SSDA Flood Impact Report

Meadowbank TAFE - MULTI-TRADES AND DIGITAL TECHNOLOGY HUB

Prepared for Gray Puksand / 03 October 2019

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1.0 Executive Summary

The vision for TAFE NSW is to create an integrated academic precinct that meets the educational services needs for Ryde and beyond. The TAFE Meadowbank project will establish TAFE Meadowbank as a leading integrated Trade Educational Hub, creating a foundation for world-class trade expertise, innovation, research and technological advancements to continually improve the delivery of quality education for Northern Suburbs of Sydney.

The development includes a New Combined Multi-Trades and Digital Hub building. See Figure 1.0 below for a depiction of the development of Meadowbank TAFE.

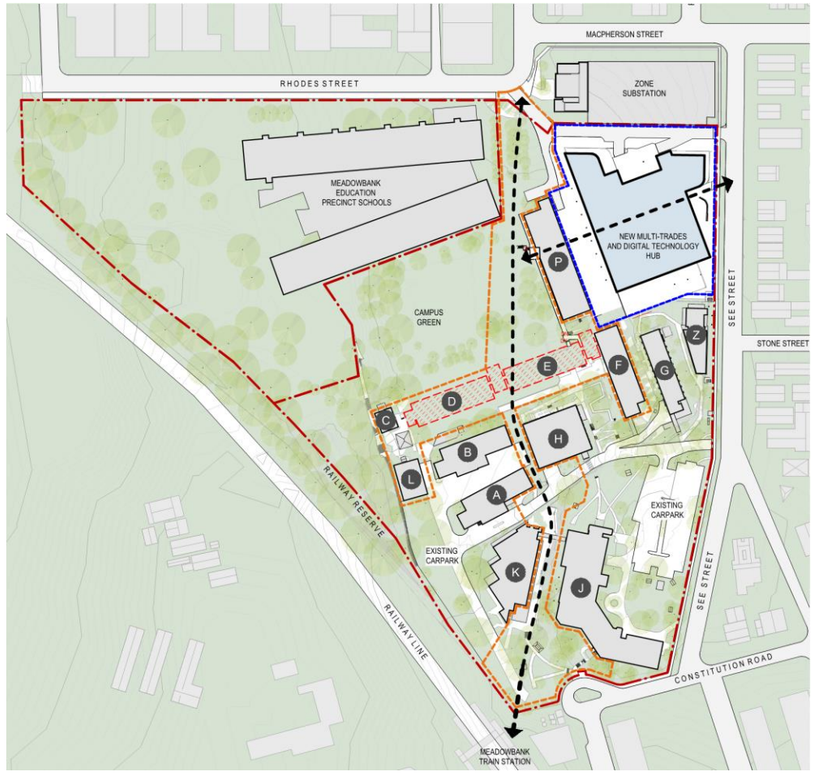


Figure 1.0: Proposed Meadowbank TAFE site.

1.1 Flooding

The site is situated within the Charity Creek catchment which has an area of 247 ha incorporating Denistone, West Ryde and Meadowbank. Significant flooding has been known to occur along the existing trunk drainage system which flows from Rhodes St into the proposed Meadowbank School to the north of the site and connects into the TAFE site culvert crossing into Charity Creek.

The site is affected by minor overland flow from See Street to the east of the site, and major overland flow from the open watercourse to the west of the site. The proposed Combined Multi-Trades and Digital Hub building is outside the mainstream flooding extent for the 1% AEP flood but is within the Probable Maximum Flood (PMF) extent. The new building site is therefore classified as Low Flood Risk. The proposed building will be outside the minor overland flowpath which will be managed by site grading and proposed stormwater.

The eastern side of the new building is proposed to have a workshop at low level to tie into the existing library building. The proposed level is below the PMF and further discussion is required with Council

The proposed 1% AEP flood extent from both mainstream and overland flood modelling is shown in figure 1.1.1 below. The flood extent shown in pink is less than 100mm deep and classified as minor overland flow in accordance with Council DCP.

As the proposed and existing buildings within the site are within the PMF extent, a flood evacuation plan will be completed as part of the design development.

The major overland flood levels across the site are follows:

- **1% AEP Flood Level = 7.50m**
- **PMF Flood Level = 16.25m**

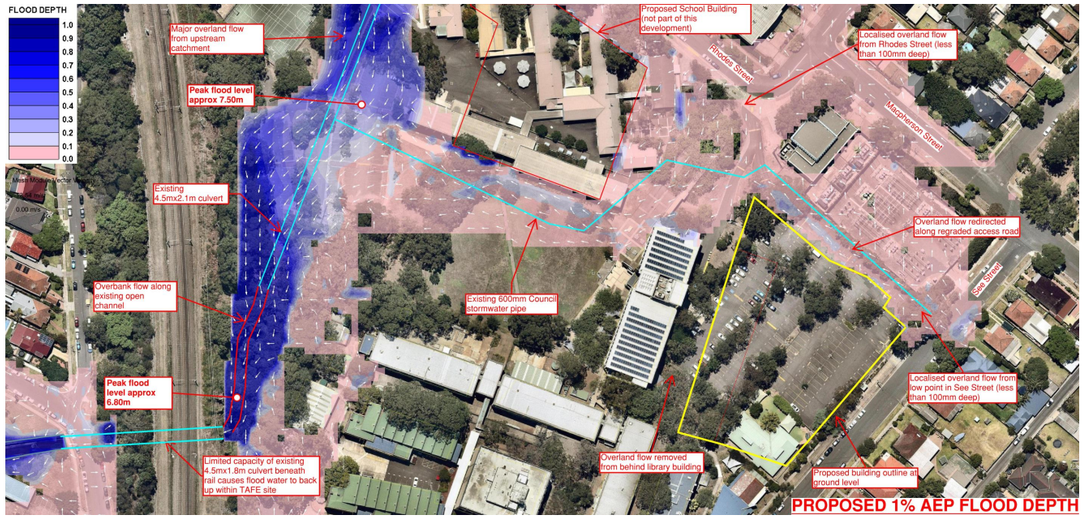


Figure 1.1.1: Proposed 1% AEP flood extent and depth

The flood planning requirements shall be in compliance with the City of Ryde Development Control Plan (DCP) Section 8.2 Stormwater and Floodplain Management. The DCP states that educational development is classed as “Sensitive Use”. The following flood mitigation measures will be included: -

- No development is within the Medium or High flood risk areas of site
- Basement parking areas are to be above the minor overland flow 1% AEP level plus 150mm freeboard;
- Basement parking access is to be above the major overland flow PMF level
- Appropriate and safe passage to an area of flood evacuation above the PMF within the new building.
- Overland flow paths will be directed away from the building.
- Building components below the PMF level will need to be designed structurally to withstand the forces of the PMF flood.
- Flood evacuation during the PMF will be to level 2 (17.52m) and levels above within the new building.

A flood evacuation management plan and detailed flood modelling that will include finalised external levels, proposed stormwater, building extents and landscaping, will be addressed during the design development stage.

2.0 Introduction

TTW have been engaged by Gray Puksand Architects on behalf of TAFE NSW to provide civil engineering and flooding advice for the proposed development of the Meadowbank TAFE site which includes the construction of a new Combined Multi-Trades and Digital Hub building.

Various elements of the site master planning and potential works have been investigated by TAFE NSW over the development of this project.

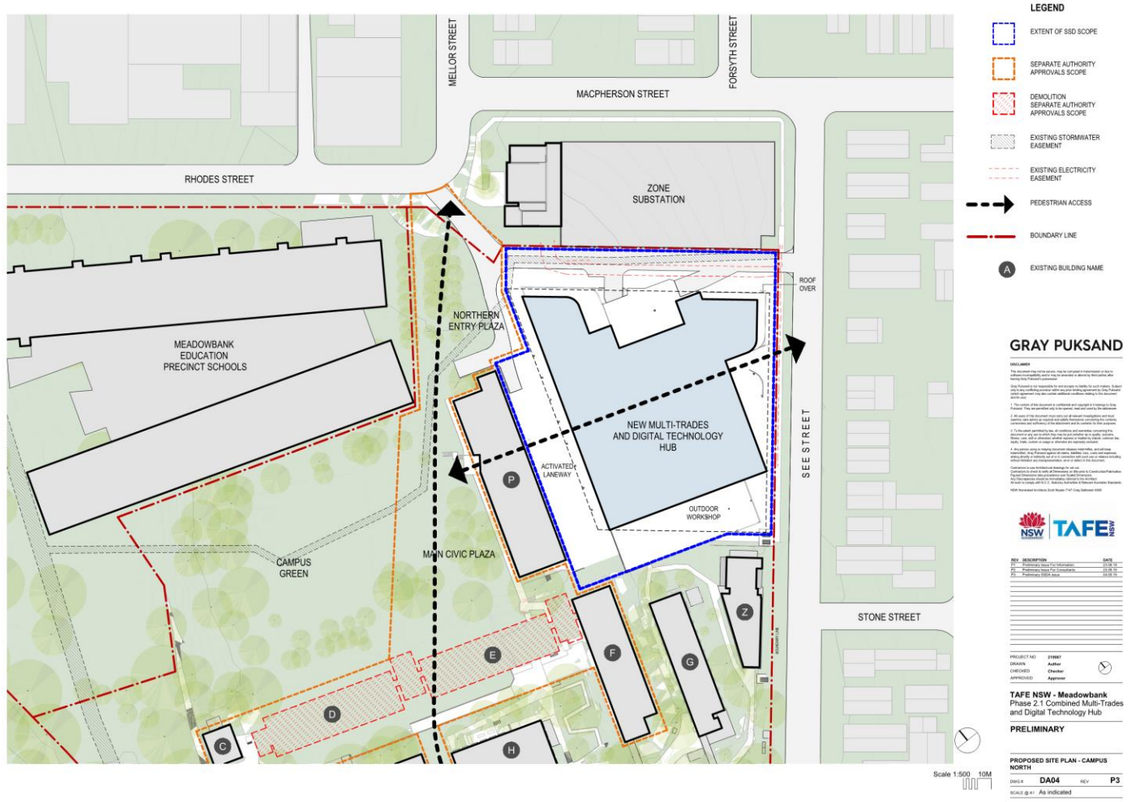
The key project elements can be seen with clarity on the diagram adjacent, placed within the context of proposed adjoining public and high schools, begins to give a feel of the true extent of the Educational Precinct being developed at Meadowbank.

The new Multi Trades hub to the North-East of the sit has a substantial new footprint in the region of 5,350m² encompassing car parking spaces to the basement levels, with an approximate building area approaching 22,000m².

The New Trades Hub will present a main civic address to See Street, providing the entre TAFE campus with a sense of arrival befitting a 6.33-hectare Educational facility

This flood impact report addresses and details the following:

- Existing flood regime throughout the site;
- Flooding and overland flow analysis design;
- Consistency with Council's Floodplain risk management study and plans;
- Potential flood impacts of the proposal and impact on the flood affectation of adjacent properties/road;
- Compatibility with the flood hazard of the land;
- Safety of future occupants and visitors shall be carefully considered;
- Provision of protection of underground elements (such as basement carparks) for flood events up to the PMF;
- Evacuation and emergency access for events up to the PMF; and
- Recommendations made in the Parramatta River Ryde Sub Catchments Flood Study Report (SKM, Jan 2015)



3.0 Existing Site

3.1 Site Location

The Meadowbank TAFE site is located within the Meadowbank educational district directly north east of Meadowbank Train Station. The TAFE site is bounded by See Street to the east, Rhodes Street and the proposed Meadowbank K-12 School to the north, the railway line to the west and Constitution Rd to the south. The Combined Multi-Trades and Digital Hub building related to this SSDA is shown in figure 3.1.1 below

Figure 3.1.1: Meadowbank TAFE Combined Multi-Trades and Digital Hub Building Site

The current site assigned for the proposed Combined Multi-Trades and Digital Hub building is occupied by an existing outdoor carpark with access off See Street.

The TAFE site has an existing internal in-ground network of pits and pipes. The main stormwater trunk drainage system runs through the northern school site connecting pipes from Rhodes St and traverses through to the western section of the TAFE grounds south along the railway boundary and eventually exits the site via a box culvert (4.5m x 1.8m) under the railway line forming Charity Creek which is an open concrete channel.

A second Council stormwater drainage main enters the site from the See Street low point and travels along the northern boundary of the proposed Multi-Trade building location heading west through a stormwater easement towards the main western site trunk main.

Existing building downpipes and various overland flow paths flow into pits connected to the system mains.

The existing stormwater network has been investigated by means of a detailed survey, site investigation and Dial Before You Dig.

Figure 3.1.2: Meadowbank TAFE Stormwater Network

4.0 Existing Flooding Regime

The existing site falls within the Charity Creek Catchment which has an area of 247ha incorporating Meadowbank, West Ryde and Denistone to the north of the site.

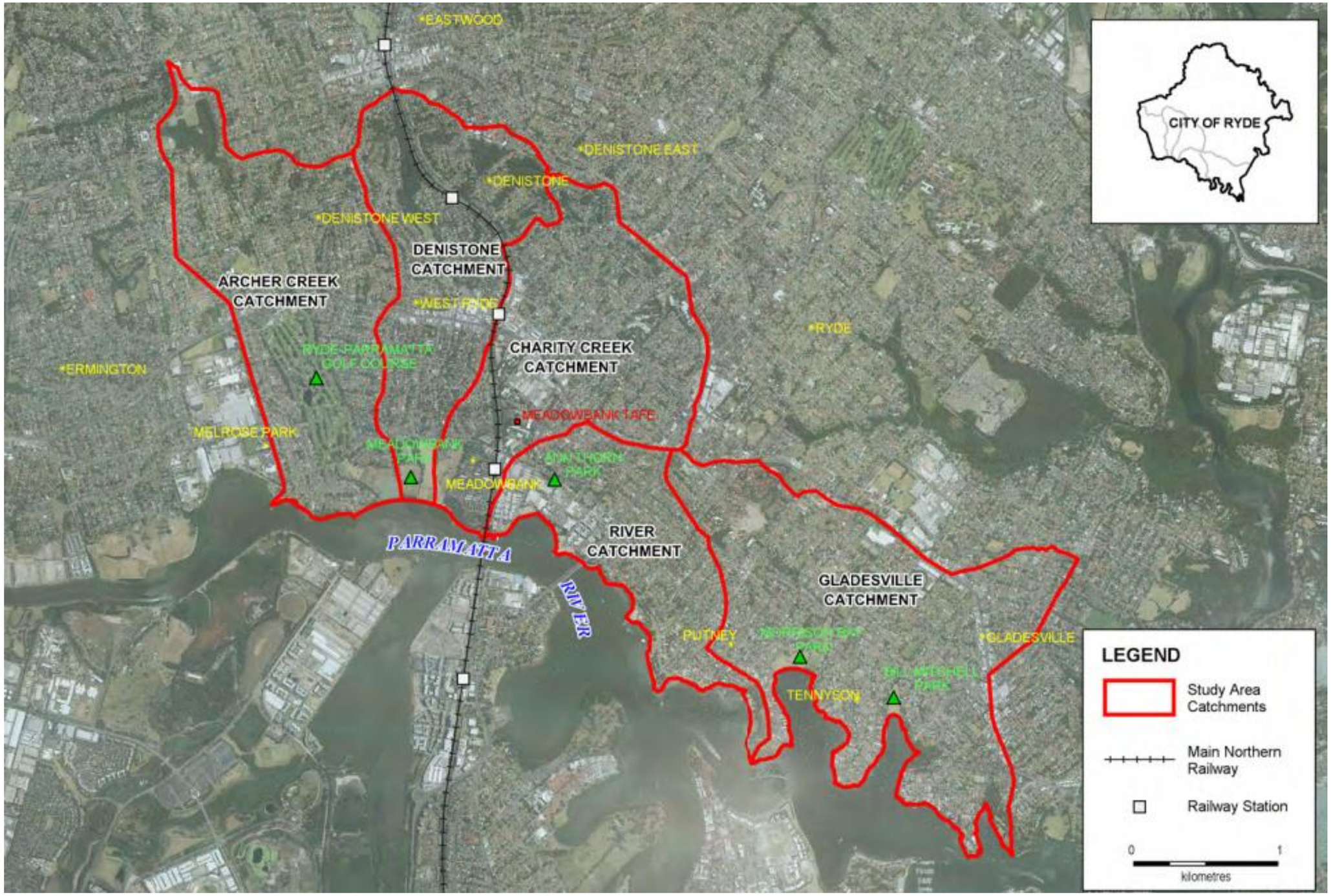


Figure 4.0: Ryde Sub-Catchments of the Parramatta River – SKM Flood Study 2015

Council have completed a flood study; *"Parramatta River - Ryde Sub Catchments Flood Study and Floodplain Risk Management Plan"* which details the nature of the flood regime through the Charity Creek catchment including the Meadowbank Educational Precinct.

TTW have obtained the flood model from Enstruct who were engaged by the Department of Education to complete a flood study for the Meadowbank School site. This model includes the original flood model used for Council's flood study. TTW have modified this flood model to use current topographical survey data within the TAFE precinct, and include adjustments for the proposed model which includes the new Combined Multi-Trades and Digital Hub building and concept site grading.

The flood modelling has been completed using TUFLOW, which uses a combined 1d/2d model with 2d representation of overland flows across a digital elevation model and 1d representation of stormwater pit and pipe networks, trunk drainage channels, culverts and bridges. Hydrological modelling of rainfall-runoff processes is completed using the DRAINS modelling software, to determine storm event flows across the catchment. No changes to the parameters of the flood model or hydrological model have been made. Figures 4.0.1 and 4.0.2 show the existing 1% AEP and PMF Peak flood depths through the TAFE site, these are also included in Appendix A.

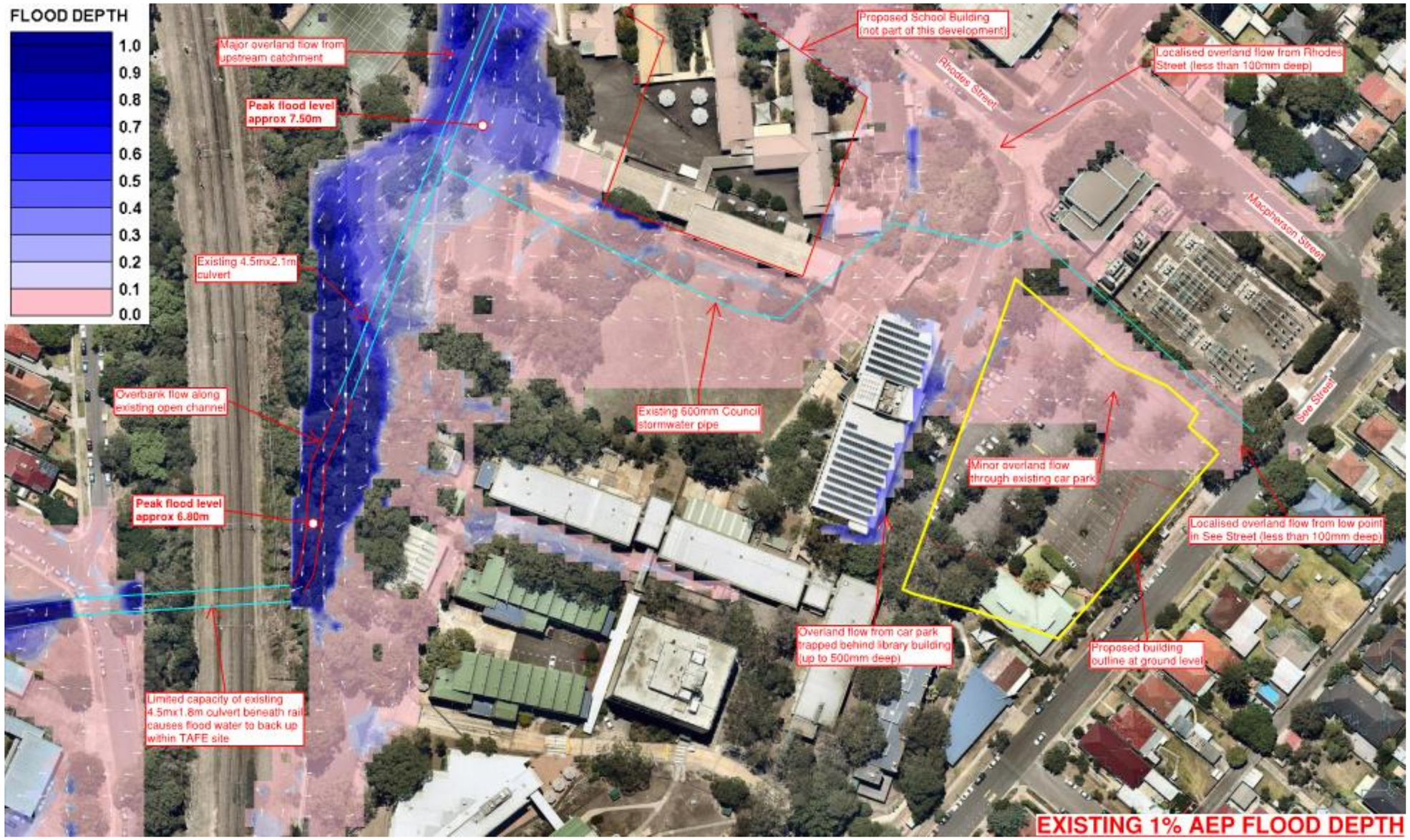


Figure 4.0.1: 1% AEP Existing Peak Flood Depths

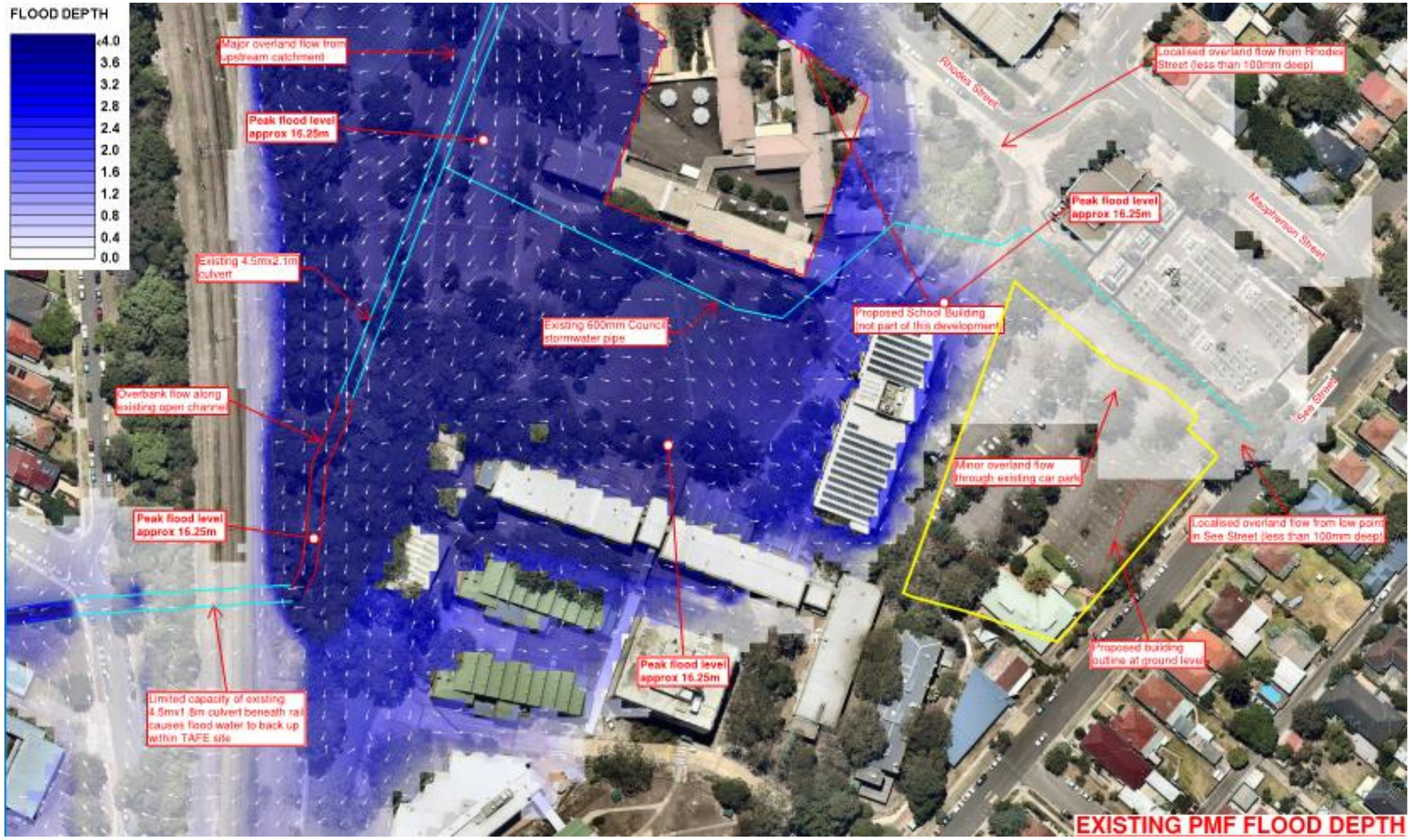


Figure 4.0.2: PMF Existing Peak Flood Depths

There are two mechanisms of flooding across the site during 1% AEP flood.

- Major flooding in excess of 5m deep along the western boundary of the site along the existing culvert and open channel. This overland flow from the upstream catchment is restricted by the capacity of the existing culvert beneath the railway line and allows flood water to back up and flood the TAFE site to a peak flood level of approximately 7.50m.
- Minor overland flow less than 100mm deep that enters the site from a low point in See Street, and Rhodes Street, shaded pink in figure 4.0.2. This localised overland flow is a result of insufficient capacity in the existing stormwater network to convey the 1% AEP flows.

In the PMF event, the major overland flow is restricted at the rail culvert and backs up to flood most of the site to a peak flood level of approximately 16.25m. The peak PMF level occurs around 90 minutes after the start of the storm and around 70 minutes after the 1% AEP flood level (7.50m) is reached. The minor Overland flow from See Street and Rhodes Street remains less than 100mm during the PMF.

5.0 Flooding Design Requirements

5.1 City of Ryde Flooding and Overland Flow

The City of Ryde specifies that flooding and overland flow within the site must be accommodated to ensure all proposed flood levels must be equal or lesser than the existing.

Freeboard is to comply to the following table under the Industrial/Commercial column.

Drainage System/ Overland Flow	Residential			Industrial/ Commercial	
	Land Level [b]	Habitable Floor Level	Non-Habitable Level [c]	Land Level [b]	Floor Level
Surface Drainage/ adjoining ground level [a]	-	.15m	-	-	.15m
Public drainage infrastructure, creeks and open channels	0.5m	0.5m	0.1m	0.3m	0.3m
Flooding and Overland Flow (Overland Flow Precincts and Low Risk)	N/A	0.3m	0.15m	N/A	0.3m
Flooding and Overland Flow (Medium Risk and greater)	N/A	0.5m	0.3m	N/A	-

Figure 5.1: City of Ryde Freeboard criteria for Stormwater and Overland Flow

5.2 Secretary's Environmental Assessment Requirements (SEARS)

The following requirements have been borne out of the applicants request for the SEARS: -

17. Flooding

- Identify flood risk on site (detailing the most recent flood studies for the project area) and consideration of any relevant provisions of the NSW Floodplain Development Manual (2005), including the potential effects of climate change, sea level rise and an increase in rainfall intensity. If there is a material flood risk, include design solutions for mitigation.

The City of Ryde Council have provided input into the SEARs listed above. They recommend the following amendments: -

4. The DRAFT SEARs do not refer to Council's DCP for Stormwater and Floodplain Management. A development of this scope would warrant OSD be provided and WSUD measures. It is suggested that under the heading 'Key Issues' item 16. Drainage please include the following dot points:

- A stormwater management plan prepared by a qualified Engineer in accordance with the provisions contained in City of Ryde Council's Development Control Plan 2014 Part 8.2 - Stormwater and Floodplain Management. The stormwater plan is to include an OSD system and provide WSUD measures.

- There is a public drainage line adjoining the northern boundary of the development lot. Development works must not impede on access to this service. Further to this, there is an easement over the service and it is aligned (naturally) along a valley. This area accommodates a failure mode should the drainage be blocked in See Street, and this should be accommodated for and detailed in the stormwater management plan.

5. Under the heading 'Key Issues' item 17. Flooding please include a dot point after the first paragraph:

The proposal shall address the relevant provisions, goals and objectives in the following:

- Parramatta River Ryde Sub Catchments Flood Study Report (SKM, Jan 2015)
- Floodplain Development Manual (NSW Government, 2005)
- City of Ryde Development Control Plan 2014 Part 8.2 Stormwater and Floodplain Management City of Ryde Stormwater and Floodplain Management Technical Manual City of Ryde
- Water Sensitive Urban Design Guidelines Australian Rainfall and Runoff (Geoscience Australia, 2019) Australian Runoff Quality (Engineers Australia, 2006)

A Flood Impact Statement, in accordance with City of Ryde Development Control Plan 2014 Part 8.2, shall be prepared and address but is not limited to:

- Consistency with Council's Floodplain risk management study and plans
- Potential flood impacts of the proposal and impact on the flood affectation of adjacent properties/road
- Compatibility with the flood hazard of the land
- As the application seeks to intensify the usage of the land, safety of future occupants and visitors shall be carefully considered
- Provision of protection of underground elements (such as basement carparks) for flood events up to the PMF
- Evacuation and emergency access for events up to the PMF
- Recommendations made in the Parramatta River Ryde Sub Catchments Flood Study Report (SKM, Jan 2015)

The recommendations listed above in the requirements, SEARs and City of Ryde amendments to the SEARs shall be completed in the documentation for the SSDA.

6.0 Proposed Flood Regime

6.1 Proposed Flood Analysis

The proposed grading plan of the site was developed into a 3D model and inputted into the TUFLOW model. The proposed location of the Combined Multi-Trades and Digital Hub building is within a minor overland flow path through the existing car park. Site grading and stormwater drainage around the building will redirect and convey the flow away from the building and along the northern access driveway and towards the open landscaped area. The proposed development has no impact on the major flooding to the west of the site and has no impact to external existing development. Figures 6.1.1 and 6.1.2 show the proposed 1% AEP and PMF Peak flood depths through the TAFE site following development, these are also included in Appendix A.

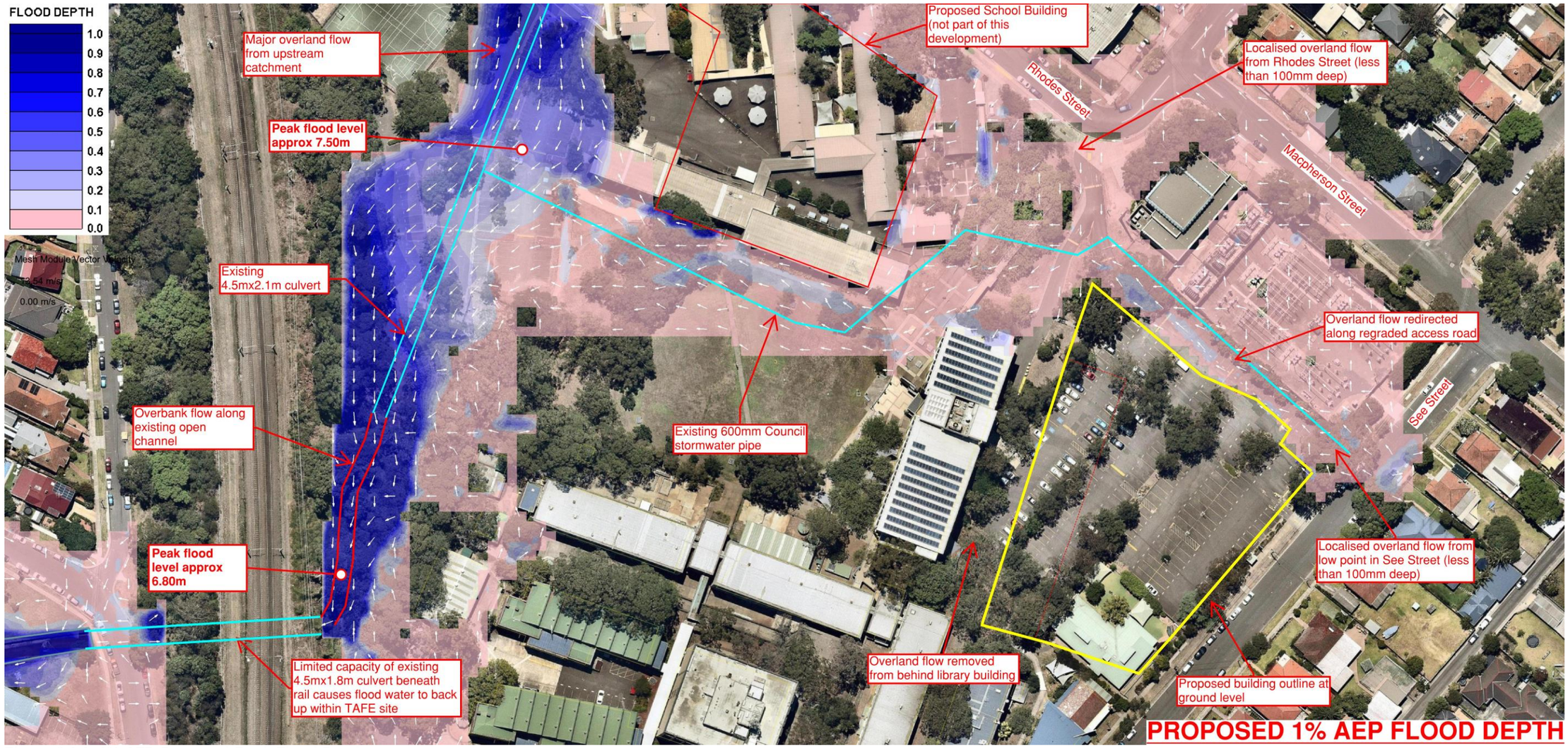


Figure 6.1.1 1% AEP Proposed Peak Flood Depths

The proposed flood model results show that the 1% AEP minor overland flow from See Street can be managed though site grading and stormwater management. Detailed flood modelling will be required following design development of site levels, building form and landscaping.

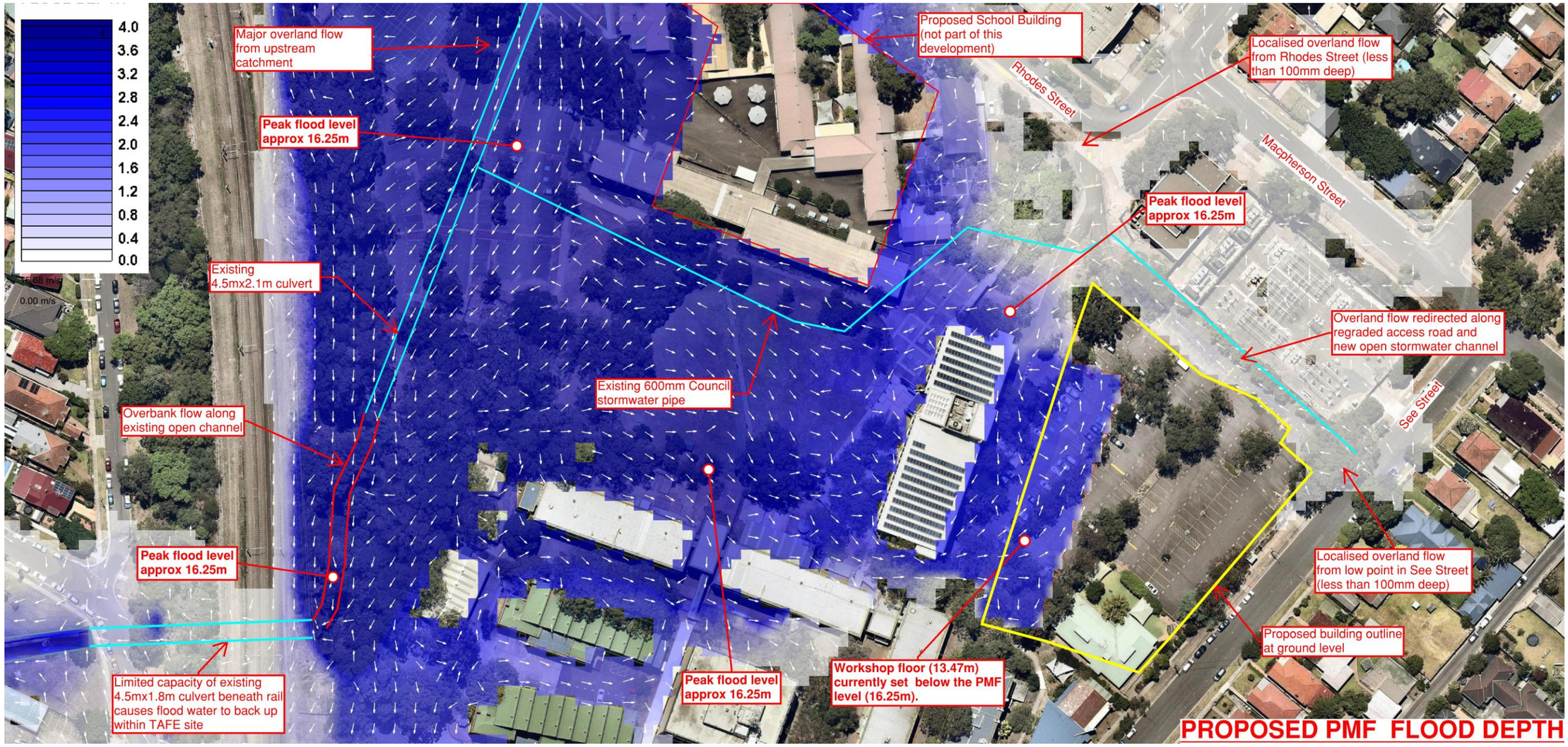


Figure 6.1.2. PMF Proposed Peak Flood Depths

The proposed flood model results show that the minor overland flow from See Street can be managed though site grading and stormwater management. The major flooding from the west of the site does not impact the new building in the 1% AEP flood which is at RL 7.50m but does impact the building in the peak PMF at RL16.25m.

6.2 Consistency with City of Ryde Policy

The City of Ryde provides a basis for assessing the flood risk (hazard) via Section 4.0 Flooding and Overland Flow of the City of Ryde Council's Development Control Plan 2014 Part 8.2 - Stormwater and Floodplain Management.

The development being an educational facility would normally fall under the “Sensitive Uses” category in Table 1 under Schedule 2 of the City of Ryde Policy. It defines the sensitive uses category as “educational establishments which are essential to evacuation during periods of flood or if affected would unreasonably affect the ability of the community to return to normal activities after flood events”.

Level 1 of the building has been designated as a workshop facility for trades and will be structurally designed to withstand the forces of the flood in the PMF if inundation of the building at this level would occur in the PMF storm. A flood evacuation and emergency response plan will be required as part of the detailed design development stage.to evacuate Level 1 and exterior pedestrians to the Level 2 evacuation zone above the PMF.

The proposed Combined Multi-Trades and Digital Hub Building Level 1 has been designed at FFL 13.47m to be equal with the ground floor of building P. The new building has been designed with direct stair and elevator access to level 2 above set at FFL 17.87m. When considering a 1% AEP storm level of RL7.50 this would indicate a flood free zone between the new multi-trade building and the existing building P directly to the west.

However during the PMF flood event at water level of RL 16.25m the flow will inundate the Level 1 floor to a depth of 2.78m at a very low velocity which is in the order of 0.04 m/s.

The peak PMF storm duration of 90 minutes indicates a time of evacuation of approximately 50 minutes. During the PMF event flood water reaches the equivalent 1% AEP flood level (RL 7.50m) 20 minutes after the onset of the storm. The flood water level reaches the workshop floor level (RL 13.47m) after 50 minutes and the flood level reaches a peak (RL 16.25m) after 80 minutes. The progression of the PMF inundation at these times are shown in figures 6.2.1 – 6.2.3 below.

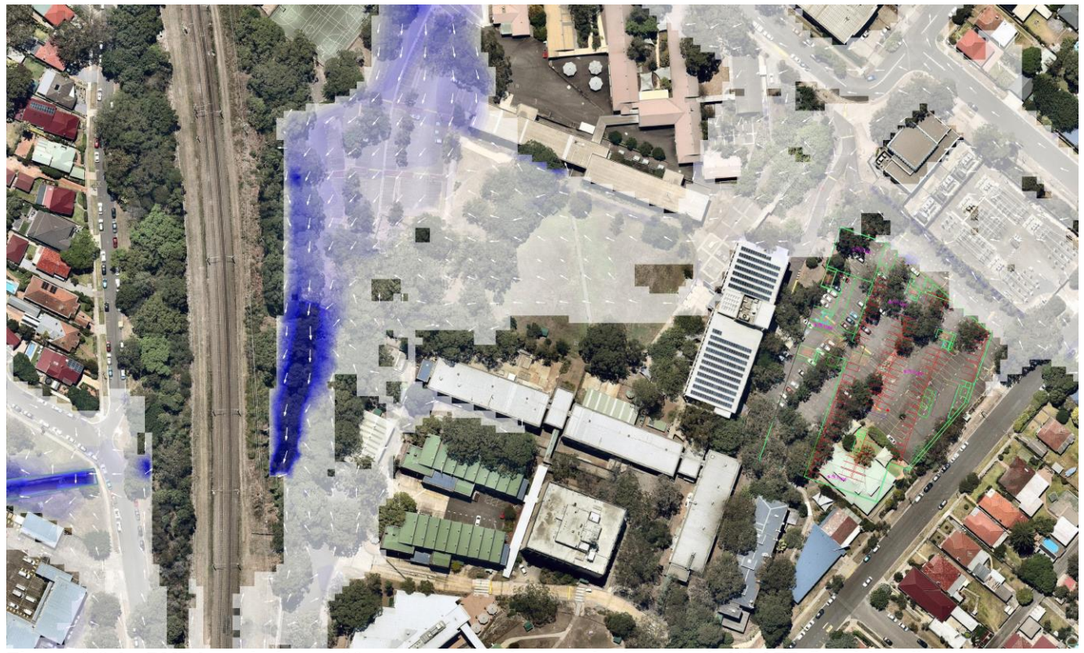


Figure 6.2.1. PMF Inundation at 20 minutes (reaches equivalent peak 1% AEP flood level)

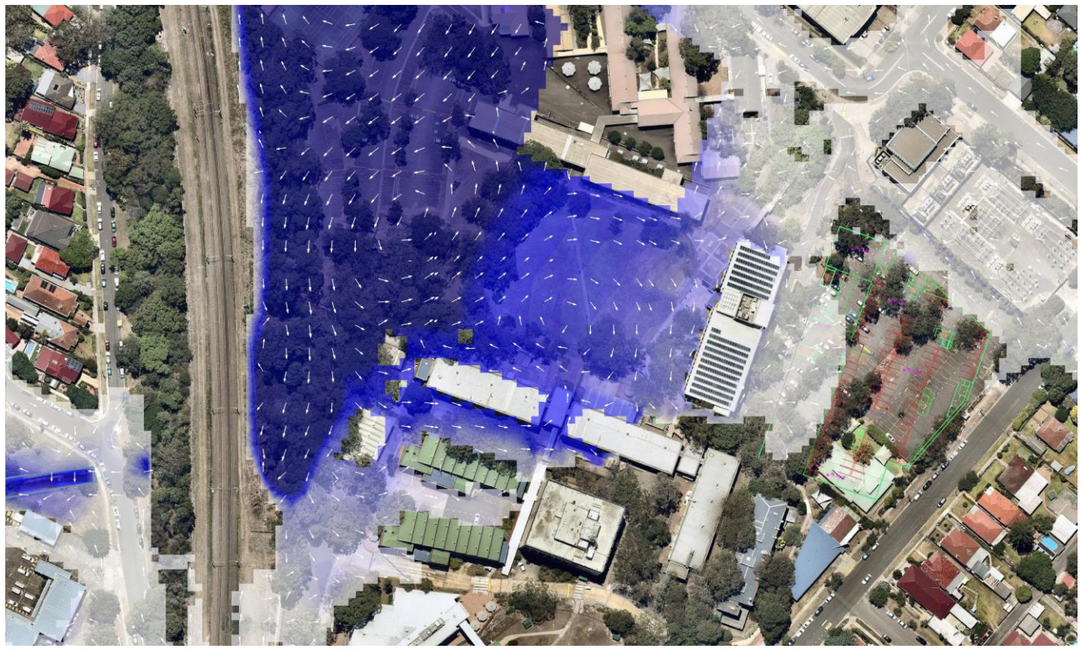


Figure 6.2.2. PMF Inundation at 50 minutes (reaches workshop floor RL 13.47m)

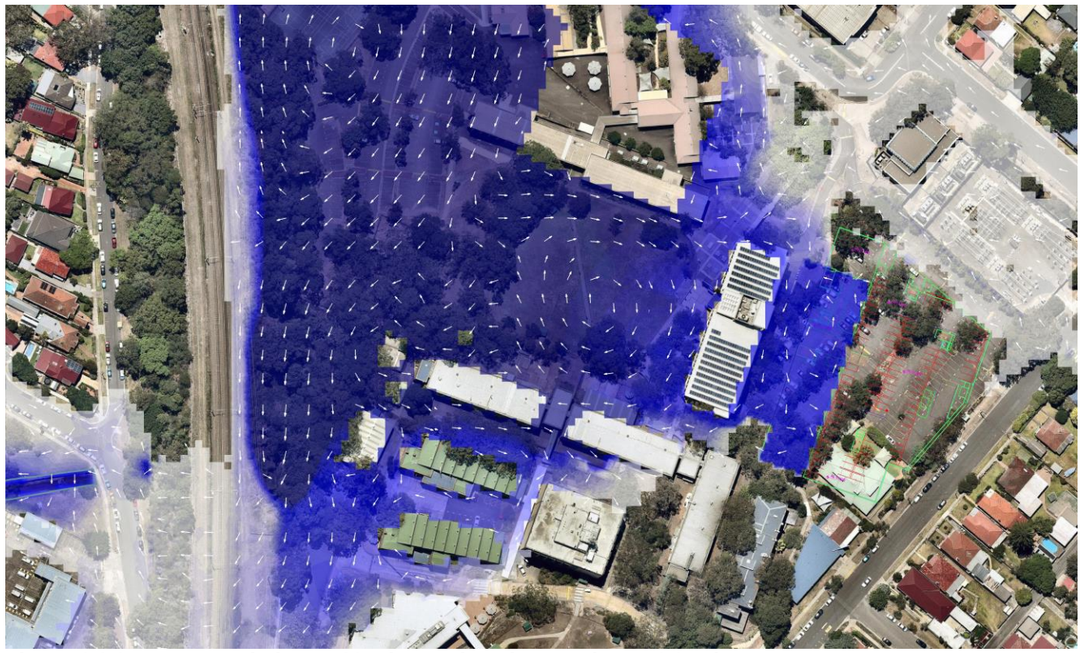


Figure 6.2.3. PMF Inundation at 80 minutes (reaches peak RL 16.25m)

Flood evacuation during the PMF will be to level 2 (17.52m) and above of the new building. The evacuation zone on Level 2 has a gross floor area of 2000sq.m and approximately 3500sq.m per floor above Level 2 would indicate a minimum capacity of 15000 persons.

The very low likelihood of the PMF storm inundation of Level 1 occurring would normally indicate a high risk given the depth of flow is 2.8m and a consequence of potential loss of life. But when it is coupled with evacuation measures being in put in place with 40 minutes to evacuate and direct access to the floor above the level of risk would be reduced and would allow the community TAFE centre to proceed normally as the Level 1 section of the building is only a small proportion of the TAFE NSW Meadowbank site. The consequence of the inundation of Level 1 would most likely damage the interior building components such as floor coverings, equipment, machinery and storage materials. Critical infrastructure will not be contained within Level 1 and will be isolated to ensure the building functions as normal.

The effect of the community as described above being normal after the PMF flooding pending minor repairs to the interior of the building would not classify the proposed development as a “Sensitive Uses and Facilities” but would classify it as a commercial facility in accordance with Section 4.0 Flooding and Overland Flow of the City of Ryde Council's Development Control Plan 2014 Part 8.2 - Stormwater and Floodplain Management.

Under the commercial facilities controls in Section 4.4.6 the flood risk is categorised as Low as described in Section 4.2.2 as being “Land within the floodplain (i.e. within the extent of the probable maximum flood) but not identified as either High Flood Risk, Medium Flood Risk Precinct or as an Overland Flow Precinct”. This is due to the development area being over 6m above the 100 year storm but within the PMF storm.

The car park basement and other floor levels are compliant with Council’s requirements.

The proposed flood model confirms that the flood hazard (product of velocity and depth) during the 1% AEP is less than 0.1m^2/s for the development and in accordance with Council requirements, refer to figure 6.2.4

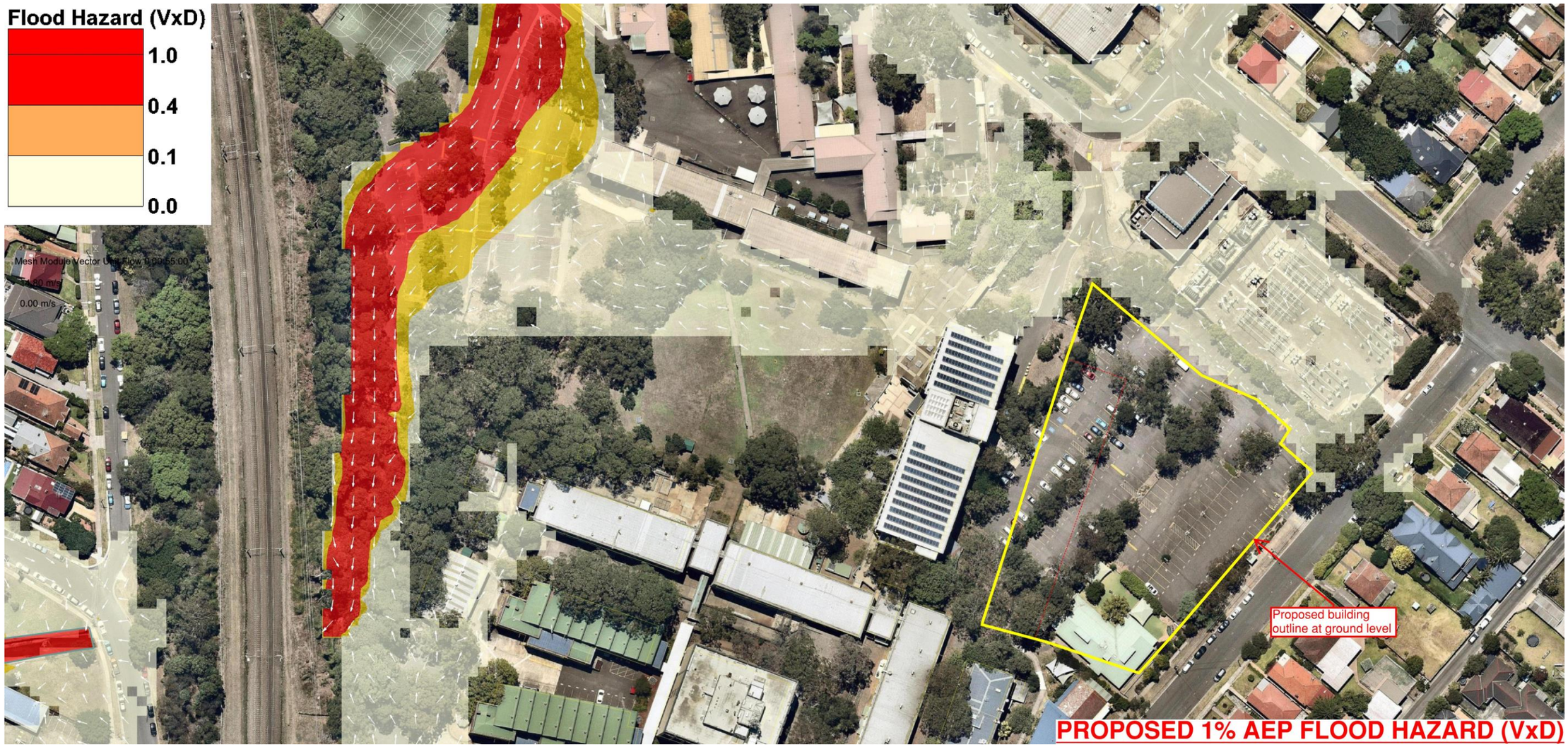


Figure 6.2.4. 1% AEP Peak Flood Hazard (VxD)

6.3 Flood Evacuation Plan

The flood evacuation plan diagrams are depicted below in Figures 6.3.1 and 6.3.2.

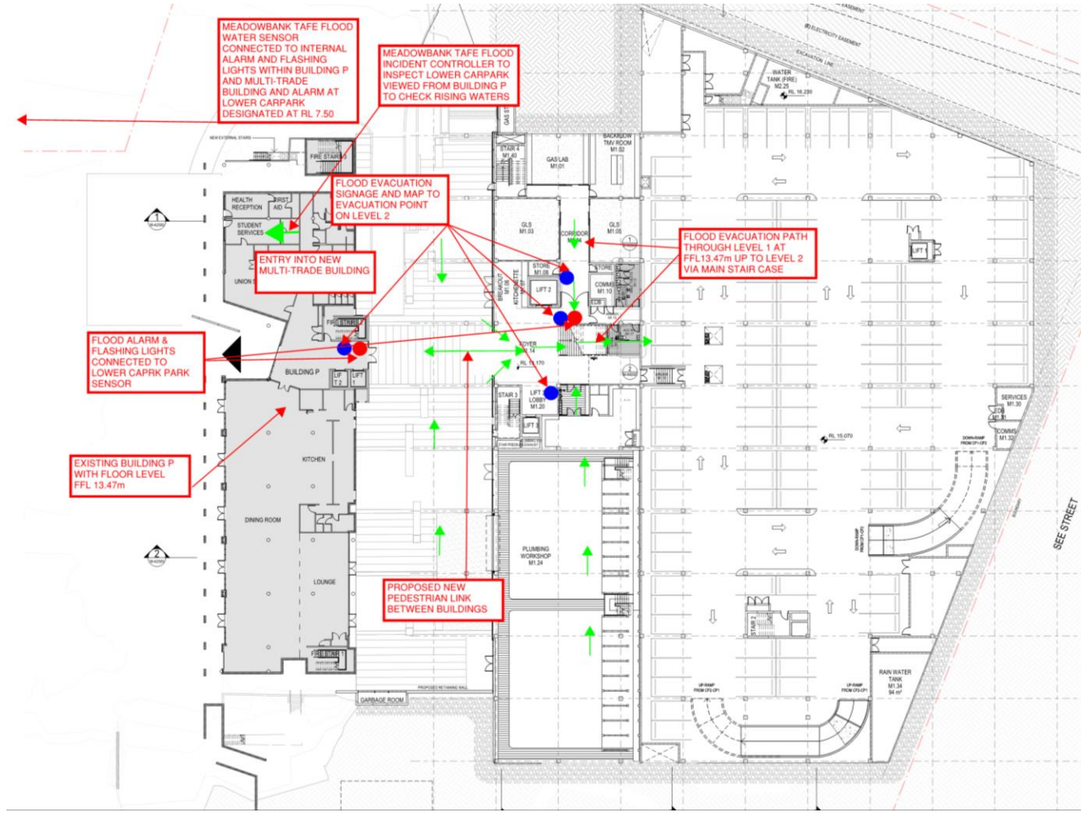


Figure 6.3.1. Flood Evacuation Plan Diagram Level 1

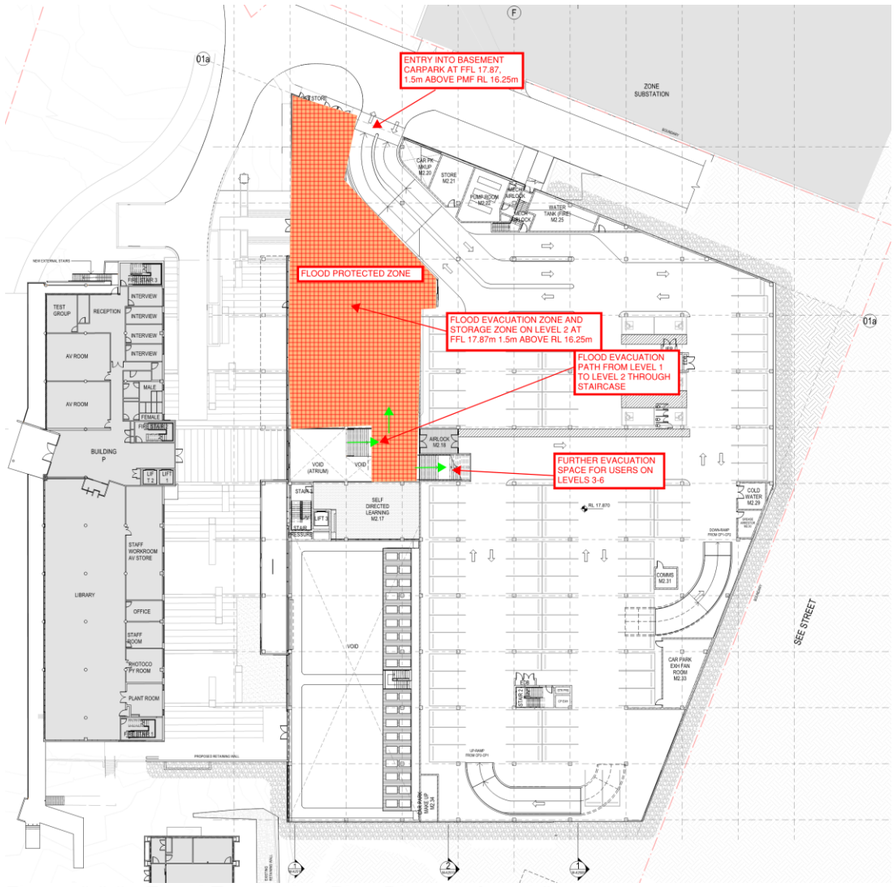


Figure 6.3.2. Flood Evacuation Plan Diagram Level 2

6.4 Flood Education

Site awareness of flooding is a significant issue within the floodplain due to the infrequency of severe floods and the anticipated depths of these floods in a PMF event.

6.4.1 Staff

As part of the preparation for a flood event, the staff managing the building will be made aware of the flood risk and their obligation to evacuate the ground floor when flood flows into the north western lower carpark of the TAFE site. Inductions will be held to educate staff on their role during a flood event. Staff to keep record of student/staff briefings.

6.4.2 Users/Student/Staff

Users of the site are to be made aware of the flood risk and the response requirement during a flood event which creates stagnant flooding in excess of 2.8m in the western pedestrian connection between buildings P and the Multi-Trade Centre as well as Level 1 in the PMF storm. As part of this procedure, evacuation drills should be conducted regularly to ensure users are aware of the procedures for sheltering on the Level level.

6.5 Flood Evacuation Drills

It is recommended that evacuation drills be held at a minimum of twice yearly to ensure all residents and staff are aware of and familiar with their flood response actions, the sound of the alert and occupancy warning system, and the location of the assembly point.

All staff will be trained in the flood response procedures with mandatory drills to be conducted twice a year as per Iglu Summer Hill's Work Health Safety (WHS) calendar. Personal safety awareness sessions will be conducted at the start of each semester or three (3) time a year.

6.6 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 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's Emergency Management Plan; and
- Emergency contact numbers.

This Emergency Kit should be stored in a waterproof container and is the responsibility of the First Aid Officer.

6.7 Coordination of Flood Response Warnings and Orders

TAFE Meadowbank Staff will decide when to issue Flood Response Warnings and Orders for the site.

A water level sensor device will be provided at the landscaped area south of the communal area as shown in the Figure 1.0. The flood water level sensor will be set up to provide early flood warning when flood water reaches 300mm deep in the in the southern pedestrian connection to provide early warning.

The early warning system installed will be connected to the 24/7 reception and student concierge service, Iglu's Incident Controller, to distribute these warnings to residents.

The Incident Controller will initiate a flood response and occupant warning through a Public Address (PA) system including continuous bell that can alert residents and staff in the event of an emergency immediately followed by door to door entry** to each accommodation located at lower ground level.

Flood Response Plan	
Alarm Condition	Recommended actions
1) Local Councils or Bureau of Meteorology issues an alert, advice or warning.	Meadowbank TAFE NSW Incident Controller to observe ponding levels in Southern Laneway.
2) Flood Water level sensor sending alert High flooding level when depth of ponding in the western lower carpark equals or exceeds RL7.50m at approximately 30 mins	Meadowbank TAFE NSW Incident Controller to confirm the ponding is to RL7.50m depth.
	Send an alert and occupant warning message over the PA system confirming a major flood event. Announce that there is water over the laneway.
	Immediately commence door to door entry to each accommodation at Level 1 AND PEDSTRIAN LINK and evacuating them to Level 2 systematically to where a headcount will be undertaken and numbers reported to the incident controller.
	Confirm any remaining people in the Level 1 have been evacuated.
3) Alert will remain in place for approximately 2 hours or such time that the ponding depth recedes	Confirm that there is no ponding in the lower carpark. Once floodwater subsided below RL 7.50M in the western carpark, the Level 1 floor would be inspected by the incident controller. Once it has been confirmed that the water level has reduced for a period of at least 2 hours and if determined safe a final headcount would be undertaken. Upon confirmation of all persons safe and accounted for the incident controller may announce that residents can return to Level 1 floor and pedestrian area external to the building
4) Flooded areas are to remain off limits until ponding is cleared. The directions of police and SES are to be followed at all times.	

6.8 Climate Change Impact

The impact of climate change on flooding in the study area was investigated within the SKM flood study "Parramatta River - Ryde Sub-Catchments Flood Study" by analysing three scenarios of storm event rainfall intensity increase (10%, 20% and 30%) coupled with two sea level rise scenarios (2050 and 2100 scenarios, corresponding with 0.4m and 0.9m sea level rise, respectively, on top of the 5% AEP ocean level at Fort Denison). Their analysis indicated that flood levels are not sensitive to sea level rise except at the outlets of the catchments and along the Parramatta River, with a number of low-lying riverside residential properties at risk from increased sea level alone, without river or overland flooding. The SKM report highlighted that where flow depths are typically shallow, results weren't sensitive to the increased rainfall intensity (less than 0.03m increase), while flood depths in flow paths and storage areas were more sensitive to the increase in rainfall intensity. Climate change sensitivity analysis has been completed and shows that peak flood levels increase by up to 450mm (RL 7.95m) for 30% increase in rainfall, refer to fig 6.8.1

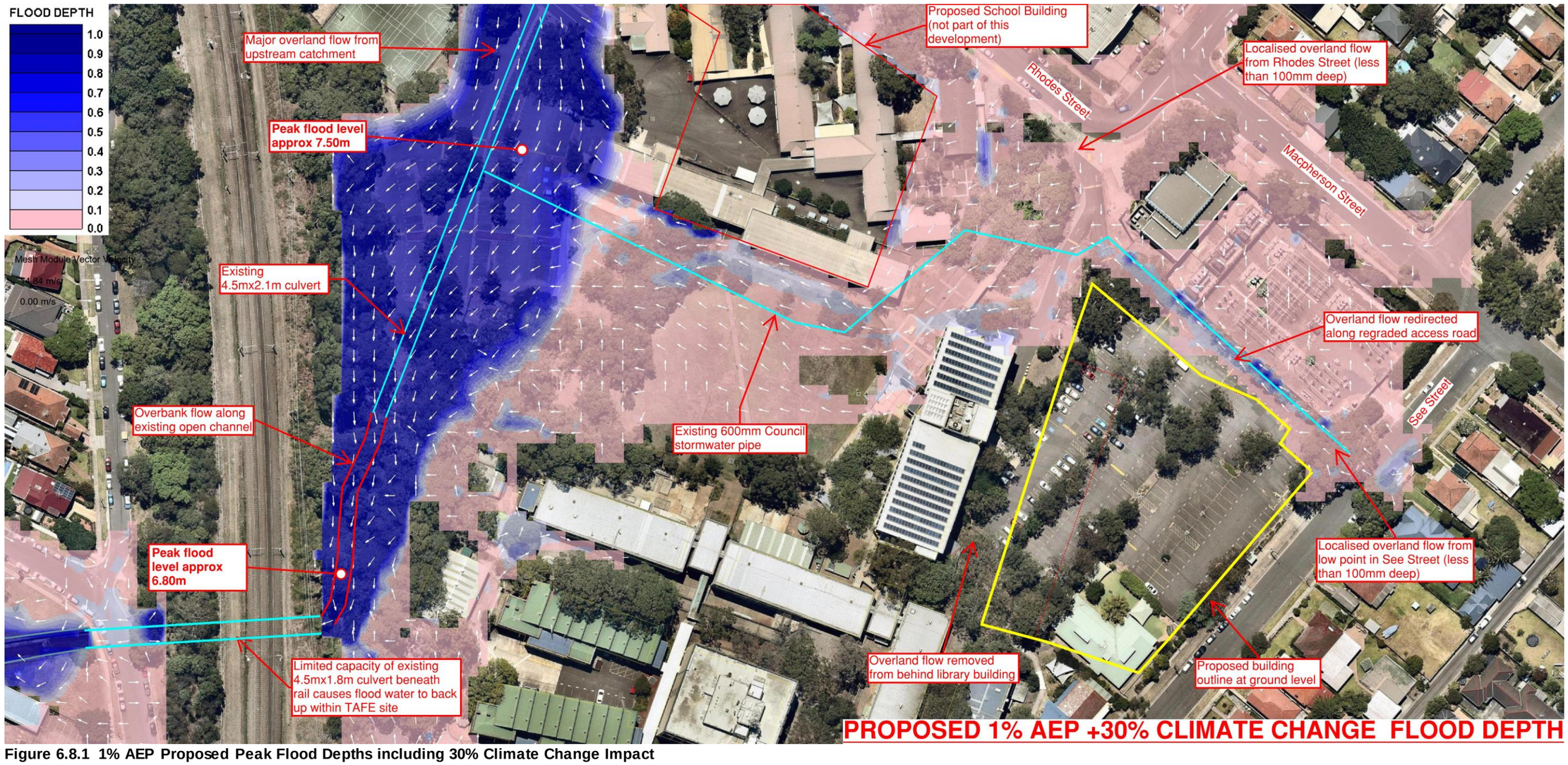


Figure 6.8.1 1% AEP Proposed Peak Flood Depths including 30% Climate Change Impact

7.0 Conclusion

This report provides a summary of the proposed flood impact management for the Meadowbank TAFE Campus.

Development does not adversely impact the existing flood regime in terms of diverting major overland flows. The implementation of the new Mulit-Trade Centre increases flood storage and flood evacuation education and sheltering. This submitted Flood Impact Statement demonstrates the development does not;

i. Reduce the pre-developed level of flood storage.

ii. Increase flood levels or velocities such to adversely impact adjoining dwellings.

Overland flow and flooding to be managed via several mitigation measures including flood evacuation education and procedure, flood detection and warning as well as training drills.

Prepared by

TAYLOR THOMSON WHITTING (NSW) PTY LTD
in its capacity as trustee for the
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Anthony Lahoud
Senior Civil Engineer

Authorised By

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Eirian Crabbe
Associate Director

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8.0 Appendix A: Flood Diagrams

FLOOD DEPTH

1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0

Major overland flow from upstream catchment

Peak flood level approx 7.50m

Existing 4.5mx2.1m culvert

Overbank flow along existing open channel

Peak flood level approx 6.80m

Limited capacity of existing 4.5mx1.8m culvert beneath rail causes flood water to back up within TAFE site

Existing 600mm Council stormwater pipe

Proposed School Building (not part of this development)

Rhodes Street

Localised overland flow from Rhodes Street (less than 100mm deep)

Macpherson Street

See Street

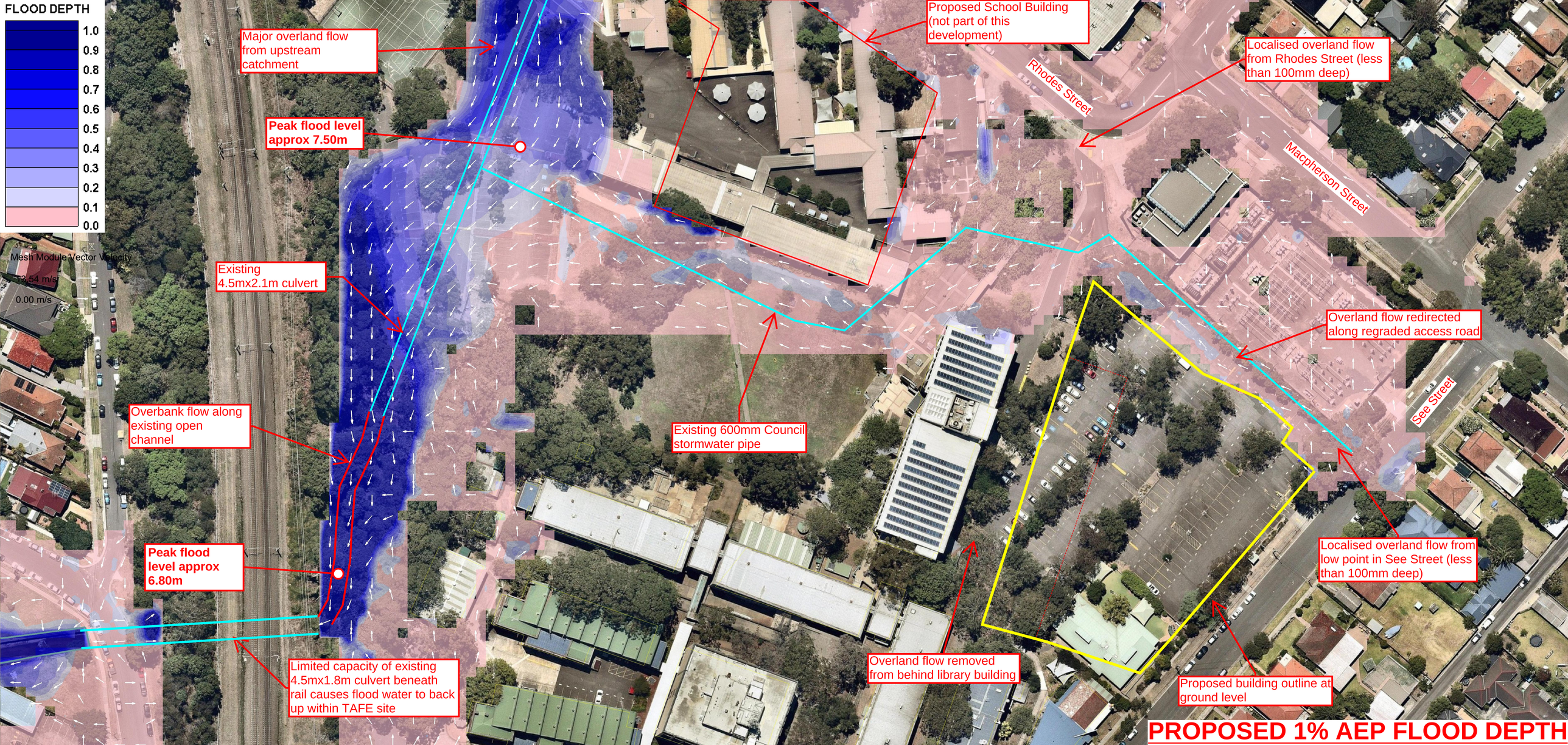
Minor overland flow through existing car park

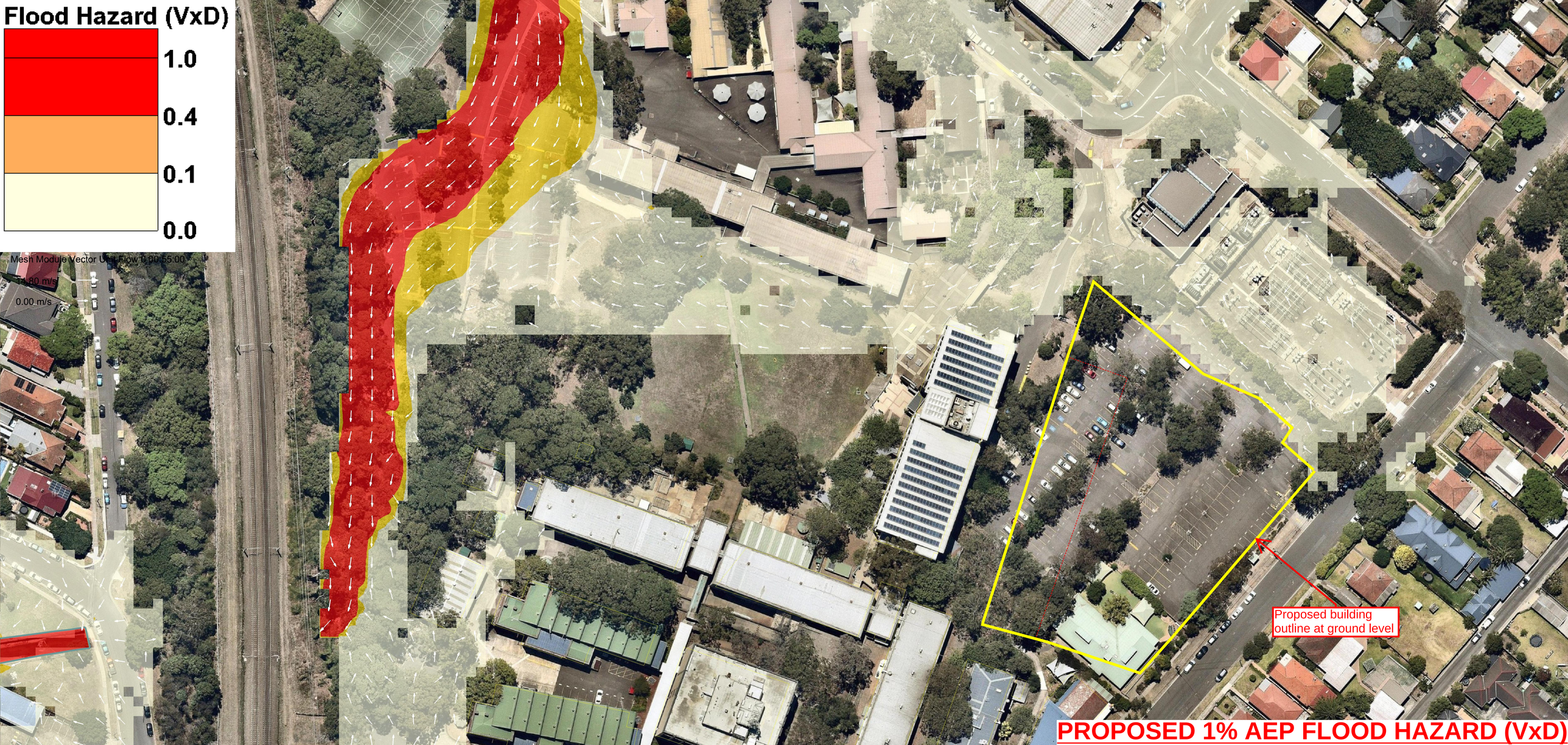
Overland flow from car park trapped behind library building (up to 500mm deep)

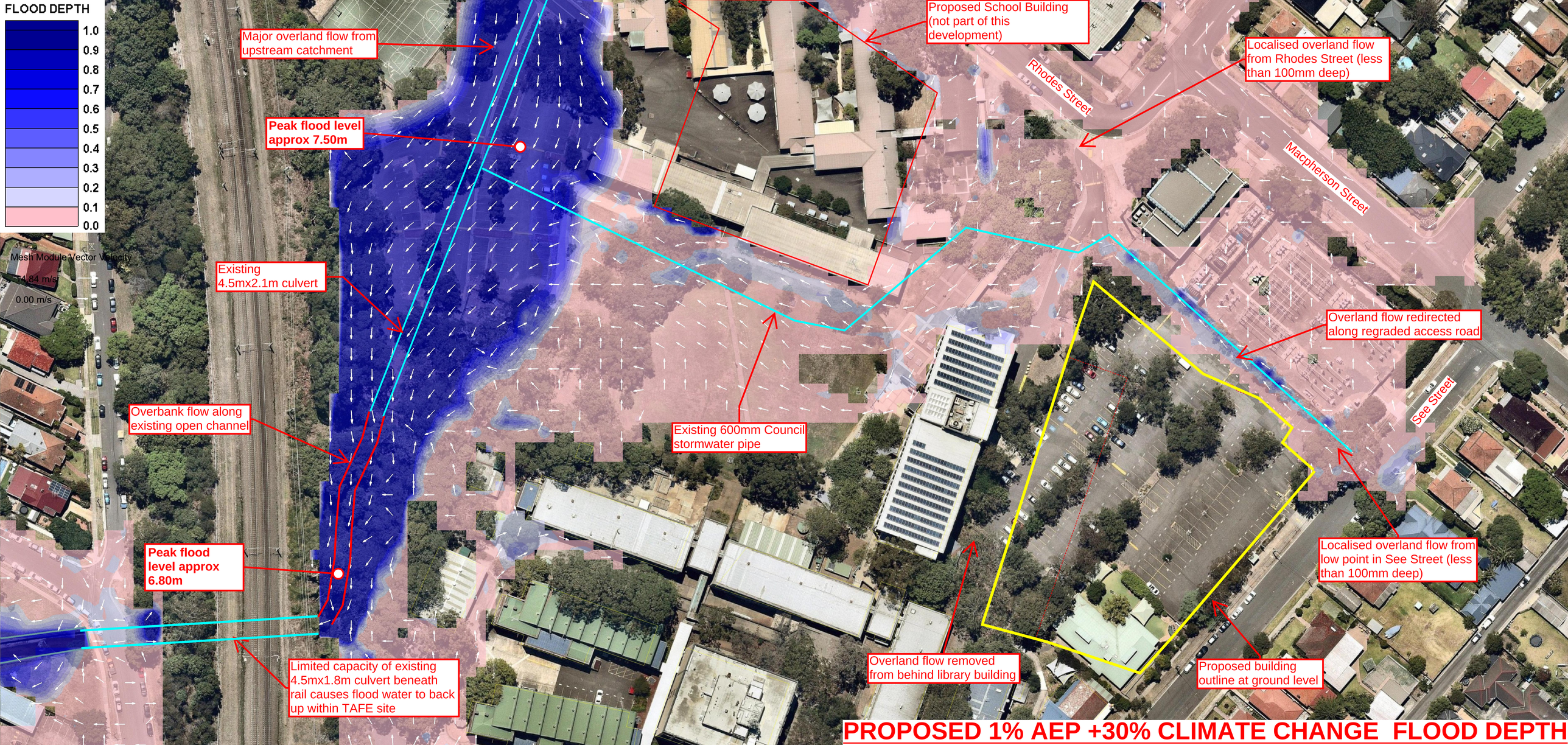
Proposed building outline at ground level

Localised overland flow from low point in See Street (less than 100mm deep)

EXISTING 1% AEP FLOOD DEPTH


FLOOD DEPTH
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
Mesh Module Vector Velocity
13.54 m/s
0.00 m/s
Major overland flow from upstream catchment
Peak flood level approx 7.50m
Existing 4.5mx2.1m culvert
Overbank flow along existing open channel
Peak flood level approx 6.80m
Limited capacity of existing 4.5mx1.8m culvert beneath rail causes flood water to back up within TAFE site
Existing 600mm Council stormwater pipe
Proposed School Building (not part of this development)
Rhodes Street
Localised overland flow from Rhodes Street (less than 100mm deep)
Macpherson Street
Overland flow redirected along regraded access road
See Street
Localised overland flow from low point in See Street (less than 100mm deep)
Overland flow removed from behind library building
Proposed building outline at ground level
PROPOSED 1% AEP FLOOD DEPTH


Flood Hazard (VxD)
1.0
0.4
0.1
0.0
Mesh Module Vector Unit Flow 0:00:55:00
1.80 m/s
0.00 m/s
Proposed building outline at ground level
PROPOSED 1% AEP FLOOD HAZARD (VxD)


FLOOD DEPTH
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
Mesh Module Vector Velocity
4.84 m/s
0.00 m/s
Major overland flow from upstream catchment
Peak flood level approx 7.50m
Existing 4.5mx2.1m culvert
Overbank flow along existing open channel
Peak flood level approx 6.80m
Limited capacity of existing 4.5mx1.8m culvert beneath rail causes flood water to back up within TAFE site
Existing 600mm Council stormwater pipe
Proposed School Building (not part of this development)
Rhodes Street
Localised overland flow from Rhodes Street (less than 100mm deep)
Macpherson Street
Overland flow redirected along regraded access road
See Street
Localised overland flow from low point in See Street (less than 100mm deep)
Overland flow removed from behind library building
Proposed building outline at ground level
PROPOSED 1% AEP +30% CLIMATE CHANGE FLOOD DEPTH

FLOOD DEPTH

<4.0
3.6
3.2
2.8
2.4
2.0
1.6
1.2
0.8
0.4
0.0

Major overland flow from upstream catchment

Peak flood level approx 16.25m

Existing 4.5mx2.1m culvert

Existing 600mm Council stormwater pipe

Proposed School Building (not part of this development)

Rhodes Street

Localised overland flow from Rhodes Street (less than 100mm deep)

Peak flood level approx 16.25m

Macpherson Street

See Street

Overbank flow along existing open channel

Peak flood level approx 16.25m

Minor overland flow through existing car park

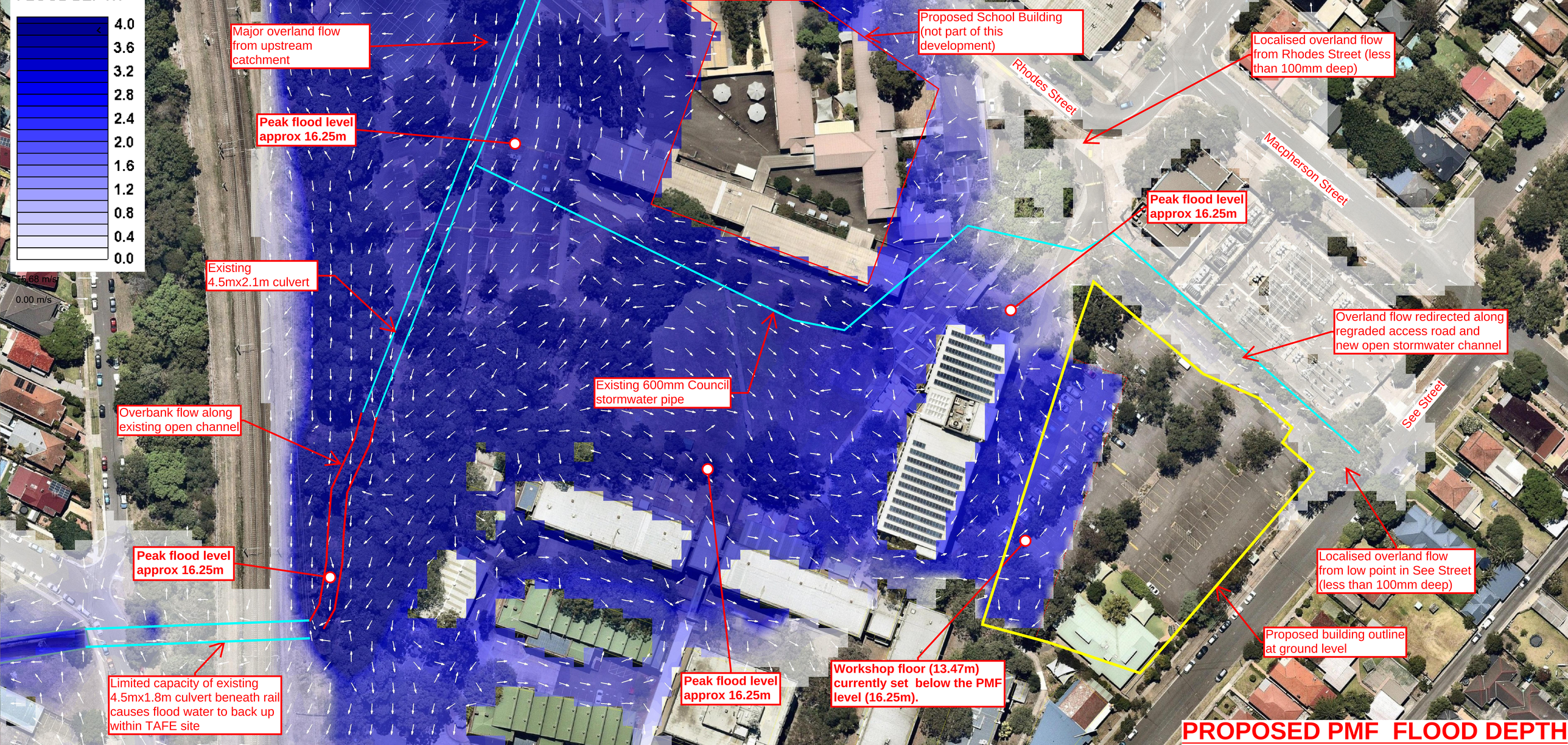
Localised overland flow from low point in See Street (less than 100mm deep)

Peak flood level approx 16.25m

Proposed building outline at ground level

Limited capacity of existing 4.5mx1.8m culvert beneath rail causes flood water to back up within TAFE site

EXISTING PMF FLOOD DEPTH


4.0
3.6
3.2
2.8
2.4
2.0
1.6
1.2
0.8
0.4
0.0
5.68 m/s
0.00 m/s
Major overland flow from upstream catchment
Peak flood level approx 16.25m
Existing 4.5mx2.1m culvert
Overbank flow along existing open channel
Peak flood level approx 16.25m
Limited capacity of existing 4.5mx1.8m culvert beneath rail causes flood water to back up within TAFE site
Existing 600mm Council stormwater pipe
Peak flood level approx 16.25m
Proposed School Building (not part of this development)
Rhodes Street
Localised overland flow from Rhodes Street (less than 100mm deep)
Macpherson Street
Peak flood level approx 16.25m
Overland flow redirected along regraded access road and new open stormwater channel
See Street
Localised overland flow from low point in See Street (less than 100mm deep)
Proposed building outline at ground level
Workshop floor (13.47m) currently set below the PMF level (16.25m).
PROPOSED PMF FLOOD DEPTH

9.0 Appendix B: Proposed Development Plan

THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT NOTES ON DRAWING S0001

CIVILWORK - MEADOWBANK TAFE PHASE 2.1

Combined Multi-Trades and Digital Technology Hub

GENERAL NOTES

1. Contractor must verify all dimensions and existing levels on site prior to commencement of works. Any discrepancies to be reported to the Engineer .
2. Strip all topsoil from the construction area. All stripped topsoil shall be disposed of off-site unless directed otherwise.
3. Make smooth connection with all existing works.
4. Compact subgrade under buildings and pavements to minimum 98% standard maximum dry density in accordance with AS 1289 5.1.1. Compaction under buildings to extend 2m minimum beyond building footprint.
5. All work on public property, property which is to become public property, or any work which is to come under the control of the Statutory Authority, the Contractor is to ensure that the drawings used for construction have been approved by all relevant authorities prior to commencement site.
6. All work on public property, property which is to become public property, or any work which is to come under the control of the Statutory Authority is to be carried out in accordance with the requirements of the relevant Authority. The Contractor shall obtain these requirements from the Authority. Where the requirements of the Authority are different to the drawings and specifications, the requirements of the Authority shall be applicable.
7. For all temporary batters refer to geotechnical recommendations.

REFERENCE DRAWINGS

1. These drawings have been based from, and to be read in conjunction with the following Consultants drawings. Any conflict to the drawings must be notified immediately to the Engineer.

Consultant	Dwg Title	Dwg No	Rev	Date
THOMSON ADSETT	FLOOR PLANS	REVIT MODEL		01.05.19
	SURVEY	35179 DETAIL MGA WITH PATH		

SITEWORKS NOTES

1. All basecourse material to comply with RMS specification No 3051 and compacted to minimum 98% modified standard dry density in accordance with AS 1289 5.2.1.
2. All trench backfill material shall be compacted to the same density as the adjacent material.
3. All service trenches under vehicular pavements shall be backfilled with an approved select material and compacted to a minimum 98% standard maximum dry density in accordance with AS 1289 5.1.1

CONCRETE FINISHING NOTES

1. All exposed concrete pavements are to be broomed finished.
2. All edges of the concrete pavement including keyed and dowelled joints are to be finished with an edging tool.
3. Concrete pavements with grades greater than 10 % shall be heavily broomed finished.
4. Carborundum to be added to all stair treads and ramped crossings U.N.O.

SURVEY AND SERVICES INFORMATION

SURVEY

Origin of levels :
Datum of levels : A.H.D. AUSTRALIAN HEIGHT DATUM
Coordinate system : MGA
Survey prepared by :
Setout Points : CONTACT THE SURVEYOR

Taylor Thomson Whitting does not guarantee that the survey information shown on these drawings is accurate and will accept no liability for any inaccuracies in the survey information provided to us from any cause whatsoever.

UNDERGROUND SERVICES - WARNING

The locations of underground services shown on Taylor Thomson Whittings drawings have been plotted from diagrams provided by service authorities. This information has been prepared solely for the authorities own use and may not necessarily be updated or accurate.

The position of services as recorded by the authority at the time of installation may not reflect changes in the physical environment subsequent to installation.

Taylor Thomson Whitting does not guarantee that the services information shown on these drawings shows more than the presence or absence of services, and will accept no liability for inaccuracies in the services information shown from any cause whatsoever.

The Contractor must confirm the exact location and extent of services prior to construction and notify any conflict with the drawings immediately to the Engineer/Superintendent.

The contractor is to get approval from the relevant state survey department, to remove/adjust any survey mark. This includes but is not limited to; State Survey Marks (SSM), Permanent Marks (PM), cadastral reference marks or any other survey mark which is to be removed or adjusted in any way.
Taylor Thomson Whitting plans do not indicate the presence of any survey mark. The contractor is to undertake their own search.

BOUNDARY AND EASEMENT NOTE

The property boundary and easement locations shown on Taylor Thomson Whitting drawing's have been based from information received from : No boundary information received.
Refer architect for boundary information and locations

Taylor Thomson Whitting makes no guarantees that the boundary or easement information shown is correct.
Taylor Thomson Whitting will accept no liabilities for boundary inaccuracies. The contractor/builder is advised to check/confirm all boundaries in relation to all proposed work prior to the commencement of construction. Boundary inaccuracies found are to be reported to the superintendent prior to construction starting.

EXISTING SERVICES LEGEND

- S — Existing sewer
- W — Existing water
- EU — Existing underground electrical
- EA — Existing aerial electrical
- T — Existing communications
- G — Existing gas
- SW — Existing stormwater

DBYD SERVICES NOTE

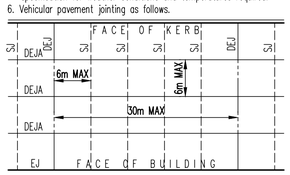
"Public Service Utility information shown on plan has been complied from information received from Dial Before You Dig inquiry, reference Number 15084520, which was obtained on 10/10/18.
Unless specifically shown otherwise, this location and depth of services shown on this plan have not been verified.

The location of services shown on this drawing have been plotted as accurately as possible from diagrams provided by service authorities and should be confirmed by site inspection."

JOINTING NOTES

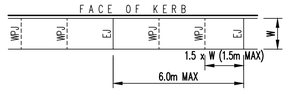
Vehicular Pavement Jointing

1. All vehicular pavements to be jointed as shown on drawings.
2. Keyed construction joints should generally be located at a maximum of 6m centres.
3. Sawn joints should generally be located at a maximum of 6m centres or 1.5 x the spacing of keyed joints, where key joint spacing is less than 4m, with dowelled expansion joints at maximum of 30m centres.
4. Provide 10mm wide full depth expansion joints between buildings and all concrete or unit pavers.
5. The timing of the saw cut is to be confirmed by the contractor on site. Site conditions will determine how many hours after the concrete pour before the saw cuts are commenced. Refer to the specification for weather conditions and temperatures required.
6. Vehicular pavement jointing as follows.



Pedestrian Footpath Jointing

1. Expansion joints are to be located where possible at tangent points of curves and elsewhere at max 6.0m centres.
2. Weakened plane joints are to be located at a max 1.5 x width of the pavement.
3. Where possible joints should be located to match kerbing and / or adjacent pavement joints.
4. All pedestrian footpath jointings as follows (uno).



KERBING NOTES

Includes all kerbs, gutters, dish drains, crossings and edges.

1. All kerbs, gutters, dish drains and crossings to be constructed on minimum 75mm granular basecourse compacted to minimum 98% modified maximum dry density in accordance with AS 1289 5.2.1.
2. Expansion joints (EJ) to be formed from 10mm compressible cork filler board for the full depth of the section and cut to profile. Expansion joints to be located at drainage pits, on tangent points of curves and elsewhere at 12m centres except for integral kerbs where the expansion joints are to match the joint locations in slabs.
3. Weakened plane joints to be min 3mm wide and located at 3m centres except for integral kerbs where weakened plane joints are to match the joint locations in slabs.
4. Broomed finished to all ramped and vehicular crossings, all other kerbing or dish drains to be steel float finished.
5. In the replacement of kerbs –
   Existing road pavement is to be sawcut 900mm from lip of gutter. Upon completion of new kerbs, new basecourse and surface is to be laid 900mm wide to match existing materials and thicknesses.
   Existing allotment drainage pipes are to be built into the new kerb with a 100mm dia hole.
   Existing kerbs are to be completely removed where new kerbs are shown.

SAFETY IN DESIGN

Contractor to refer to Appendix B of the Civil Specification for the Civil Risk and Solutions Register.

EXISTING SERVICES

Contractor to be aware existing services are located within the site. Location of all services to be verified by the Contractor prior to commencing works. Contractor to confirm with relevant authority regarding measures to be taken to ensure services are protected or procedures are in place to demolish and/or relocate.

EXISTING STRUCTURES

Contractor to be aware existing structures may exist within the site. To prevent damage to existing structure(s) and/or personnel, site works to be carried out as far as practicably possible from existing structure(s).

EXISTING TREES

Contractor to be aware existing trees exist within the site which need to be protected. To prevent damage to trees and/or personnel, site works to be carried out as far as practicably possible from existing trees. Advice needs to be sought from Arborist and/or Landscape Architect on measures required to protect trees.

GROUNDWATER

Contractor to be aware ground water levels are close to existing surface level. Temporary de-watering may be required during construction works.

EXCAVATIONS

Deep excavations due to stormwater drainage works is required. Contractor to ensure safe working procedures are in place for works. All excavations to be fenced off and batters adequately supported to approval of Geotechnical Engineer.

GROUND CONDITIONS

Contractor to be aware of the site geotechnical conditions. Refer to geotechnical report by (JK GEOTECHNICS) for details.

HAZARDOUS MATERIALS

Existing asbestos products & contaminated material may be present on site. Contractor to ensure all hazardous materials are identified prior to commencing works. Safe working practices as per relevant authority to be adopted and appropriate PPE to be used when handling all hazardous materials. Refer to geotechnical/environmental report by (insert report details) for details.

CONFINED SPACES

Contractor to be aware of potential hazards due to working in confined spaces such as stormwater pits, trenches and/or tanks. Contractor to provide safe working methods and use appropriate PPE when entering confined spaces.

MANUAL HANDLING

Contractor to be aware manual handling may be required during construction. Contractor to take appropriate measures to ensure manual handling procedures and assessments are in place prior to commencing works.

WATER POLLUTION

Contractor to ensure appropriate measures are taken to prevent pollutants from construction works contaminating the surrounding environment.

SITE ACCESS/EGRESS

Contractor to be aware site works occur in close proximity to footpaths and roadways. Contractor to erect appropriate barriers and signage to protect site personnel and public.

VEHICLE MOVEMENT

Contractor to supply and comply with traffic management plan and provide adequate site traffic control including a certified traffic marshall to supervise vehicle movements where necessary.

SITEWORKS LEGEND

- ● F22.20 — Finished surface level
- F22.00 — Finished contour
- K&G — Kerb and gutter
- KO — Kerb only
- FK — Flush kerb
- DD — Dish drain
- TE — Thickened Edge
- IK+TE — Intergrated kerb + Thickened Edge
- Taper kerb to zero height over 500 mm
- CRW# — Wheelstop
- SRW — Civil retaining wall
- SHW — Wall detailed by structural engineer
- DEJ — Shotcrete Wall detailed by Geotechnical engineer
- SJ — Dowelled expansion joint
- KJ — Sawn joint
- WPJ — Keyed construction joint
- EJ — Weakened plane joint
- Guard Rail — Expansion joint

DRAWING SCHEDULE

Drawing No.	Drawing Title
SKC100	NOTES AND LEGEND SHEET
SKC102	EROSION & SEDIMENT CONTROL PLAN
SKC110	SITEWORKS AND STORMWATER PLAN
SKC120	TYPICAL DETAILS SHEET 1

FileName: SKC100.dwg - USER: anthonyl - Plot File Created: Oct 03, 2019 - 11:34pm

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Rev	Description	Eng	Draft	Date
P2	ISSUED FOR SSDA	AL	SP	03.10.19
P1	PRELIMINARY	AL	PM	09.08.19

Client: NSW GOVERNMENT TAFE NSW

Architect: GRAY PUKSAND
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Ph. (02) 92479422

Structural Engineer: TTW Taylor Thomson Whitting
612 9439 7288 | 48 Chandos Street St Leonards NSW 2065

Project: TAFE MEADOWBANK
MULTI-TRADES AND DIGITAL TECHNOLOGY HUB

Sheet Subject: NOTES AND LEGEND SHEET

PRELIMINARY

Scale : A1	Drawn	Authorised
NTS	PM	

Job No	Drawing No	Revision
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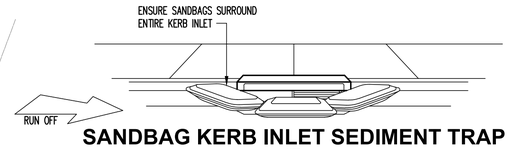
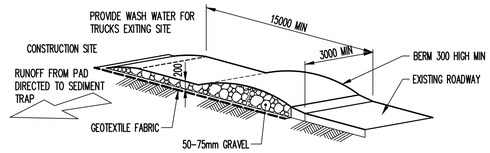
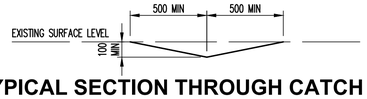


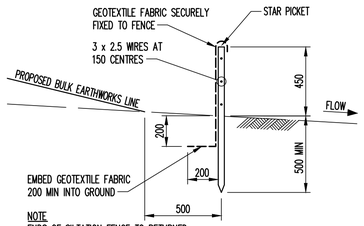
SANDBAG KERB INLET SEDIMENT TRAP
NTS



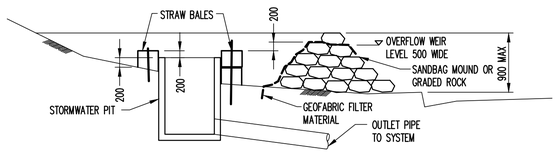
TEMPORARY CONSTRUCTION EXIT
NTS



TYPICAL SECTION THROUGH CATCH DRAIN
SCALE 1: 20



SILTATION FENCE DETAIL
SCALE 1: 20



SEDIMENTATION TRAP
NTS

EROSION AND SEDIMENT CONTROL NOTES

1. All work shall be generally carried out in accordance with
   (A) Local authority requirements,
   (B) EPA – Pollution control manual for urban stormwater,
   (C) LANDCOM NSW – Managing Urban Stormwater: Soils and Construction ("Blue Book").
2. Erosion and sediment control drawings and notes are provided for the whole of the works. Should the Contractor stage these works then the design may be required to be modified. Variation to these details may require approval by the relevant authorities.
   The erosion and sediment control plan shall be implemented and adapted to meet the varying situations as work on site progresses.
3. Maintain all erosion and sediment control devices to the satisfaction of the superintendent and the local authority.
4. When stormwater pits are constructed prevent site runoff entering the pits unless silt fences are erected around pits.
5. Minimise the area of site being disturbed at any one time.
6. Protect all stockpiles of materials from scour and erosion. Do not stockpile loose material in roadways, near drainage pits or in watercourses.
7. All soil and water control measures are to be put back in place at the end of each working day, and modified to best suit site conditions.
8. Control water from upstream of the site such that it does not enter the disturbed site.
9. All construction vehicles shall enter and exit the site via the temporary construction entry/exit.
10. All vehicles leaving the site shall be cleaned and inspected before leaving.
11. Maintain all stormwater pipes and pits clear of debris and sediment. Inspect stormwater system and clean out after each storm event.
12. Clean out all erosion and sediment control devices after each storm event.

Sequence Of Works

1. Prior to commencement of excavation the following soil management devices must be installed.
1.1. Construct silt fences below the site and across all potential runoff sites.
1.2. Construct temporary construction entry/exit and divert runoff to suitable control systems.
1.3. Construct measures to divert upstream flows into existing stormwater system.
1.4. Construct sedimentation traps/basin including outlet control and overflow.
1.5. Construct turf lined swales.
1.6. Provide sandbag sediment traps upstream of existing pits.
2. Construct geotextile filter pit surround around all proposed pits as they are constructed.
3. On completion of pavement provide sand bag kerb inlet sediment traps around pits.
4. Provide and maintain a strip of turf on both sides of all roads after the construction of kerbs.

WATER QUALITY TESTING REQUIREMENTS

Prior to discharge of site stormwater, groundwater and seepage water into council's stormwater system, contractors must undertake water quality tests in conjunction with a suitably qualified environment consultant outlining the following:

- Compliance with the criteria of the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000)
- If required subject to the environmental consultants advice, provide remedial measures to improve the quality of water that is to be discharged into Councils storm water drainage system.This should include comments from a suitably qualified environmental consultant confirming the suitability of these remedial measures to manage the water discharged from the site into Councils storm water drainage system. Outlining the proposed, ongoing monitoring, contingency plans and validation program that will be in place to continually monitor the quality of water discharged from this site. This should outline the frequency of water quality testing that will be undertaken by a suitably qualified environmental consultant.

PRELIMINARY

Rev	Description	Eng	Draft	Date
P2	ISSUED FOR SSDA	AL	SP	03.10.19
P1	PRELIMINARY	AL	SP	06.09.19

Client: NSW GOVERNMENT TAFE NSW

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Project: TAFE MEADOWBANK
MULTI-TRADES AND DIGITAL TECHNOLOGY HUB

Sheet Subject: EROSION AND SEDIMENT CONTROL PLAN

Scale : A1 1:300 | Drawn PM | Authorised

Job No 191346 | Drawing No SKC102 | Revision P2

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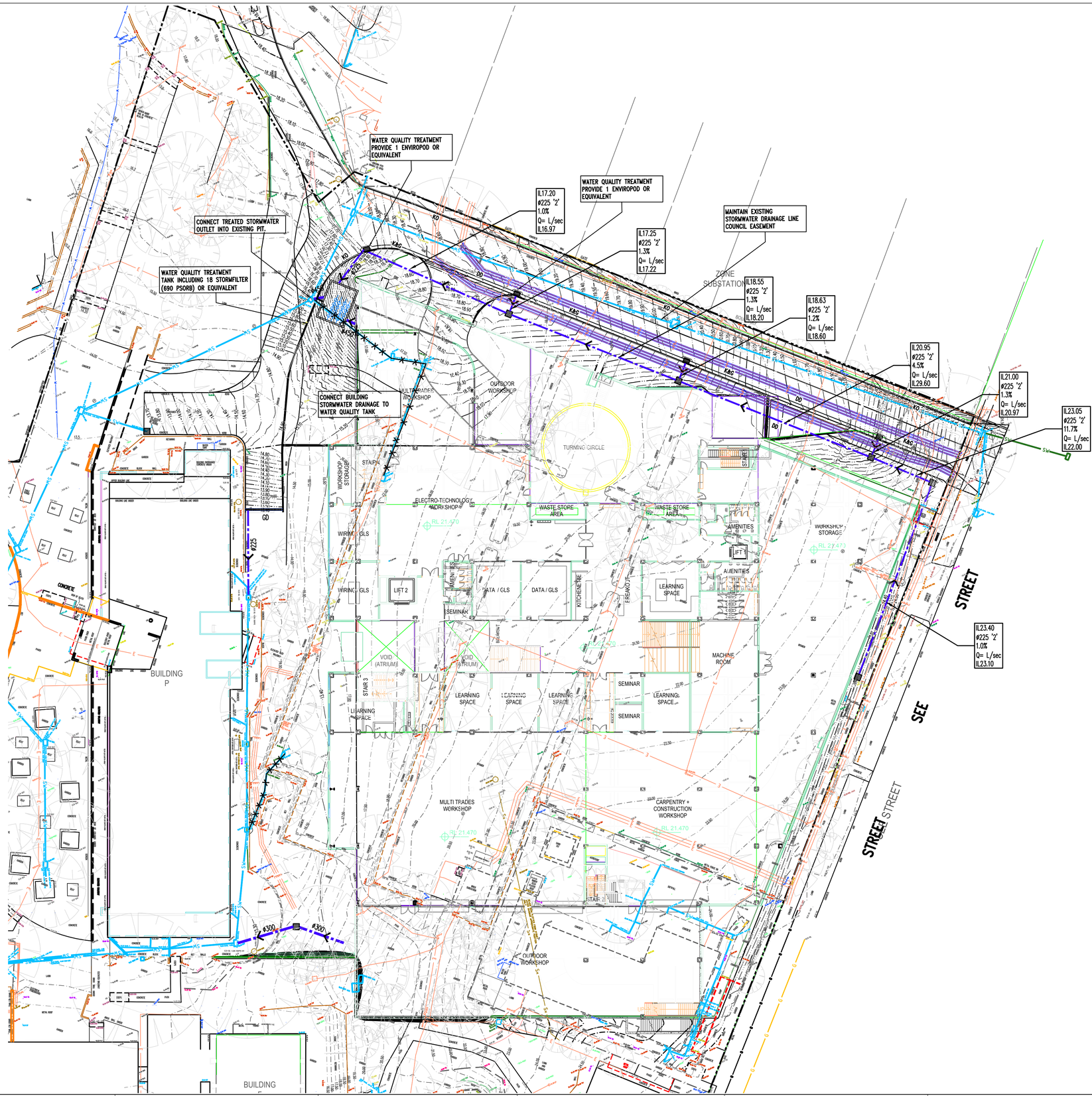
FileName: SKC102.dwg - USER: anthonyl - Plot File Created: Oct 03, 2019 - 11:36pm

A1 0 1 2 3 4 5 6 7 8 9 10



FileName: SKC110.dwg – USER: anthonyt – Plot File Created: Oct 03, 2019 - 10:05pm

A1 0 1 2 3 4 5 6 7 8 9 10

Rev	Description	Eng	Draft	Date
P2	ISSUED FOR SSDA	AL	SP	03.10.19
P1	PRELIMINARY	AL	SP	24.09.19

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Structural Engineer: TTW Taylor Thomson Whitting
612 9439 7288 | 48 Chandos Street St Leonards NSW 2065

Project: TAFE MEADOWBANK
MULTI-TRADES AND DIGITAL TECHNOLOGY HUB

Sheet Subject: SITEWORKS AND STORMWATER PLAN

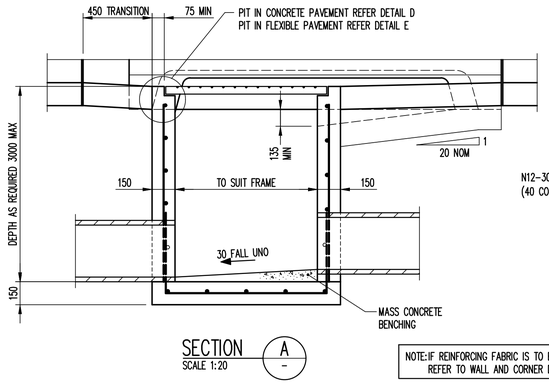
PRELIMINARY

Scale : A1	Drawn	Authorised
1:300	PM	

Job No	Drawing No	Revision
191346	SKC110	P2

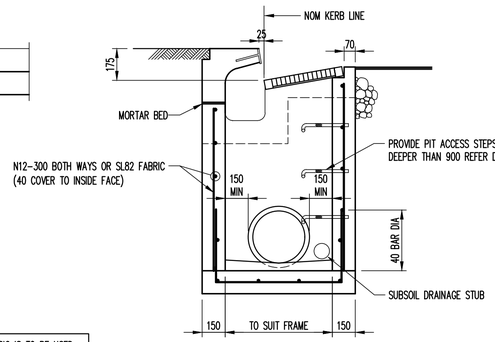
Plot File Created: Oct 03, 2019 - 10:05pm

THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT NOTES ON DRAWING S0001

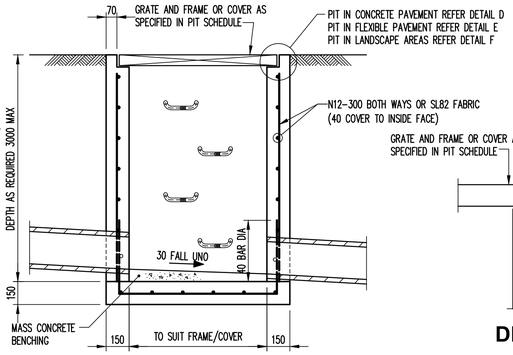


SECTION A
SCALE 1:20

NOTE:IF REINFORCING FABRIC IS TO BE USED REFER TO WALL AND CORNER DETAILS

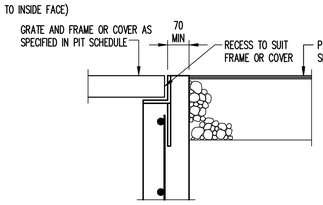


SECTION B
SCALE 1:20

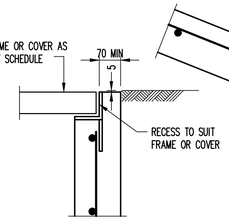


SECTION D
SCALE 1:20

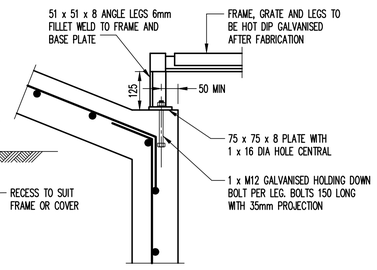
NOTE:IF REINFORCING FABRIC IS TO BE USED REFER TO WALL AND CORNER DETAILS



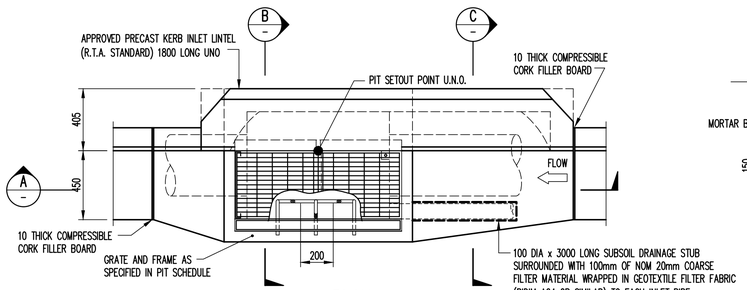
DETAIL E
SCALE 1: 10



DETAIL F
SCALE 1: 10

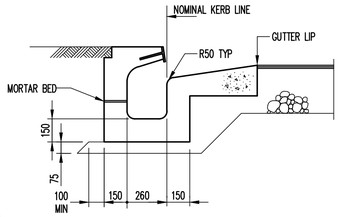


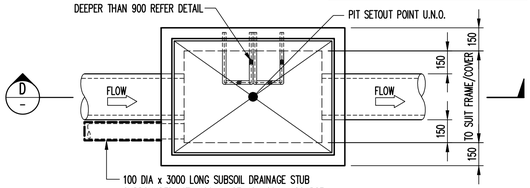
DETAIL G
SCALE 1: 10



PLAN
SCALE 1: 20

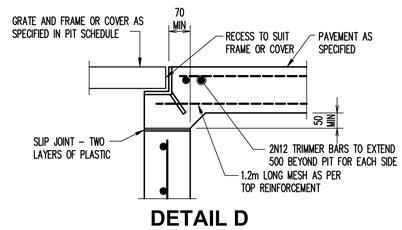
PIT TYPE A



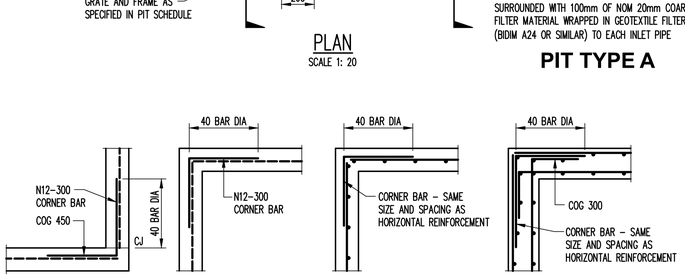


PLAN
SCALE 1: 20

PIT TYPE B



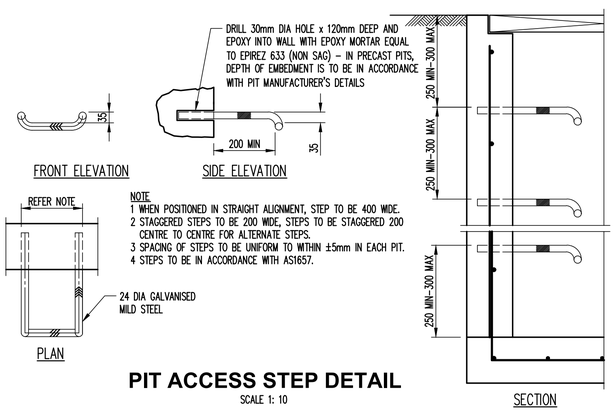
DETAIL D
SCALE 1: 10



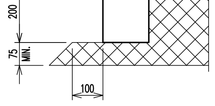
ELEVATION AT BASE | PLAN | PLAN–SINGLE LAYER | PLAN–DOUBLE LAYER

FABRIC | REINFORCEMENT

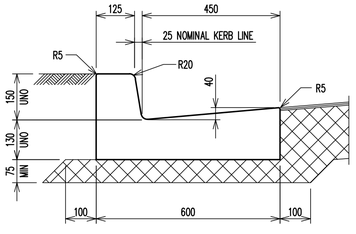
PIT CORNER DETAILS
SCALE 1: 20



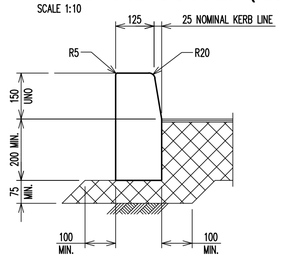
PIT ACCESS STEP DETAIL
SCALE 1: 10



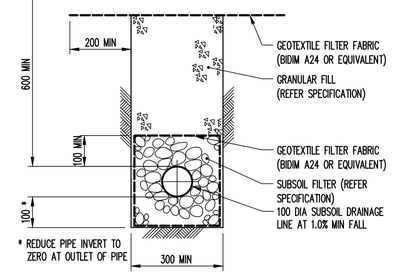
FLUSH KERB (FK)
SCALE 1:10



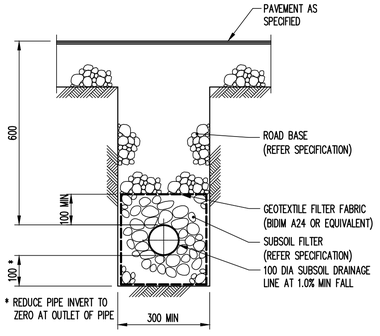
KERB AND GUTTER (K&G)
SCALE 1:10



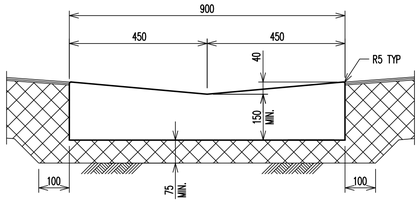
KERB ONLY (KO)
SCALE 1:10



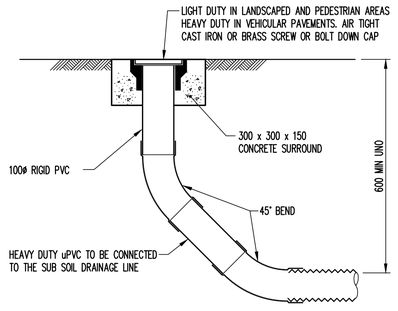
SUBSOIL IN LANDSCAPED AREAS
SCALE 1: 10



SUBSOIL IN PAVED AREAS
SCALE 1: 10



DISH DRAIN (DD)
SCALE 1:10



FLUSHING POINT (FP)
SCALE 1: 10
NOTE: SLOTTED RIGID PVC PIPE AND FITTINGS MAY BE USED

FileName: SKC120.dwg - USER: anthonyl - Plot File Created: Oct 03, 2019 - 11:36pm

A1 0 1 2 3 4 5 6 7 8 9 10

PRELIMINARY

Rev	Description	Eng	Draft	Date
P2	ISSUED FOR SSDA	AL	SP	03.10.19
P1	PRELIMINARY	DU	PM	09.08.19

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Project: TAFE MEADOWBANK
MULTI-TRADES AND DIGITAL TECHNOLOGY HUB

Sheet Subject: TYPICAL DETAIL SHEET 1

Scale : A1	Drawn	Authorised
AS SHOWN	PM	

Job No	Drawing No	Revision
191346	SKC120	P2

Plot File Created: Oct 03, 2019 - 11:36pm