Flood Statement

New High School for Leppington and Denham Court

Prepared for NSW Department of Education / 13 January 2025

232024

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

Your Partner in Engineering

Contents

Rev	Date	Prepared By	Approved By	Remarks
1	12/11/2024	MK	JM	
2	18/11/2024	MK	JM	Final
3	13/01/2025	MK	JM	Final

1.0 Introduction

This Flood Statement Report has been prepared by TTW (NSW) Pty Ltd on behalf of the NSW Department of Education (the proponent) to support a Review of Environmental Factors (REF) for the new high school for Leppington and Denham Court (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.

The proposed activity is for construction of a new high school located at 128-134 Rickard Road, Leppington, NSW, 2179 (the site).

This report has been prepared generally in accordance with the Flood Risk Management Guideline LU01 (NSW Department of Environment and Heritage, dated June 2023) and has also referenced other documents as outlined in Section 1.2. This report outlines the existing constraints of flooding and overland flow paths, including likely flood impacts (if any) that the activity will cause to the surrounding properties. The details of this report are based on currently available information and correspondence undertaken at the time of the assessment and writing of this report.

1.1 Site Description

The site is known as 128-134 Rickard Road, Leppington, NSW, 2179 and is legally described as Lot A and B in Deposited Plan 411211. The site is located on the eastern side of Rickard Road and is approximately 4.1ha in area. The site is located immediately south of the existing Leppington Public School at 144 Rickard Road and is approximately 700m south of Leppington Train Station.

Figure 1 shows the aerial image and approximate extent of the site.

Figure 1: Site location and surrounding area (Source: Nearmap, dated March 2024).

The northern portion of the site is currently used for residential purposes. The southern portion of the site is used for agricultural purposes, with multiple greenhouses and an existing pond on the property.

1.2 Guidance Documents

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

- Australian Institute of Disaster Resilience (AIDR) Guideline 7-3: Flood Hazard (2017)
- Camden Growth Centre Precincts Development Control Plan (CGCPDCP), 2023
- Leppington Town Centre Development Control Plan, 2023 (draft version)
- Camden Development Control Plan (DCP), 2019
- Camden Council Flood Risk Management Policy, 2023
- Camden Council Engineering Design Specification, 2020 (draft version)
- Camden Council Review of Upper South Creek Flood Study in the Context of Ongoing Development Report, 2022 (prepared by WMAwater)
- Camden Local Environmental Plan (LEP) 2010
- NSW Department of Environment and Heritage – Flood Risk Management Guideline LU01, June 2023
- NSW Department of Planning and Environment – Flood Risk Management Manual, 2023
- NSW 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))
- School Infrastructure New South Wales (SINSW) Guidelines for School Site Selection and Master Planning, 2023

1.3 Proposed Activity Description

The proposed activity is for a new high school for Leppington and Denham Court. The new high school will accommodate up to 1,000 students across 3 new buildings that will comprise 48 permanent teaching spaces (PTS), 3 support teaching spaces (STS), 19 specialist labs/workshops/kitchens and a hall. Buildings 1, 2 and 3 will be clustered along the southern boundary and the hall will be located in south-east corner of the site. The activity also includes the construction of a sports field in the centre of the site and 3 x multipurpose courts along the northern boundary. The proposed scope of works is illustrated in Figure 2.

Figure 2: Layout Plan of New High School for Leppington and Denham Court (Source: DJRD Architects)

1.4 Future Road Works

The site is bounded by planned future road works along the western, southern and eastern site boundaries. These road works include:

- Proposed widening/realignment of Rickard Road to the west of the site and including a portion of the site area.
- Proposed intersection with Rickard Road and new public road to be constructed along the southern site boundary.
- Proposed new road to the east of the site, which includes a portion of the site area.

The above road works are to be delivered by Council but the timing of delivery of these road works are unknown at the time of assessment, and these road works do not form part of this activity.

2.0 Site Characteristics

2.1 Site Access

The current access to the site is via Rickard Road on the eastern side of the site.

2.2 Site Topography

Survey of the site collected by Project Surveyors in February 2024 (attached in Appendix A) shows that there is a crest present near the site's north-east corner, with majority of the site falls toward the west and south (i.e. only a small area falls to the north and north-east). The fall from the crest to the western boundary has a slope of approximately 5% (i.e. fall of 10m over 200m), while the fall to the southern boundary has a slope of approximately 6% (i.e. fall of 8m over 140m). The fall to the northern boundary is estimated to have a slope of approximately 3%. Figure 3 shows the surveyed site contours and approximate fall slopes.

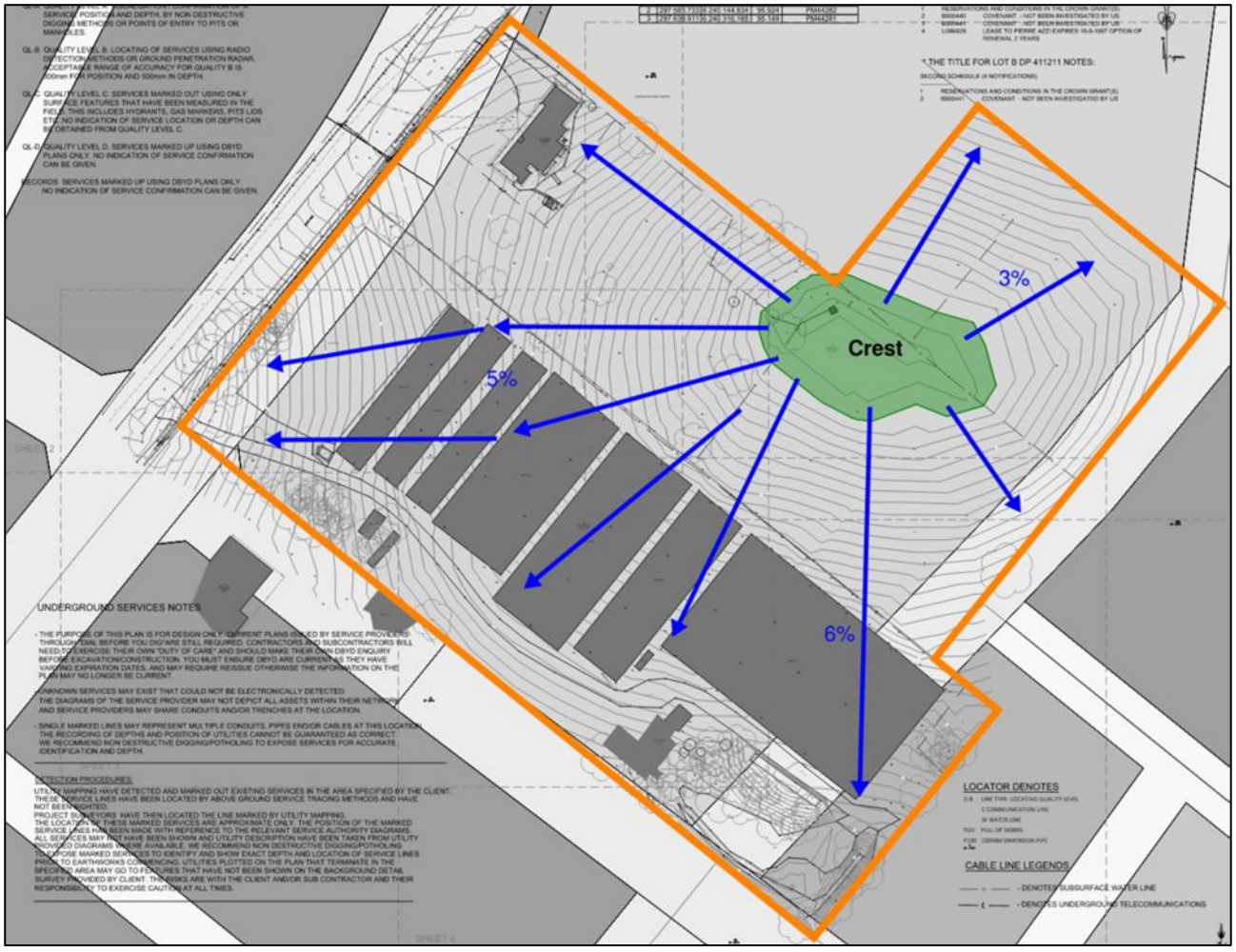


Figure 3: Site Survey (Source: Project Surveyors)

2.3 Site Zoning

The site is zoned B7 Business Park but is proposed to be changed to SP2 Infrastructure as part of the Leppington Town Centre Planning Proposal, to pave way for a future school development.

2.4 Existing Stormwater

The survey carried out by Project Surveyors for the site identified no underground stormwater or drainage systems currently present within the site and along the section of Rickard Road fronting the site. As such,

existing excess stormwater runoff (i.e. generated within the site) leaves the site as sheet flows from the crest near the north-east corner. These sheet flows travel outward from the crest (i.e. flows to the west being collected by the swale on the side of Rickard Road, while flows to other site boundaries leaving the site onto private properties). The closest existing stormwater pit on Rickard Road is located approximately 30m to the north of the site, while the stormwater pits on the south of Rickard Road is located approximately 300m from the site (i.e. near the intersection with Ingleburn Road).

3.0 Existing Site Flood Information

The site is located within the Upper South Creek Catchment, and the latest catchment wide flood assessment or study completed for this catchment is the "*Review of Upper South Creek Flood Study in the Context of Ongoing Development*" prepared by WMAwater in 2022 (referred herein as "The 2022 Review Study"). The modelling outcome and results from the 2022 Review Study has since been endorsed by Camden Council and incorporated into its planning provision to define the flood planning area for the catchment area.

The 2022 Review Study confirmed that the site is located outside the Council Mainstream and Overland Flood Planning Area (FPA) zones and is not affected by flooding for all design AEP (Annual Exceedance Probability) events, up to and including the Probable Maximum Flood (PMF) event (i.e. site is located outside the Flood Prone Land zone). Hence, the site is not mapped within any flood risk precincts. Figure 4 shows the FPA zone (i.e. both mainstream and overland flow FPAs) adopted for the site and its surrounding area. Figure 5 and Figure 6 show the flood hazards estimated for the 1% AEP and PMF events, respectively. Figure 7 shows the flood risk precincts derived from the 2022 Review Study for the site area, while Figure 8 shows the Camden Council adopted Flood Prone Land zone for the Leppington Town Centre area.

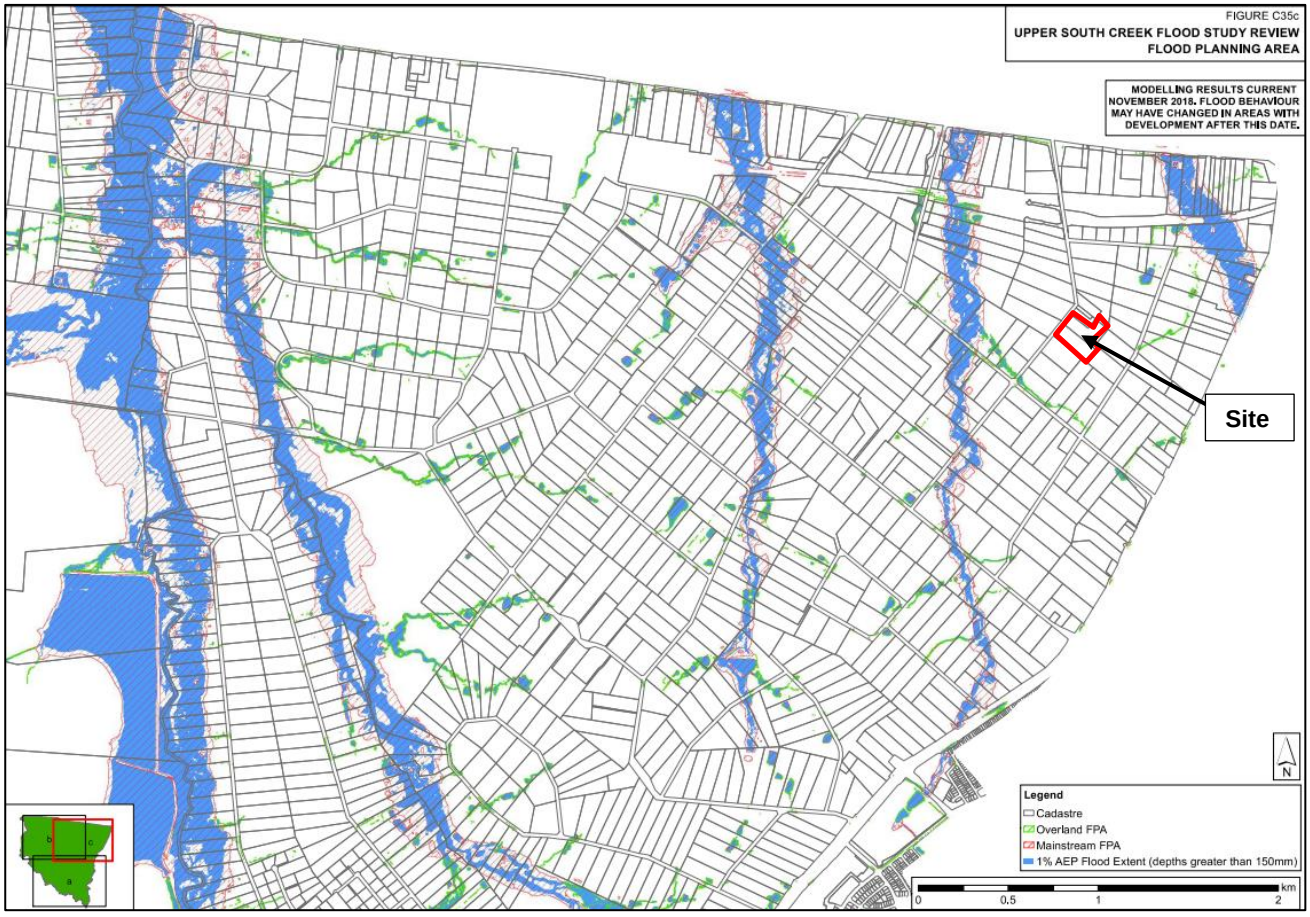


Figure 4: Upper South Creek Flood Study Review – Flood Planning Area (Source: WMAwater 2022 Review Study)

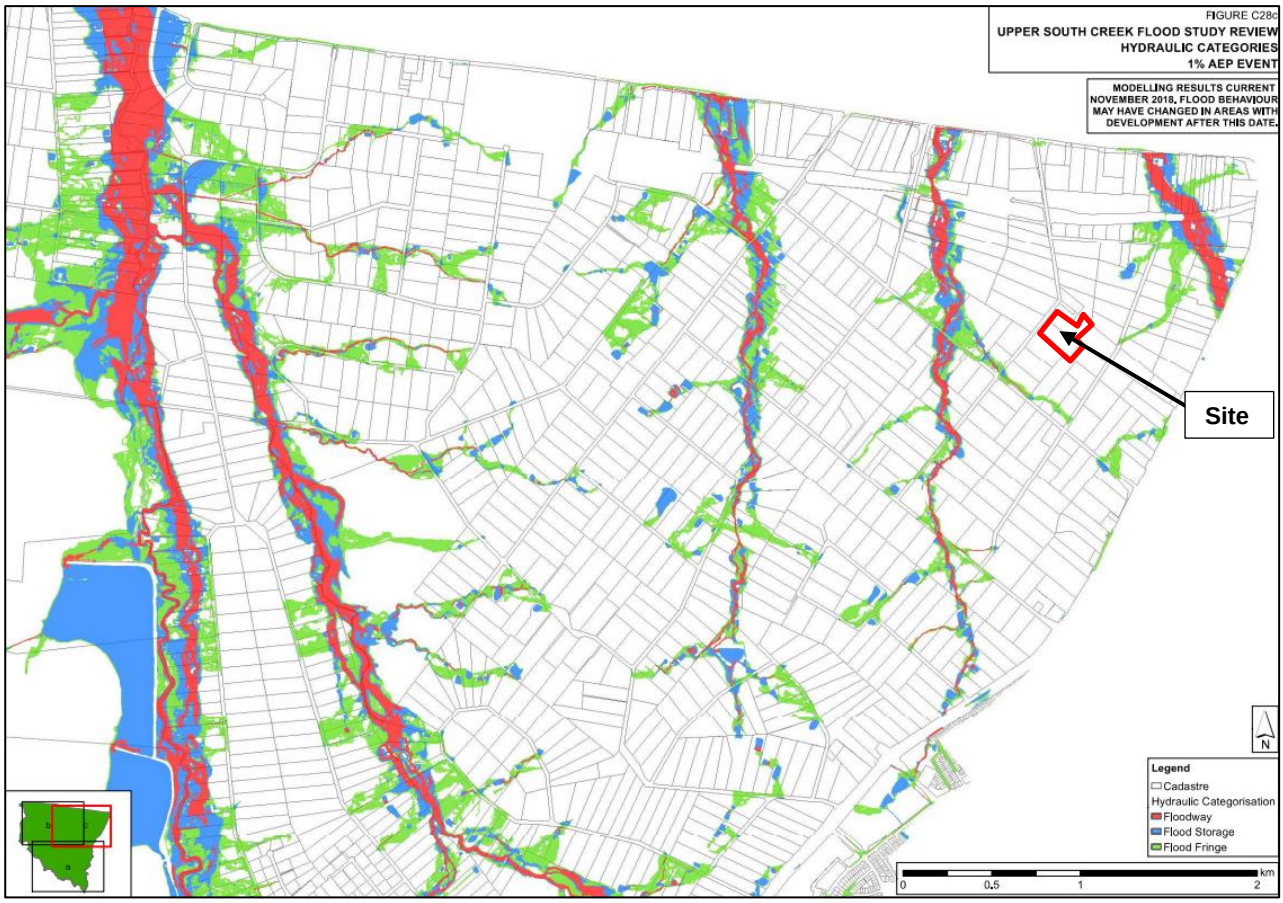


Figure 5: 1% AEP Flood Hazard Mapping (Source: Source: WMAwater 2022 Review Study)

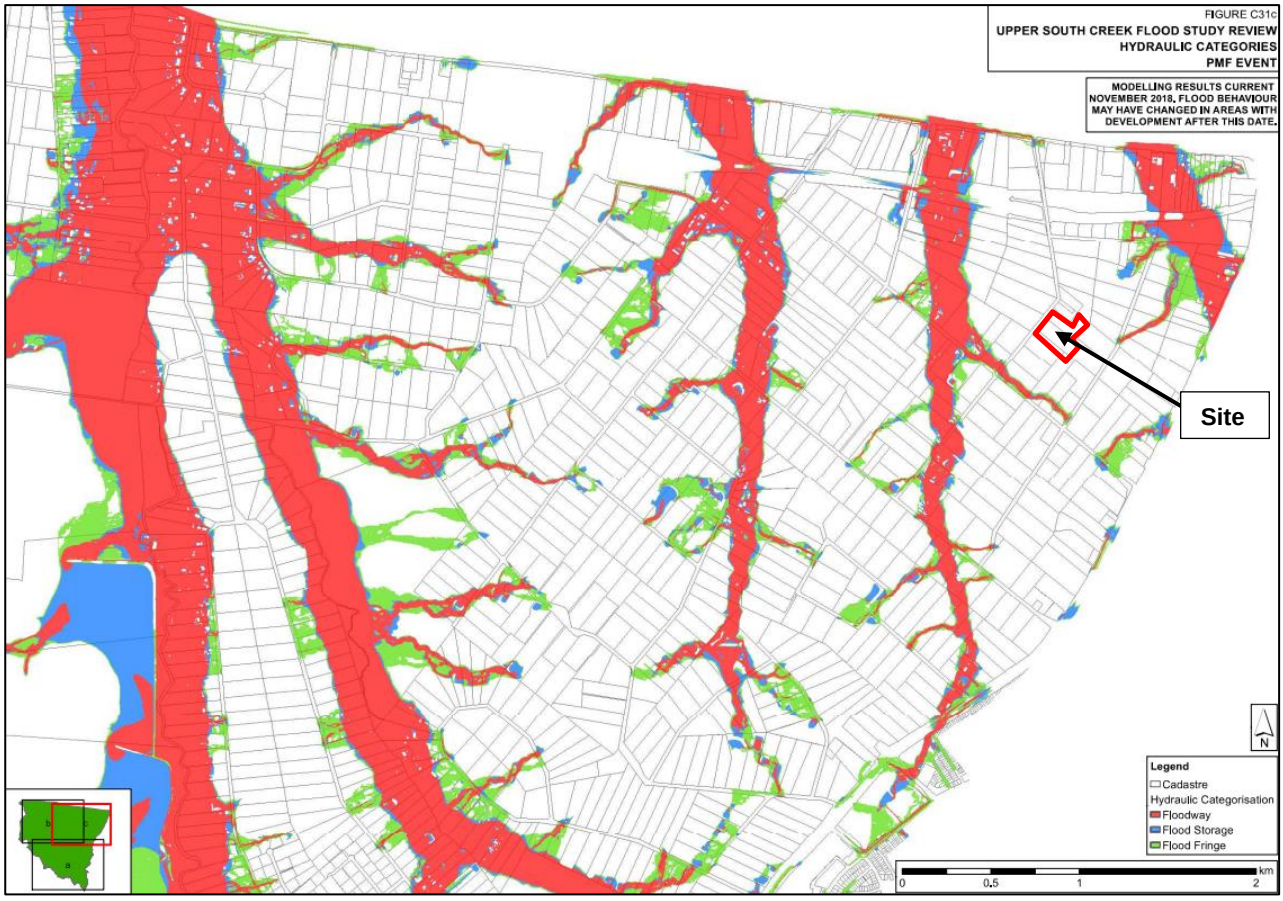


Figure 6: PMF Flood Hazard Mapping (Source: Source: WMAwater 2022 Review Study)

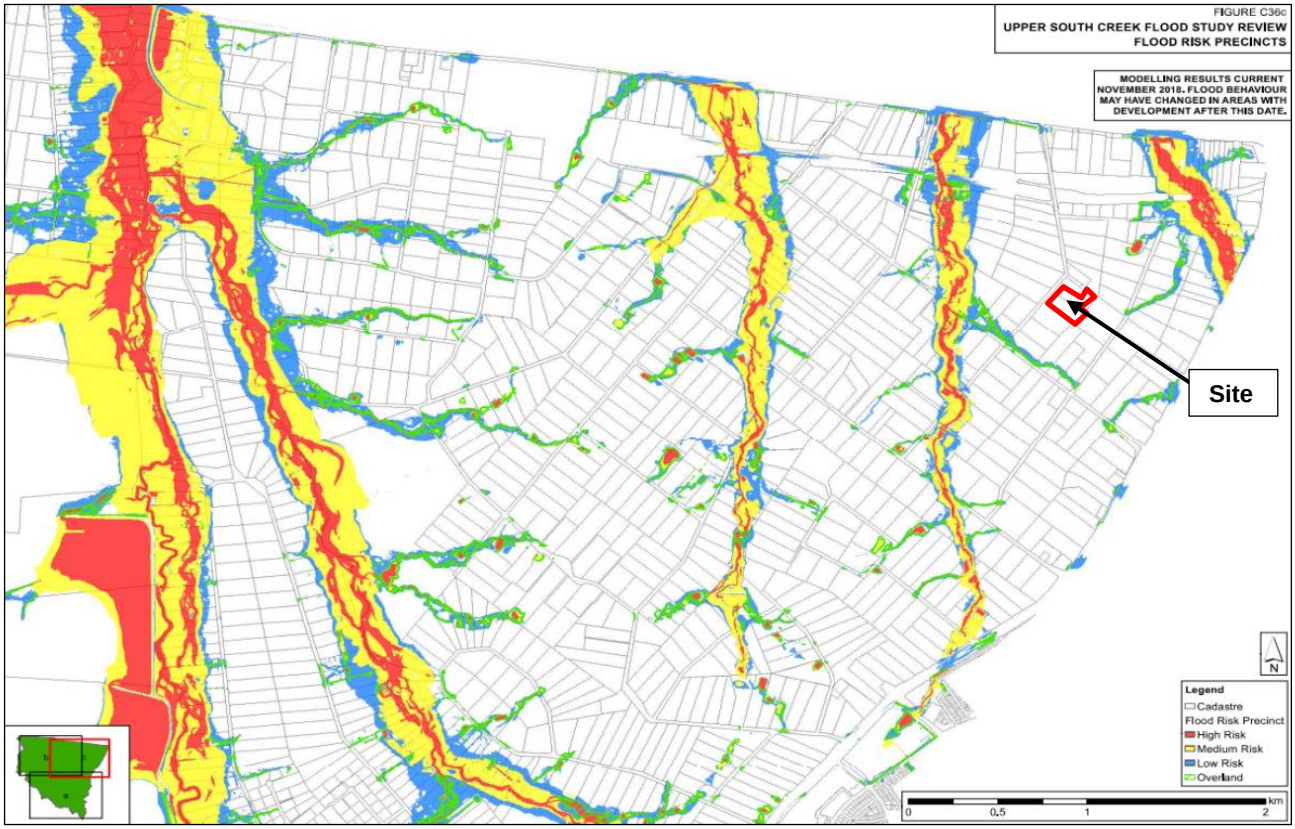


Figure 7: Upper South Creek Flood Study Review – Flood Risk Precincts (Source: WMAwater 2022 Review Study)

Figure 8: Camden Council Flood Prone Land – Leppington Town Centre (Source: Source: Camden Council 2023 Leppington Town Centre DCP)

It is worth noting that although the site is not affected by flooding, access to the site will be cutoff during severe flood events. In particular, Rickard Road to the south (i.e. near the intersection with Ingleburn Road), Bringelly Road (i.e. approximately 500m and 600m to the west and east of Rickard Road respectively) and Edmondson Avenue (i.e. approximately 700m north of intersection between Rickard Road and Bringelly Avenue in Liverpool City Council LGA) will be inundated by floodwater and considered not safe for traffic during severe flood events.

Cumulative Impact Assessment

As discussed in Section 2.2, the site is located at a crest near the site's north-east corner with no external upstream catchment that will contribute stormwater runoff to the site (i.e. the entire site area is sloping away from the crest). Based on this and the fact that the site is located outside the PMF flood extent, the proposed activity is not anticipated to result in any cumulative flood impacts to the surrounding properties, provided that the site stormwater runoff is being maintained to the pre-development levels.

4.0 Flood Planning Requirements

As most of the flood related development controls adopted by Camden Council mainly apply to areas mapped within the Flood Prone Land zone, the proposed activity should not have issues meeting these development controls as the site is located outside the Flood Prone Land zone (refer to Figure 8). Nonetheless, the relevant flood related development controls that are applicable to the site area are discussed further below.

4.1 Camden Growth Centre Precincts Development Control Plan (March 2023)

The site is located within the Leppington Town Centre Development Boundary, therefore Parts 5 and 6 of the Camden GCPDCP (Growth Centre Precincts Development Control Plan) and Schedule 2 of the Camden GCPDCP are applicable to the site, including the Leppington Town Centre Development Control Plan (Draft, September 2023). Controls of the Draft Leppington Town Centre Development Control Plan is discussed in Section 4.2.

The flood-related objectives of the Camden GCPDCP (i.e. Item 2.3.1) are:

- To limit the flow of stormwater from development (activity) to replicate pre-development flows.
- To define the flood constraints and standards applicable to development (activity) in the Precincts.
- To minimise the potential of flooding impacts on development (activity), essential services, other land uses and risk to human life.

The flood-related development controls include:

- The subdivision layout is to ensure that the ability to develop land, including adjoining properties, is not adversely impacted, with regard to the 1% Annual Exceedance Probability (AEP) flood extent shown on the Flood Prone Land figure in the relevant Precinct's Schedule and Council's Floodplain Risk Management Policy.
- Filling and/or other development (activity) within the 1% Annual Exceedance Probability (AEP) flood extent shown on the Flood Prone Land figure in the relevant Precinct's Schedule may be permitted where site specific flood investigations demonstrate compliance with Council's Floodplain Risk Management Policy and Council's Engineering Specification.
- Pedestrian and vehicle access to basement car parking is to be located above the 1% AEP level plus 500mm freeboard.
- The design of the road network is to ensure that evacuation routes from the proposed development (activity) and any existing development (activity) and adjoining properties are maintained, or suitable alternative evacuation routes are provided for in accordance with Council's Floodplain Risk Management Policy and the Precinct Water Cycle Management Strategy (available from Council).

The existing Council flood mapping for the Upper South Creek catchment show that the site is located outside the PMF flood extent (refer to Figure 6), hence the proposed activity will comply with the above development controls with the provision of appropriate site stormwater and drainage design.

4.2 Leppington Town Centre Development Control Plan (Draft, September 2023)

It is worth noting that the Draft Leppington Town Centre Development Control Plan is not endorsed at the time of assessment, hence compliance to the requirements is not mandatory. The objectives of the Draft Leppington Town Centre Development Control Plan in relation to flood prone land are to:

- Mitigate flood risk in Leppington Town Centre.
- Maximise the development potential of land in Leppington Town Centre, and the productive use of land that is affected by flooding.
- Ensure that development (activity) does not create an increased risk of flooding or changes to flooding conditions.
- Ensure the coordinated and orderly development of land that manages stormwater flows and quality.

The flood-related development controls laid out in the Draft Leppington Town Centre Development Control

Plan include:

- No residential allotments are to be located at a level lower than the 1% Annual Exceedance Probability (AEP) flood level plus a freeboard of 500mm (i.e. within the 'flood planning area').

Note: Where development (activity) is proposed within or adjacent to land that is shown on the Flood Prone Land figure, 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.

