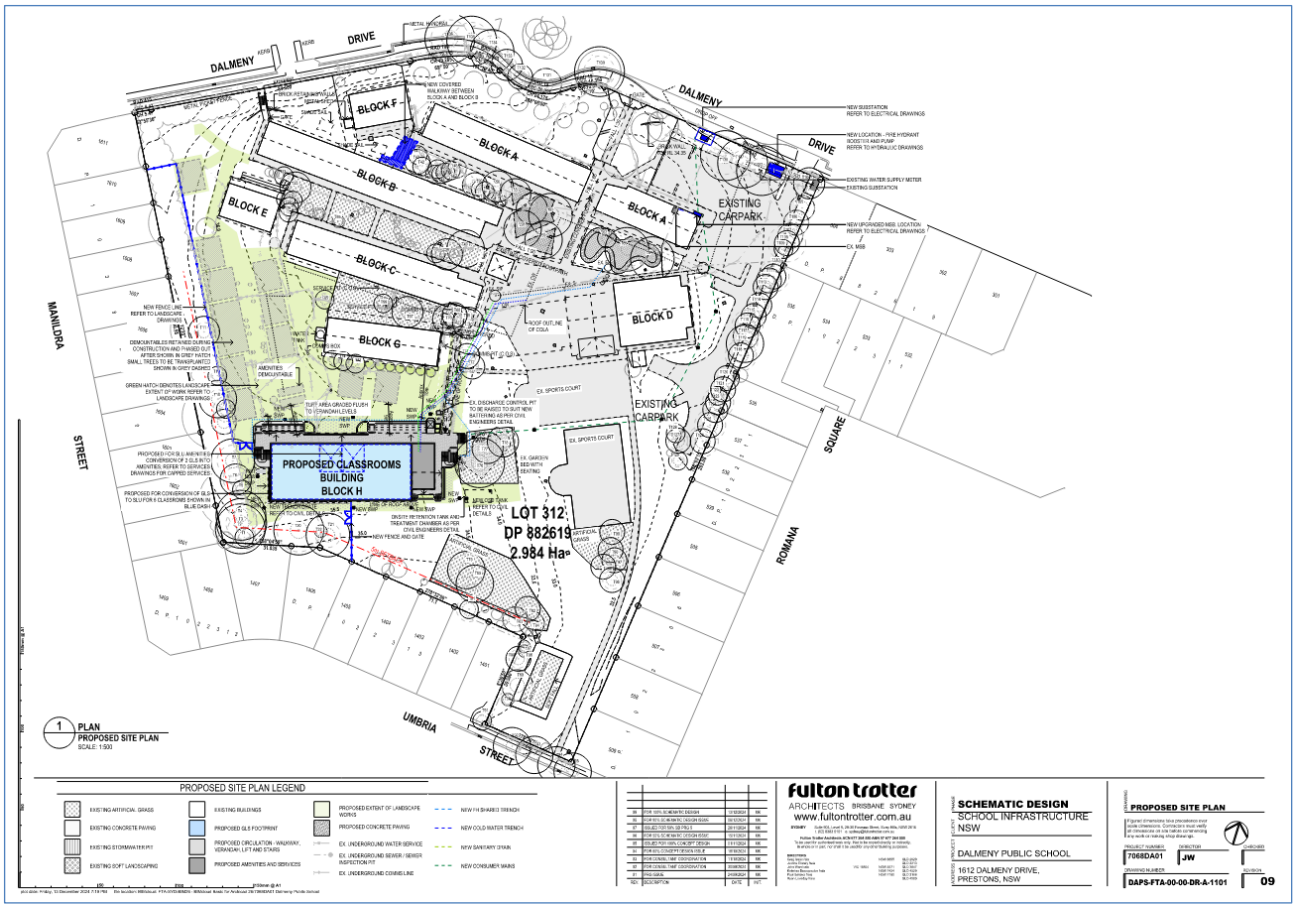

Figure 1: Proposed Site Plan

1.2 Works to be undertaken under a separate Planning Pathway (not part of this REF)

Works to be undertaken under a separate planning pathway cannot be undertaken until the Activity is completed and operational.

- Decommission and remove existing single storey portable classrooms;
- Decommission and remove existing portable amenities;
- Associated covered walkways to be demolished;
- Associated site infrastructure works;
- Shade structure over pathway between block G and H;
- Remainder of landscaping
- Fencing and gate north-west of Block H.

1.3 Activity Site Location

The project site is located at 129 Dalmeny Drive, Prestons and is legally described as Lot 312 DP 882619. Dalmeny Public School is located on the southern side of Dalmeny Drive and on the northern side of Umbria Street. The surrounding context of the site is predominantly low density residential.

Figure 2 is an aerial photograph of the site.

There is also an RE1 Public Recreation corridor running from the southwest to northwest, to the west of the school (refer to Figure 2). The landowner of the activity site is the Minister for Education and Training.

