KINGSWOOD PUBLIC SCHOOL

FLOOD IMPACT ASSESSMENT REPORT

Prepared for: Department of Education (DoE)
By: **en**struct group pty ltd
March 2025

KINGSWOOD PUBLIC SCHOOL

FLOOD IMPACT RISK ASSESSMENT REPORT

ISSUE AUTHORISATION

PROJECT: Kingswood Public School

Project No: 2200072

Rev	Date	Purpose of Issue / Nature of Revision	Prepared by	Reviewed by	Issue Authorised by
1	29/01/25	Issue for REF	ASE	TAH	PAL
2	4/03/25	Re-Issue for REF	ASE	TAH	PAL
3	12/03/25	Re-Issue for REF	ASE	TAH	PAL

Executive Summary

enstruct have been engaged by Department of Education (DoE) to provide flood engineering consultancy services for the development of Kingswood Public School (hereafter KPS).

The aim of the Flood Impact Assessment report is to assess the impact of a 1% Annual Exceedance Probability (AEP) storm and larger events up to and including the Probable Maximum Flood (PMF).

This report will raise awareness of the risk of flooding and must be read in conjunction with the Flood Emergency Management Plan (FEMP), which includes evacuation routes analysis, designated safe assembly areas and evacuation management plans.

This report supports the submitted for a Review of Environmental Factors (REF) documentation.

I. Contents

II. Abbreviations

The following abbreviations are used in this document:

AHD	Australian Height Datum
AEP	Annual Exceedance Probability
ARI	Average Recurrence Interval
COPC	City Of Parramatta Council
CDP	Development Control Plan
DoE	Department of Education
FERP	Flood Emergency Response Plan
FEMP	Flood Emergency Management Plan
FIAR	Flood Impact Assessment Report
FFL	Finished Floor Level
LGA	Local Government Area
OSD	On Site Detention
PMF	Probable Maximum Flood
SINSW	School Infrastructure NSW

1 Introduction

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

This document has been prepared in accordance with the Guidelines for Division 5.1 assessments (the Guidelines) by the Department of Planning, Housing and Infrastructure.

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

This report has been prepared to assess the impact of a 1% Annual Exceedance Probability (AEP) storm and larger events up to and including the Probable Maximum Flood (PMF).

This report will raise awareness of the risk of flooding and must be read in conjunction with the Civil Engineering report as well as the Flood Emergency Management Plan (FEMP), which includes evacuation routes analysis, designated safe assembly areas and evacuate on management plans.

1.1 Proposed Activity

The proposed activity for upgrades to Kingswood Public School includes:

- One (1) new single storey classroom building comprising eight (8) general learning spaces (GLS), two (2) learning commons areas, two (2) multi-purpose spaces and a verandah along the eastern side of the building;
- The construction of a covered walkway that will provide a connection between the proposed classroom building and an existing covered outdoor learning area (COLA) to the north east of the proposed building; and
- Removal of existing portable classroom buildings containing ten (10) classrooms.

The Review of Environmental Factors prepared by DFP planning consultants provides a full description of the proposed works.

1.2 Activity Site Description

The project site is located at 46-54 Second Avenue, Kingswood and is legally described as Lot 172 in Deposited Plan (DP) 839785. Kingswood Public School is located on the southern side of Second Avenue.

Figure 1 provides an aerial photograph of the site.

Figure 1: Site Plan (Source: Nearmap)

The activity is located within the Penrith City Council (PCC) LGA. The school covers an approximate area of 42,040m^2 and is generally rectangular in shape.

The Site is bound by Second Avenue to the north, residential properties to the west, Western Sydney University Kingswood Campus to the east, and Anglicare housing to the south,.

Site levels generally fall from the east to the west, however, the northern-most portion falls to the north. The highest point of the site is at the south-east corner with an elevation of 59.00m, and the lowest point is at the north-west corner with an elevation of 43.00m. There is a valley running through the southern portion of the site, just south of the bisecting tree line, and a gentle crest north of the tree line. There is an existing stormwater drainage line from the Western Sydney University campus underlying the valley

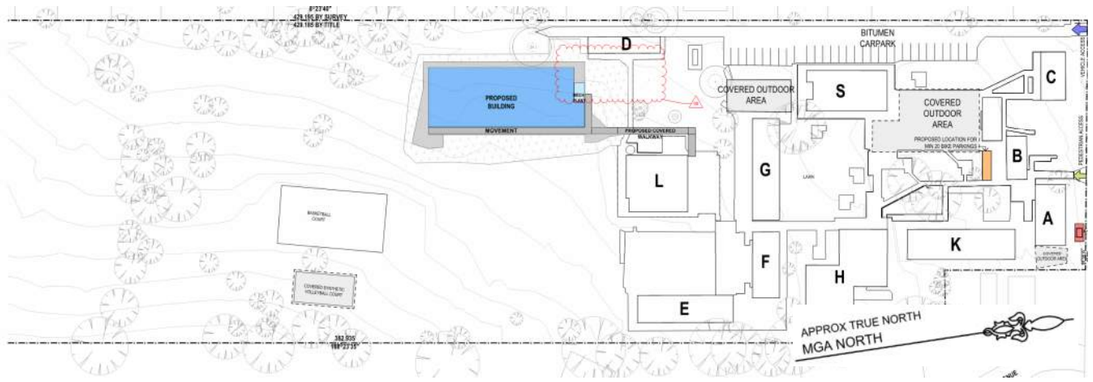

Figure 2: Site Plan (Source: Fulton Trotter)

1.3 Significance of Environmental Impacts

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

- The extent and nature of potential impacts are low and will not have significant impact on the locality, community and/or the environment.
- Potential impacts can be appropriately mitigated or managed to ensure that there is no significant impact on the environment.

2 Standards List

This Flood Impact Assessment Report has been prepared in accordance with the following documentation:

- PCC Development Control Plan (DCP) 2014 Part C3.5 Flood Planning,
- Penrith Local Environment Plan (LEP) 2010 Part 5.21 Flood Planning,
- NSW Flood Risk Manual
- Floodplain Development Manual (2005)
- PCC College, Orth and Werrington Creeks Catchment Overland Flow Flood Study 2017 Volume 1 & 2,
- PCC Flood Level Enquiry (17/12/2024) Reference. P-820532-Y7N5.

3 Existing Flood Behaviour

The current flood behaviour on the school site and surrounding area is based on PCC College, Orth and Werrington Creeks Catchment Overland Flow Flood Study 2017 Volume 1 & 2. Alongside this, PCC Flood Level Enquiry (17/12/2024) Reference. P-820532-Y7N5 reflect key flood behaviour of the wider Kingswood area. Key flood behaviour noted from these hazard maps include:

- There is a sag point at the western end of the valley through the site. This sag point experiences flooding in storm events from the 2-year Average Recurrence Interval (ARI) to the PMF event. The flood depths are minor and remain less than 300mm in all storm events. The localised ponding is further verified through confirmation of no failure, surcharge or ponding at the pits in the adjacent streets in all events up to the 0.2% AEP storm event.

- Overland flow from Manning Street travels down to Chapman Gardens and crosses Second Avenue to the north during storms greater than 10% AEP in intensity up to PMF, reaching a maximum depth of 0.5m at the along Manning Street and at Second Avenue.

- Overland flow along College Creek to the east of the Western Sydney University Campus flow north across Second Avenue and down towards the Great Western Highway underpass during storms greater than 5% AEP in intensity up to PMF, reaching a maximum depth of 1.0m at Second Avenue.