- Roads are to be located above the 1% AEP flood level in the creek and are to be designed in accordance with specifications of Council in relation to management of stormwater flows and quality.

Note: This clause applies for all development (activity) in Leppington Town Centre. Council may require the applicant to demonstrate how development (activity) achieves appropriate road levels and management of stormwater flows and quality.

- Development (activity) must manage stormwater flows and quality by:
    a. Preventing damage by stormwater to the built and natural environment.
    b. Reducing nuisance flows to a level which is acceptable to the community.
    c. Providing a stormwater system which can be economically maintained, and which uses open space in a compatible manner.
    d. Controlling flooding.
    e. Minimising urban water run-off pollutants entering watercourses.

Note: Pedestrian and cycle pathways and open space may extend within the 1% AEP flood level, provided the safe criteria contained in the NSW Floodplain Manual are met.

The existing Council flood mapping for the Upper South Creek catchment show that the site is located outside the PMF flood extent (refer to Figure 6), hence the proposed activity will comply with the above development controls with the provision of appropriate site stormwater and drainage design.

4.3 Camden Council Flood Risk Management Policy (February 2023)

This Flood Risk Management Policy establishes flood risk management planning and development procedures for all mapped flood prone lands within the Camden Council LGA. In this Flood Risk Management Policy, Part 2 - Upper South Creek: Development Controls apply to the site. The type of development controls apply to development (activity) is dependent on the development (activity) land use category proposed and is derived from the Floodplain Development Control Matrix for Upper South Creek.

As the site is proposed for a new high school, it is categorised as a sensitive use or facility. According to this Flood Risk Management Policy, sensitive use or facility activity is not suitable on lands mapped within the high and medium flood risk zones as well as the overland flow FPA (i.e. only suitable on lands mapped within the low or no flood risk zones). The flood-related development controls apply to sensitive uses and facilities in the mapped low flood risk zone include:

- Floor Levels – FPL (Flood Planning Level) for sensitive uses is the PMF flood level with no freeboard.
- Building Components – All parts of a sensitive uses building are to be constructed of flood compatible materials below the level of the PMF.
- Structural Soundness – Applicant to demonstrate that the structure can withstand floodwater forces including debris and buoyancy up to the PMF. An engineer's report will be required.
- Flood Affectation – The flood impact of the development (activity) is to be considered having regard to:
    a) Loss of flood storage;
    b) Changes in flood levels, flows and velocities upstream, downstream and adjacent to the site;
    c) Cumulative impact of multiple development (activity) in the vicinity; and
    d) Negligible impact to flood hazard as a result of development (activity). A flood impact and risk assessment report is to be prepared based on flood modelling.

- Emergency Management – Appropriate methods of reaching safety from flood waters during the PMF are to be demonstrated for habitable buildings in accordance with the Local Flood Plan or SES flood emergency management plan for the area. An engineer's report will be required.

- Car Parking – Where basement car parking is proposed, the entry level is to be the 1% AEP plus freeboard. If the level of the PMF is higher than the proposed entry level, a FERP is to be provided to manage flood risk in the car park.

- Management and Design – Provision of adequate emergency response information and advice to residents, employees, attendants, guests and/or visitors. Applicant to demonstrate that storage is available for goods above the level of the PMF.

The existing Council flood mapping for the Upper South Creek catchment show that the site is located outside the PMF flood extent (refer to Figure 6), and it is not anticipated that significant cut will occur as part of the activity, therefore all building floor levels proposed for the site will be set above the PMF flood level. As the site is located outside the PMF flood extent and is located at the high point of the area, the activity is not expected to cause any flood impacts to the surrounding properties. As the access to the site will be cutoff by floodwater in severe flood events (i.e. with the closest road being cutoff at the intersection between Rickard Road and Ingleburn Road to the south), a Flood Emergency Response Plan (FERP) is recommended and required for the proposed activity, to provide flood emergency response guidance for the school users.

5.0 Conclusions

As a sensitive use or facility, the proposed activity (new high school development) at 128-134 Rickard Road, Leppington (the site), is subject to flood controls discussed in Section 4 of this report. This is because evacuation route for the site will be cutoff in the event of major flood events, even though the site is located outside any mainstream or overland flow flood extents of the area.

Flood assessment of Camden Council adopted flood mapping for the Upper South Creek catchment indicated that the site is located outside the PMF flood extent and is flood-immune in the PMF event. A desktop analysis of the site showed that the site is located at the high point with a crest present near the site's north-east corner, hence no external upstream catchment that will contribute stormwater runoff to the site (i.e. the entire site area is sloping away from the crest). Based on the above, a Flood Impact and Risk Assessment (FIRA) for the site is not warranted, as the proposed activity is unlikely to cause any flood impacts to the surrounding properties.

Nonetheless, it is recommended that all buildings proposed within the site be set at least 300mm above the surrounding surface levels to ensure that these buildings will have some freeboard to tolerate the unforeseen local flooding conditions (i.e. due to blockages, etc.). Further, appropriate site local stormwater and drainage design will still be required for the site to ensure that the site will not be affected by overland flow flooding and unforeseen local flooding conditions (i.e. due to blockages to local drainage system).

Nonetheless, a site-specific Flood Emergency Response Plan (FERP) will be required for the site as evacuation routes from/to the site will be cut off in severe flood events, to minimise the flood risks associated with the people present at the site during a flood event. TTW has been engaged to prepare a FERP for the site, at the time of writing this report. The completed FERP will be submitted to support a REF for the proposed new high school at 128-134 Rickard Road, Leppington.

Mitigation Measures and Recommendations

Mitigation Name	Aspect	Mitigation Measure	Reason for Mitigation Measure
Drainage Design	During Design Phase	Appropriate drainage provisions should be provided for the site.	To reduce local flooding risks for the site and ensure that all proposed buildings are flood-immune in the PMF event.
Building Finished Floor Level	During Design Phase	All buildings should be set higher than (i.e. preferably 300mm or higher) surrounding areas to allow floodwater to flow away from the buildings.	To ensure that all proposed buildings are flood-immune in the PMF event and safe for temporary sheltering.
FERP	During Design and prior to Operation Phase	A site specific FERP to be prepared (i.e. a draft site specific FERP, prepared by TTW has been submitted together with this report). A final site specific FERP to be prepared to incorporate the final design details of the activity and generally in accordance with the Draft FERP, prepared by TTW revision 3 and dated 13 January 2025.	To provide emergency response guidance in the event of a flood event and further reduce flood risks associated with the activity.

Prepared by
TAYLOR THOMSON WHITTING (NSW) PTY LTD

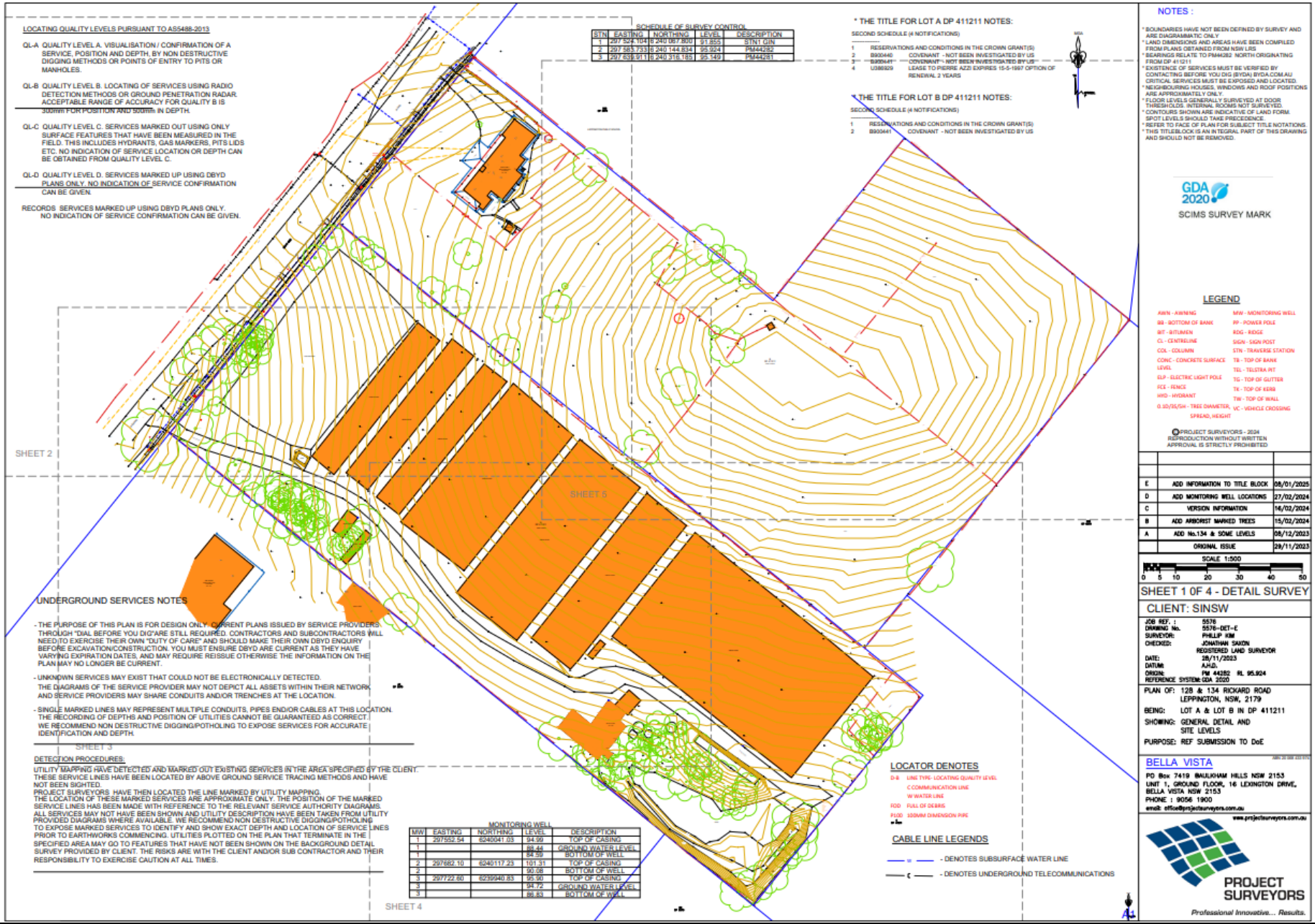
MICHAEL KOI
Associate - Flood

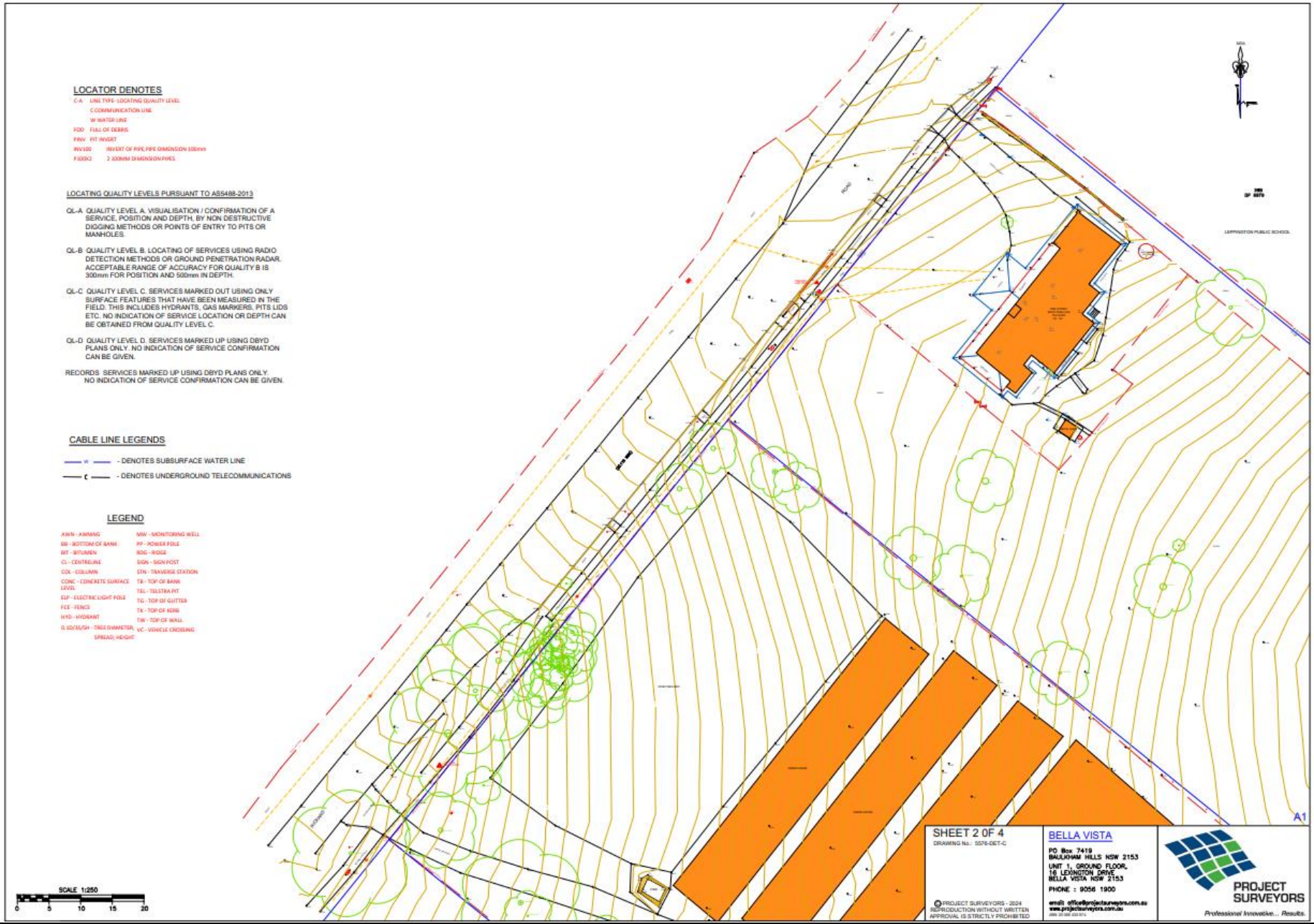
Reviewed and Authorised by
TAYLOR THOMSON WHITTING (NSW) PTY LTD

JAMIE MARSHALL
Associate - Flood

Appendix A

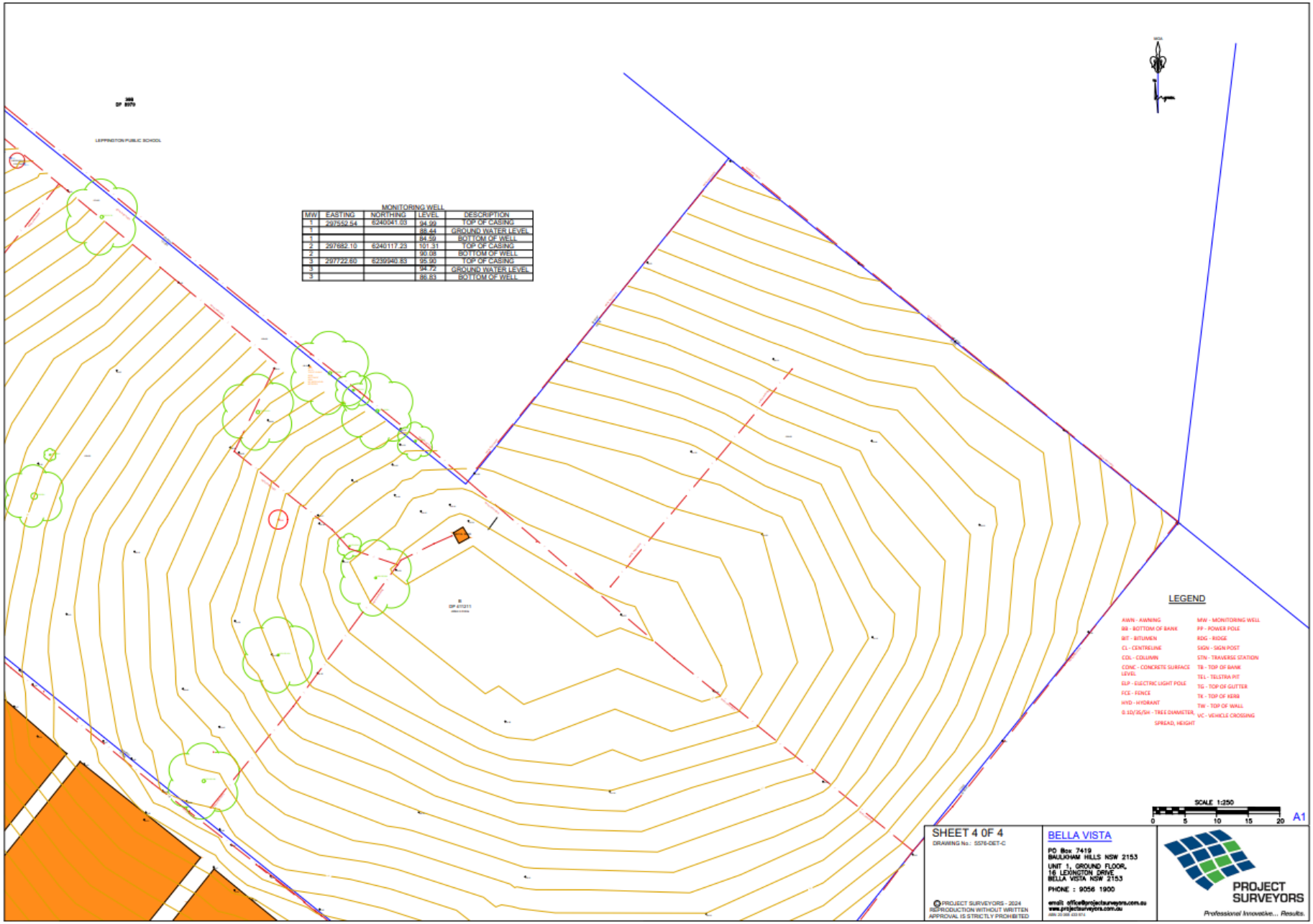
Site Survey


LOCATING QUALITY LEVELS PURSUANT TO AS5488-2013
QL-A QUALITY LEVEL A. VISUALISATION / CONFIRMATION OF A SERVICE, POSITION AND DEPTH, BY NON DESTRUCTIVE DIGGING METHODS OR POINTS OF ENTRY TO PITS OR MANHOLES.
QL-B QUALITY LEVEL B. LOCATING OF SERVICES USING RADIO DETECTION METHODS OR GROUND PENETRATION RADAR. ACCEPTABLE RANGE OF ACCURACY FOR QUALITY B IS 300mm FOR POSITION AND 500mm IN DEPTH.
QL-C QUALITY LEVEL C. SERVICES MARKED OUT USING ONLY SURFACE FEATURES THAT HAVE BEEN MEASURED IN THE FIELD. THIS INCLUDES HYDRANTS, GAS MARKERS, PITS LIDS ETC. NO INDICATION OF SERVICE LOCATION OR DEPTH CAN BE OBTAINED FROM QUALITY LEVEL C.
QL-D QUALITY LEVEL D. SERVICES MARKED UP USING DBYD PLANS ONLY. NO INDICATION OF SERVICE CONFIRMATION CAN BE GIVEN.
RECORDS SERVICES MARKED UP USING DBYD PLANS ONLY. NO INDICATION OF SERVICE CONFIRMATION CAN BE GIVEN.
SCHEDULE OF SURVEY CONTROL
STN EASTING NORTHING LEVEL DESCRIPTION
1 297 529.104 6 240 087.800 91.855 STN1 GIN
2 297 585.733 6 240 144.834 95.924 PM44282
3 297 639.911 6 240 316.185 95.149 PM44281
* THE TITLE FOR LOT A DP 411211 NOTES:
SECOND SCHEDULE (4 NOTIFICATIONS)
1 RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)
2 B930440 COVENANT - NOT BEEN INVESTIGATED BY US
3 B930441 COVENANT - NOT BEEN INVESTIGATED BY US
4 U386929 LEASE TO PIERRE AZZI EXPIRES 15-5-1997 OPTION OF RENEWAL 2 YEARS
* THE TITLE FOR LOT B DP 411211 NOTES:
SECOND SCHEDULE (4 NOTIFICATIONS)
1 RESERVATIONS AND CONDITIONS IN THE CROWN GRANT(S)
2 B930441 COVENANT - NOT BEEN INVESTIGATED BY US
NOTES :
* BOUNDARIES HAVE NOT BEEN DEFINED BY SURVEY AND ARE DIAGRAMMATIC ONLY
* LAND DIMENSIONS AND AREAS HAVE BEEN COMPILED FROM PLANS OBTAINED FROM NSW LRS
* BEARINGS RELATE TO PM44282 NORTH ORIGINATING FROM DP 411211
* EXISTENCE OF SERVICES MUST BE VERIFIED BY CONTACTING BEFORE YOU DIG (BYDA) BYDA.COM.AU CRITICAL SERVICES MUST BE EXPOSED AND LOCATED.
* NEIGHBOURING HOUSES, WINDOWS AND ROOF POSITIONS ARE APPROXIMATELY ONLY.
* FLOOR LEVELS GENERALLY SURVEYED AT DOOR THRESHOLDS. INTERNAL ROOMS NOT SURVEYED.
* CONTOURS SHOWN ARE INDICATIVE OF LAND FORM. SPOT LEVELS SHOULD TAKE PRECEDENCE.
* REFER TO FACE OF PLAN FOR SUBJECT TITLE NOTATIONS.
* THIS TITLEBLOCK IS AN INTEGRAL PART OF THIS DRAWING AND SHOULD NOT BE REMOVED.
GDA 2020
SCIMS SURVEY MARK
LEGEND
AWN - AWNING
BB - BOTTOM OF BANK
BIT - BITUMEN
CL - CENTRELINE
COL - COLUMN
CONC - CONCRETE SURFACE LEVEL
ELP - ELECTRIC LIGHT POLE
FCE - FENCE
HYD - HYDRANT
0.SD/SS/SH - TREE DIAMETER, SPREAD, HEIGHT
MW - MONITORING WELL
PP - POWER POLE
RDG - RIDGE
SIGN - SIGN POST
STN - TRAVERSE STATION
TB - TOP OF BANK
TEL - TELSTRA PIT
TG - TOP OF GUTTER
TK - TOP OF KERB
TW - TOP OF WALL
VC - VEHICLE CROSSING
© PROJECT SURVEYORS - 2024 REPRODUCTION WITHOUT WRITTEN APPROVAL IS STRICTLY PROHIBITED
E ADD INFORMATION TO TITLE BLOCK 08/01/2025
D ADD MONITORING WELL LOCATIONS 27/02/2024
C VERSION INFORMATION 16/02/2024
B ADD ARBORIST MARKED TREES 15/02/2024
A ADD No.134 & SOME LEVELS 08/12/2023
ORIGINAL ISSUE 29/11/2023
SCALE 1:500
0 5 10 20 30 40 50
SHEET 1 0F 4 - DETAIL SURVEY
CLIENT: SINSW
JOB REF. : 5576
DRAWING No. 5576-DET-E
SURVEYOR: PHILLIP KIM
CHECKED: JONATHAN SAXON REGISTERED LAND SURVEYOR
DATE: 29/11/2023
DATUM: A.H.D.
ORIGIN: PM 44282 RL 95.924
REFERENCE SYSTEM: GDA 2020
PLAN OF: 128 & 134 RICKARD ROAD LEPPINGTON, NSW, 2179
BEING: LOT A & LOT B IN DP 411211
SHOWING: GENERAL DETAIL AND SITE LEVELS
PURPOSE: REF SUBMISSION TO DoE
BELLA VISTA
PO Box 7419 BAULKHAM HILLS NSW 2153
UNIT 1, GROUND FLOOR, 16 LEXINGTON DRIVE, BELLA VISTA NSW 2153
PHONE : 9056 1900
email: office@projectsurveyors.com.au
www.projectsurveyors.com.au
PROJECT SURVEYORS
Professional Innovative... Results.
SHEET 2
SHEET 5
SHEET 3
SHEET 4
UNDERGROUND SERVICES NOTES
- THE PURPOSE OF THIS PLAN IS FOR DESIGN ONLY. CURRENT PLANS ISSUED BY SERVICE PROVIDERS THROUGH "DIAL BEFORE YOU DIG"ARE STILL REQUIRED. CONTRACTORS AND SUBCONTRACTORS WILL NEED TO EXERCISE THEIR OWN "DUTY OF CARE" AND SHOULD MAKE THEIR OWN DBYD ENQUIRY BEFORE EXCAVATION/CONSTRUCTION. YOU MUST ENSURE DBYD ARE CURRENT AS THEY HAVE VARYING EXPIRATION DATES, AND MAY REQUIRE REISSUE OTHERWISE THE INFORMATION ON THE PLAN MAY NO LONGER BE CURRENT.
- UNKNOWN SERVICES MAY EXIST THAT COULD NOT BE ELECTRONICALLY DETECTED. THE DIAGRAMS OF THE SERVICE PROVIDER MAY NOT DEPICT ALL ASSETS WITHIN THEIR NETWORK AND SERVICE PROVIDERS MAY SHARE CONDUITS AND/OR TRENCHES AT THE LOCATION.
- SINGLE MARKED LINES MAY REPRESENT MULTIPLE CONDUITS, PIPES AND/OR CABLES AT THIS LOCATION. THE RECORDING OF DEPTHS AND POSITION OF UTILITIES CANNOT BE GUARANTEED AS CORRECT. WE RECOMMEND NON DESTRUCTIVE DIGGING/POTHOLING TO EXPOSE SERVICES FOR ACCURATE IDENTIFICATION AND DEPTH.
DETECTION PROCEDURES:
UTILITY MAPPING HAVE DETECTED AND MARKED OUT EXISTING SERVICES IN THE AREA SPECIFIED BY THE CLIENT. THESE SERVICE LINES HAVE BEEN LOCATED BY ABOVE GROUND SERVICE TRACING METHODS AND HAVE NOT BEEN SIGHTED.
PROJECT SURVEYORS HAVE THEN LOCATED THE LINE MARKED BY UTILITY MAPPING. THE LOCATION OF THESE MARKED SERVICES ARE APPROXIMATE ONLY. THE POSITION OF THE MARKED SERVICE LINES HAS BEEN MADE WITH REFERENCE TO THE RELEVANT SERVICE AUTHORITY DIAGRAMS. ALL SERVICES MAY NOT HAVE BEEN SHOWN AND UTILITY DESCRIPTION HAVE BEEN TAKEN FROM UTILITY PROVIDED DIAGRAMS WHERE AVAILABLE. WE RECOMMEND NON DESTRUCTIVE DIGGING/POTHOLING TO EXPOSE MARKED SERVICES TO IDENTIFY AND SHOW EXACT DEPTH AND LOCATION OF SERVICE LINES PRIOR TO EARTHWORKS COMMENCING. UTILITIES PLOTTED ON THE PLAN THAT TERMINATE IN THE SPECIFIED AREA MAY GO TO FEATURES THAT HAVE NOT BEEN SHOWN ON THE BACKGROUND DETAIL SURVEY PROVIDED BY CLIENT. THE RISKS ARE WITH THE CLIENT AND/OR SUB CONTRACTOR AND THEIR RESPONSIBILITY TO EXERCISE CAUTION AT ALL TIMES.
MONITORING WELL
MW EASTING NORTHING LEVEL DESCRIPTION
1 297552.54 6240041.03 94.99 TOP OF CASING
1 89.44 GROUND WATER LEVEL
1 84.59 BOTTOM OF WELL
2 297682.10 6240117.23 101.33 TOP OF CASING
2 90.08 BOTTOM OF WELL
3 297722.60 6239940.83 95.90 TOP OF CASING
3 94.72 GROUND WATER LEVEL
3 89.83 BOTTOM OF WELL
LOCATOR DENOTES
D-B LINE TYPE- LOCATING QUALITY LEVEL
C COMMUNICATION LINE
W WATER LINE
FOD FULL OF DEBRIS
P100 100MM DIMENSION PIPE
CABLE LINE LEGENDS
- DENOTES SUBSURFACE WATER LINE
- DENOTES UNDERGROUND TELECOMMUNICATIONS


LOCATOR DENOTES
C-A LINE TYPE- LOCATING QUALITY LEVEL
C COMMUNICATION LINE
W WATER LINE
FOD FULL OF DEBRIS
FINV PIT INVERT
INV100 INVERT OF PIPE/PIPE DIMENSION 100mm
F300X3 3 300MM DIAMENSION PIPES
LOCATING QUALITY LEVELS PURSUANT TO AS5488-2013
QL-A QUALITY LEVEL A. VISUALISATION / CONFIRMATION OF A SERVICE, POSITION AND DEPTH, BY NON DESTRUCTIVE DIGGING METHODS OR POINTS OF ENTRY TO PITS OR MANHOLES.
QL-B QUALITY LEVEL B. LOCATING OF SERVICES USING RADIO DETECTION METHODS OR GROUND PENETRATION RADAR. ACCEPTABLE RANGE OF ACCURACY FOR QUALITY B IS 300mm FOR POSITION AND 500mm IN DEPTH.
QL-C QUALITY LEVEL C. SERVICES MARKED OUT USING ONLY SURFACE FEATURES THAT HAVE BEEN MEASURED IN THE FIELD. THIS INCLUDES HYDRANTS, GAS MARKERS, PITS LIDS ETC. NO INDICATION OF SERVICE LOCATION OR DEPTH CAN BE OBTAINED FROM QUALITY LEVEL C.
QL-D QUALITY LEVEL D. SERVICES MARKED UP USING DBYD PLANS ONLY. NO INDICATION OF SERVICE CONFIRMATION CAN BE GIVEN.
RECORDS SERVICES MARKED UP USING DBYD PLANS ONLY. NO INDICATION OF SERVICE CONFIRMATION CAN BE GIVEN.
CABLE LINE LEGENDS
- DENOTES SUBSURFACE WATER LINE
- DENOTES UNDERGROUND TELECOMMUNICATIONS
LEGEND
AWN - AWNING
BB - BOTTOM OF BANK
BIT - BITUMEN
CL - CENTRELINE
COL - COLUMN
CONC - CONCRETE SURFACE LEVEL
ELP - ELECTRIC LIGHT POLE
FCE - FENCE
HYD - HYDRANT
D, SD/DS/SH - TREE DIAMETER, SPREAD, HEIGHT
MW - MONITORING WELL
PP - POWER POLE
RDG - RIDGE
SIGN - SIGN POST
STN - TRAVERSE STATION
TB - TOP OF BANK
TEL - TELSTRA PIT
TG - TOP OF GUTTER
TK - TOP OF KERB
TW - TOP OF WALL
VC - VEHICLE CROSSING
SCALE 1:250
0 5 10 15 20
A1
SHEET 2 OF 4
DRAWING No.: 5576-DET-C
BELLA VISTA
PO Box 7419
BAULKHAM HILLS NSW 2153
UNIT 1, GROUND FLOOR,
16 LEXINGTON DRIVE
BELLA VISTA NSW 2153
PHONE : 9056 1900
PROJECT SURVEYORS
Professional Innovative... Results.


LOCATOR DENOTES
C-A LINE TYPE- LOCATING QUALITY LEVEL
C COMMUNICATION LINE
W WATER LINE
FOD FULL OF DEBRIS
PINV PIT INVERT
INV100 INVERT OF PIPE,PIPE DIMENSION 100mm
P300X2 2 300MM DIMENSION PIPES
LOCATING QUALITY LEVELS PURSUANT TO AS5488-2013
QL-A QUALITY LEVEL A. VISUALISATION / CONFIRMATION OF A SERVICE, POSITION AND DEPTH, BY NON DESTRUCTIVE DIGGING METHODS OR POINTS OF ENTRY TO PITS OR MANHOLES.
QL-B QUALITY LEVEL B. LOCATING OF SERVICES USING RADIO DETECTION METHODS OR GROUND PENETRATION RADAR. ACCEPTABLE RANGE OF ACCURACY FOR QUALITY B IS 300mm FOR POSITION AND 500mm IN DEPTH.
QL-C QUALITY LEVEL C. SERVICES MARKED OUT USING ONLY SURFACE FEATURES THAT HAVE BEEN MEASURED IN THE FIELD. THIS INCLUDES HYDRANTS, GAS MARKERS, PITS LIDS ETC. NO INDICATION OF SERVICE LOCATION OR DEPTH CAN BE OBTAINED FROM QUALITY LEVEL C.
QL-D QUALITY LEVEL D. SERVICES MARKED UP USING DBYD PLANS ONLY. NO INDICATION OF SERVICE CONFIRMATION CAN BE GIVEN.
RECORDS SERVICES MARKED UP USING DBYD PLANS ONLY. NO INDICATION OF SERVICE CONFIRMATION CAN BE GIVEN.
CABLE LINE LEGENDS
- W - - DENOTES SUBSURFACE WATER LINE
- C - - DENOTES UNDERGROUND TELECOMMUNICATIONS
MONITORING WELL
MW EASTING NORTHING LEVEL DESCRIPTION
1 297524.54 6240041.03 94.99 TOP OF CASING
1 86.44 GROUND WATER LEVEL
1 84.59 BOTTOM OF WELL
2 297682.10 6240117.23 101.31 TOP OF CASING
2 90.08 BOTTOM OF WELL
3 297722.60 6239940.83 95.90 TOP OF CASING
3 94.72 GROUND WATER LEVEL
3 86.83 BOTTOM OF WELL
LEGEND
AWN - AWNING
BB - BOTTOM OF BANK
BIT - BITUMEN
CL - CENTRELINE
COL - COLUMN
CONC - CONCRETE SURFACE LEVEL
ELP - ELECTRIC LIGHT POLE
FCE - FENCE
HYD - HYDRANT
0.10/35/5H - TREE DIAMETER, SPREAD, HEIGHT
MW - MONITORING WELL
PP - POWER POLE
RDG - RIDGE
SIGN - SIGN POST
STN - TRAVERSE STATION
TB - TOP OF BANK
TEL - TELSTRA PIT
TG - TOP OF GUTTER
TK - TOP OF KERB
TW - TOP OF WALL
VC - VEHICLE CROSSING
SCALE 1:250
0 5 10 15 20
SHEET 3 OF 4
DRAWING No.: 5576-DET-C
A1
BELLA VISTA
PO Box 7419
BAULKHAM HILLS NSW 2153
UNIT 1, GROUND FLOOR,
16 LEXINGTON DRIVE
BELLA VISTA NSW 2153
PHONE : 9056 1900
PROJECT SURVEYORS
Professional Innovative... Results.


MONITORING WELL
MW | EASTING | NORTHING | LEVEL | DESCRIPTION
1 | 297552.54 | 6240041.03 | 94.99 | TOP OF CASING
1 | | | 88.44 | GROUND WATER LEVEL
1 | | | 84.59 | BOTTOM OF WELL
2 | 297882.10 | 6240117.23 | 101.31 | TOP OF CASING
2 | | | 90.08 | BOTTOM OF WELL
3 | 297727.80 | 6239940.83 | 95.90 | TOP OF CASING
3 | | | 94.72 | GROUND WATER LEVEL
3 | | | 86.83 | BOTTOM OF WELL
LEGEND
AWN - AWNING
MW - MONITORING WELL
BB - BOTTOM OF BANK
PP - POWER POLE
BIT - BITUMEN
RDG - RIDGE
CL - CENTRELINE
SIGN - SIGN POST
COL - COLUMN
STN - TRAVERSE STATION
CONC - CONCRETE SURFACE LEVEL
TB - TOP OF BANK
TEL - TELSTRA PIT
ELP - ELECTRIC LIGHT POLE
TG - TOP OF GUTTER
FCE - FENCE
TK - TOP OF KERB
HYD - HYDRANT
TW - TOP OF WALL
D,SD/SS/GH - TREE DIAMETER, SPREAD, HEIGHT
VC - VEHICLE CROSSING
SCALE 1:250
0 5 10 15 20
A1
SHEET 4 OF 4
DRAWING No.: 5576-DET-C
BELLA VISTA
PO Box 7419
BAULKHAM HILLS NSW 2153
UNIT 1, GROUND FLOOR,
18 LEXINGTON DRIVE
BELLA VISTA NSW 2153
PHONE : 9056 1900
PROJECT SURVEYORS
Professional Innovative... Results.


LEPPINGTON PUBLIC SCHOOL
MONITORING WELL
MW | EASTING | NORTHING | LEVEL | DESCRIPTION
1 | 297552.54 | 6240041.03 | 94.99 | TOP OF CASING
1 | | | 88.44 | GROUND WATER LEVEL
1 | | | 84.59 | BOTTOM OF WELL
2 | 297682.10 | 6240117.23 | 101.31 | TOP OF CASING
2 | | | 90.08 | BOTTOM OF WELL
3 | 297722.60 | 6239940.83 | 95.99 | TOP OF CASING
3 | | | 94.72 | GROUND WATER LEVEL
3 | | | 86.83 | BOTTOM OF WELL
LEGEND
AWN - AWNING
BB - BOTTOM OF BANK
BIT - BITUMEN
CL - CENTRELINE
COL - COLUMN
CONC - CONCRETE SURFACE LEVEL
ELP - ELECTRIC LIGHT POLE
FCE - FENCE
HYD - HYDRANT
Ø SD/SS/SH - TREE DIAMETER, SPREAD, HEIGHT
MW - MONITORING WELL
PP - POWER POLE
RDG - RIDGE
SIGN - SIGN POST
STN - TRAVERSE STATION
TB - TOP OF BANK
TEL - TELSTRA PIT
TG - TOP OF GUTTER
TK - TOP OF KERB
TW - TOP OF WALL
VC - VEHICLE CROSSING
SCALE 1:250
0 5 10 15 20
A1
SHEET 4 0F 4
DRAWING No.: SS76-DET-C
© PROJECT SURVEYORS - 2024
REPRODUCTION WITHOUT WRITTEN APPROVAL IS STRICTLY PROHIBITED
BELLA VISTA
PO Box 7419
BAULKHAM HILLS NSW 2153
UNIT 1, GROUND FLOOR,
16 LEXINGTON DRIVE,
BELLA VISTA NSW 2153
PHONE : 9056 1900
email: office@projectsurveyors.com.au
www.projectsurveyors.com.au
PROJECT SURVEYORS
Professional Innovative... Results.

Draft Flood Emergency Response Plan

New High School for Leppington and Denham Court

Prepared for NSW Department of Education / 31 January 2025

232024

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

Your Partner in Engineering

Contents

Rev	Date	Prepared By	Approved By	Remarks
1	12/11/2024	MK	JM	
2	18/11/2024	MK	JM	Final
3	13/01/2025	MK	JM	Final
4	31/01/2025	MK	JM	Final

1.0 Introduction

This Flood Emergency Response Plan (FERP) has been prepared by TTW (NSW) Pty Ltd on behalf of the NSW Department of Education (the proponent) to support a Review of Environmental Factors (REF) for the new high school for Leppington and Denham Court (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.

The proposed activity is for construction of a new high school located at 128-134 Rickard Road, Leppington, NSW, 2179 (the site).

While the Flood Statement report prepared by TTW (i.e. submitted together with this FERP) confirmed that the site is not located within the PMF (Probable Maximum Flood event) extent, the surrounding road network is notably impacted, especially in severe flood events. Therefore, a response plan is required to address the management of site users during these flood events. This FERP has been prepared to summarise the flood risks associated with the site, identify preparation measures that should be undertaken to mitigate such risks, and provide an action plan with steps to be completed during a flood event.

1.1 Site Description

The site is known as 128-134 Rickard Road, Leppington, NSW, 2179 and is legally described as Lot A and B in Deposited Plan 411211. The site is located on the eastern side of Rickard Road and is approximately 4.1ha in area. The site is located immediately south of the existing Leppington Public School at 144 Rickard Road and is approximately 700m south of Leppington Train Station.

Figure 1 shows the aerial image and approximate extent of the site.

Figure 1 - Site location and surrounding area (Source: Nearmap, dated March 2024).

The northern portion of the site is currently used for residential purposes. The southern portion of the site is used for agricultural purposes, with multiple greenhouses and an existing pond on the property.

1.2 Reference Documents

The FERP has been prepared with reference to the following:

- Australian Institute of Disaster Resilience (AIDR) Guideline 7-3: Flood Hazard (2017);
- FloodSafe guidelines and the relative FloodSafe Tool Kits;
- NSW Department of Planning and Environment (2023) Draft Shelter-in-place Guideline – Preamble (https://pp.planningportal.nsw.gov.au/draftplans/under-consideration/shelter-place-guideline);
- NSW Department of Planning and Environment (2023) Flood Risk Management Manual https://www.environment.nsw.gov.au/topics/water/floodplains/floodplain-manual;
- NSW Department of Planning and Environment (2023) Support for Emergency Management Planning – Flood Risk Management Guideline EM01;
- NSW Department of Planning, Housing and Infrastructure – Planning Circular PS 24-001, Update on addressing flood risk in planning decisions, 1st March 2024;
- NSW State Emergency Service (SES) Guidelines;
- Camden Growth Centre Precincts Development Control Plan (CGCPDCP), 2023;
- Leppington Town Centre Development Control Plan, 2023 (draft version);
- Camden Development Control Plan (DCP), 2019;
- Camden Council Flood Risk Management Policy, 2023;
- Camden Council Review of Upper South Creek Flood Study in the Context of Ongoing Development Report, 2022 (prepared by WMAwater);
- Liverpool City Council Online Flood Map Portal https://eplanning.liverpool.nsw.gov.au/Pages/lcc.maps/maps.aspx?context=LCC_OnlineMaps_OpenFloodRisk;
- Camden Local Environmental Plan (LEP) 2010; and
- TTW (2024) Flood Statement Report – New High School for Leppington and Denham Court, dated 18 November 2024.

1.3 Proposed Activity Description

The proposed activity is for a new high school for Leppington and Denham Court. The new high school will accommodate up to 1,000 students across 3 new buildings that will comprise 48 permanent teaching spaces (PTS), 3 support teaching spaces (STS), 19 specialist labs/workshops/kitchens and a hall. Buildings 1, 2 and 3 will be clustered along the southern boundary and the hall will be located in south-east corner of the site. The activity also includes the construction of a sports field in the centre of the site and 3 x multipurpose courts along the northern boundary. The proposed scope of works is illustrated in Figure 2 below.

Figure 2 – Layout Plan of New High School for Leppington and Denham Court (Source: DJRD Architects)

2.0 Flood Behaviour

2.1 Available Flood Information

Located at the crest that contributes to both the Scalabrini Creek (a majority of site falls this way to the west) and the Bonds Creek (on the east), the site is safely elevated above the floodplains of both creeks, and as a consequence, is not situated within the Camden Council adopted Flood Prone Land area. This is confirmed by the latest catchment wide flood study completed for the Upper South Creek catchment by WMAwater, "*Review of Upper South Creek Flood Study in the Context of Ongoing Development*" in 2022 (referred herein as "2022 Review Study"). It is worth noting that both Scalabrini Creek and Bonds Creek are tributaries of the Upper South Creek. Results of the 2022 Review Study have been endorsed by Camden Council and incorporated into its planning provision related to flooding for the catchment area.

Based on the 2022 Review Study, the site is located outside the Camden Council adopted Mainstream and Overland Flood Planning Area (FPA) zones and is not affected by flooding for all design Annual Exceedance Probability (AEP) events, up to and including the Probable Maximum Flood (PMF) event. Further, the site is also not mapped within any flood risk precincts.

Figure 3 shows the FPA zone (i.e. both mainstream and overland flow FPAs) adopted by Camden Council for the site and its surrounding area. Figure 4 and Figure 5 show the flood hazards estimated for the 1% AEP and PMF events, respectively. Figure 6 shows the flood risk precincts derived from the 2022 Review Study for the site area, and Figure 7 shows the Camden Council adopted Flood Prone Land zone for the Leppington Town Centre area.

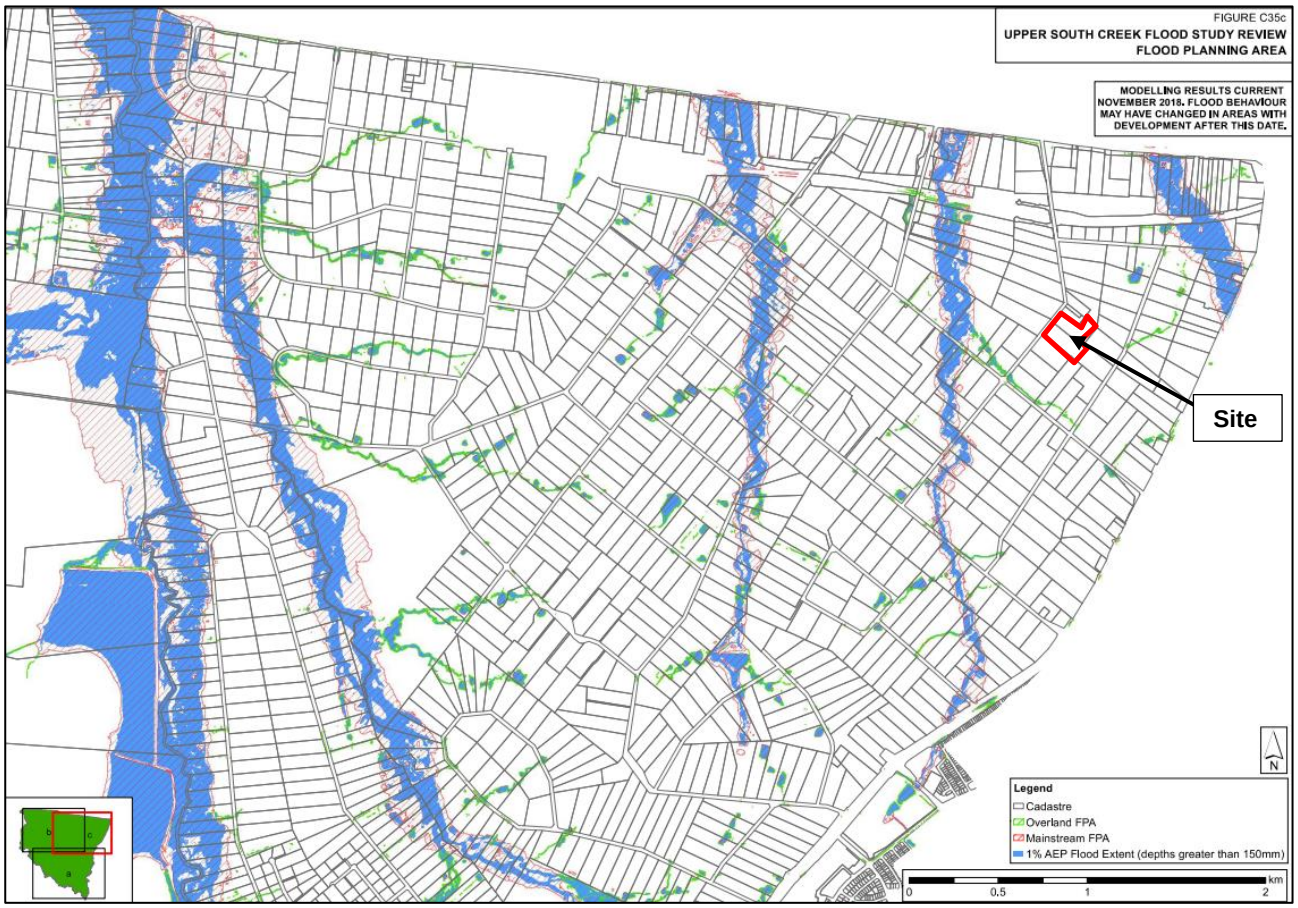


Figure 3 - Upper South Creek Flood Study Review – Flood Planning Area (Source: WMAwater 2022 Review Study)

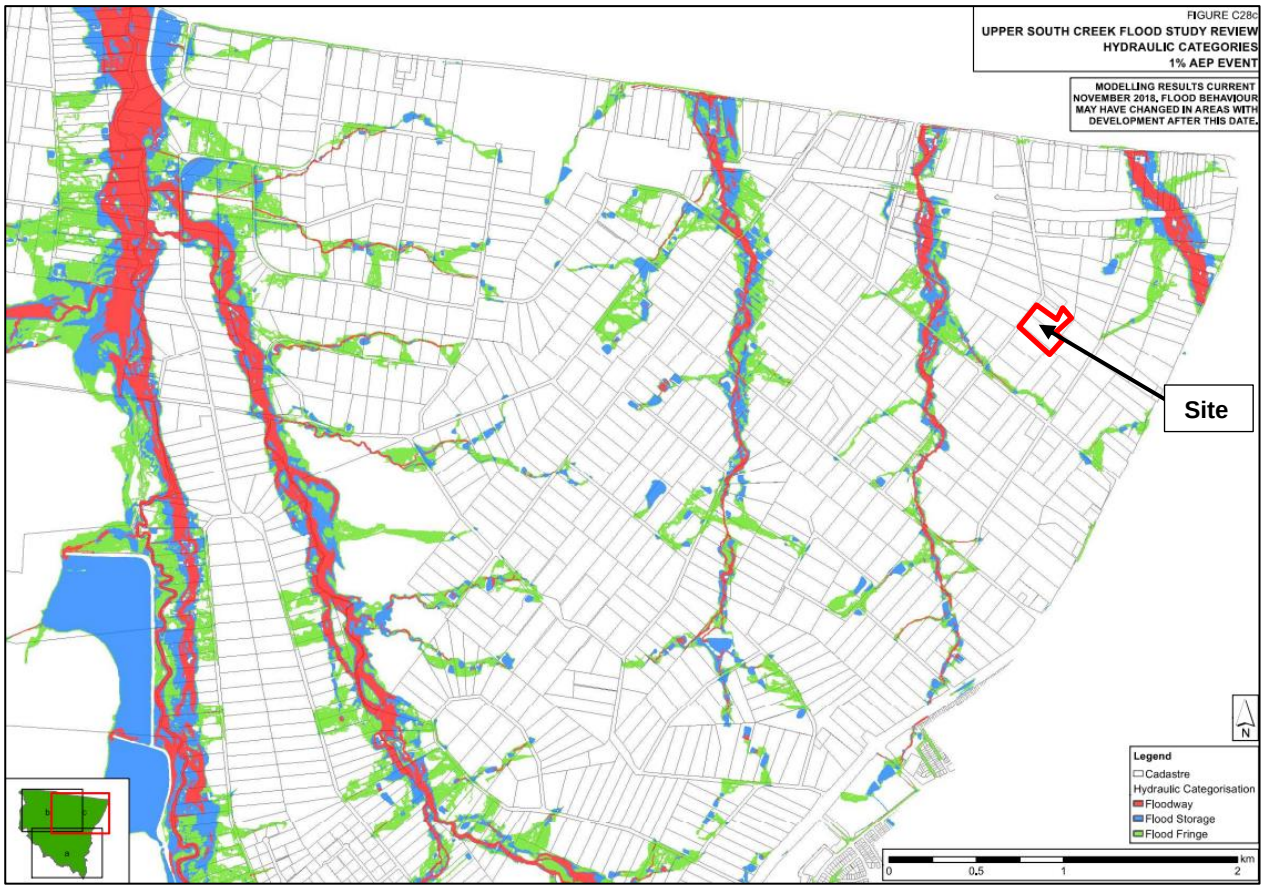


Figure 4 - 1% AEP Flood Hazard Mapping (Source: Source: WMAwater 2022 Review Study)

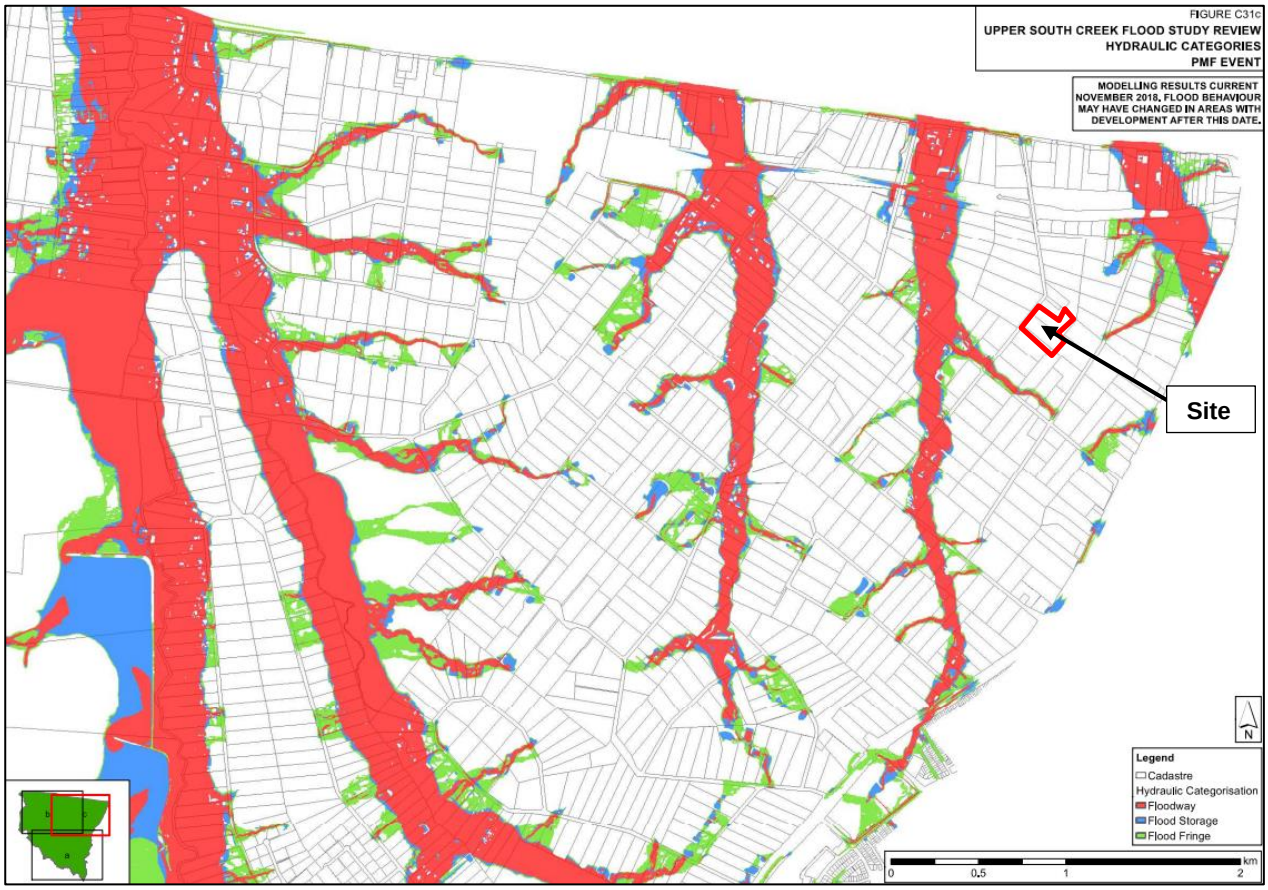


Figure 5 - PMF Flood Hazard Mapping (Source: Source: WMAwater 2022 Review Study)

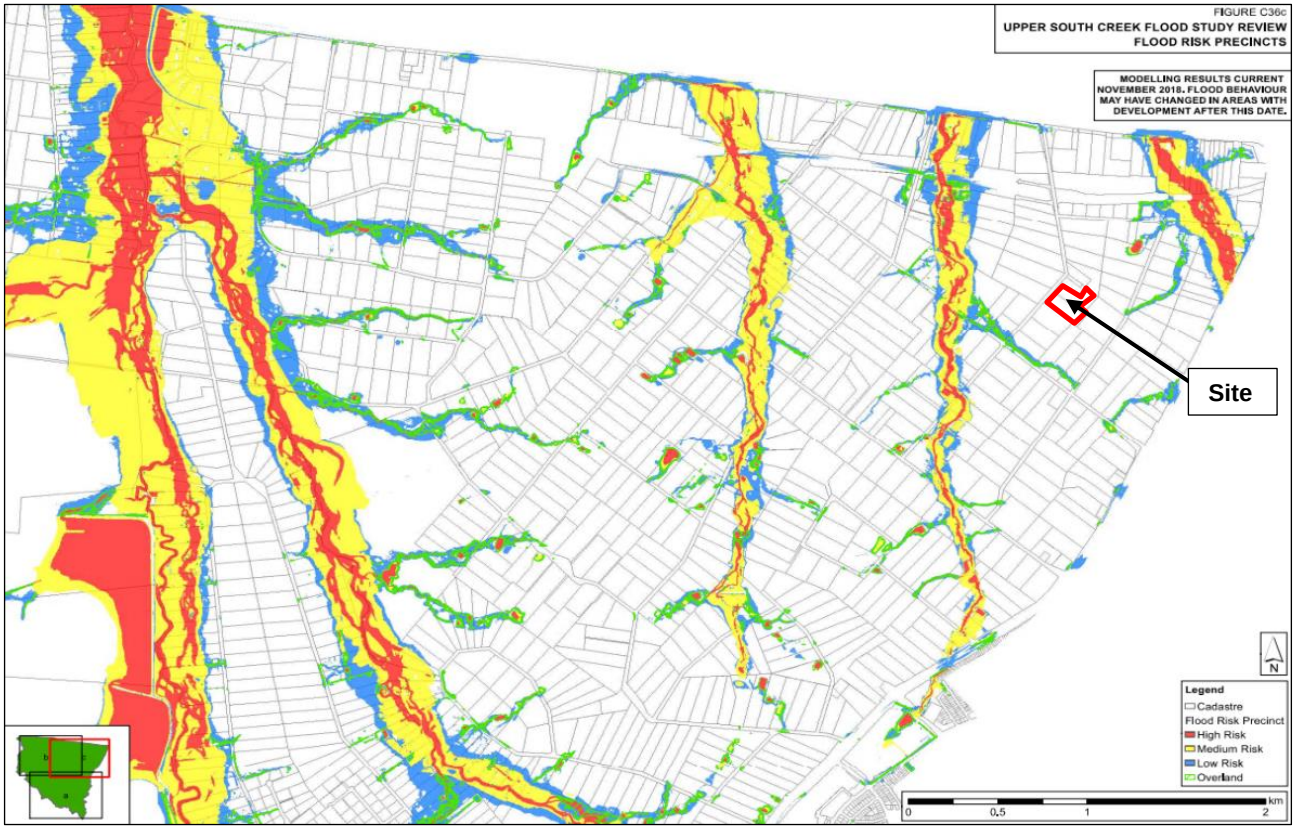


Figure 6 - Upper South Creek Flood Study Review – Flood Risk Precincts (Source: WMAwater 2022 Review Study)

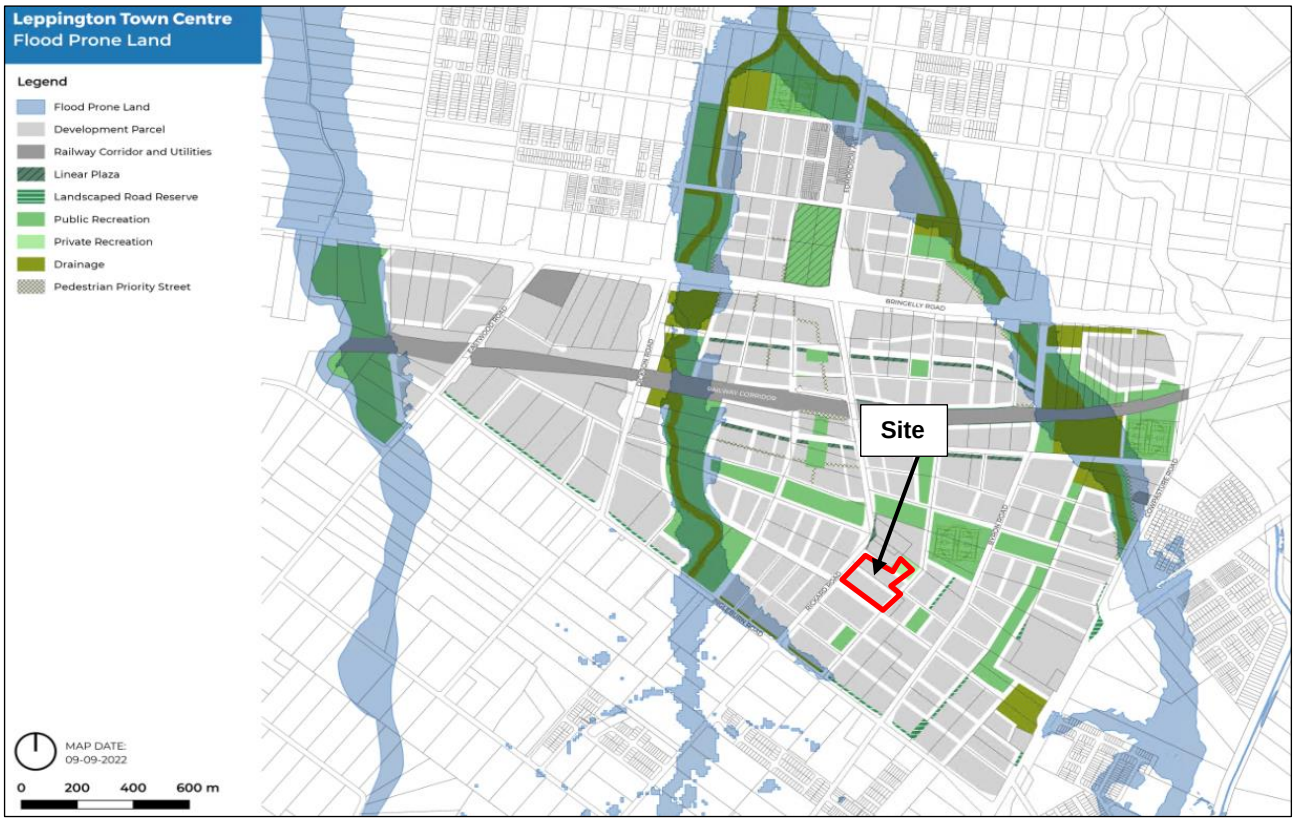


Figure 7 - Camden Council Flood Prone Land – Leppington Town Centre (Source: Source: Camden Council 2023 Leppington Town Centre DCP)

Although the site is estimated to be flood free and not subject to any flooding in the PMF event, the 2022 Review Study indicates that the surrounding road network that provides access to the site are impacted by flooding. In particular, the following surrounding roads are estimated to be impacted by flooding by the 2022 Review Study.

- Rickard Road – a section of this road near the intersection with Ingleburn Road (i.e. north of intersection) is estimated to be inundated by floodwater for events more frequent than the 5% AEP event. However, the 2022 Review Study shows that the flood hazards estimated on this inundated section of road will remain low at H1 up to and including the 0.2% AEP event. Hence, is considered to be safe for traffic in the 0.2% AEP event. Nonetheless, this section of road will be completely cut off and considered not safe for traffic in the PMF event where flood hazards of H4 and H5 are estimated. It is worth noting t that flooding on this section of road is mainly due to overland flow, hence onset time and inundation time are expected to be short.

- Ingleburn Road - a section of this road near the intersection with Mallow Avenue (i.e. south-east of site) is estimated to be inundated by floodwater for event more frequent than the 5% AEP event. However, the 2022 Review Study shows that the flood hazards estimated on this inundated section of road will remain low at H1 up to and including the 0.2% AEP event. Hence, is considered to be safe for traffic in the 0.2% AEP event. Nonetheless, this section of road will be completely cut off and considered not safe for traffic in the PMF event where flood hazards of H3 and H4 are estimated. It is worth noting though that flooding on this section of road is mainly due to overland flow, hence onset time and inundation time are expected to be short.

- Bringelly Road (at Bonds Creek) – this road crossing is estimated to be flood free in the 0.2% AEP event but will be inundated in the PMF event and is considered not safe for traffic.

- Bringelly Road (at Scalabrini Creek) – this road crossing is estimated to be flood free in the 0.2% AEP event but will be inundated in the PMF event and is considered not safe for traffic.

- Bringelly Road (at Kemps Creek) – this road crossing is estimated to be flood free in the 0.2% AEP event but will be inundated in the PMF event and is considered not safe for traffic.

- Bringelly Road (at South Creek) – this road crossing is estimated to be flood free in the 1% AEP event but will be inundated in the 0.5% AEP event and is considered not safe for traffic only in events more severe than the 0.5% AEP event.

- Cowpasture Road (at Bonds Creek) – this road crossing is estimated to be flood free in the 20% AEP event but will remain safe for traffic in the 2% AEP event (i.e. flood depth at approximately 230mm). This section of road is not considered to be safe for traffic events more severe than the 2% AEP.

- Camden Valley Way (at Bonds Creek in Liverpool City Council LGA) – based on Liverpool City Council's online flood mapping information, this crossing will be inundated in the 1% AEP event and part of the bridge approaches are within the 1% AEP floodway. Hence, making this section of road not safe for traffic in the 1% AEP event.

- Camden Valley Way – a section of this road near Parade Road (i.e. south-east of site) is estimated to be inundated by floodwater for event more frequent than the 5% AEP event. However, the 2022 Review Study shows that the flood hazards estimated on this inundated section of road will remain low at H1 up to and including the 0.2% AEP event. Hence, is considered to be safe for traffic in the 0.2% AEP event. Nonetheless, this section of road will be completely cut off and considered not safe for traffic in the PMF event where flood hazards of H3 and H4 are estimated. It is worth noting though that flooding on this section of road is mainly due to overland flow, hence onset time and inundation time are expected to be short.

- Camden Valley Way – a section of this road near the intersection with St Andrews Road (i.e. north-east of intersection) is estimated to be flood free in the 1% AEP event. However, the 2022 Review Study shows that this section of road will be inundated by floodwater in the 0.2% AEP event where this section of road is estimated to experience flood hazards as high as H3. Hence, it is considered not safe for traffic in the 0.2% AEP event. It is worth noting though that flooding on this section of road

is mainly due to flows from small upstream catchment, hence onset time and inundation time are expected to be not long.

- Camden Valley Way (at Rileys Creek) – this road crossing is estimated to be flood free in the 0.2% AEP event but will be inundated in the PMF event and is considered not safe for traffic.

- Camden Valley Way (at South Creek) – this road crossing is estimated to be flood free in the 0.2% AEP event but will be inundated in the PMF event and is considered not safe for traffic.

- Edmondson Avenue (at Bonds Creek, north of intersection with Sixth Avenue in Liverpool City Council LGA) – based on Liverpool City Council's online flood mapping information, this crossing will be inundated in the 1% AEP event and significant portion of the flood affected areas are within the 1% AEP floodway. Hence, making this section of road not safe for traffic in the 1% AEP event.

Review of the available information (at the time of preparing this FERP) for the site indicates that there is a flood-free access route from the site to the north of Rickard Road onto Bringelly Road and then onto Camden Valley Way to the east, in all events, up to, and including the 1% AEP event. However, the route will likely be cutoff on Camden Valley Way at the Cabramatta Creek crossing as the available Liverpool City Council's flood mapping shows that this crossing is impacted by floodwater in events more frequent than the 1% AEP. Though not flood free, there is a trafficable route (i.e. with flood hazard of H1) from Rickard Road to the south onto Ingleburn Road, then to the east onto Camden Valley Way, and commencing south on this road, in the 1% AEP event.

Although TTW have requested the Camden Council TUFLOW model from the 2022 Review Study in order to confirm depths, onset time and time of inundation data over these roads, these files have not yet been received and as such this FERP has been completed on data available at the time of writing. It will be updated as more information is available as the FERP is updated on a regular basis.

Flood Hazards

The flood hazard assessment adopted in the 2022 Review Study was conducted using the flood hazard vulnerability curves set out in 'Handbook 7 – Managing the Floodplain: A Guide to Best Practice in Flood Risk Management in Australia' of the Australian Disaster Resilience Handbook Collection (2017). These curves assess the vulnerability of people, vehicles and buildings to flooding based on the velocity and depth of flood flows. The flood hazard categories are outlined in Figure 8, 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). Figure 4 and Figure 5 show the flood hazards estimated for the 1% AEP and PMF events, respectively.

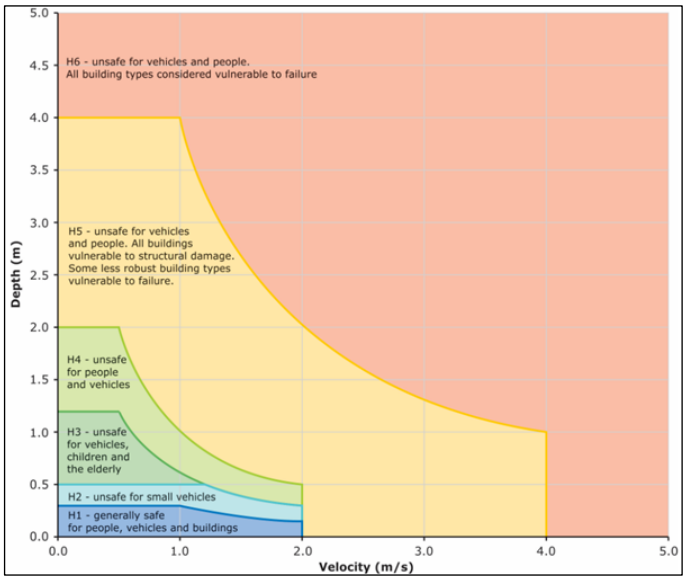


Figure 8 - Flood hazard vulnerability curve (Source: Flood Risk Management Guide FB03 - Flood Hazard, NSW Department of Planning and Environment, 2022)

2.2 Inundation and Recession Times

The Office of Environment and Heritage, in conjunction with the State Emergency Service (SES) developed the 'Flood Emergency Response Planning Classification of Communities' (2007). The guideline provides a basis for the categorisation of floodplain communities into various Emergency Response Planning (ERP) classifications and can be used to provide an indication of the type of emergency response required across different sections of the floodplain.

As discussed earlier, the Camden Council TUFLOW model from the 2022 Review Study is not available to TTW while preparing this FERP, hence the estimated likely onset time and time of inundation over all the flood affected roads discussed in Section 2.1 (for a range of design storm durations) cannot be confirmed at this stage. However, onset time and time of inundation over some affected roads for the adopted (i.e. by the 2022 Review Study) critical storm durations can be derived from the 2022 Review Study. This includes:

- Bringelly Road (at South Creek) – for the critical storm duration of the PMF event, the time it takes for the road to first inundated is less than 90 minutes and the road is estimated to be inundated for approximately 5.8 hours before the road is flood free again. The inundation time for the critical durations of the 0.2% AEP and 0.5% AEP events are estimated to be less than 4 hours and 2 hours, respectively.

- Cowpasture Road (at Bonds Creek) – for the critical storm duration of the PMF event, the time it takes for the road to first inundated is less than 30 minutes and the road is estimated to be inundated for approximately 3.5 hours before the road is flood free again. The inundation time for the critical durations of the 0.2%-2% AEP events are estimated to be less than 2.5 hours.

Further, the onset time and time of inundation of the flood affected roads along the evacuation route to the south are expected to be short as these road crossings are mainly subjected to overland flow flooding and are located at the upper end of creek/waterway with minor catchment areas that contribute stormwater runoff to. In contrast, the onset time and time of inundation of Bringelly Road and the connecting Camden Valley Way to the north of the site are expected to be longer than the evacuation route to the south as the catchment areas that contribute to these crossings are considerably larger. This can be confirmed during the detailed design phase of the activity and prior to the operation of the school.

3.0 Flood Response Strategies

3.1 Preferred Strategy

3.1.1 Pre-Emptive Closure

Pre-emptive closure of the school is the preferred flood emergency strategy for the school site if advanced warning is received outside of school hours, or where a severe event is forecast several hours in advance.

Although overland flow flood events are characterised by minimal warning times, there may be advanced notice of the extreme rainfall experienced in a 1% AEP to PMF events. During the operational phase, where there is enough warning prior to school opening hours, the school should be closed in advance of the flood event so children can be safe at home and parents do not have to drive through roads that could become hazardous due to flooding.

An SMS must be sent to staff and parents at the earliest opportunity (once the severe weather warning is issued by BOM) to ensure no site users enter dangerous road conditions.

3.1.2 Shelter-in-Place

While there is often advanced warning time of extreme rainfall events such as those endured in a 1% AEP or more severe 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 cannot be accomplished.

Draft shelter-in-place (SIP) guidance published by the NSW Department of Planning and Environment in 2023 states that SIP is an appropriate emergency management response when the flood warning time and flood duration are both less than six hours. With overland flow flooding mainly governing the immediate local road network, the onset time and time of inundation are likely to be short, hence it is recommended that the school is also prepared for a shelter-in-place strategy, especially when the site itself is flood free in the PMF event.

As evident in Figure 5, there is no way in or out of the site that does not go through high or medium hazard waters during the PMF event. NSW SES state that evacuation of a site must not require people to drive or walk through floodwater. It should also be noted that all proposed buildings are to be set above the PMF level and will not experience above-floor inundation provided adequate site local stormwater management is implemented. As a result, all buildings are safe to shelter in from the ground floor and upwards.

During the shelter-in-place strategy, all staff and students are to remain indoors. The Site Manager must ensure that there are no site users outdoors, including within the car park area.

3.1.3 Self-Evacuation

Although shelter-in-place is the preferred emergency response strategy, should a severe event begin without sufficient warning, any decision to shelter-in-place must be accompanied by alternative plans for evacuation in the event of a secondary emergency (e.g. medical or fire) or if some site users refuse to shelter-in-place. While they should be advised to stay in place (at least until the magnitude of the flood is clearer), if they insist on leaving or if there is a secondary emergency, the preferred route is to the south via Rickard Road onto Ingleburn Road then onto Camden Valley Way to the south. It is understood that Council's roads are proposed along the site's eastern and southern boundaries, and when these roads are constructed, they should be used as evacuation route to the south (i.e. via Byron Road onto Ingleburn Road) substituting Rickard Road as these new roads will provide higher flood immunity and lower flood hazards (when compared to Rickard Road to the south onto Ingleburn Road).

Self-evacuation should only be considered in the event that NSW SES issue evacuation action statements that cover the site, or if the proximity, scope or anticipated duration of the flood emergency poses an immediate threat to the safety of the people present at the site.

This route can also be used in the event that emergency personnel require access to the site due to a coincident event, including a medical emergency or a fire during a flood event. **However, it should be noted**

that this access route is likely to become cut off and not safe for traffic in flood events of a larger magnitude than the 1% AEP event.

Site users should be reminded not to drive through floodwaters, and in the event that their intended route is cut off by floodwaters, they should return to the site and shelter in place.

Given that the Bonds Creek crossings at Edmondson Avenue (north of Rickard Road), and Camden Valley Way and Cowpasture Road are flood affected in events more frequent than the 1% AEP event, site users should be warned of the flood risks here, and strongly advised against travelling on this road.

4.0 Flood Warnings and Notifications

4.1 Bureau of Meteorology

Severe weather and thunderstorm warnings are issued by the Bureau of Meteorology (BoM). These warnings are continually updated with descriptions of the likely conditions, including predicted extreme rainfall depths. Flood warnings are issued by the BoM when flooding is occurring or is expected to occur in an area. Warnings may include specific predictions of flood depths dependent on real-time rainfall and river level data. These warnings are distributed by BoM to councils, police and the relevant local SES, as well as being available on the BoM website.

- A ***Flood watch*** is issued by the BoM up to four days prior to a flood event. A watch is generally updated daily and may be issued before, during, or after rainfall has occurred.

- ***Flood warnings*** are issued by the BoM when flooding is occurring or expected to occur in a particular area. Warnings may include specific predictions of flood depths dependent on real-time rainfall and river level data. These warnings are distributed to Council, Police, and the relevant local SES, as well as being available on the BoM website, through telephone weather warnings and radio broadcasts.

4.2 NSW SES Australian Warning System

NSW SES has recently implemented the Australian Warning System (AWS) which replaces their previous evacuation orders and warnings system. The AWS is a new national approach to information and 'Calls to Actions' for hazards including flooding. The System uses a nationally consistent set of icons, with three warning levels: Advice, Watch and Act, and Emergency Warning. The flood warnings are described in Figure 9.

Figure 9 - Australian Warning System - Three Warning Levels

The NSW SES utilises a range of sources to build detailed flood intelligence within local communities, including information from flood studies and historical flood data. As part of the transition to the Australian Warning System, the NSW SES has increased flexibility to tailor warnings at the community level, based on the expected consequences of severe weather events.

The Site Manager is responsible for monitoring information from the AWS. Impacted communities will continue to receive flood warnings through the NSW SES website, NSW SES social media channels and by listening to local ABC radio stations. The NSW SES has also developed an all-hazards warning platform, Hazard Watch, to provide an additional channel for communities to access important warning information.

Each warning has three components:

1) **Location and hazard**: The location and the type of hazard impacting the community.
2) **Action statement**: For each warning level there are a range of action statements to guide protective action by the community. These statements evolve as the warning levels increase in severity.

Statements range from ‘stay informed’ at the Advice level, to ‘prepare to evacuate’ at the Watch and Act level, to ‘evacuate now’ in the Emergency Warning level. As the situation changes and the threat is reduced, the level of warning will decrease accordingly.

3) **The warning level**: The severity of the natural hazard event based on the consequence to the community.

4.3 Camden Council Emergency Dashboard

Camden Council has implemented an online dashboard that has information that guide the community to navigate and receive information during emergency events, including flood event. The Camden Council Emergency Dashboard can be accessed via the following link https://emergency.camden.nsw.gov.au/#.

4.4 Triggers

Given the anticipated “flashy” nature of flooding for the site immediate surrounding areas (and the inherently limited warning time associated with this type of flooding), this limits the capacity of NSW SES to issue flood notifications and action statements with sufficient lead time. It is important to note that the warnings estimated may not be available or occur with advanced warning for a particular local area due to the differences of actual weather patterns over a catchment.

To ensure adequate response time, alternative triggers should be monitored, including severe weather warnings, media updates via local radio stations and social media. While the Chief Warden is responsible for monitoring information from the AWS, NSW SES recommend that all site users (namely, all staff members and wardens) refer to the HazardWatch website and the Hazards Near Me app.

4.5 Emergency Signals

The site should have a Public Announcement (PA) system that can be used by the Site Manager to inform all staff of the chosen response strategy in the event of a flood emergency. This ensures that staff with key responsibilities in the Plan can begin to fulfil their duties without delay.

The PA system should be used alongside SMS and email updates to staff and students to inform them of any severe weather or flood warnings covering the site.

5.0 Flood Response Team

5.1 Staff Responsibilities

In the event of a severe flood, various staff members will be responsible for specific tasks as detailed in Table 1. Before the site is in operation, these roles must be delegated to specific staff members.

Table 1: Staff Flood Responsibilities

Role	Responsibilities
Site Manager / Chief Warden	- Decide if pre-emptive closure can occur if warnings are received prior to school opening hours or with several hours' notice - Decide when SIP occur and cease evacuation - Monitor flood warnings and notifications from BoM and AWS - Monitor BOM lidar and weather in the area of the site - Inform staff and students/parents of flood risk - Coordinate flood SIP drills
First Aid Officer	- Coordinate assistance for less able students and staff - Prepare a Flood Emergency Kit that includes a portable radio, torch, spare batteries, first aid materials, emergency contact numbers, candles, waterproof matches, waterproof bags and required medications
Staff	- Check visitor log and student registers so all site users can be accounted for - Report missing students or site visitors to Site Manager

5.2 Key Contact Details

In the event of a severe flood, key telephone numbers have been listed in Table 2 below.

Table 2: Key Contact Numbers

IMPORTANT TELEPHONE NUMBERS	
Site Manager	tba
Deputy Manager	tba
Safety/First Aid Officer	tba
Centre Staff	tba
External Contacts	
Police/Ambulance	000
NSW State Emergency Services (SES)	132 500
Fire & Rescue NSW – Horningsea Park	02 9493 1007
Fire & Rescue NSW – Oran Park	02 9493 1095
Fire & Rescue NSW – St. Andrews	02 9493 1092
Macquarie Fields Police Station	02 9605 0499
Camden Hospital	02 4634 3000
Campbelltown Hospital	02 4634 3000
Liverpool Hospital	02 8738 3000

6.0 Preparation for Flood Response

6.1 Education

As part of the preparation for a flood event, all staff and students will be made aware and advised of the flood risks present on site and the flood protocols & procedures. All staff on site will be made aware of the flood risks (including their management responsibilities) via briefing. This will form part of the mandatory site inductions (i.e. at the beginning of each school calendar year) that all staff must undertake prior to commencing work. A copy of this FERP which includes emergency response procedures will be made available at communal areas within the site as well as the main office. Completion of site induction and safety training for existing and new staff is the responsibility of the Site Manager.

6.2 Signage

Discussion with Camden Council should be carried out by NSW Department of Education to suggest and confirm the installation of a flood warning sign and a depth marker at Rickard Road (i.e. near the intersection with Ingleburn Road), to show floodwater depths during a flood event. This will ensure that road and site users are aware of the potential risks of flooding at this section of road. This depth marker may also serve to assist the Site Manager to decide when evacuation should be ceased and initiated the SIP.

6.3 Flood Drills

It is recommended that flood drills be held by staff annually to ensure all staff workers and students are familiar with the sound of the alert and their subsequent flood response actions. It is the responsibility of the Site Manager to ensure that evacuation drills are organised and that any issues with these drills are attended to, and if necessary, rerun.

These drills are required to test the suitability of the plan, identify gaps and to provide staff the opportunity to put into practice their specific responsibilities. If issues arise, this plan should be reviewed and updated. The Site Manager will also ensure that all site drills are recorded in an appropriate records book and any non-conformities reported and responded to.

6.4 Flood Emergency Kit

A Flood Emergency Kit should be prepared prior to a flood event taking place and regularly checked to ensure that supplies within the kit are sufficient and in working condition. This check could occur after the evacuation drill takes place to provide a regular schedule. The Kit should at a minimum include:

- Radio with spare batteries;
- Torch with spare batteries;
- First aid kit and other medicines;
- Candles and waterproof matches;
- Waterproof bags;
- A copy of the Site Emergency Management Plan; and
- Emergency contact numbers.

This Emergency Kit should be stored in a waterproof container, and it is the responsibility of the First Aid Officer to make sure that this kit is maintained and available during an emergency.

7.0 Flood Response Actions

The flood response actions are outlined in Table 3.

Table 3: Flood Emergency Response Actions for the site

Flood Emergency Response Plan	
Flood Warning and Notification Procedures	**Evacuation and Refuge Protocols**
1) Weather forecast predicts significant rainfall event in the area or BoM issues a **FLOOD WATCH** or NSW SES issue a yellow "**ADVICE**" warning 	The following actions must be undertaken by the Site Manager: 1) Notify all staff, site users and parents of the flood watch via SMS and email and confirm availability of relevant staff to assist with emergency actions if required. 2) Ensure that the emergency kit is ready to use. 3) Listen to the local radio station for updates on forecasted flood heights and timings. Monitor updates on social media and NSW SES platform Hazard Watch. 4) Ensure staff are familiar with their responsibilities.
2) Flash flooding is reported in the media / via visual observation or BoM issues a **FLOOD WARNING** or NSW SES issue an amber "**WATCH AND ACT**" or red "**ACT NOW**" warning 	If the flood event is not anticipated to impact the site (either directly or indirectly), the **Site Manager** is to continue hourly check-ins and postpone high risk activities (e.g. unnecessary deliveries etc.). The Site Manager must also undertake the following actions if surrounding roads are expected to be impacted: • **For life-threatening emergencies phone 000 immediately.** **If outside of school hours or where several hours of notice has been given:** • Implement pre-emptive closure of school. Send SMS to staff and parents to inform them and advise them of closure. **If during school hours or where warning time is deemed insufficient:** • An alert and warning message should be broadcast over the PA system confirming a significant flood event, notifying all students and staff to begin **shelter-in-place** procedures. • Ensure no one is outdoors. • Send SMS to parents, advising them of SIP strategy and asking them not to travel to school. • Direct all students and staff to shelter in their classrooms. Unnecessary movement between buildings should be avoided. Staff must check student registers and complete a headcount to ensure all site users are accounted for. • The **Site Manager** is to follow any action statements provided via the AWS. **<u>NOTE</u>: Avoid driving or walking through floodwaters. These are the main causes of death during flooding.**
3) Visual observation shows flood is receding or the alert has been downgraded by the relevant authorities and any flood event that occurred has passed. 	• Flooded surrounding roads are to remain off limits until inundation has cleared. Site is to be inspected by the **Site Manager** if required. Once it has been confirmed that the water level has reduced to a suitable level, and if determined safe, the **Site Manager** may announce that staff and students no longer need to shelter-in-place.

8.0 Limitations and Revision of the Flood Emergency Response Plan

This FERP only addresses the flood response strategies, as discussed in Section 3.1 during extreme flooding events for students and staff within the site itself and is considered a guide only. The strategies have been derived based on the flood modelling results completed by WMAwater in 2022 as part of the "*Review of Upper South Creek Flood Study in the Context of Ongoing Development*". Given the pace of development in the area, modelling completed as part of the 2022 study may not fully captured the current constructed features. Further, this FERP does not cover either student and staff individual safe travel arrangements to the site or when their safe travel arrangements may be disrupted by flooding and/or road closures.

In addition, this FERP is based on the currently available information for the proposed activity at the site (i.e. at the time of preparation), and must be updated following the detailed design stage, prior to the site becoming operational.

It is the NSW Department of Education & Communities' responsibility to ensure this FERP is current and updated as necessary to be in line with relevant standards, directorate, legislation, and the Regional's State Emergency Management Plan to ensure the health, safety and welfare of all staff, students and others.

9.0 Mitigation Measures and Conclusions

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:

- The proposed activity is considered to result in low flood risks to people present at the school during a flood event and will not have significant adverse effects on the locality, community and the environment (refer to Flood Statement Report completed by TTW and submitted alongside this report); and
- Potential residual flood risks/impacts associated with the proposed activity can be appropriately mitigated or managed (refer to table below) to ensure that there is minimal effect on the locality and community.

Mitigation Name	Aspect	Mitigation Measure	Reason for Mitigation Measure
FERP	During Design Phase and Operation Phase	This FERP is based on the currently available information for the proposed site, and must be updated following the detailed design stage, prior to the site becoming operational. This includes confirmation of estimated flood depths, onset time and time of flood inundation time over the surrounding roads for evacuation (i.e. based on Council's flood model from the 2022 Review Study).	To provide emergency response guidance in the event of a flood event and further reduce flood risks associated with the activity.
Staff Responsibility	Prior to Commencement of Operation Phase	Delegate Staff Responsibilities so all staff are aware of their specific roles and associated flood response actions, as discussed in Section 5.1.	To ensure that all emergency responses adopted in a flood event are carried out in an orderly manner and sharing among school staff.
Education	During Operation Phase	As part of the preparation for a flood event, all staff and students will be made aware and advised of the flood risks present on site and the flood protocols & procedures.	To ensure all staff and students understand the flood risks and associated response protocols and procedures.
Flood Drill	During Operation Phase	It is recommended that flood drill be held by staff annually to ensure all staff workers and students are familiar with the sound of the alert and their subsequent flood response actions.	To ensure all staff and students are familiar with the flood response protocols and actions.
Flood Emergency Kit	Prior to Commencement of Operation Phase	A Flood Emergency Kit should be prepared prior to a flood event taking place and regularly checked to ensure that supplies within the kit are sufficient and in working condition.	To ensure that an emergency kit is available for use in the event of a flood event, and this further reduces the risks for the activity.
Signage	Prior to Commencement of Operation Phase	Flood warning sign and depth marker can be implemented (by Council through consultation with Council) on Rickard Road near the intersection with Ingleburn Road.	To make site and road users aware of the potential flood risks at this section of road.

Pre-Emptive School Closure	During Operation Phase	Staff and parents should be notified (i.e. via SMS or equivalent communication tool at the earliest opportunity upon BOM issuing severe weather warning for the area) to inform the closure of the school.	To ensure that site users do not enter potentially dangerous road conditions on their way to school.
Shelter-in-Place	During Operation Phase	Staff, students and people present at the school during a flood event should be notified and guided to the appropriate building areas within the school to shelter-in-place. Site manager to ensure that no one is present outdoor.	To ensure that site users are gathered and located in areas above the PMF flood levels and safe from flooding.

Prepared by
TTW (NSW) PTY LTD

MICHAEL KOI
Associate

Reviewed & Authorised By
TTW (NSW) PTY LTD

JAMIE MARSHALL
Associate