Figure 2: Site Locality

1.4 Relevant Guidelines and References

In preparing this report the following documents were used:

- Cabramatta Creek Floodplain Management Study and Plan October 2004.
- NSW Government's Floodplain Development Manual, NSW Department of Infrastructure Planning and Natural Resources, 2005.
- Liverpool City Local Environmental Plan (LEP), 2008.

- Liverpool City Development Control Plan (DCP), 2008, Chapter 9.
- Considering Flooding in Land Use Planning Guideline DPE 2021.
- Section 170, Section 171 and Section 171A of the *Environmental Planning and Assessment Regulations 2021* EP&A Regulation, guidelines for Division 5.1 Assessments – *Consideration of environmental health facilities and schools, Addendum October 2024.*

2.0 Existing Site

The location and layout of the existing site is shown in Figure 3 below. The site is approximately pentagonal with school buildings to the north and west, and open space and playing fields to the south and east. The site area is approximately 3ha. The topography of the site shows elevations naturally fall towards the southeast corner on Umbria Street.

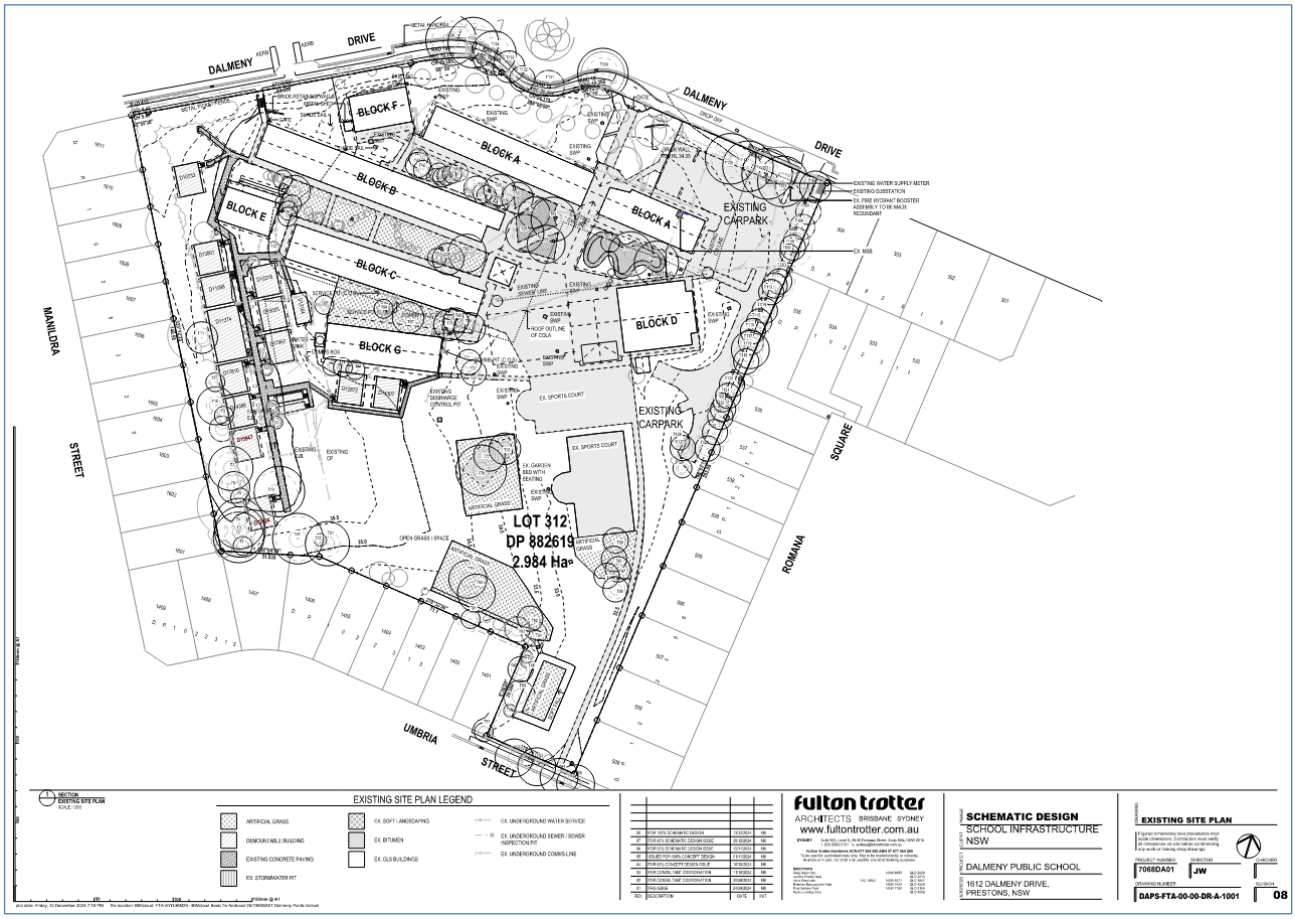

Figure 3: Existing Site Plan – Fulton Trotter 2024

3.0 Existing Flood Information

The site is bounded by Soldiers Creek to the east and south and by Maxwells Creek to the east, see Figure 4 below.