The aforementioned flood inundation travel along both of the site's eastern and western boundaries, before travelling north towards the existing Great Western Highway, is supported by PCC's flood hazard map for the PMF event.

4 Flood Planning Requirements

The flood planning requirements for the development are outlined in the PCC DCP Part 3.5. The policy describes the risks associated with development at or below the Flood Planning Level (FPL). The FPL is the 1% AEP flood level + 500mm. The key risk associated with this kind of development is obstruction of flood movements and partial or full blockage of floodways or flood storage areas which can then redistribute flood flows or impacts. It is clear from the distance between the proposed building and the flood affected areas of the Site, in **Figure 5** and **Figure 6**, the proposed development will create no obstruction of flood movements or blockages of flood storages or floodways.

Specific flood planning requirements outlined in the PCC DCP Part 3.5 that apply to this development are:

- Section 6:

a) Floor levels shall be at least 0.5m above the 1% AEP (100-year ARI) flood or the buildings shall be flood-proofed to a least 0.5m above the 1% AEP (100 year ARI) flood. If floor levels are below the 1% AEP (100-year ARI) flood the matters listed in section 7 i) – vii) shall be addressed.

b) Flood safe access and emergency egress shall be provided to all new developments.

- Section 7:

a) Where the application is for an extension to an existing building on land at or below the flood planning level or for new development that can be classed as infill development, Council may approve of the development with floor levels below the 1% AEP (100 year ARI) flood if it can be demonstrated by the applicant that all practical measures will be taken to prevent or minimise the impact of flooding. In considering such applications and determining the required floor level, Council shall take into account such matters as:

i) The nature of the business to be carried out;

ii) The frequency and depth of flooding;

iii) The potential for personal and property loss;

iv) The utility of the building for its proposed use;

v) Whether the filling of the site or raising of the floor levels would render the development of the property unworkable or uneconomical;

vi) Whether the raising of the floor levels would be out of character with adjacent buildings; and

vii) Any risk of pollution of water from storage or use of chemicals within the building.

- Section 11:

b) Council will generally not support an application for any land use which may attract large numbers of people (including schools, function centres, child care centres, hostels, etc.) on land below the flood planning level and on land that cannot be safely and effectively evacuated during a 1% AEP (100 year ARI) flood event.

- Section 13”

a) Council has undertaken a Penrith Overland Flow Flood 'Overview' Study. Consideration must be given to the impact on any overland flow path. Generally, Council will not support development obstructing overland flow paths. Development is required to demonstrate that any overland flow is maintained for the 1% AEP (100 year ARI) overland flow. A merit based approach will be taken when assessing development applications that affect the overland flow.

The maximum 1% AEP flood level within the Site is RL 50.00m and the proposed building FFL is 48.100m. Clearly, the proposed floor level is below the 1% AEP flood level, however, the proposed activity will create no impact on the existing flood conditions, nor will the flooding affect the proposed activity. The proposed building resides approximately 100m from the 1% AEP flood extent and almost perpendicular to the direction of flow of the flooding. Moreover, there is a crest in the Site topography between the valley where the flooding occurs and the proposed building. Consequently, there is negligible risk of any impact to the development or the flood waters. A similar situation is true for the PMF flood event.

In the 1% AEP flood event, in the case of emergencies, Second Avenue can be traversed by trucks in the westerly direction and higher ground can be sought to the south. Second Avenue west and east of the Site is blocked by floodways in the PMF event.

In the event of any storm event the school facilities will not be impacted. Hence, the school can return to normal operations without the need for substantial works to repair the facilities..

5 Flood analysis

enstruct has reviewed the flood behaviour in the PCC College, Orth and Werrington Creeks Catchment Overland Flow Flood Study and based on this review, enstruct has extracted the relevant Provisional Flood Hazard maps from the report. The Provisional Flood Hazard is the consideration of the depth and velocity of the floodwater in isolation. The Provisional Flood Hazard maps have been attached showing the extents of hazard category to analyse the potential escape routes. Figure 3 below provides a visual representation of the hazard classification based on depths and velocity factors.

All building works, including cut and fill, as part of this school development are not affected by flood extents and do not impact or modify the existing flood behaviours or overflow paths.

As the floodway remains within the road, permanent building structures will not face considerable water forces and, therefore, will withstand flood impacts.

The development does not adversely impact any neighbouring properties.

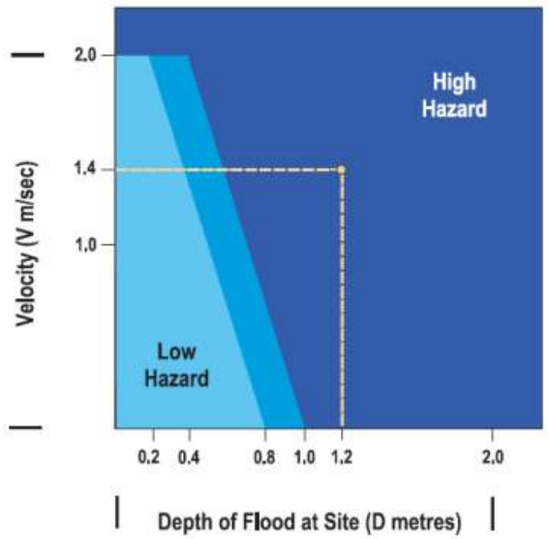

Figure 3: Provisional Hydraulic Hazard Categories

(Source: College, Orth and Werrington Creeks Catchment Overland Flow Flood Study 2017)

5.1 Selection of Flood Events

This Flood Impact Assessment Report analyses the flood maps provided in the PCC College, Orth and Werrington Creeks Catchment Overland Flow Flood Study for the major events the 100-year flood event (1% AEP), 200year storm event (0.5%), 500-year storm event (0.2% AEP) and PMF Flood event as part of ESFG Design Framework requirements for site selection.

enstruct was only able to analyse the Provisional Flood Hazard Maps for the 1% AEP and PMF as the that was the only storm events provided for major storm events.

In addition, the minor events being 5% and 10% AEP flood events have also been analysed and can be viewed in Appendix A.

The relevant major flood events for the site will be detailed below in increasing order of importance.

5.2 100-year flood event (1%AEP)

Based on the flood study undertaken by PCC 'College, Orth and Werrington Creeks Catchment Overland Flow Flood Study 2017', it is understood that Manning Street, Second Avenue and College Creek are subject to flood in the 100-year (1%AEP) storm event, as seen in the **Figure 4** below. It is noted that Lamrock Reserve which has College Creek flowing through it acts as flood storage for the catchment, with ponding depth to a maximum depth of 2.0m.

