5 February 2024

Craig Shelsher
Custance Associates Australia Pty Ltd
Level 3, 87-89 Foveaux Street
SURRY HILLS NSW 2000

Our Ref: N0221293 - CRPT.02D

Dear Craig,

Overland Flow Report - 10 Munmurra Road and 5 Bernadotte Street, Riverwood NSW 2210 Australia

JN has been engaged to provide overland flow advice for the proposed development at 10 -14 Munmurra Rd and 5 Bernadotte St Riverwood.

The subject site is located on the corner of Munmurra Rd and Bernadotte St, refer Figure 1. The site comprises Lot 57-60 DP 35818, with a total area of 2,493m^2. The site falls to the north-east, with ground levels ranging from RL 31.00 mAHD down to the lowest point at 27.35mAHD. It is currently occupied by single-story residential dwellings on each lot with included driveways and backyards for each.

Figure 1: Site Location (Nearmap)

Proposed Development

The proposed development comprises of two-storey apartment building accommodating 16 residential units for Seniors Living with a shared vehicle access car park from Bernadotte Street. The existing 4 residential houses on the lots will be demolished before the construction of the proposed works.

Figure 2: Proposed Site Plan (Custance Architects)

Council Flood Information

Georges River Council have provided flood mapping for the subject site; this information is from the SMEC study for the Hurstville, