Flood Risk Assessment

New primary school at Wilton Junction

Prepared for SINSW on behalf of NSW Department of Education / 01 April 2025

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1	05/02/2025	RC	TM	DRAFT
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1.0 Introduction

This Flood Risk Assessment (FRA) has been prepared to support a Review of Environmental Factors (REF) for the NSW Department of Education (DoE) for the construction and operation of the new primary school at Wilton Junction (the activity).

The purpose of the REF is to assess the potential environmental impacts of the activity prescribed by *State Environmental Planning Policy (Transport and Infrastructure) 2021* (T&I SEPP) as "development permitted without consent" on land carried out by or on behalf of a public authority under Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The activity is to be undertaken pursuant to Chapter 3, Part 3.4, Section 3.37A of the T&I SEPP.

This document has been prepared in accordance with the *Guidelines for Division 5.1 assessments* (the Guidelines) by the Department of Planning, Housing and Infrastructure (DPHI) as well as the *Addendum Division 5.1 guidelines for schools*.

The Planning Circular PS 24-001 notes that the flood risk profile of each proposal should be considered, which assess the flood characteristics for the location, the nature and type of development and any impacts on the existing community and surrounding properties. The purpose of this report is to outline the existing constraints of flooding and overland flow paths at the school site and assess the risk and impact associated with the proposed activity. The details of this report are based on currently available information and correspondence undertaken at the time of writing.

1.1 Guidance Documents

The following documents have been reviewed and referenced in preparing this report:

- Department of Planning and Environment (2021) Considering Flooding in Land Use Planning Guideline;
- Department of Planning and Environment (2023) Flood Impact and Risk Assessment – Flood Risk Management Guide LU01;
- Department of Planning, Housing and Infrastructure – Planning Circular PS 24-001, Update on addressing flood risk in planning decisions, 1st March 2024;
- NSW Floodplain Development Manual, June 2023
- NSW Planning Portal Spatial Viewer (Spatial Collaboration Portal - Map Viewers (nsw.gov.au)); and
- School Infrastructure New South Wales (SINSW) Guidelines for School Site Selection and Master Planning, 2023.
- Wilton Growth Area Development Control Plan (DCP) 2021
- Wollondilly Interactive Mapping 2025
- Wollondilly Shire Council Development Control Plan 2016
- Wollondilly Shire Draft Flood Study, 2021 / 2024

1.2 Site Description

The current street address is 200 Fairway Drive, Wilton, 2571, NSW. The site forms part of the northern portion of Lot 1063 in Deposited Plan 1289197) that was previously subdivided by Landcom. The site is approximately 3.4ha hectares in size and is located within Wilton Junction which is part of the North Wilton Precinct.

As a result of precinct wide rezonings, the surrounding locality is transitioning from a semi-rural residential area to a highly urbanised area with new low to medium density residential development with supporting services. North Wilton Precinct is approximately 85km south-west of the Sydney CBD, 30km north-west of Wollongong and 30km southwest of Campbelltown-Macarthur Strategic Centre. The precinct is located on the interchange with the Hume Highway, which connects the Southern Highlands with the Sydney metropolitan region to the northeast and Canberra to the south-west.

The proposed school site does not currently have road access, however Landcom is expected to deliver the

road network and surrounding public domain network in accordance with DA/2022/1279/1. Proposed Road 14 located on the eastern boundary of the site will ultimately provide future access to the site. The site contains several patches of remnant native vegetation particularly within the northern portion of the site. The central part of the site has been predominantly cleared and consists of grassland. An aerial photograph of the site is provided at Figure 1.

Figure 1: Aerial photograph of the site. Source: Urbis, 2024

1.3 Proposed Activity Description

The proposed activity is for the construction and operation of a new primary school at Wilton Junction which will accommodate up to 552 students and 35 staff. Additionally, the proposal includes an integrated pre-school which will capacity for up to 60 students and 7 staff. In total, the new school will support up to 612 students and 42 staff.

The new school includes general and support learning spaces, a library, administrative areas and a staff hub. Core facilities include a standalone school hall and canteen, two carparks and a sports court.

Specifically, this proposal includes the following:

- Construction of a 3-storey learning hub which includes:
  - 24x General Learning Spaces
  - 3 x Support Learning Spaces
  - Staff hub including administrative areas and library.
  - Integrated public pre-school.
- Standalone hall and COLA with outside of school hours care (OSHC).

- Associated landscaping including sports court and separate outdoor play space for the preschool.
- Associated site utilities and services including installation of new 1500 kVA padmount substation and a new main switchboard.
- Main car park to the south of the site with 33 car spaces (including one accessible space).
- Separate car park for pre-school located to the north of the school with 18 spaces (including one accessible space).
- Main school pedestrian entrance proposed off Road 14.
- Earthworks.

Figure 2 shows the proposed site plan.

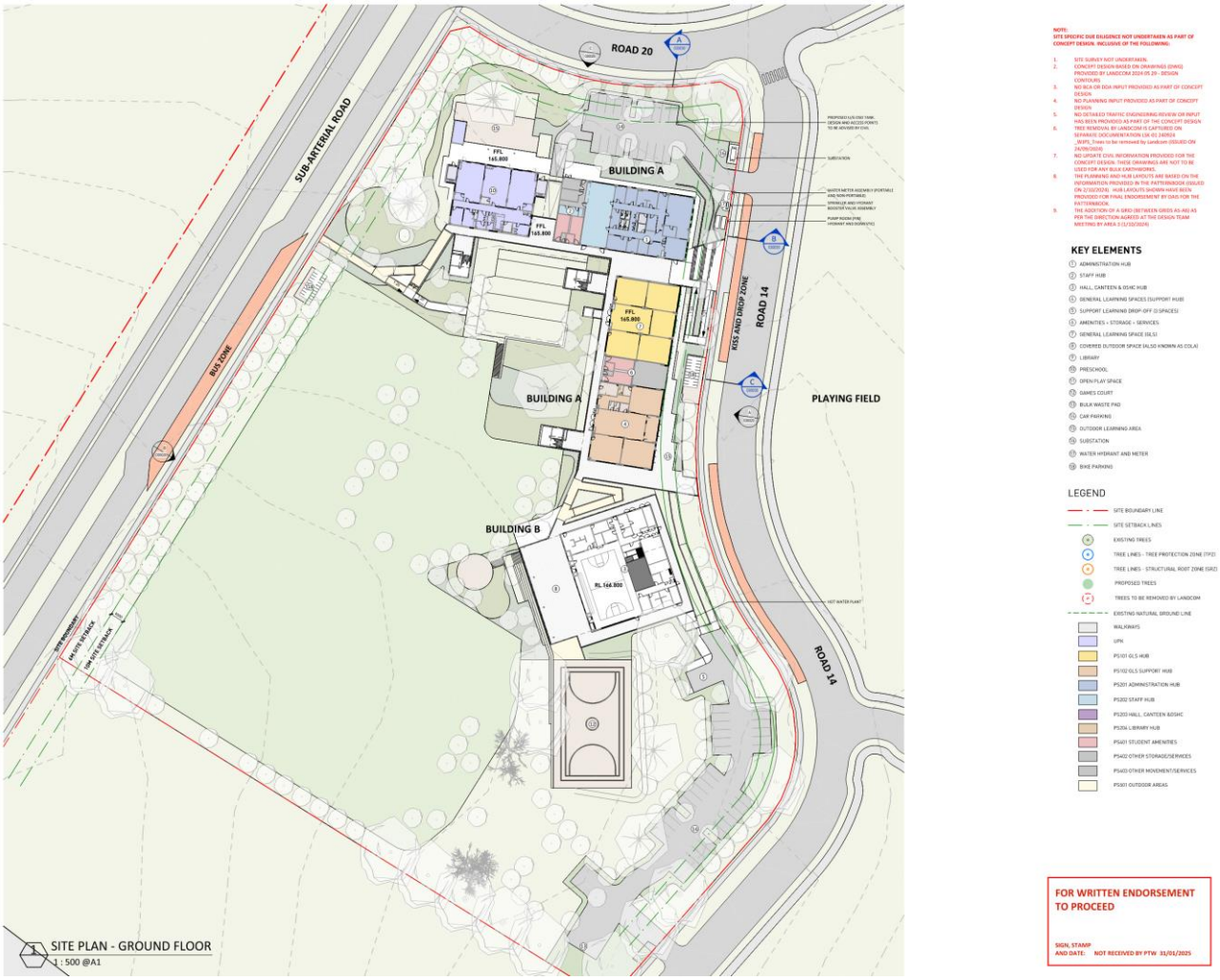

Figure 2: Proposed Site Plan. Source: PTW, 2024.

2.0 Site Characteristics

2.1 Future Development and Zoning

The site is located within the North Wilton Precinct. The approved North Wilton Precinct Structure Plan is shown in Figure 3.

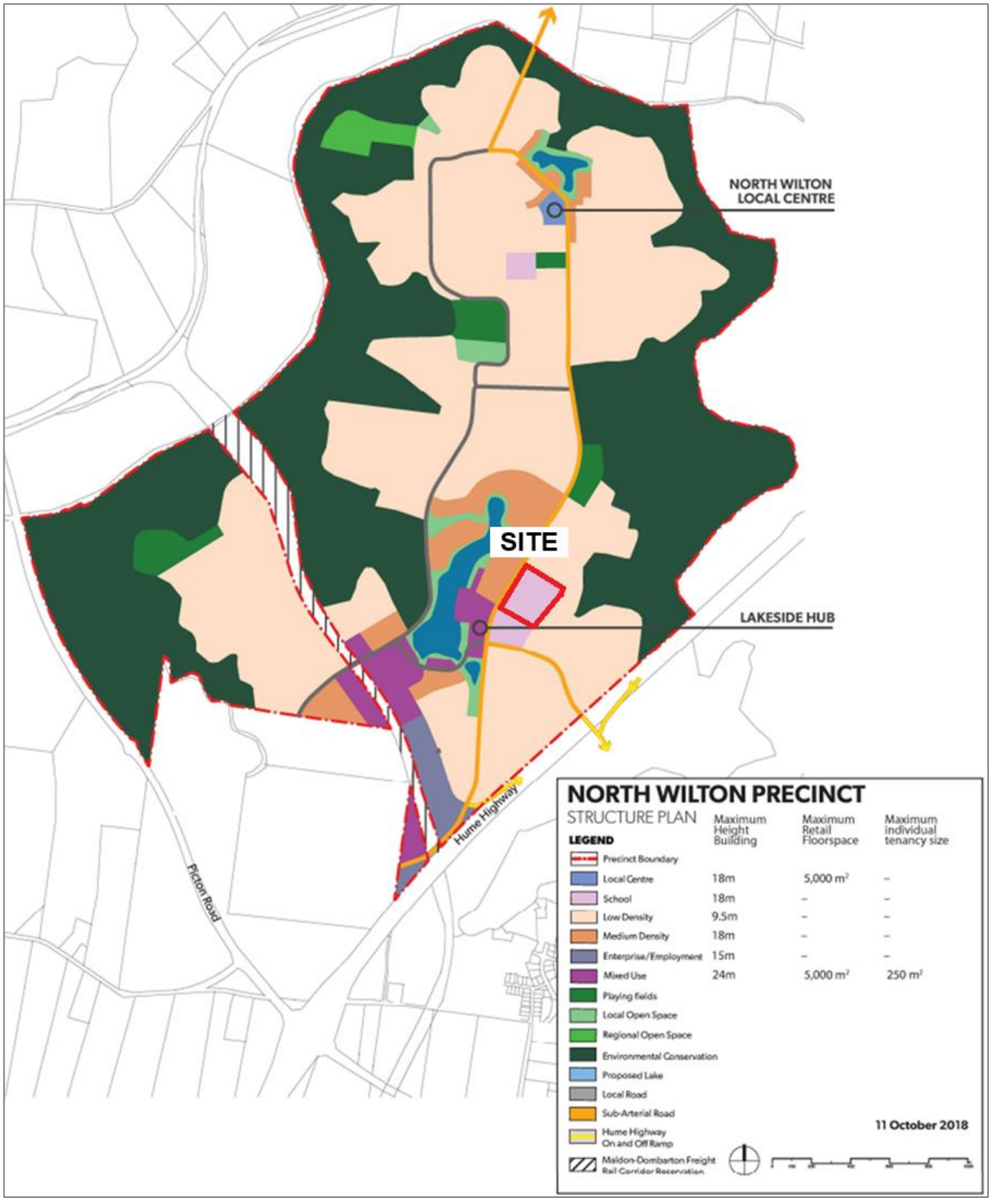

Figure 3: Approved North Wilton Precinct Structure Plan. Source: North Wilton Precinct – Schedule 2 (NSW DPIE)

The Wilton area is under development pressure with the construction of new roads and housing in the Wilton Growth Area. Consequently, reliable flood information is required to ensure that new development is appropriately placed and flood risk appropriately managed.

Though the site was not included in the Wollondilly Local Environmental Plan (LEP) 2011 land zoning, the site has been categorised as SP2 Regional Road and UD Urban Development in the 2021 State Environmental Planning Policy Precincts – Western Parkland City (SEPPPWPC) land use zoning.

2.2 Catchment Information

The site is situated within the Upper Nepean sub-catchment of the larger Hawkesbury-Nepean catchment. The Upper Nepean River Catchment area covers around 1,000 km^2, including the Nepean, Cataract, Cordeaux and Avon Rivers. The site is flanked by the Nepean River to the west and Allens Creek to the east.

This region is currently undergoing significant development, including new residential subdivisions and new/upgraded roadways to support the increasing population. These developments have the potential to alter catchment runoff characteristics and flood behaviour along the river.

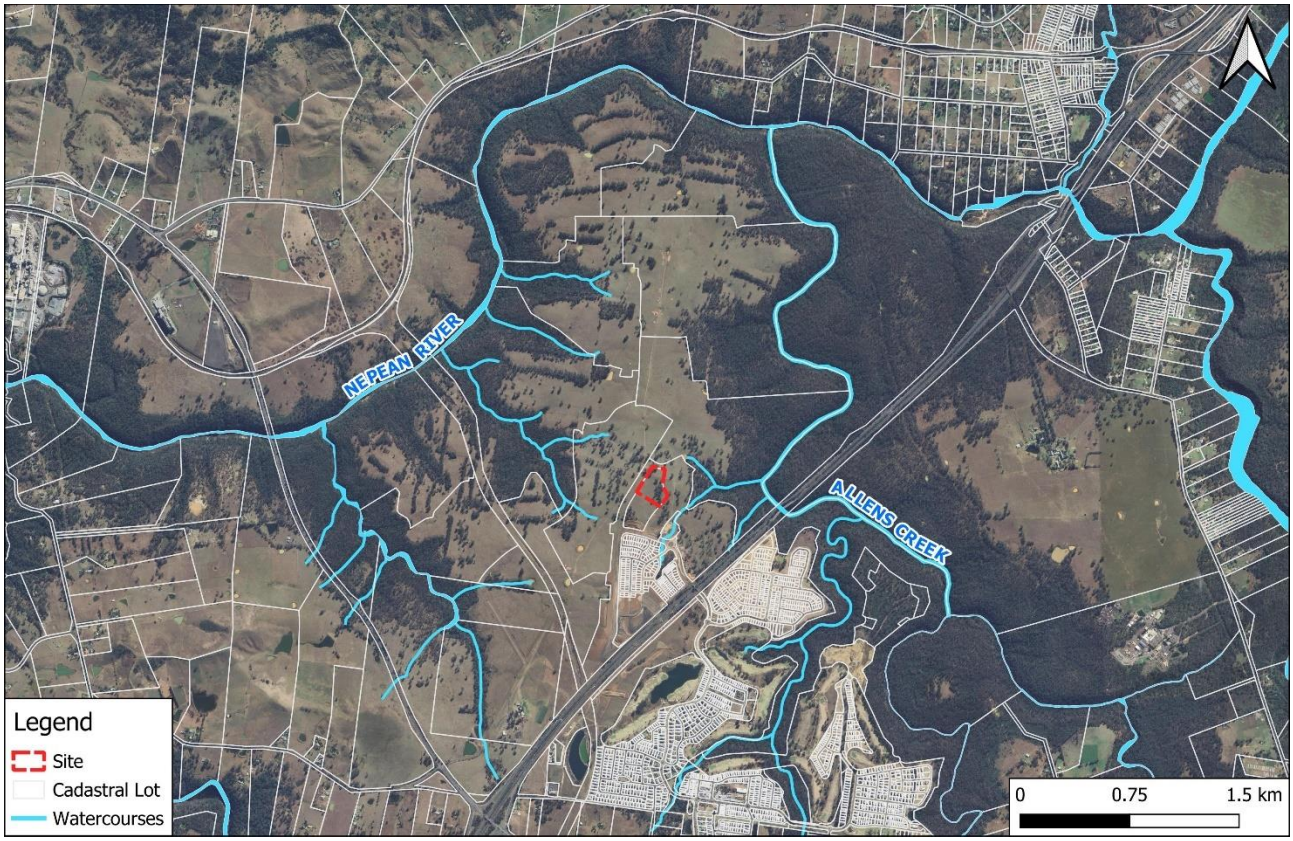

Figure 4: Location of site in relation to surrounding watercourses.

2.3 Site Topography

The ground surface within the wider site boundary varies between 95 – 195 m AHD, depicted in the Digital Elevation Model (DEM) of the site in Figure 5. There is a minor ridgeline running through the wider site, visible in Figure 6, which shows a cross-sectional profile of the site. Primarily, the site itself slopes towards the northeast, ranging from 171.2m AHD at the southwest and a low of 162.8m AHD to the northeast, with a maximum gradient of 3.4%. The creek system to the east sits well below the site, with the first order tributary around 130m AHD.

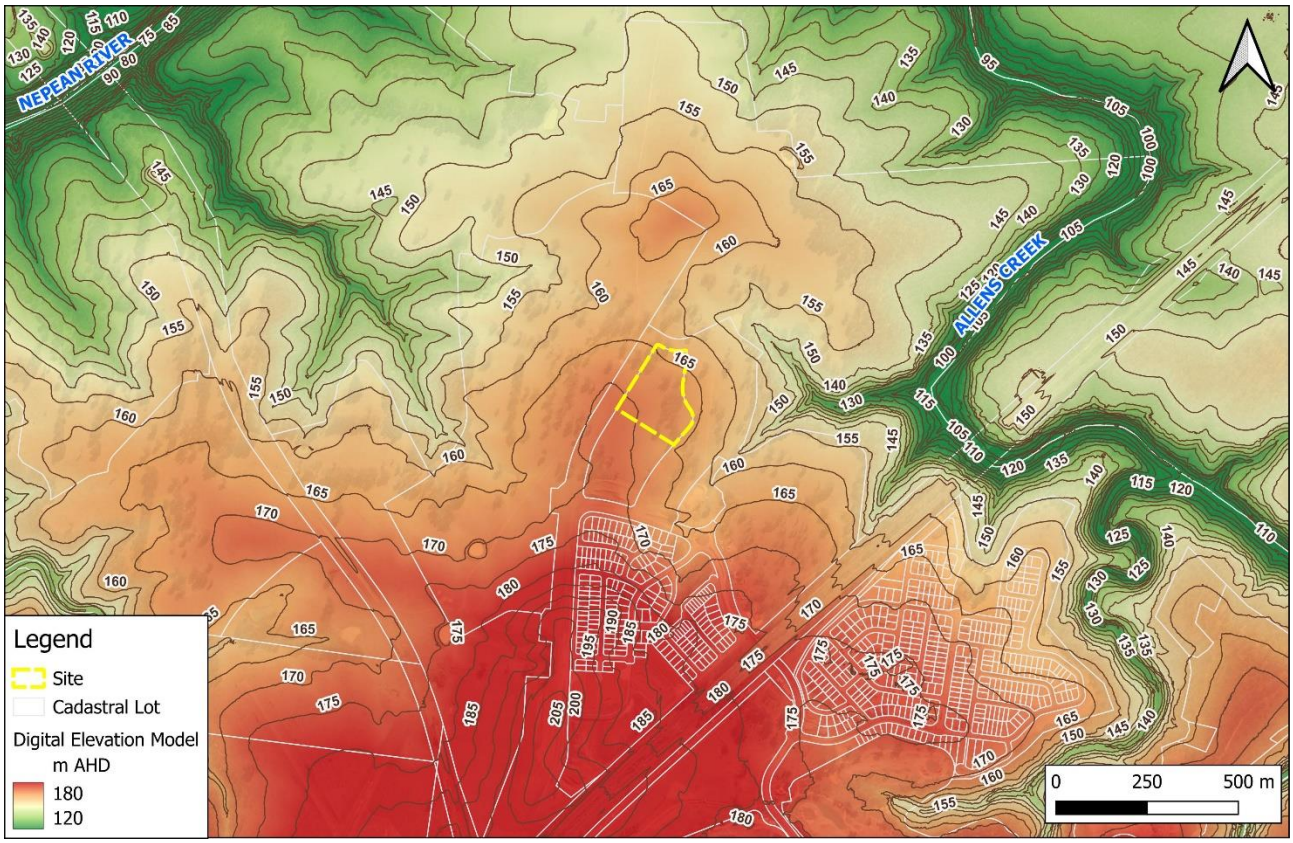

Figure 5: Topography of the site and surrounding area

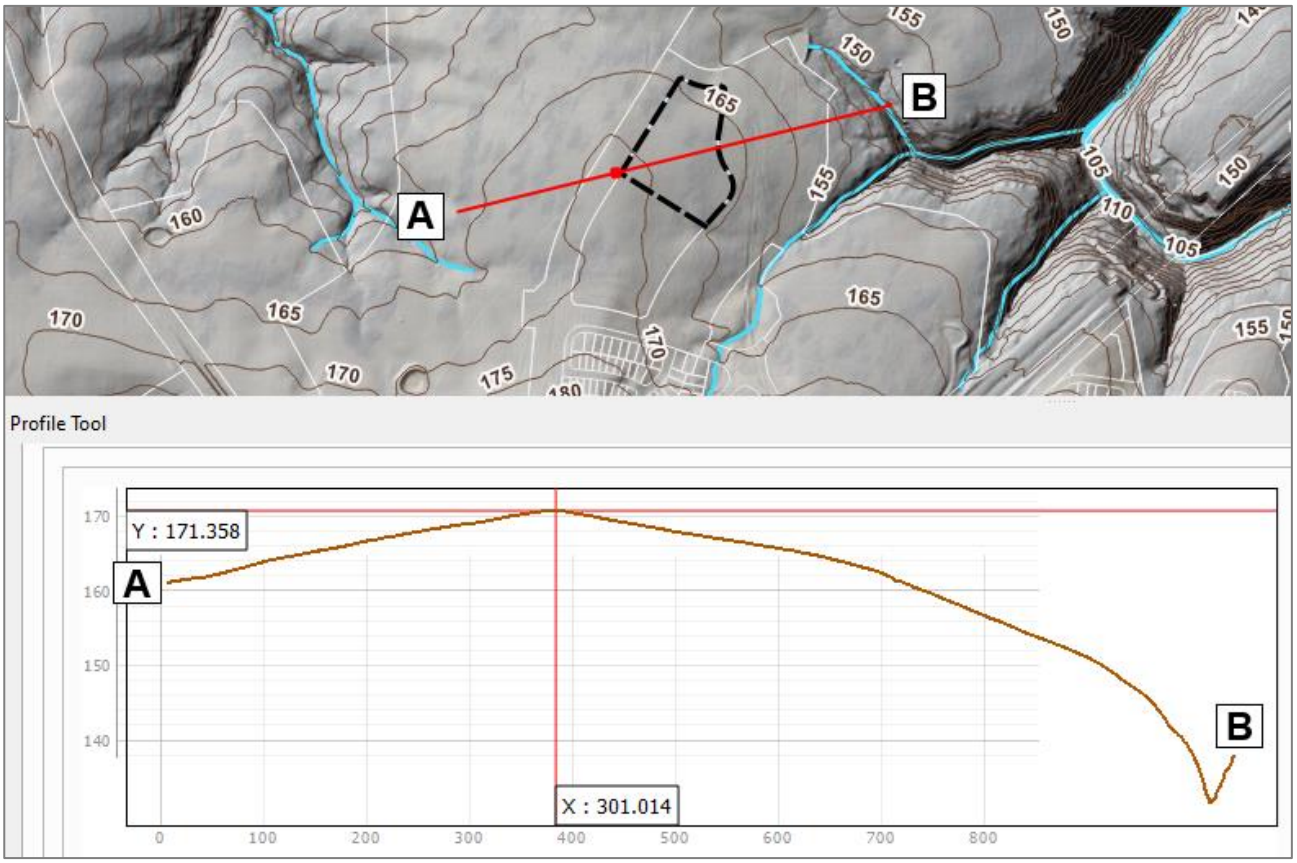

Figure 6: Cross-sectional elevation profile through the school wider boundary

3.0 Flood Planning Requirements

3.1 Wilton Growth Area DCP, 2021

The current Development Control Plan (DCP) in place for North Wilton is the Wilton Growth Area DCP. This was published in 2021 and supersedes all previous development controls laid out in the Wollondilly Local Environment Plan 2011 and the Wollondilly DCP 2016.

Under Section 4.15 of the Environmental Planning and Assessment Act 1979, the consent authority is required to take into consideration the relevant provisions of the DCP in determining a development application.

Section 3.2 of the Wilton Growth Area DCP provides a risk-based approach to planning and development in the flood prone lands of the wider Wilton area. 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 Wilton Growth Area DCP in relation to flooding are:

- To ensure that development is compatible with the flood behaviour, flood hazard and flood emergency management.
- To maintain the existing flood regime and flow conveyance and avoid significant adverse impacts on flood behaviour.
- To minimise any adverse impacts of development on the safety of the existing community in responding to floods.
- To ensure the safety of people and development from flood risk.
- Consider adaptability to changing flood risks due to a changing climate.
- To utilise the best available flood information to define flood behaviour and the flood constraints within the precinct in the development of the flood impact assessment.

The flood controls laid out in Section 3.2.2 are as below:

3.2.2 Controls

1. Development must assess impacts of climate change and increased rainfall intensities.
2. Stormwater conveyance will have a Major/Minor System configuration. Minor flows will be conveyed and contained in a system of kerb and gutter, pits and pipes/culverts. Major flows (flow in excess of Minor System capacity) will be conveyed in overland flow paths designed to cater for such flows.
3. Management of 'minor' flows using piped systems for the 1 in 10 (10%) AEP (residential land use) and the 1 in 20 (5%) AEP (commercial land use) will be in accordance Council's Design and Construction Specifications.
4. Management of 'major' flows using dedicated overland flow paths such as open space areas, roads, waterways and riparian corridors for all flows in excess of the pipe drainage system capacity and above the 10% AEP will be in accordance Council's Design and Construction Specifications.
5. Pedestrian and cycle pathways and open space may extend within the 1% AEP flood level, provided the safe access criteria contained in the NSW Floodplain Manual are met and there is no impact on the flood behaviour.