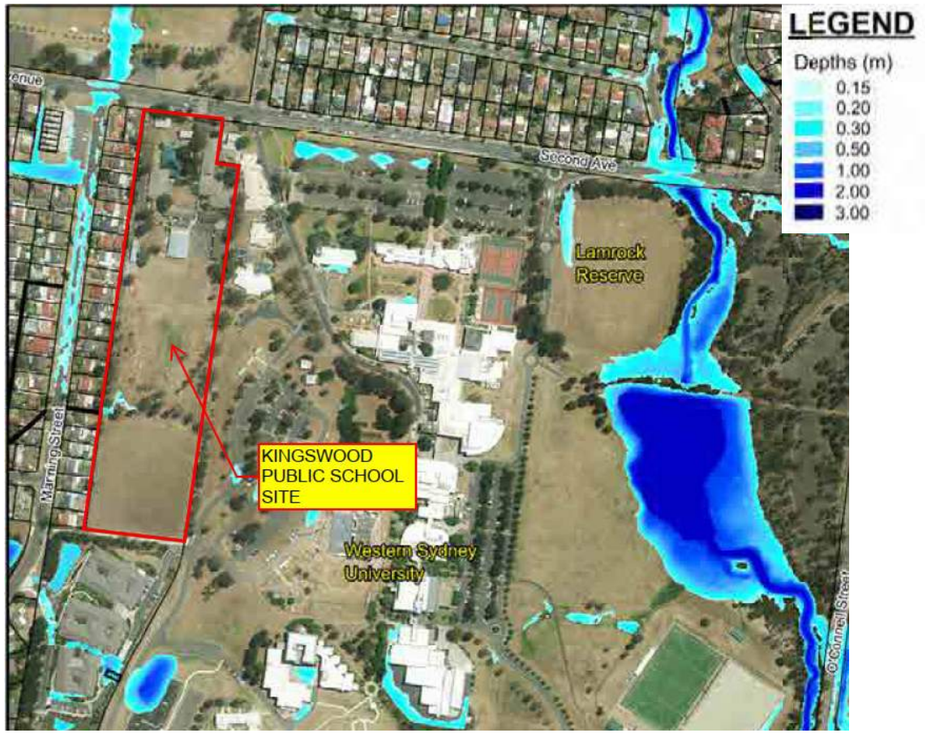

Figure 4: KPS – Existing – 1:100-year Flood Depths

(Source: College, Orth and Werrington Creeks Catchment Overland Flow Flood Study 2017)

enstruct has reviewed the site with the proposed school in it for the 1%AEP storm, and it can be seen that the new buildings in the primary school is clear of flood inundation.

The Provisional Flood Hazard maps indicate that there is a low category to the north on Second Avenue. The velocities are up to 1.0m/s.

The Peak Flood Level on Second Avenue to the west of the site is approximately RL42.5m.

Refer to Appendix A for 1%AEP depth, peak flood level, velocities and hazard maps.

Figure 5: KPS –1:100-year Provisional Flood Hazard

(Source: College, Orth and Werrington Creeks Catchment Overland Flow Flood Study 2017)

Figure 6: KPS –1:100-year Floodwater Velocities

(Source: College, Orth and Werrington Creeks Catchment Overland Flow Flood Study 2017)

Figure 7: KPS –1:100-year Peak Floodwater Level

(Source: College, Orth and Werrington Creeks Catchment Overland Flow Flood Study

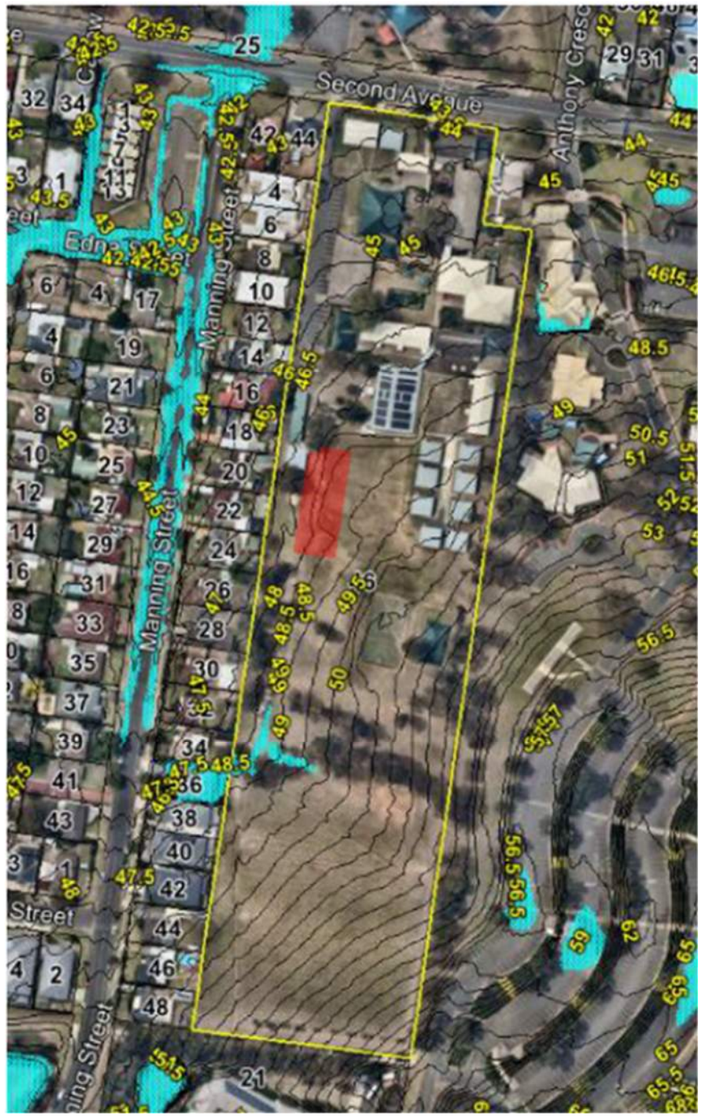

Figure 8: KPS – 1% AEP Flood Extent with Proposed Development

(Source: PCC)

5.3 500-year flood event (0.2%AEP)

The 500-year (0.2% AEP) storm event was analysed in the PCC 'College, Orth and Werrington Creeks Catchment Overland Flow Flood Study 2017'and as part of ESFG Design Framework requirements. enstruct has reviewed the relevant flood maps for site and it can be seen that Manning Street, Second Avenue and College Creek are subject to flood, as seen in **Figure** . It can be seen that the school including the new building is clear of flood inundation.

Figure 9: KPS –1:500-year Flood Depths with Proposed Development

(Source: College, Orth and Werrington Creeks Catchment Overland Flow Flood Study 2017)

Figure **Figure** show the velocity and the Peak Flood Level. The velocity of the overland flow across Second Aveue is up to 2.0m/s. The Peak Flood Level on Second Avenue to the west of the site is approximately RL42.6m.

Refer to Appendix A for 0.2%AEP depth, peak flood level and velocities.

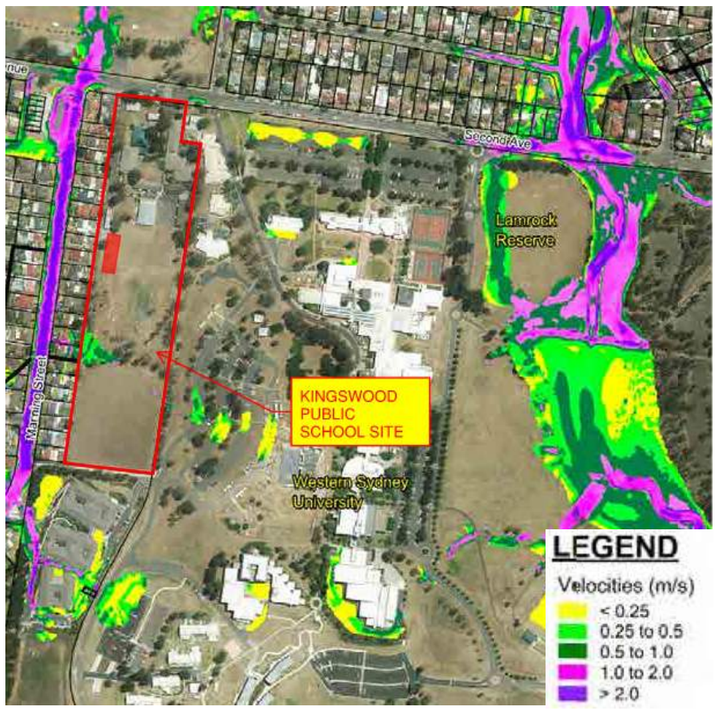

Figure 9: KPS –1:500-year Floodwater Velocities

(Source: College, Orth and Werrington Creeks Catchment Overland Flow Flood Study 2017)