Figure 4: Creek systems affecting the Site

Liverpool City Council's Flood Planning Mapping indicates that the site is located outside the flood zone of all known waterways (see Figure 5).

The Liverpool City Council's ePlanning Portal shows the flood risk category (Low, Medium and High flood risk) and indicative flood extents for the 1%, 5% and PMF flood events. The Flood Planning Area (1% AEP flood extent plus 0.5m freeboard) is also shown (see Figure 5).

The Probable Maximum Flood (PMF) is the largest flood that could conceivably occur at a particular location. The PMF is an extreme event with an estimated Annual Exceedance Probability of at least 1 in 10,000 year event (0.001% AEP). Council's flood maps show that Dalmeny School lies outside the PMF flood extent and the Flood Planning Area (FPA - 1% AEP + 500mm) and should be at no risk of being affected by flooding (see Figure 5).

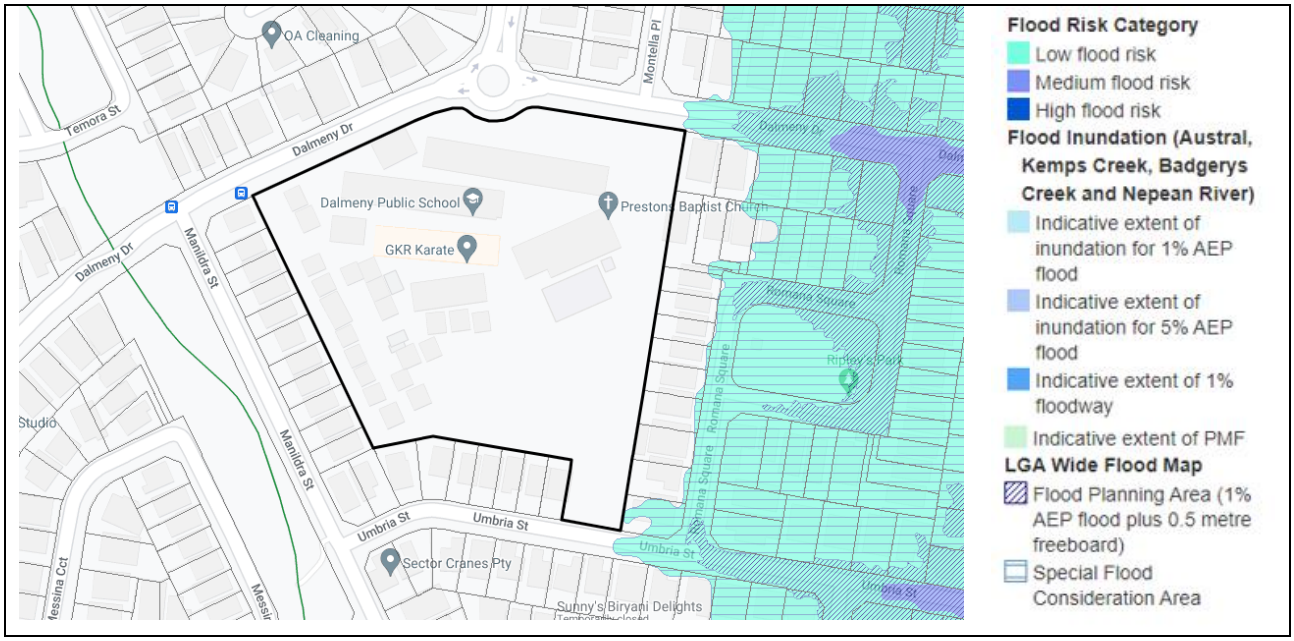

Figure 5: Liverpool City Council Flood Planning Map

4.0 Stormwater and Overland Flow

4.1 Site Topography

The site topography is illustrated in Figure 6. The prevailing slope is from the western boundary to the northeast. The contours indicate a relatively uniform fall of 4.6m in 193m across the site, or grade of 2.4%.

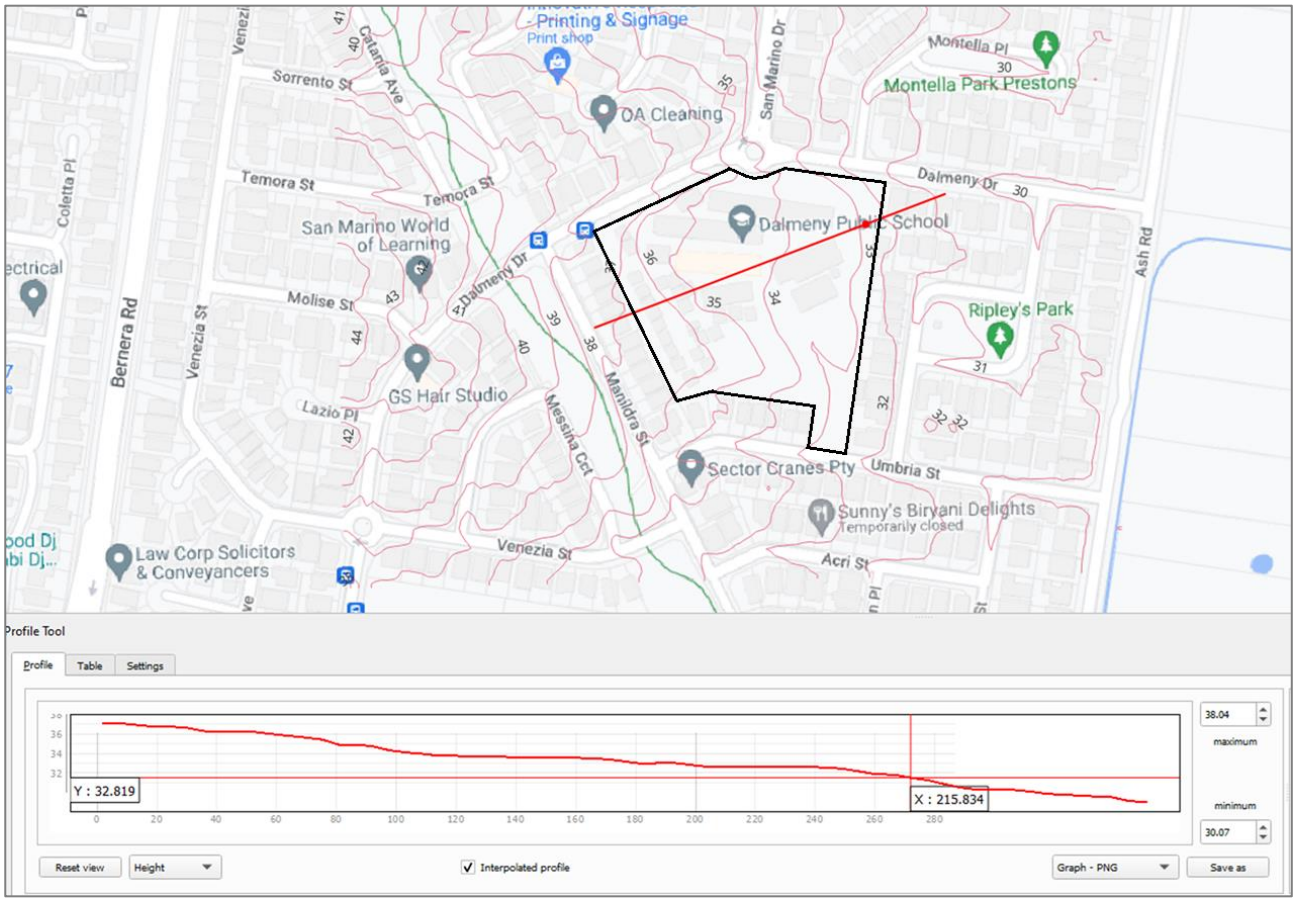

Figure 6: Site topography

4.2 Rainfall Runoff - Rational Method Estimations

The upstream catchment that generates runoff flows that may reach the subject site is shown with black polygon in Figure 7 below. The contributing catchment area is estimated to be approximately 4.6ha, based on available LiDAR obtained from the ELVIS data portal. Flows to the west of this will be preventing from entering the catchment by the housing development and the north south Bernera Road.

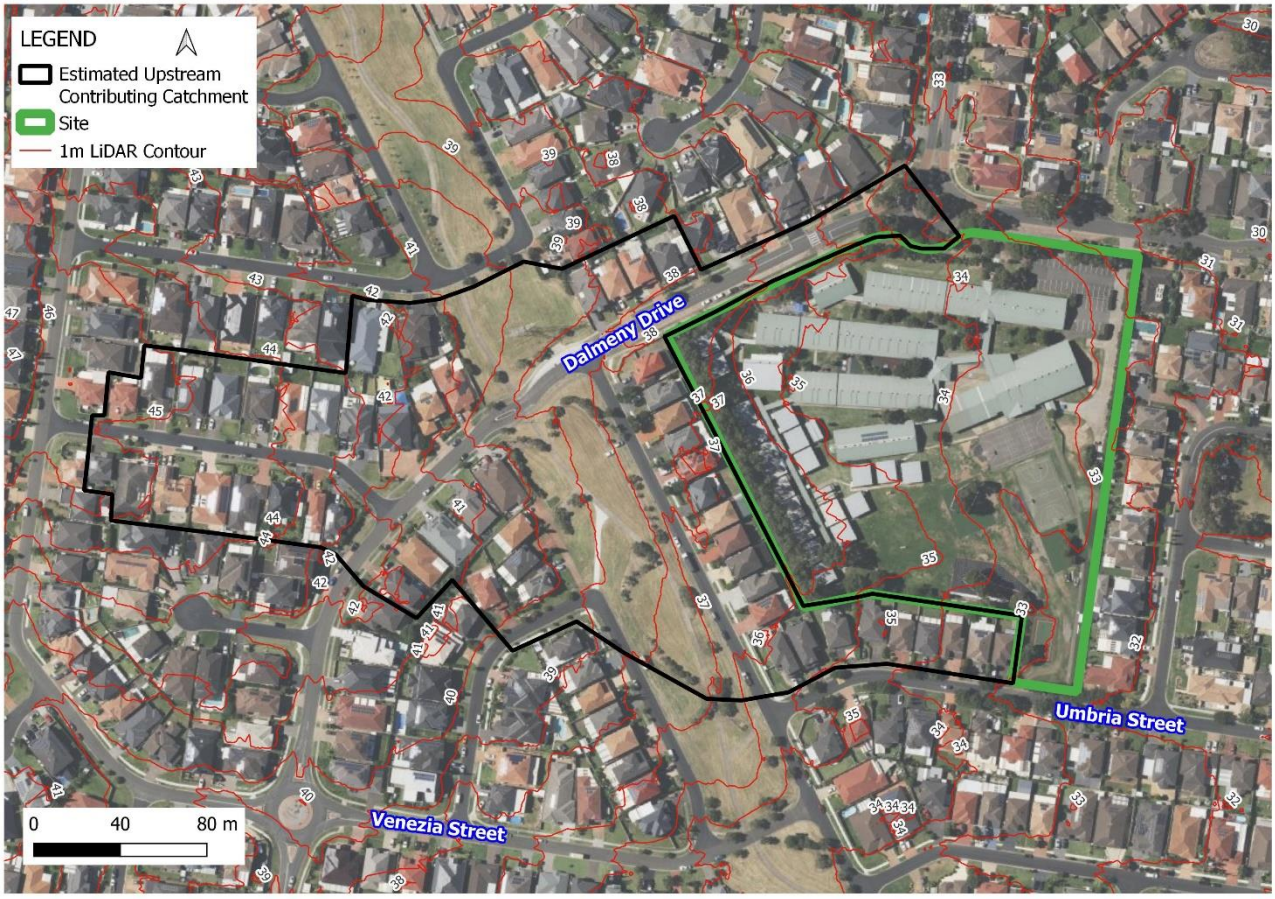

Figure 7: Overland Flow catchment

The Rational Method Equation is Q = CIA.

C is a runoff coefficient, estimated as 0.88 to reflect that the area is a mix of residential development and a nature strip to the west of the school (i.e. fraction impervious of 0.7). Rainfall intensity (I) is 199 mm/hr for the 1% 8-min storm for the site area, from the BOM website.

Q = (0.88 x 199 x 4.6) / 360

Q = 2.24 m^3/s

It is assumed that much of this flow would be collected by the existing underground stormwater system, while some would also be prevented from entering the school site by the nature strip, road and housing development to the west. As such, we have assumed that only 50% of the overall estimated flow, or 1.12 m3/s, would enter the school site, though more detailed hydraulic modelling and site assessment would be needed to assess this accurately.

Calculations show that a 4m wide channel of roughness 0.04 and 1% grade would be sufficient to convey a flow of 1.23 m^3/s (i.e. with flow depth of 0.3m), thus securing the site from overland flow.

It is assumed that any rain falling on the site would be managed by the site local drainage system.

5.0 Flood Planning Requirements

5.1 Requirements of the Development Control Plan

The Development Control Plan (DCP) applies to all land in Liverpool Local Government Area (LGA). The plan is known as Liverpool Development Control Plan 2008.

The New South Wales State Government flood prone land policy is to reduce the impact of flooding and flood liability on individual owners and occupiers of flood prone property, and to reduce private and public losses resulting from floods, utilising ecologically positive methods wherever possible.

The Objectives of the DCP in relation to flooding are:

- to minimise the potential impact of development and other activity upon the aesthetic, recreational and ecological value of the waterway corridors;
- to ensure essential services and land uses are planned in recognition of all potential floods.
- to reduce the risk to human life and damage to property caused by flooding through controlling development on land affected by potential floods;
- to ensure that the economic and social costs which may arise from damage to property due to flooding is minimised and is not greater than that which can be reasonably managed by the property owner and general community;
- to limit developments with high sensitivity to flood risk (e.g. critical public utilities) to land with minimal risk from flooding;
- to prevent intensification of inappropriate use of land within high flood risk areas or floodways;
- to permit development with a lower sensitivity to the flood hazard to be located within the floodplain, subject to appropriate design and siting controls;
- to ensure that development should not detrimentally increase the potential flood affectation on other development or properties either individually or in combination with the cumulative impact of development that is likely to occur in the same floodplain; and
- to ensure that development does not prejudice the economic viability of any Voluntary Acquisition Scheme.

According to the DCP, the land use category of a school is Sensitive Uses and Facilities. The planning controls for each category are set out in the DCP tables (Table 2 and Table 3) below. Figure 5 above makes it clear that the site lies outside the fluvial flood zones, and therefore controls set out in Table 2 below will not apply to the school site.

Flood Risk Category	Land Use Risk Category	Planning Controls							
		Floor Level	Building Components	Structural Soundness	Flood Effects	Car Parking & Driveway Access	Evacuation	Management & Design	Fencing
Low Flood Risk	Critical Uses & Facilities								
	Sensitive Uses & Facilities	13	4	4	2, 4, 5	2, 3, 6, 7, 8	3, 6, 8	4, 5	
	Subdivision				2, 4, 5			1, 6	
	Residential (++)	2, 6	3	3		2, 3, 7	3, 6		
	Commercial & Industrial	2, 11, 15	3	3	2, 4, 5	2, 3, 6, 7, 8	(3 or 4), 6	2, 3, 5	
	Tourist Related Development	2, 6, 15	3	3	2, 4, 5	2, 3, 6, 7, 8	3, 6	2, 3, 5	
	Recreation & Non-Urban	2, 7	3	3	2, 4, 5	1, 5, 7, 8	6, 8	2, 3, 5	
	Concessional Development	14, 15	3	3	2, 4, 5	1, 7, 8, 9	3, 6	2, 3, 5	
Medium Flood Risk	Critical Uses & Facilities								
	Sensitive Uses & Facilities								
	Subdivision				1, 4, 5			1, 6	1, 2, 3
	Residential	2, 6, 15	3	1	2, 4, 5	2, 3, 6, 7, 8	3, 6		1, 2, 3
	Commercial & Industrial	11, 15	3	1	2, 4, 5	2, 3, 6, 7, 8	4, 6	2, 3, 5	1, 2, 3
	Tourist Related Development	2, 6, 15	3	1	2, 4, 5	2, 3, 6, 7, 8	3, 6	2, 3, 5	1, 2, 3
	Recreation & Non-Urban	2, 7	3	1	2, 4, 5	1, 5, 7, 8	6, 8	2, 3, 5	1, 2, 3
	Concessional Development	14, 15	3	1	2, 4, 5	1, 7, 8, 9	3, 8	2, 3, 5	1, 2, 3
High Flood Risk	Critical Uses & Facilities								
	Sensitive Uses & Facilities								
	Subdivision								
	Residential								
	Commercial & Industrial								
	Tourist Related Development								
	Recreation & Non-Urban	2, 7	3	1	1, 4, 5	1, 5, 7, 8	6, 8	2, 3, 5	1, 2, 3
	Concessional Development	14, 15	3	1	1, 4, 5	1, 7, 8, 9	3, 6	2, 3, 5	1, 2, 3

Key:

	Not Relevant
	Unsuitable Land Use
1, 2, 3	Control reference number relevant to the particular planning consideration. (see Table 6)
(++)	Attached dwellings, Dwelling houses, dual occupancies, multi unit dwelling housing, residential flat buildings (not including development for the purpose of group homes or seniors housing), Secondary dwellings and Semi-detached dwellings are exempt from these controls.

Table 2: Flood Planning Controls for Fluvial Flooding

Flood Risk Category	Land Use Risk Category	Planning Controls							
		Floor Level	Building Components	Structural Soundness	Flood Effects	Car Parking & Driveway Access	Evacuation	Management & Design	Fencing
Local Overland Flood Risk	Critical Uses & Facilities	13	4	5	3	4, 7, 8	7	3, 5	2, 4
	Sensitive Uses & Facilities	13	4	5	3	4, 7, 8	7	3, 5	2, 4
	Subdivision				3		5	1	2, 4
	Residential	3, 5	1	6	3	4, 7, 8	5		2, 4
	Commercial & Industrial	10	1	6	3	4, 7, 8	5	3, 5	2, 4
	Tourist Related Development	3, 5	1	6	3	4, 7, 8	5	3, 5	2, 4
	Recreation & Non-Urban	3, 5	1	6	3	4, 7, 8	5	3, 5	2, 4
	Concessional Development	14	1	6	3	4, 7, 8	5	3, 5	2, 4

Key:
Not Relevant
1, 2, 3 Control reference number relevant to the particular planning consideration.