6. Development is not to result in an increase in flood levels on adjoining or surrounding land.
7. Development on flood prone land will comply with Council's Design and Construction Specifications and Flood Risk Management Policy.
8. Flood Prone Land identified in the relevant Precinct's Schedule shows indicatively the extent of the 1% AEP flood level. Where development is proposed adjacent to land identified as Flood Prone Land, in the relevant Precinct Schedule, as being affected by the 1% AEP level, Council may require a more detailed flood study to be undertaken by the applicant to confirm the extent of the flood affectation on the subject land.
9. Cut and fill is not to occur in the 1% Annual Exceedance Probability (AEP) floodway or within critical flood storage areas.

The DCP states that where development is shown to be affected by the 1% AEP event, Council may require a more detailed flood study to be undertaken to confirm the flood affectation of the land.

While the DCP notes that Flood Prone Land (including an indicative 1% AEP flood extent) is identified the relevant Precinct Schedule, this is not in the North Wilton Precinct Schedule 2 attached with the DCP. However, a draft Flood Planning Area (FPA) is available on the Wollondilly Interactive Map, based on the findings of the draft Wollondilly Flood Study (2024). This is depicted in Figure 7, with the site located outside of the FPA.

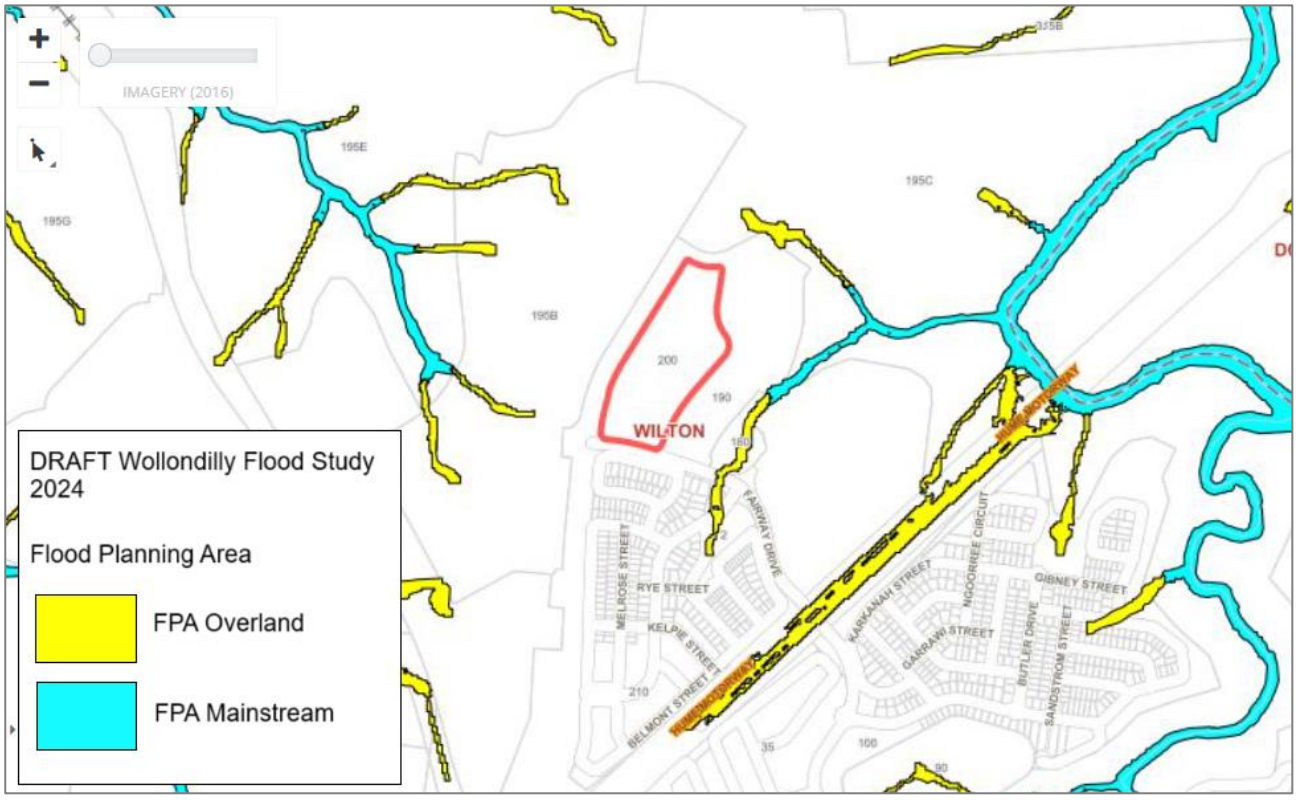

Figure 7: Wollondilly Flood Planning Area close to the site. Source: Source: adapted from Wollondilly City Council, 2024.

No flood-related controls for educational facilities are laid out in the Wilton Growth Area DCP. Section 7.2.2.1 of the DCP ('Childcare facilities') states that centre-based childcare facilities are not appropriate on flood liable land (according to the NSW flood risk management manual, that is **land susceptible to flooding by the PMF**) or land affected by local overland flooding.

3.2 Wollondilly DCP

Though the Wilton Growth Area DCP supersedes the Wollondilly DCP, it is important to acknowledge the controls within the Council DCP, which is still adopted for other areas within the LGA.

In the 2016 Wollondilly DCP, schools are categorised as an 'Essential Community Facility' and are consequently subject to stringent development controls.

Essential Community Facilities must not be located within Medium or High Flood Risk Precincts, with the definition outlined in Table B of the DCP.

Table B – Flood Risk Precinct Definitions

High Flood Risk Precinct In the absence of a detailed assessment with a Floodplain Risk Management Plan (that takes precedence over this definition), the following definition applies. The High Hazard Flood Risk Precinct has been defined as the area within the envelope of land subject to a high hydraulic hazard (as defined with the provisional criteria outlined in the Floodplain Development Manual and must be deemed to include the transition zone without a comprehensive study) in a 1% AEP (1in 100 year ARI) flood event.
Medium Flood Risk Precinct In the absence of a detailed assessment with a Floodplain Risk Management Plan (that takes precedence over this definition), the following definition applies. The Medium Hazard Flood Risk Precinct has been defined as land below the 1:100 year ARI flood level plus 0.5m freeboard (Flood Planning Level) that is not within the High Flood Risk Precinct.
Low Flood Risk Precinct In the absence of a detailed assessment with a Floodplain Risk Management Plan (that takes precedence over this definition), the following definition applies. The Low Hazard Flood Risk Precinct has has been defined as all other land within the floodplain (ie; within the extent of the Probable Maximum Flood or PMF) but not identified within either the High Flood Risk or the Medium Flood Risk Precinct where risk of damages are low for most land uses.

If located within the Low Flood Risk Precinct, *"The floor of any development must be above the Probable Maximum Flood Level. The submission of a surveyor's certificate must be required on forming up of the structure, certifying that floor is not less than the required level."*

4.0 Hydrologic Analysis

Given the sensitivity of the proposed land use alongside the expanding development around the Wilton area, it is necessary to review the risks associated with stormwater and overland flow within the site.

4.1 External Catchment Analysis

The external catchment contributing to runoff flows within the site boundary is shown in blue hatching in Figure 8, with the total contributing area estimated as 1.6 hectares.

There are first order streams lying to the east and west of the site. To the east, the first and second order streams drain into the fourth order Allens Creek, situated approximately 670 m from the site. The streams to the west of the site run towards the northwest, discharging into the Nepean River approximately 1.5 km from the site.

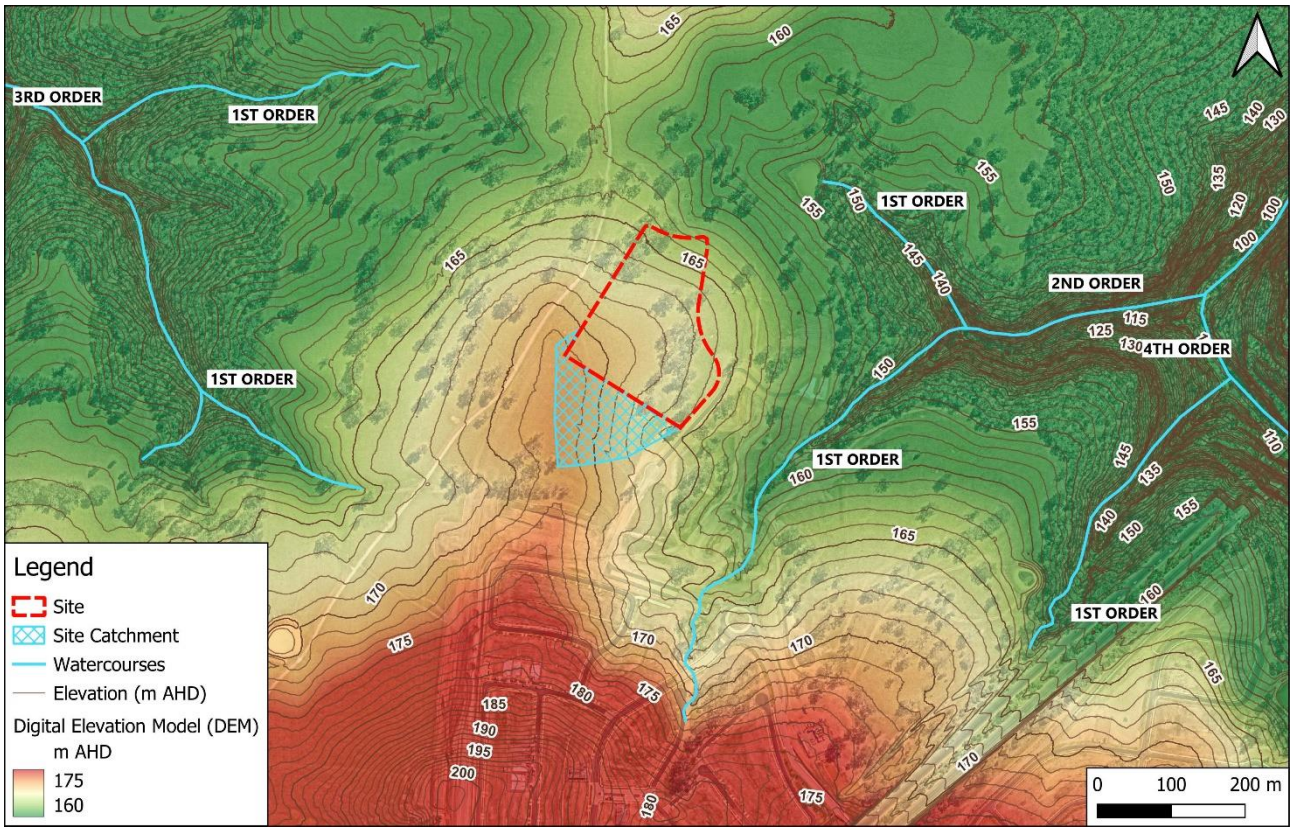

Figure 8: Catchment contributing to overland flow within the Wilton Junction Primary School boundary

As the site is located at the top of the catchment area, the external catchment area is small and will not produce significant overland flows across the site.

4.2 DRAINS Hydrological Flow Calculation

A DRAINS model was prepared to estimate overland flow across the site derived from the upstream catchment outlined in Section 4.1.

The model parameters and assumptions are laid out in Table 1. The upstream catchment forms part of the wider lot that has been allocated for educational use. A 75% effective impervious area has been adopted based on a typical school layout similar to the proposed development with substantial playing fields.

Table 1: DRAINS Model Parameters

Parameter	Input
Model Type	IL/CL Model
Overland Flow Equation	Kinematic wave equation
Catchment Area	1.6 ha
Impervious Area Initial Loss	0 mm
Impervious Area Continuing Loss	0 mm
Pervious Area Initial Loss	15 mm
Pervious Area Continuing Loss	2 mm
Time of Concentration	6 minutes
Effective Impervious Area	75%
Pervious Area	25%

1% AEP rainfall data, including temporal patterns and incremental rainfall data, was obtained from the Australian Rainfall and Runoff Data Hub and the Bureau of Meteorology (BOM) Rainfall Intensity-Frequency-Duration (IFD) Data System. The model was run for 10 temporal patterns, with storm durations ranging from five minutes to three hours.

Table 2 outlines the peak flow for each of the median 1% AEP storms. The 1% AEP 10-minute storm was found to be the critical duration, with a peak flow of 0.98 m^3/s.

Table 2: Peak flow calculated for each of the median 1% AEP storms

1% AEP Median Storm	Peak Flow (m^3/s)
1% AEP, 5-minute burst, Storm 1	0.920
1% AEP, 10-minute burst, Storm 6	**0.979 (critical duration)**
1% AEP, 15-minute burst, Storm 2	0.921
1% AEP, 20-minute burst, Storm 4	0.832
1% AEP, 25-minute burst, Storm 1	0.814
1% AEP, 30-minute burst, Storm 3	0.727
1% AEP, 45-minute burst, Storm 3	0.638
1% AEP, 60-minute burst, Storm 2	0.515
1% AEP, 90-minute burst, Storm 2	0.498
1% AEP, 120-minute burst, Storm 1	0.478
1% AEP, 180-minute burst, Storm 6	0.301

Rainfall depths and intensity in the PMF event were calculated using the Generalised Short Duration Method (GSDM). The 15-, 30-, 45-, 60- and 90-minute storm durations were assessed, and the peak flows for each outlined in Table 3.

Table 3: Peak flow calculated for each of PMF storms

PMF Storms	Peak Flow (m^3/s)
15-minute	**4.320 (critical duration)**
30-minute	3.341
45-minute	2.894
60-minute	2.736
90-minute	2.115

With a peak flow of 4.32 m^3/s entering the site in the 15-minute PMF event, this equates to a flow depth of about 100mm however based on the proposed site layout and contours this would not impact the proposed buildings and would pass through the southeast corner of the site unimpeded.

Based on the above the proposed buildings are not impacted by overland flow from the external catchment. The site will need to cater for runoff from the site itself and have adequately sized inground drainage and overland flow provisions. It is recommended that good practice levels design is adopted with falls away from building thresholds and Finished Floor Level (FFL) of the school at least 300mm above surrounding ground levels.

4.3 Rainfall Runoff Flows Estimation

The Rational Rainfall Runoff Method was used to validate the DRAINS hydrological flow calculations. The overland flow travel time was calculated using the Friend equation:

$$t_o = \frac{107\ x\ n\ x\ L^{0.333}}{S^{0.2}}$$

Where:

t_o = overland flow travel time (mins)
L = flow path length (m)
n = Manning's n roughness
S = slope of surface (%)

The overland flow travel time was calculated at approximately 6 minutes. This then informed the rainfall-runoff equation to calculate flow for the 1% AEP 6-min duration storm. To account for future development in the surrounding area, the fraction impervious was assumed as 0.75, reflective of urban residential – medium density. The rainfall-runoff equation is as follows:

$$Q = CiA$$

Where:

C = the runoff coefficient (in this case, estimated as 0.78);
i = the rainfall intensity (in this case, 240 mm/hr for the 1% 6-min storm, taken from the BOM website);
A = the area of the contributing catchment (1.6 hectares)

$$Q = 0.78\ x\ 240\ x\ 1.6/360$$

$$Q = 1.0\ m^3/s$$

Based on the above, the results show that the estimated 1% AEP peak flow by the DRAINS hydrological model developed as part of this study is within 2% of that estimated using the Rational Method. Therefore, the DRAINS hydrological prepared for this study is considered to produce reasonable catchment flows and is appropriate to be adopted for this study.

5.0 Existing Flood Information

5.1 Draft Wollondilly Shire Flood Study, 2024

The flood analysis within this report is primarily based on existing flood studies conducted on behalf on Wollondilly City Council. The Wollondilly Shire Flood Study Report (Draft, 2024) was used as the main reference to inform this report. Though this Flood Study has not been formally adopted, it was available for public exhibition and the flood mapping produced as part of the study is available for use on the Council website (with updated following flood consultation in 2024).

The proposed primary school site lies within the Nepean River Catchment and was consequently included in the Wollondilly Shire Flood Study Report. This study utilised a 2D TUFLOW model to complete a broad scale assessment of flood conditions in areas not previously studied, with design flood mapping considering both overland flows and riverine conditions. The study noted that flooding at residential areas east of Broughton Street in South Wilton have typical depths of 0.1 – 0.3 m during the 1% Annual Exceedance Probability (AEP) event, and 0.15 – 0.40 m during the Probable Maximum Flood (PMF), while a flow path exists at Beatty Street/Greenbridge Drive (0.05 – 0.1 m depth during 1% AEP event, 0.1 – 0.3 m during PMF).

Interactive flood mapping was produced based on the findings of the flood study and contributions from the community. Figure 9 shows the peak flood extent around the site during both the 1% AEP event and the PMF, with the proposed school site remaining flood-immune in both scenarios. Figure 10 shows the modelled flood depth during the PMF event, with depths between 0.5 – 1.0 m approximately 140 m northwest of the site, close to the first order stream. This lies well below the site, with a low of 162m AHD, while the creek systems are around 130-150m AHD (see Section 2.3).

The flood study recommended Wilton as a site for consideration for detailed flood modelling assessment. While this is a useful indication of the need for further analysis in the wider Wilton area, this is some distance from the proposed primary school site in the North Wilton Precinct.

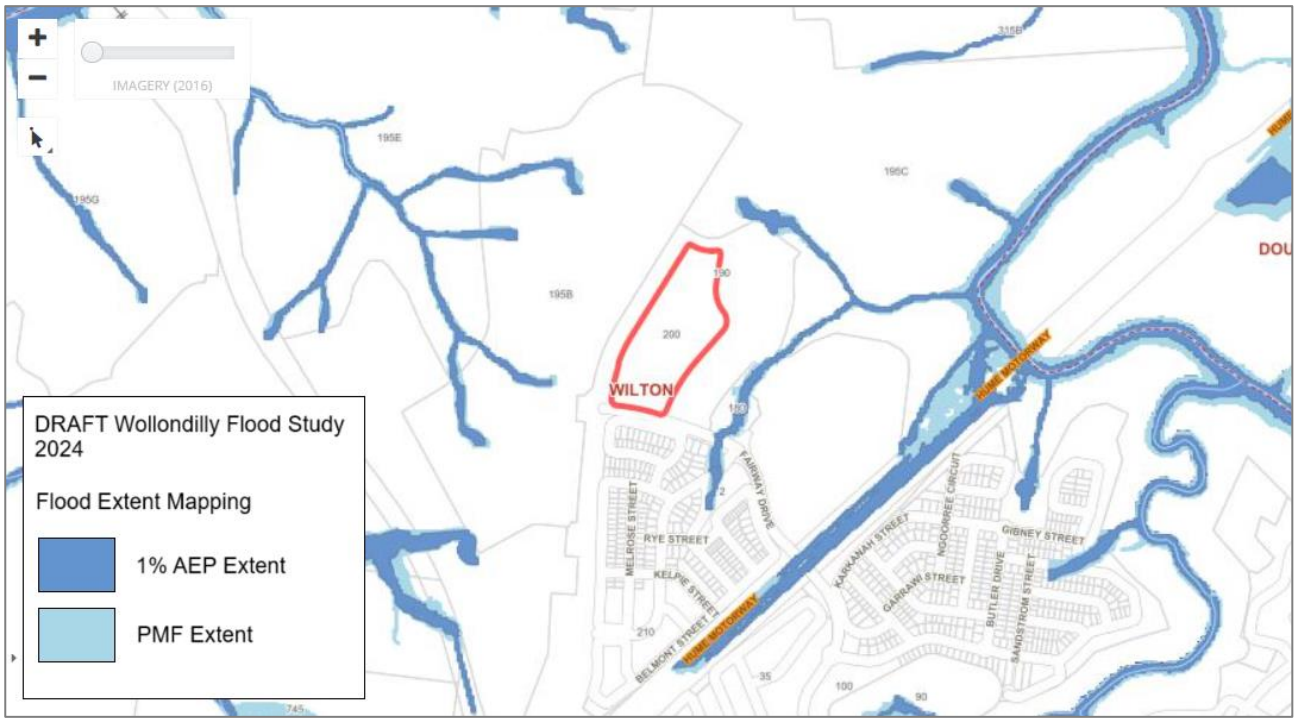

Figure 9: Peak flood extent in the Wilton area during both the 1% AEP event and the PMF event. Source: adapted from Wollondilly City Council, 2024.

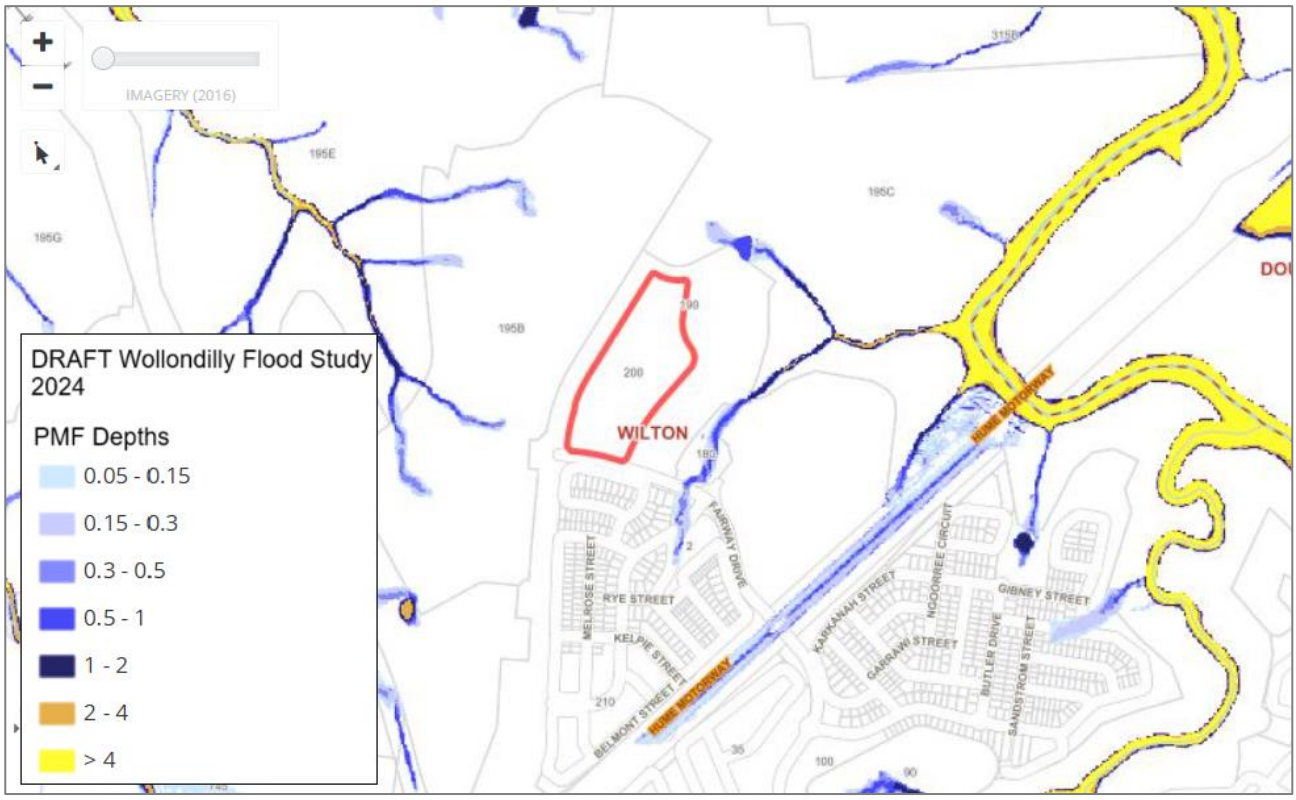

Figure 10: Peak flood depth in the Wilton area during the PMF event. Source: adapted from Wollondilly City Council, 2024.

It should be noted that the flood extents and depths are based on a draft study and subject to change. Despite this, they have been used as the main reference point in this report given that they are based on the current industry standard methods and guidelines and in accordance with the Australian Rainfall & Runoff 2019 (AR&R 2019) Guidelines.

As is stated in the Flood Study, it is important to note that the history of flooding in many parts of Wollondilly is not well documented, and isolated incidences (including evacuations and road closures) have not been recorded in detail. This is particularly relevant for the site, given the area is only newly developed and receptors were limited during past flood events. The study is also limited in that the model grid size is 6m, and this coarser resolution may mask areas of localised flooding.

5.2 North Wilton Stage 2 & 3 Water Cycle Management Strategy Report, 2022

Stantec (formerly 'Cardno') were engaged by Landcom to undertake a Water Cycle Management Study to demonstrate that the North Wilton Stage 2 & 3 subdivision and its proposed land uses (which the school site is located within) comply with all relevant flooding and stormwater management controls and objectives as described in the Wilton Growth Area (WGA) Development Control Plan (DCP) 2021 and the Design Specification. The study included proposed development in their model, with assumed land uses (including the proposed school and residential lots) incorporated, as shown in Figure 8. None of the Gross Pollutant Traps (GPTs), bioretention treatments or stormwater treatment measures outlined in the report are expected to have an impact on flood risk.

The report notes that hydrologic and hydraulic calculations demonstrate that the 1% AEP event flood level does not interact with the proposed North Wilton Precinct. Any remaining flood risk will be dealt with through the design of a trunk and street stormwater system. The report concludes that flood modelling for subsequent stages of the precinct is not required, and the requirements of WGA DCP and Wollondilly LEP (WLEP) 2011 have been met.

Figure 11: Land use assumptions incorporated into the Water Cycle Management Strategy MUSIC model. Source: Stantec, 2022.

5.3 Climate Change

The Planning Circular PS 24-001 notes that the impacts of climate change on future flood frequency and levels should also be considered when assessing a proposal.

Climate change is expected to have an adverse impact on the frequency and severity of flood-producing rainfall events, which has the potential to have a significant impact on flood behaviour. As per FB01 (Understanding and Managing Flood Risk) of the Flood Risk Management Guidelines (NSW Department of Planning and Environment, 2023), flood studies under the Floodplain Management Program must consider how changes in flood-producing rainfall events impact on flood behaviour.

The FB01 Guideline summarises the percentage change to the intensity and volume of flood-producing rainfall events based on a 7% uplift for every 1°C increase in mean temperature. This is outlined in Table 4, demonstrating an increase between 10.6–14.4% for representative concentration pathway (RCP) 4.5, and 22.5–30.0% for RCP8.5.

Table 4: Typical increases in rainfall for different RCPs in different locations (Source: NSW Department of Planning and Environment FB01 Guide, 2023)

Year	% change in rainfall (based on 7% change in intensity and volume for every 1°C change in mean temperature)							
	East Coast South		Murray Basin		Rangelands		Southern Slopes	
	RCP4.5	RCP8.5	RCP4.5	RCP8.5	RCP4.5	RCP8.5	RCP4.5	RCP8.5
2060	10.6	15.7	10.4	15.5	12.0	17.8	9.0	13.0
2070	11.6	19.2	11.3	19.3	13.3	22.0	9.8	16.4
2080	12.5	22.7	12.2	22.8	14.1	26.0	10.4	19.5
2090	12.7	26.0	12.6	26.2	14.4	30.0	10.6	22.5

The 0.5% and 0.2% AEP events are in the order of 15% and 30% more rainfall than the present-day 1% AEP flood event, respectively. The 0.5% AEP event can therefore provide a proxy for the scale of change to the 1% AEP event under RCP4.5 in 2090, while the 0.2% AEP event provides an indication of flood behaviour under RCP8.5 in 2090.

As presented in Figure 9, the site is not impacted by flooding in the PMF event and is therefore unaffected by flooding in both the 0.5% and 0.2% AEP events. As such, climate change is not expected to have any adverse effects on flood behaviour at the site.

5.4 Site Access

Though the site is not directly affected by flooding, it is important to assess access and egress from the site during flood events. Figure 12 shows the site during the PMF event with three potential access routes. It is unclear if there are to be slip roads constructed to provide direct access onto Hume Motorway, although this has been assumed as the case in Route 1 and Route 2. The construction of future slip roads would need to be verified otherwise Route 3 should be assumed to the only access and egress route.

Using available mapping, all three routes are flood affected and appear to involve driving through floodwaters to access the site or during an evacuation. It is necessary in all routes to travel along Fairway Drive, where flood depths are modelled as up to 0.5 m due to the first order stream at this location.

- Route 1 travels southwest along Hume Motorway, which is flood affected for approximately 400 m with some small areas above 0.5 m depth.
- Route 2 travels northeast along Hume Motorway, which is flood affected for approximately 800 m, with similar spots of 0.5 m flood depths.
- Route 3 travels south on Fairway Drive towards the residential area, which is subject to flood depths between 1.5 – 2m.

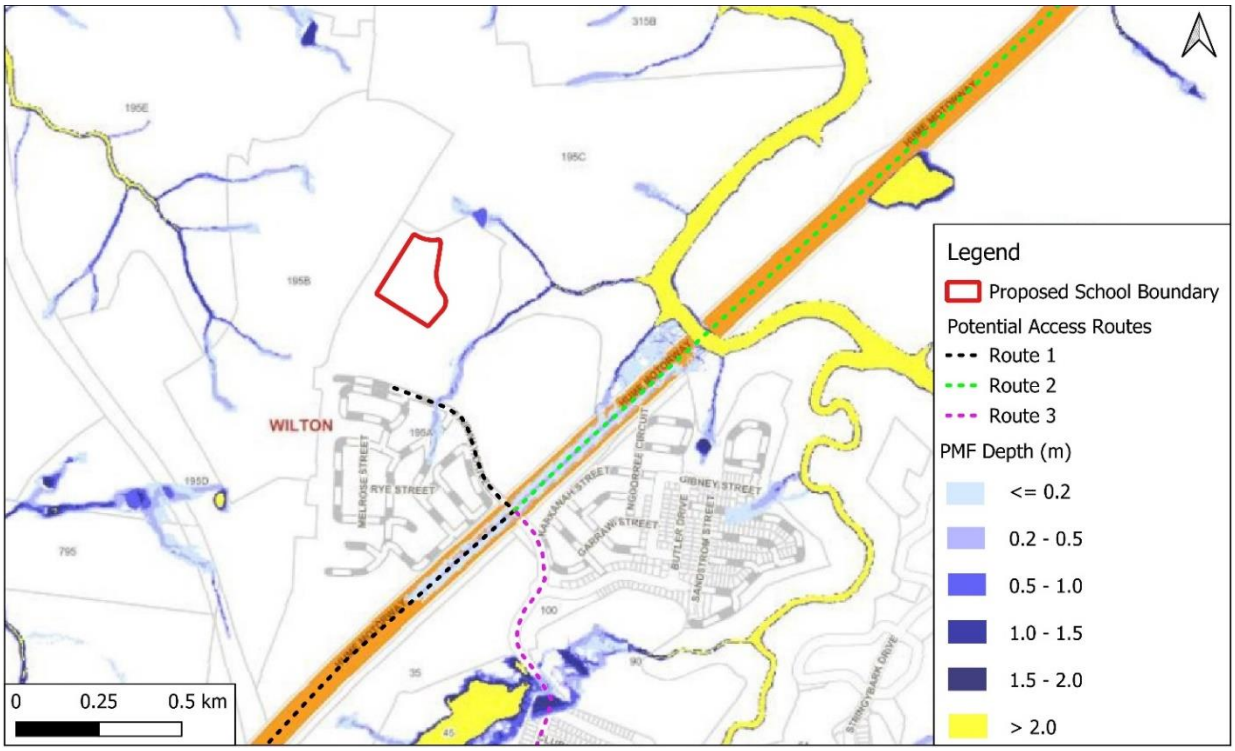

Figure 12: Access and egress routes from Wilton Junction Primary School shown against the PMF flood depths. Source: adapted from Wollondilly City Council, 2025.

Although the velocity of flows is not known, it is possible to gauge the flood hazard using the depth information provided. This can be compared against the Australian Institute of Disaster Resilience (2017) hazard curves which assess the vulnerability of people, vehicles and buildings to flooding based on the velocity and depth of flood flows. This flood hazard vulnerability curve is shown in Figure 13, with six classes ranging from a level of H1 (generally safe for people, vehicles and buildings) to H6 (unsafe for vehicles and people, with all buildings considered vulnerable to failure). With Route 3 showing depths between 1.5 – 2 m, this indicates a flood hazard rating of at least H4 based on depth alone – which is deemed unsafe for vehicles and people.

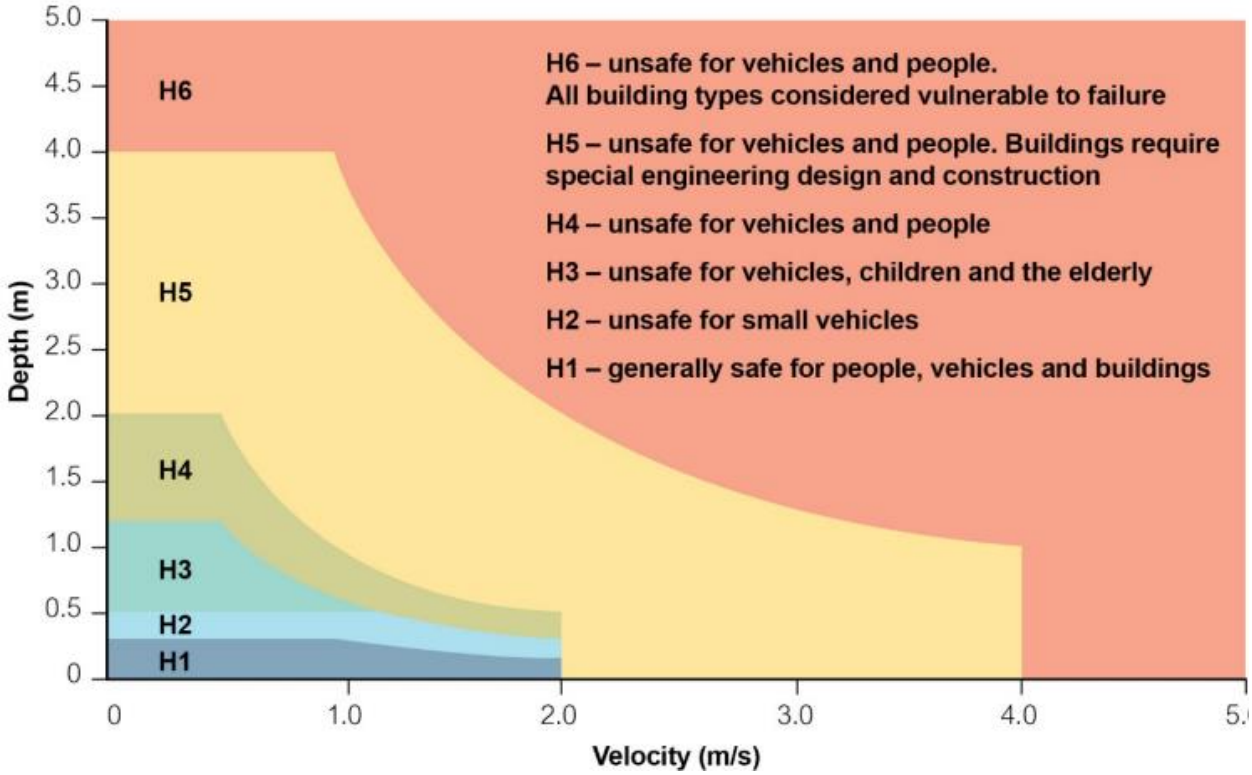

Figure 13: Flood Hazard Vulnerability Curve (Source: Australian Institute of Disaster Resilience: Hazard Guideline).