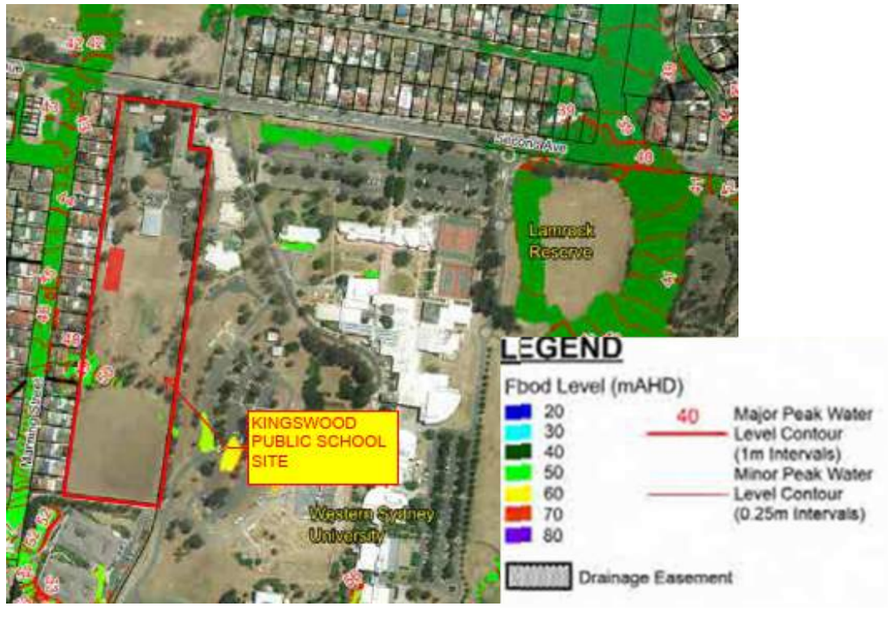

Figure 10: KPS –1:500-year Peak Floodwater Level

(Source: College, Orth and Werrington Creeks Catchment Overland Flow Flood Study 2017)

5.4 Climate Change

Flood analysis prepared by Catchment Simulations Solutions (CSS) in the College, Orth and Werrington Creeks Catchment Overland Flow Flood Study (2017) includes climate change analysis. CSS undertook additional simlations which included 10%, 20%, and 30% increases in rainfall intensities to quantify the potential impacts associate with climate change. The peak 1% AEP flood level from climate change simulation at Second Avenue Kingswood provided the following:

Location	**Base Case** (mAHD)	**10% Increase in Rainfall** (mAHD)	**20% Increase in Rainfall** (mAHD)	**30% Increase in Rainfall** (mAHD)
Second Avenue	39.07	39.20	39.31	39.41

As the proposed floor level for the new building is RL48.5m, it can be seen that the proposed building level is above all the simulations. The results of the climate change analyses show that the site is resilient to climate change.

5.5 PMF

Based on the flood maps previously mentioned, it is noted that Manning Street,parts of Second Avenue in the vicinity of the site and two small areas within the school will be subject to flood risk in the PMF event. The areas within the school is the valley towards the southern end of the site and a small localised low point in between the buildings toward the north of the site as seen in the Figure 11 below.

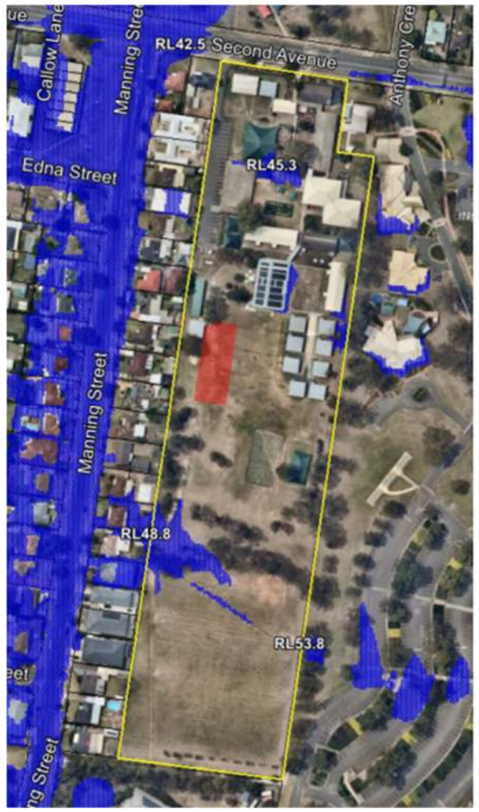

Figure 11: KPS – PMF Flood Extent with Proposed Development

(Source: PCC)

High hazards of inundation, reaching a depth greater than 1.0m are observed in Second Avenue and in Mannaing Street. There is a low hazard level in the valley towards the southern end of the site. The small localised low point in between the buildings toward the north is not even considered a flood hazard.

Although, land which the school site sits on is not flood affected in the event of the PMF event, occupants might still need to find routes leading to the nearest hospital in case of an emergency. Consequently, a flood emergency management plan has been prepared by **en**struct and is recommended to be implemented in perpetuity to provide guidance regarding a safe strategy and the provision of refuge with sufficient area to shelter all occupants at the PMF level. Refer to the Flood Emergency Management Plan for further information.

Refer to Appendix A for PMF depth, peak flood level, velocities and hazard maps.

Figure 12: KPS – PMF – Provisional Flood Hazar

(Source: College, Orth and Werrington Creeks Catchment Overland Flow Flood Study 2017)

Figure 13: KPS –PMF Floodwater Velocities

(Source: College, Orth and Werrington Creeks Catchment Overland Flow Flood Study 2017)

Figure 14: KPS –PMF Peak Floodwater Level

(Source: College, Orth and Werrington Creeks Catchment Overland Flow Flood Study 2017)

6 Overland Flow Paths

The site is not subject to major overland flows from the upstream neighbouring properties, therefore there are no major risks associated with in this regards.

In case of blockages and/or events within the site and/of major rainfall events, the site overland flow will be directed towards the north western side of the site.

7 Mitigation measures

The following table provides a summary of the adopted mitigation measures.

Project Stage D – Design C – Constrction O - Operation	Mitigation Measures	Relevant section of the report
D	Build above flood planning levels	Section 4

Table 1: Mitigation measures related to Civil Engineering

8 Conclusion

Although the PMF does not inundate the site, water build up on the road and the accesses routes are unsafe to travel. Refer to the flood Emergency Management Plan which includes designated safe assembly areas and evacuation management plans.

The 1% AEP and 0.5% AEP storm events do not flood the site. There is some inundation on Second Avenue, however it is considered a Low Category which allows for some movement. This supports the selected site as per the ESFG guidelines. During these events is still safe to exit/enter the site with due caution.

Subject to implementing the recommendations/mitigation measures set out in Section 7 of this report, the conclusion of this assessment is that the proposed Activity is not likely to significantly affect the environment in relation to flooding matters.