Table 3: Flood Planning Controls for Overland Flow

These flood controls are provided for information only and are summarised below:

- Floor levels to be no lower than the PMF level unless justified by a site specific assessment.
- All structures to have flood compatible building components below the PMF level.
- Applicant to demonstrate that any structure can withstand the forces of floodwater, debris and buoyancy up to and including a PMF.
- The flood impact of the development to be considered to ensure that the development will not increase flood affectation elsewhere having regard to changes in flood levels and velocities caused by alteration of conveyance of flood waters. An engineer's report may be required if Council considers a significant affectation is likely. The unmitigated obstruction, concentration or diversion of overland flow paths to adjacent property shall not be permitted.
- Basement car parking shall be protected from inundation by the 1% AEP flood.
- Basement car parking or car parking areas accommodating more than 3 vehicles (other than on Rural zoned land) with a floor level below the 5% AEP flood or more than 0.8m below the 1% AEP flood level; shall have adequate warning systems, signage and exits.
- Barriers to be provided to prevent floating vehicles leaving a site during a 1% AEP flood.
- The evacuation requirements of the development are to be considered up to the PMF level.
- Applicant to demonstrate that area is available to store goods above the 1% AEP flood level plus 500mm freeboard. No storage of materials below the design floor level which may cause pollution or be potentially hazardous during any flood.

5.2 Risks and Compliance

Council mapping makes it clear that the site lies outside the fluvial flood zones, and therefore most controls set out in Table 2 above will not apply in this case. However, the land adjoining the site area, although mapped as low risk on the Liverpool City Planning map, does lie within the PMF extent. This may impact on accessibility or evacuation of the site.

The overland flow analysis in Section 4 estimates that overland flow affecting the site would be small, at approximately 1.12 m^3/s, which can be controlled with through onsite stormwater drainage and management.

6.0 Flood Emergency Management

Flood emergency management measures are implemented by schools to reduce risk to people and property in extreme flood events.

The Liverpool City Council Flood Emergency Sub Plan (2023) notes that evacuating people pre-emptively is the NSW SES's primary response strategy for managing the population at risk of flooding. The sub plan states that school administration offices (Government and Private) will coordinate the evacuation of schools in consultation with Welfare Services, if not already closed.

While there is often advanced warning time of extreme rainfall events such as those endured in a 1% AEP-PMF event, this cannot be relied upon. Severe weather events may lead to flash flooding with little to no warning time, and pre-emptive closure of the school may not be achievable.

Shelter-in-place (SIP) guidance published by the NSW Department of Planning and Environment (DPE) in January 2025 states that SIP is an appropriate emergency management response when the flood warning time is less than six hours, and where the duration of isolation is less than 12 hours. In the event of a major flood event, the school is therefore safe for a shelter-in-place flood emergency management approach, as it is set above the PMF level. Where roads are flood impacted in the wider area, the period of isolation is reasonably short. There is a small catchment contributing to the road crossings surrounding the site, and although flooding is mainstream, the site and surrounding area are not impacted by backflow from the downstream major river system. Therefore, the period of inundation will not be prolonged (and will be less than 12 hours, as per SIP guidance).

In the event of a major flood event, the school is therefore safe for a shelter-in-place flood emergency management approach, provided good practice levels design is adopted (with falls away from building thresholds).

In the event of a secondary emergency, evacuation from the site should be made towards the west via Bernera Road (shown in Figure 8). South of Camden Valley Way, Bernera Road is shown as impacted but this will quickly clear as the upstream contributing catchment is relatively small and this area is not affected by backwater effects.

The eastern area adjacent to the site is impacted by mainstream flooding and should be avoided. This flooding is usually associated by a longer recession time.

Based on the above, and the fact that the school itself is not flood affected, a standalone Flood Emergency Response Plan (FERP) is not considered necessary for the school.