However, it is important to acknowledge the coarse modelling involved in the Council mapping, which can lead to inaccuracies in the representation of flooding in local areas. Figure 14 is from the Draft Flood Study and shows flood emergency response considerations for the wider area, noting that the Hume Motorway crossing of Allens Creek remains 'flood-free up to the PMF' (Point 15), despite the mapping showing otherwise (even in events as frequent as the 10% AEP). A Google Earth desk study of the area appears to indicate that Hume Motorway is elevated above the PMF level, and any flooding (particularly towards Allens Creek) is likely a result of the road not being built into the DEM, allowing flows from the creek to encroach onto the motorway. It is probable that Hume Motorway is therefore trafficable during a flood event.

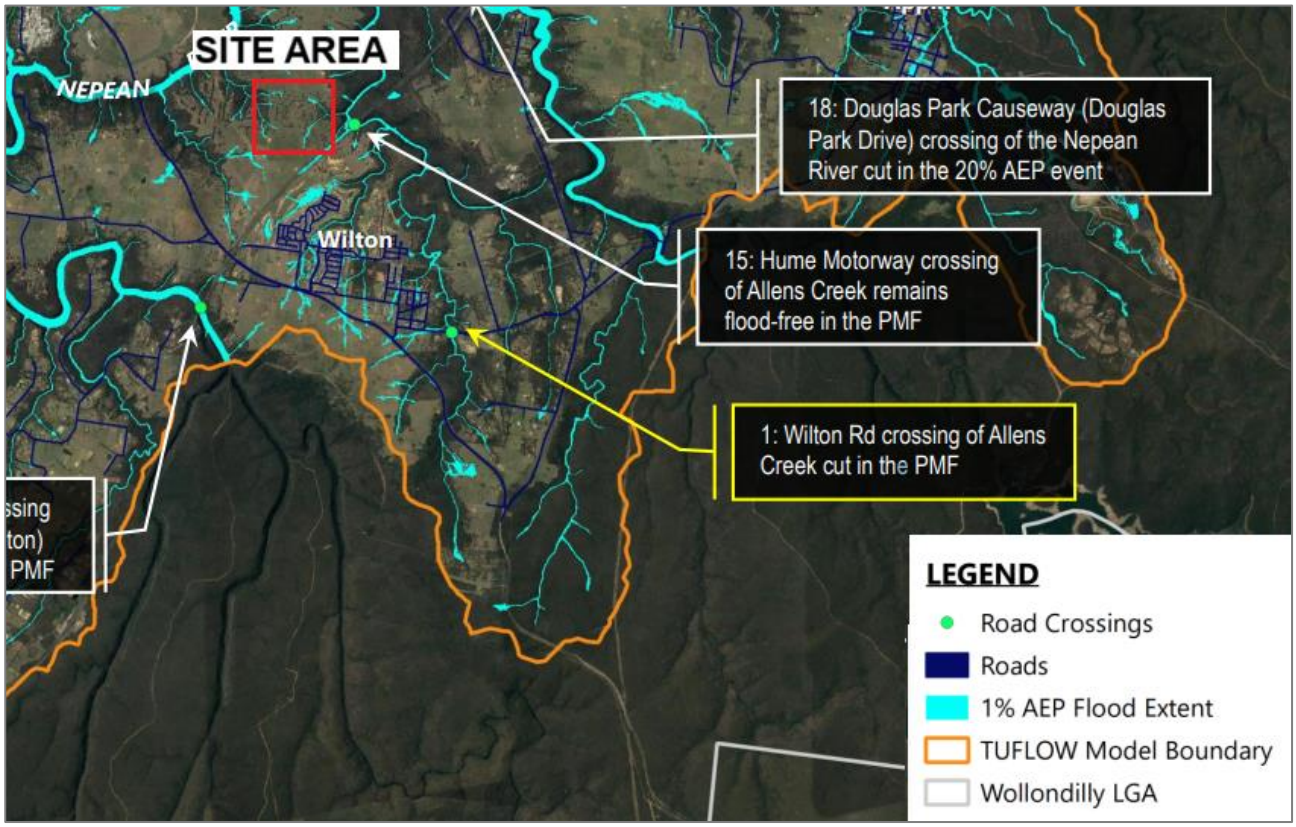

Figure 14: Draft Flood Study - Flood Emergency Response Considerations in the South Wollondilly area, shown against the 1% AEP Flood Event. Source: Wollondilly Shire Draft Flood Study, August 2023.

This is also likely the case along Fairway Drive to the south (Route 3), with modelling indicating flood depths up to 2m on the road. Mapping indicates that this flooding is derived from the watercourse to the east (see Figure 12). Elevation data obtained from ELVIS (2019) show that the road is approximately 178m AHD, while the landscaped area to the east is approximately 173m AHD. It is therefore likely that the road is elevated above the PMF level at this location.

While the TUFLOW model produced in the Draft Flood Study incorporated design plans for subdivisions and developments, this did not include the development to the southeast of Hume Highway, or the development just south of the proposed school site. It is anticipated that the first-order stream southeast of the site will be culverted underneath the road, as shown in the aerial image of the area in Figure 15. This is likely to enable this stretch of Fairway Drive to become trafficable during the PMF event.

Site access and egress is a residual risk for the site and should be reviewed again once the flood study is finalised to confirm there is no change to flood affectation in the surrounding area, though this is unlikely.

Figure 15: Ongoing construction in area surrounding the site, shown against existing watercourses. Red box indicates area of flooding in Council mapping, which is sourced from first-order stream crossing road. Source: Google Earth, 2023.

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 school itself is not flood affected and subject to further verification site access and egress should be maintained during extreme events. As a result, a standalone Flood Emergency Response Plan (FERP) is not considered necessary for the school. Further verification of the flood risk to the surrounding road network is recommended including a review of the final Wollondilly Shire Flood Study Report, once available, to ensure any residual risks are accounted for. This may include inputs to the school's Emergency Management Plan as opposed to a standalone FERP.

Where roads are flood impacted in the wider Wollondilly area, the period of isolation is reasonably short. The Draft Flood Study assessed time of flood duration at several locations where key access roads are potentially cut by floodwaters. Though this assessment did not include the Wilton area, it provides an indicator of isolation times within the catchment. The assessment showed that roads are typically cut within 2 to 4 hours of the start of the storm for the events tested that are smaller than the PMF. During the PMF, the identified roads are cut by local watercourse flooding within 1 to 2 hours and the duration of inundation is typically less than 2 hours.

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 and flood duration are both less than six hours. 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 and a FFL at least 300mm above surrounding ground levels).

7.0 Conclusions and Recommendations

This report provides an analysis of the flood characteristics at the site location in addition to the nature and type of development to supplement the REF submission for the new primary school at Wilton Junction.

The Wilton Growth Area Development Control Plan (DCP) states that where development is shown to be affected by the 1% AEP event, Council may require a more detailed flood study to be undertaken to confirm the flood affectation of the land. Similarly, the Wollondilly DCP categorises schools as an 'Essential Community Facility' which are subject to stringent development controls, and floors must be located above the Probable Maximum Flood (PMF) level.

Updated flood maps based on the Draft Wollondilly Shire Flood Study indicate that the site is not subject to flooding up to the PMF event. The site is therefore deemed suitable for the development of a primary school.

A DRAINS model was prepared to calculate hydrological flows entering the site from the upstream catchment. Based on this the proposed buildings are not impacted by overland flow from the external catchment. The site will need to cater for runoff from the site itself and have adequately sized inground drainage and overland flow provisions. It is recommended that good practice levels design is adopted with falls away from building thresholds and Finished Floor Level (FFL) of the school at least 300mm above surrounding ground levels.

Mitigation Measures

Mitigation measures identified as necessary are outlined in Table 5.

Table 5: Mitigation Measures

Mitigation Number/Name	Aspect/ Section	Mitigation Measure	Reason for Mitigation Measure
2	Design	Sufficient drainage and grading	Sufficient drainage provisions should be provided around each proposed building within the site to either fully contain or divert anticipated stormwater runoff away from the buildings. An overland flow path will need to be provided to the northeast of the site to allow overland flow to pass between Building A.
3	Operations	Review	Review the final Wollondilly Shire Flood Study Report, once available, and if required highlight management measures within the schools Emergency Management Plan.

Evaluation of Environmental Impacts

Based on the identification of potential issues, and an assessment of the nature and extent of the impacts of the proposed activity, it is determined that:

- As the site is located outside the PMF extent, the proposed development will not redistribute flows or reduce flood storage. As such, the development will have no impact on flood behaviour, flood risk to the existing community, nor will it expose its users to onsite flood risks that require management or mitigation. In addition, it will not have any adverse offsite impacts, nor will it impact hydrology, drainage lines, downstream assets or watercourses.
- The extent and nature of potential impacts are low and will not have significant impact on the locality, community and/or the environment.

- Potential impacts can be appropriately mitigated or managed to ensure that there is minimal impact on the locality, community and/or the environment.

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