Supporting Information and External References

Fulton Trotter Architect's plans (100% Schematic Design) Dated 14/01/2025

Penrith City Council - College, Orth and Werrington Creeks Catchment Overland Flow Flood Study 2017 Volumes 1 & 2

Penrith City Council - Flood Level Enquiry (17/12/2024) Reference. P-820532-Y7N5

Correspondence from NSW State Emergency Service dated 6 March 2025

ESFG
https://efsg.det.nsw.edu.au/design
https://efsg.det.nsw.edu.au/spec
https://education.nsw.gov.au/about-us/efsg/design-framework

NSW LGA boundaries map
https://portal.spatial.nsw.gov.au/portal/home/webmap/viewer.html

APPENDIX A: RELEVANT FLOOD MAPS

ENSTRUCT'S:

EXTRACTS FROM 5% AEP FLOOD - PEAK DESIGN FLOODWATER DEPTH

10% AEP FLOOD - PEAK DESIGN FLOODWATER DEPTH

1% AEP FLOOD - PEAK DESIGN FLOODWATER DEPTH
1% AEP FLOOD - PEAK DESIGN FLOODWATER LEVELS
1% AEP FLOOD - PEAK DESIGN VELOCITIES
1% AEP FLOOD – PROVISIONAL FLOOD HAZARD

0.5% AEP FLOOD - PEAK DESIGN FLOODWATER DEPTH

0.2% AEP FLOOD - PEAK DESIGN FLOODWATER DEPTH
0.2% AEP FLOOD - PEAK DESIGN FLOODWATER LEVELS
0.2% AEP FLOOD - PEAK DESIGN VELOCITIES

PMF - PEAK DESIGN FLOODWATER DEPTH
PMF - PEAK DESIGN FLOODWATER LEVELS
PMF - PEAK DESIGN VELOCITIES
PMF – PROVISIONAL FLOOD HAZARD

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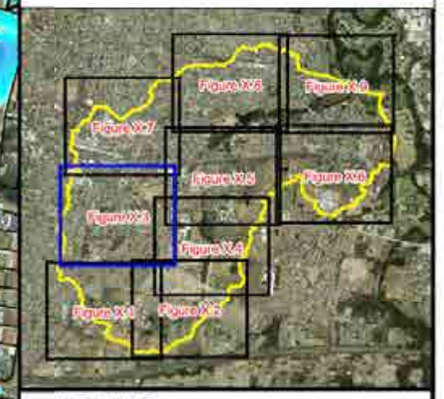

LEGEND

Depths (m)

- 0.15
- 0.20
- 0.30
- 0.50
- 1.00
- 2.00
- 3.00

Drainage Easement

Notes:

Water depths less than 0.15m not displayed.
Aerial photograph date: 2014.

Innundation across this area not mapped. Please refer to "Updated South Creek Flood Study" - (Worley Parsons, 2015)

N
W E
S

Scale 1:5,000 (at A3)

0 0.15 0.3

Km

Figure 17.3: Peak Design Floodwater Depths for the 5% AEP Flood

Prepared By:
Catchment Simulation Solutions
Suite 2.01, 210 George St
Sydney, NSW 2000

File Name: Fig17.3 Design floodwater depths for 5% AEP.wor

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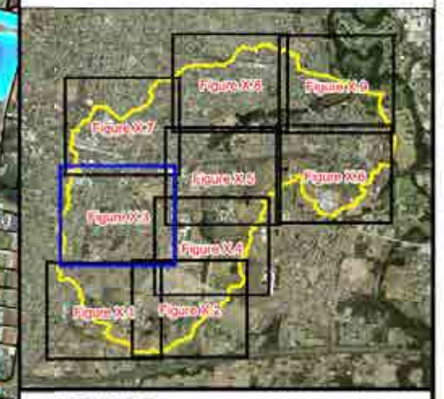

Nepean Hospital
Railway
Kingswood Sports Club
Chapman Gardens
Somerset Street
Second Avenue
Jamison Road
Bringelly Road
KINGSWOOD PUBLIC SCHOOL SITE
Manning Street
Peppermint Crescent
Peppermint Reserve
Smith Street
Kingswood South Public School
Kingswood High School
Castlereagh Circuit

LEGEND

Depths (m)
- 0.15
- 0.20
- 0.30
- 0.50
- 1.00
- 2.00
- 3.00

Drainage Easement

Notes:

Water depths less than 0.15m not displayed.
Aerial photograph date: 2014.

Innundation across this area not mapped. Please refer to "Updated South Creek Flood Study" - (Worley Parsons, 2015)

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W E
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Scale 1:5,000 (at A3)

0 0.15 0.3

Km

Figure 16.3: Peak Design Floodwater Depths for the 10% AEP Flood

Prepared By:
Catchment Simulation Solutions
Suite 2.01, 210 George St
Sydney, NSW 2000

File Name: Fig16.3 Design floodwater depths for 10% AEP.wor

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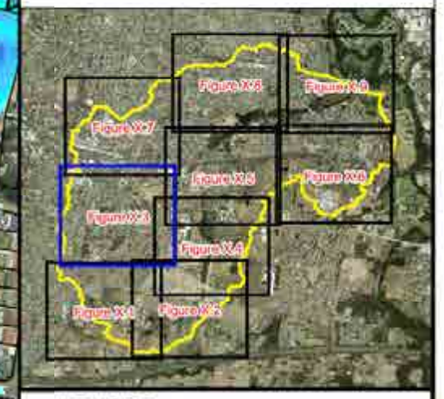

LEGEND

Depths (m)
- 0.15
- 0.20
- 0.30
- 0.50
- 1.00
- 2.00
- 3.00

Drainage Easement

Notes:

Water depths less than 0.15m not displayed.
Aerial photograph date: 2014.

Innundation across this area not mapped. Please refer to "Updated South Creek Flood Study" - (Worley Parsons, 2015)

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W E
S

Scale 1:5,000 (at A3)

0 0.15 0.3

Km

Figure 19.3: Peak Design Floodwater Depths for the 1% AEP Flood

Prepared By:

Catchment Simulation Solutions
Suite 2.01, 210 George St
Sydney, NSW 2000

File Name: Fig19.3 Design floodwater depths for 1% AEP.wor

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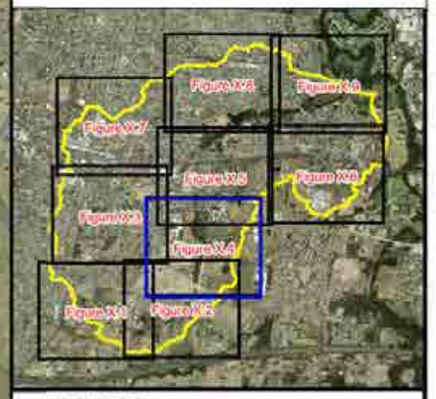

LEGEND

Flood Level (mAHD)

- 20
- 30
- 40
- 50
- 60
- 70
- 80

40 Major Peak Water Level Contour (1m Intervals)

Minor Peak Water Level Contour (0.25m Intervals)

Drainage Easement

Notes:

Water depths less than 0.15m not displayed.
Aerial photograph date: 2014.

Innundation across this area not mapped. Please refer to "Updated South Creek Flood Study" - (Worley Parsons, 2015)

N
W E
S

Scale 1:5,000 (at A3)

0 0.15 0.3

Km

Figure 28.4: Peak Design Floodwater Levels for the 1% AEP Flood

Prepared By:
Catchment Simulation Solutions
Suite 2.01, 210 George St
Sydney, NSW 2000

File Name: Fig28.4 Design floodwater levels for 1% AEP.wor

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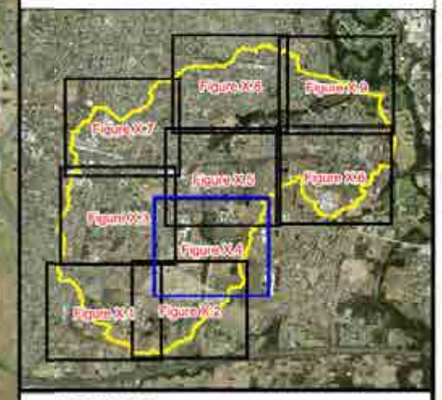


LEGEND

Velocities (m/s)

- < 0.25
- 0.25 to 0.5
- 0.5 to 1.0
- 1.0 to 2.0
- > 2.0

Drainage Easement

Notes:

Results only shown in areas where water depths are above 0.15m.

Aerial photograph date: 2014.

Innundation across this area not mapped. Please refer to "Updated South Creek Flood Study" - (Worley Parsons, 2015)

N

W E

S

Scale 1:5,000 (at A3)

0 0.15 0.3

Km

Figure 37.4: Design Floodwater Velocities for the 1% AEP Flood

Prepared By:

Catchment Simulation Solutions
Suite 2.01, 210 George St
Sydney, NSW 2000

File Name:Fig 37.4 Design Floodwater Vel for the 1% AEP Flood.wor

PENRITH CITY COUNCIL

KINGSWOOD PUBLIC SCHOOL SITE

Second Ave

Lamrock Reserve

Nepean College Kingswood

Western Sydney University

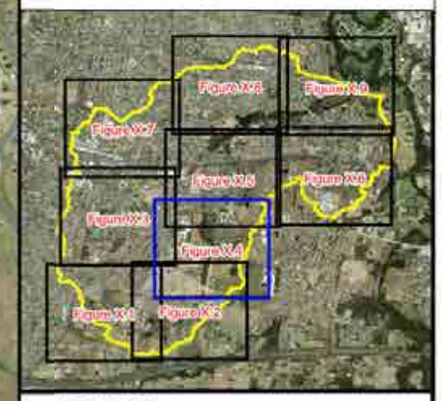
Penrith Baptist Church

Manning Street

O'Connell Street

O'Connell Lane

Weema St



LEGEND

Hazard Categories

- Low
- High

Drainage Easement

Notes:

Results only shown in areas where water depths are above 0.15m.

Aerial photograph date: 2014.

Innundation across this area not mapped. Please refer to "Updated South Creek Flood Study" - (Worley Parsons, 2015)

N W E S

Scale 1:5,000 (at A3)

0 0.15 0.3

Km

Figure 44.4: Provisional Flood Hazard for the 1% AEP Flood

Prepared By:

Catchment Simulation Solutions

Suite 2.01, 210 George St

Sydney, NSW 2000

File Name:Fig 44.4 Provisional Flood Hazard for the 1% AEP Flood.wor

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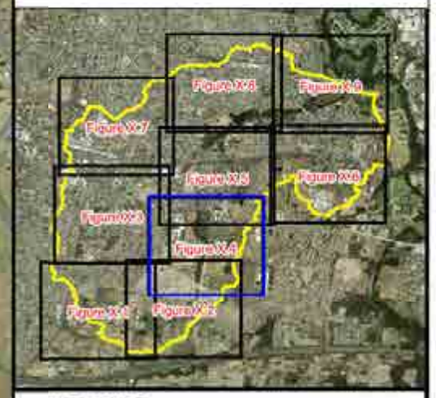


KINGSWOOD PUBLIC SCHOOL SITE

Second Ave
Lamrock Reserve
Nepean College Kingswood
Western Sydney University
Manning Street
O'Connell Street
O'Connell Lane
Weema St
Penrith Baptist Church

LEGEND

Flood Level (mAHD)

- 20
- 30
- 40
- 50
- 60
- 70
- 80

40 Major Peak Water Level Contour (1m Intervals)

Minor Peak Water Level Contour (0.25m Intervals)

Drainage Easement

Notes:

Water depths less than 0.15m not displayed.
Aerial photograph date: 2014.

Innundation across this area not mapped. Please refer to "Updated South Creek Flood Study" - (Worley Parsons, 2015)

N
W E
S

Scale 1:5,000 (at A3)

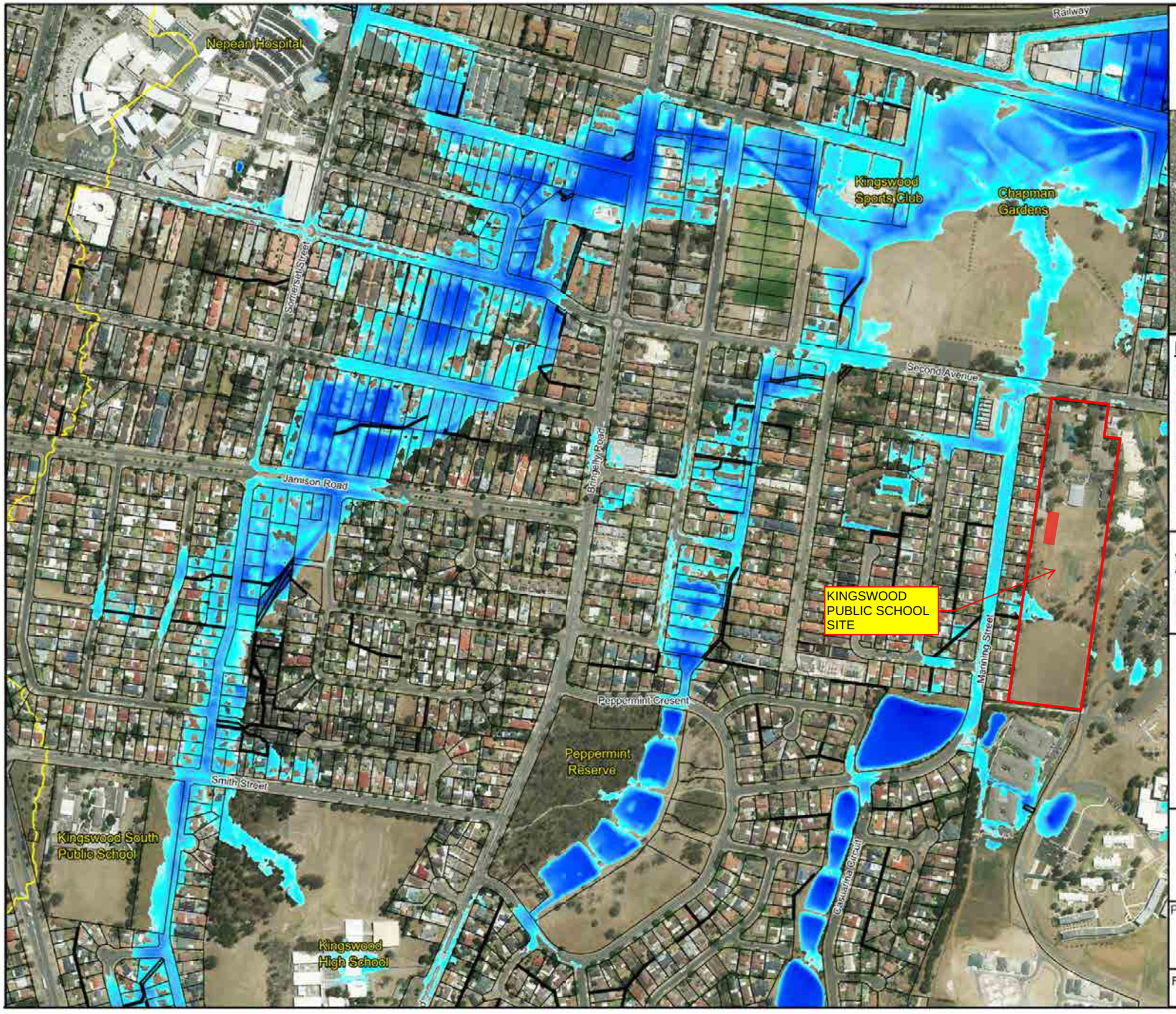
0 0.15 0.3

Km

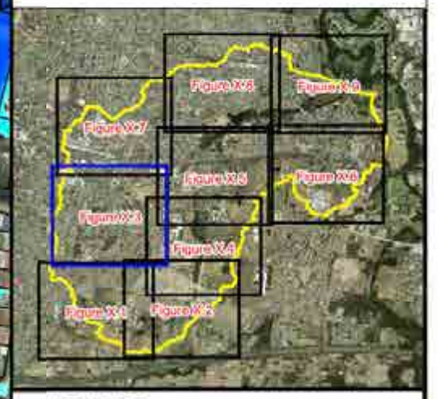
Figure 29.4: Peak Design Floodwater Levels for the 0.5% AEP Flood

Prepared By:
Catchment Simulation Solutions
Suite 2.01, 210 George St
Sydney, NSW 2000

File Name: Fig29.4 Design floodwater Levels for 0.5% AEP.wor



PENRITH CITY COUNCIL



LEGEND

Depths (m)

- 0.15
- 0.20
- 0.30
- 0.50
- 1.00
- 2.00
- 3.00

Drainage Easement

Notes:

Water depths less than 0.15m not displayed.
Aerial photograph date: 2014.

Innundation across this area not mapped. Please refer to "Updated South Creek Flood Study" - (Worley Parsons, 2015)

N
W E
S

Scale 1:5,000 (at A3)

0 0.15 0.3

Km

Figure 21.3: Peak Design Floodwater Depths for the 0.2% AEP Flood

Prepared By:
Catchment Simulation Solutions
Suite 2.01, 210 George St
Sydney, NSW 2000

File Name: Fig21.3 Design floodwater depths for 0.2% AEP.wor

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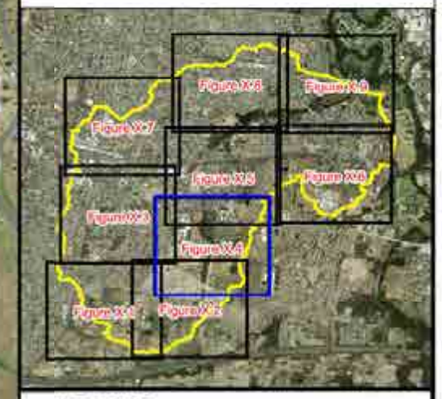

KINGSWOOD PUBLIC SCHOOL SITE

Second Ave

Lamrock Reserve

Nepean College Kingswood

Western Sydney University

Manning Street

O'Connell Street

O'Connell Lane

Weema St

Penrith Baptist Church

LEGEND

Flood Level (mAHD)

- 20
- 30
- 40
- 50
- 60
- 70
- 80

40 Major Peak Water Level Contour (1m Intervals)

Minor Peak Water Level Contour (0.25m Intervals)

Drainage Easement

Notes:

Water depths less than 0.15m not displayed.
Aerial photograph date: 2014.

Innundation across this area not mapped. Please refer to "Updated South Creek Flood Study" - (Worley Parsons, 2015)

N W E S

Scale 1:5,000 (at A3)

0 0.15 0.3

Km

Figure 30.4: Peak Design Floodwater Levels for the 0.2% AEP Flood

Prepared By:
Catchment Simulation Solutions
Suite 2.01, 210 George St
Sydney, NSW 2000

File Name: Fig30.4 Design floodwater levels for 0.2% AEP.wor

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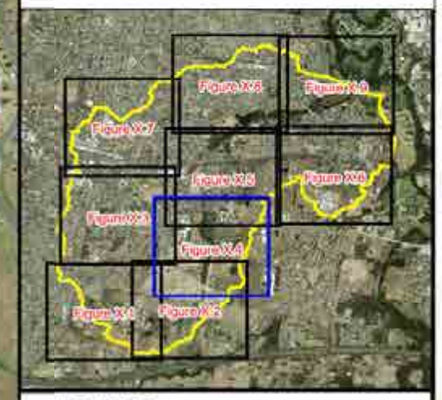

KINGSWOOD PUBLIC SCHOOL SITE

Second Ave
Lamrock Reserve
Nepean College Kingswood
Western Sydney University
Penrith Baptist Church
Marring Street
O'Connell Street
Weema St

LEGEND

Velocities (m/s)

- < 0.25
- 0.25 to 0.5
- 0.5 to 1.0
- 1.0 to 2.0
- > 2.0

Drainage Easement

Notes:

Results only shown in areas where water depths are above 0.15m.
Aerial photograph date: 2014.

Innundation across this area not mapped. Please refer to "Updated South Creek Flood Study" - (Worley Parsons, 2015)

N
W E
S

Scale 1:5,000 (at A3)

0 0.15 0.3

Km

Figure 39.4: Design Floodwater Velocities for the 0.2% AEP Flood

Prepared By:
Catchment Simulation Solutions
Suite 2.01, 210 George St
Sydney, NSW 2000

File Name:Fig 39.4 Design Floodwater Vel for the 0.2% AEP Flood.wor

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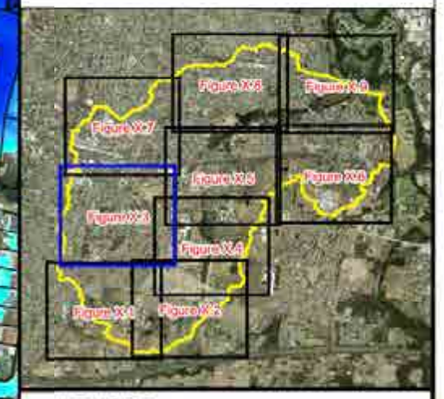


LEGEND

Depths (m)
- 0.15
- 0.20
- 0.30
- 0.50
- 1.00
- 2.00
- 3.00

Drainage Easement

Notes:

Water depths less than 0.15m not displayed.
Aerial photograph date: 2014.

Innundation across this area not mapped. Please refer to "Updated South Creek Flood Study" - (Worley Parsons, 2015)

N
W E
S

Scale 1:5,000 (at A3)

0 0.15 0.3

Km

Figure 22.3: Peak Design Floodwater Depths for the PMF

Prepared By:
Catchment Simulation Solutions
Suite 2.01, 210 George St
Sydney, NSW 2000

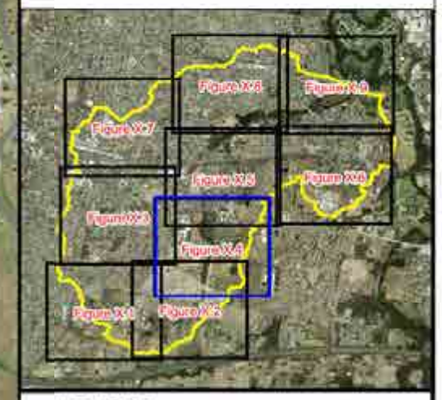
File Name: Fig22.3 Design floodwater depths for PMF.wor

Nepean Hospital
Railway
Kingswood Sports Club
Chapman Gardens
Somerset Street
Second Avenue
Jamison Road
Bringelly Road
KINGSWOOD PUBLIC SCHOOL SITE
Manning Street
Peppermint Crescent
Peppermint Reserve
Smith Street
Kingswood South Public School
Kingswood High School
Gascoigne Circuit

PENRITH CITY COUNCIL

KINGSWOOD PUBLIC SCHOOL SITE

Second Ave
Lamrock Reserve
Nepean College Kingswood
Western Sydney University
Penrith Baptist Church
Manning Street
O'Connell Street
O'Connell Lane
Weema St



LEGEND

Flood Level (mAHD)

- 20
- 30
- 40
- 50
- 60
- 70
- 80

40 Major Peak Water Level Contour (1m Intervals)

Minor Peak Water Level Contour (0.25m Intervals)

Drainage Easement

Notes:

Water depths less than 0.15m not displayed.
Aerial photograph date: 2014.