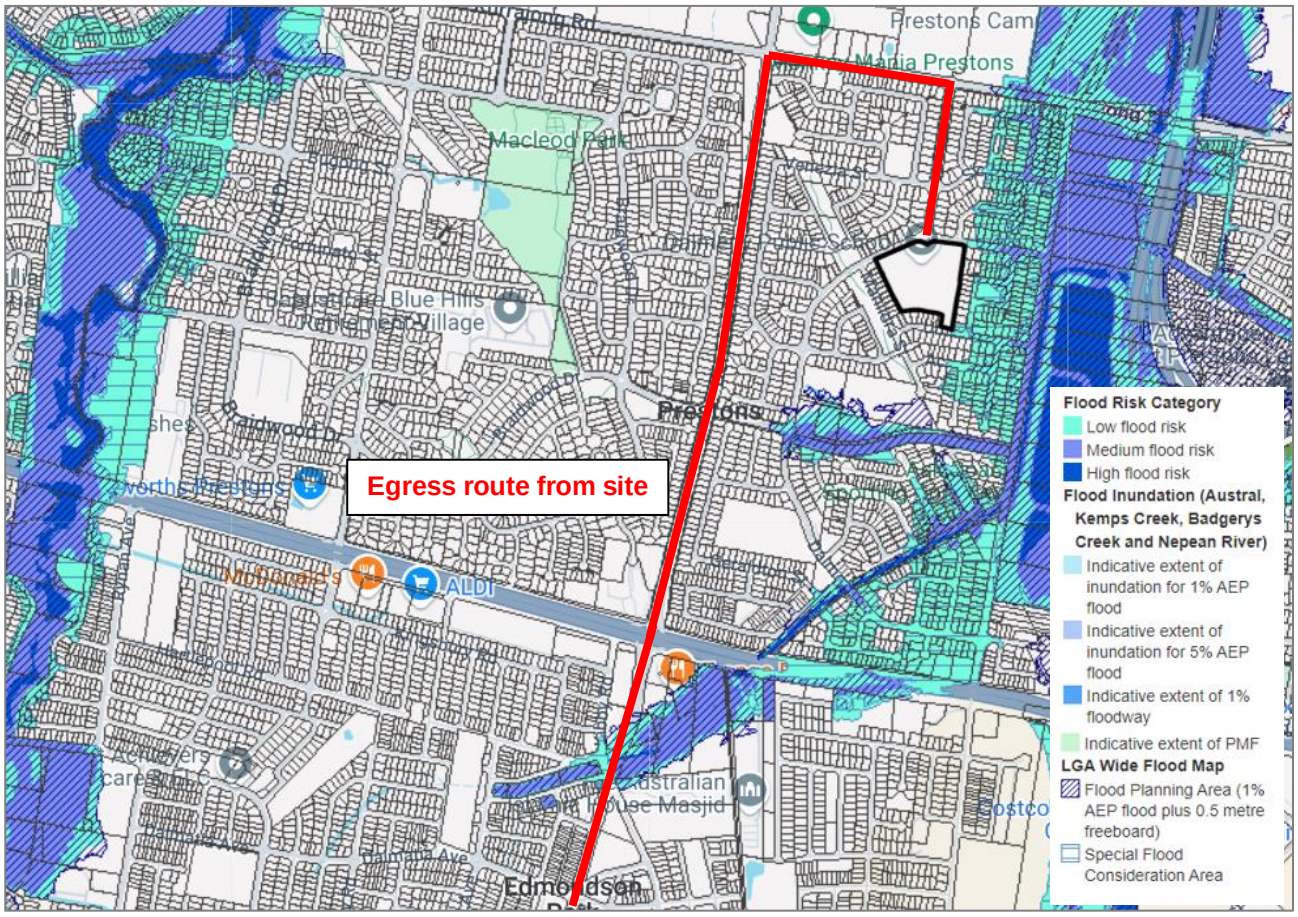

Figure 8: Best egress route from site

7.0 Conclusion

The following conclusions have been drawn from this assessment:

- It is evident from Council mapping that the proposed works lie outside the PMF, and outside the Flood Planning Area, and therefore most of the controls set out in Section 5 will not apply in this case.
- The analysis in Section 4 estimates that overland flow affecting the site would be small, with inflows of approximately 1.12 m^3/s, which can be controlled with onsite stormwater management and drainage design.
- It is noted that the areas adjoining the site are however flood affected and as such should be considered for the purposes of access and evacuation of the site in rare events.
- It is recommended that any existing emergency plans are updated for the ultimate site design.
- Any onsite overland flows will be managed via a Stormwater Management Plan (SMP) and drainage design.
- The updates proposed will not cause any environmental harm or impacts in terms of flooding.

7.1 Mitigation Measures

This report outlines the preliminary assessment of existing risks or flood and their impacts. It does not include any design or preparation of physical or non-physical mitigation measures but does recommend the approaches to mitigate the risks identified. These measures can be achieved to ensure any risks associated with the development and flooding at the site are adequately mitigated.

Mitigation Number/ Name	When is Mitigation Measure to be complied with	Mitigation Measure	Reason for Mitigation Measure
1) Onsite Overland flow Management Design	During detailed design phase	Stormwater Management Plan (SMP) and drainage design	To ensure that any runoff onsite it directed away from buildings, and captured by onsite drainage, and discharged to a legal point of discharge
2) Flood Emergency Management - Operational	Prior to operation of the site	Review Existing Emergency Plans	Site emergency plans should be reviewed and updated if required prior to operations to ensure site and staff are adequately prepared in the event of a major flood event for the ultimate site design.

7.2 Evaluation of Environmental Impacts

The proposed site upgrades will not have any significant impacts on the environment (Section 5.7 of the EP&A Act) in terms of flooding as the site is located outside on the flood prone areas.

Any overland flows on site will be managed though a stormwater management plan and design and any construction to complete these upgrades will include the required stormwater treatment measures to mitigate environmental impact. This will not however impact on flooding at the site which is the focus of this report.

Prepared by	Updated by	Authorised By
TTW (NSW) PTY LTD	**TTW (NSW) PTY LTD**	**TTW (NSW) PTY LTD**
		
JAMIE MARSHALL Associate (Flood)	**RACHEL CALDWELL** Civil Flood Modeller	**MICHAEL KOI** Associate (Flood)