Innundation across this area not mapped. Please refer to "Updated South Creek Flood Study" - (Worley Parsons, 2015)

N
W E
S

Scale 1:5,000 (at A3)

0 0.15 0.3

Km

Figure 31.4: Peak Design Floodwater Levels for the PMF

Prepared By:
Catchment Simulation Solutions
Suite 2.01, 210 George St
Sydney, NSW 2000

File Name: Fig31.4 Design floodwater depths for PMF.wor

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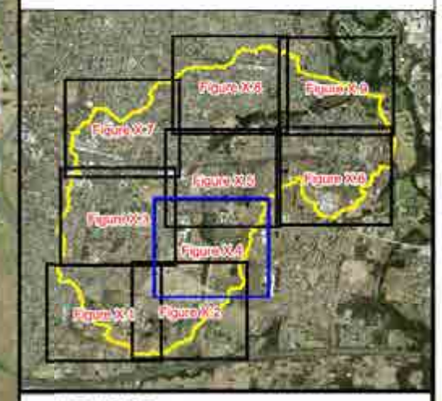


KINGSWOOD PUBLIC SCHOOL SITE

Second Ave

Lamrock Reserve

Nepean College Kingswood

Western Sydney University

Penrith Baptist Church

Weema St

Marring Street

O'Connell Street

LEGEND

Velocities (m/s)

- < 0.25
- 0.25 to 0.5
- 0.5 to 1.0
- 1.0 to 2.0
- > 2.0

Drainage Easement

Notes:

Results only shown in areas where water depths are above 0.15m.

Aerial photograph date: 2014.

Innundation across this area not mapped. Please refer to "Updated South Creek Flood Study" - (Worley Parsons, 2015)

N

W E

S

Scale 1:5,000 (at A3)

0 0.15 0.3

Km

Figure 40.4: Design Floodwater Velocities for the PMF

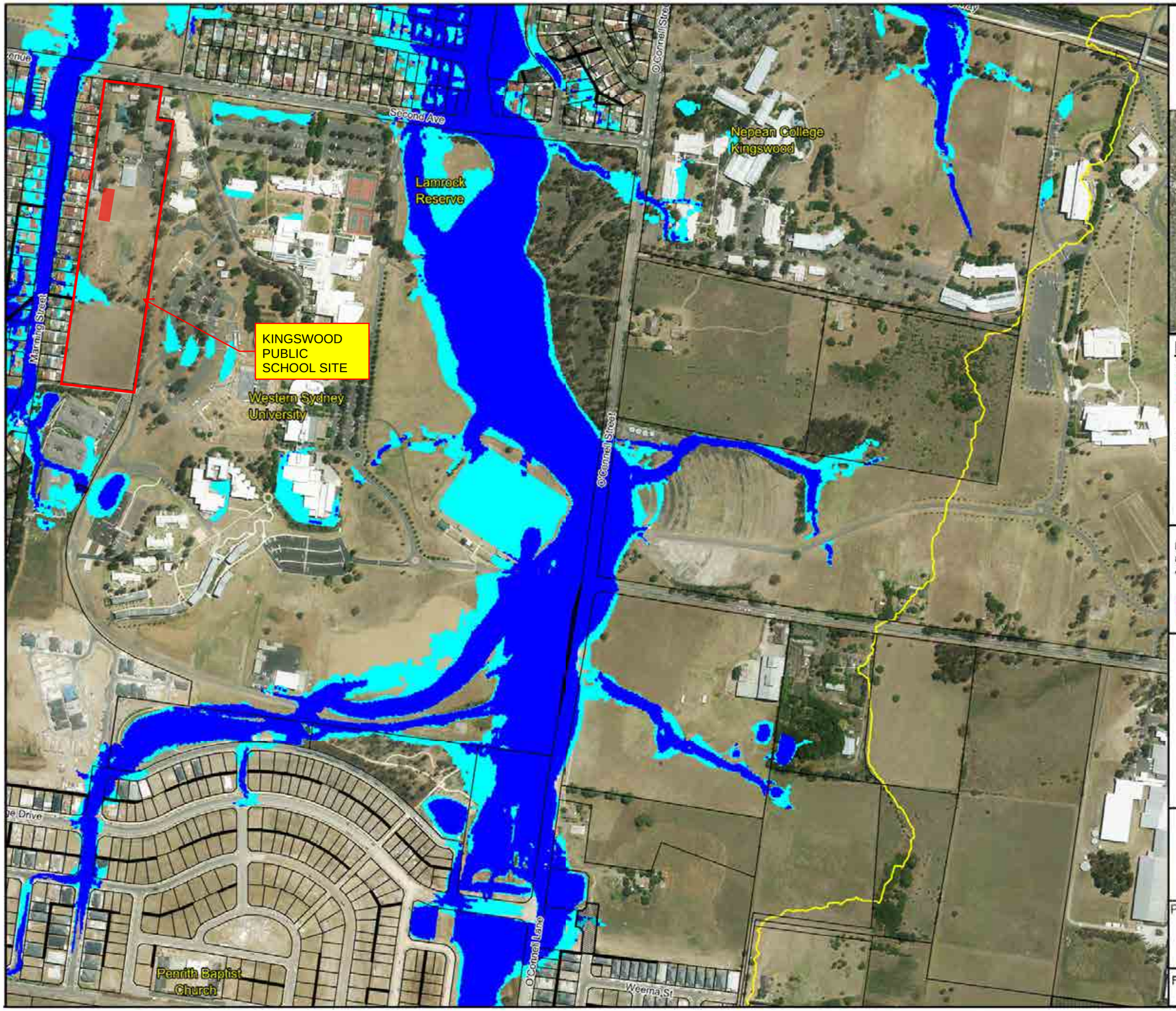
Prepared By:

Catchment Simulation Solutions

Suite 2.01, 210 George St

Sydney, NSW 2000

File Name:Fig 40.4 Design Floodwater Vel for the PMF.wor



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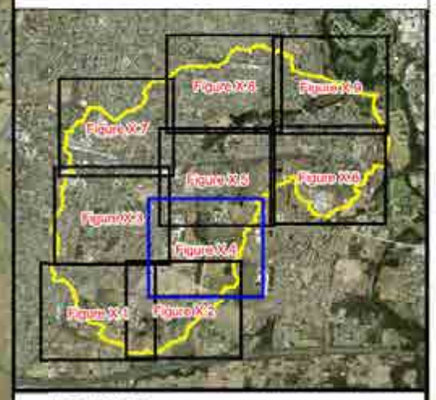

LEGEND

Hazard Categories
- Low
- High

Drainage Easement

Notes:

Results only shown in areas where water depths are above 0.15m.
Aerial photograph date: 2014.

Innundation across this area not mapped. Please refer to "Updated South Creek Flood Study" - (Worley Parsons, 2015)

N
W E
S

Scale 1:5,000 (at A3)

0 0.15 0.3

Km

Figure 45.4: Provisional Flood Hazard for the PMF

Prepared By:

Catchment Simulation Solutions
Suite 2.01, 210 George St
Sydney, NSW 2000

File Name:Fig 45.4 Provisional Flood Hazard for the PMF.wor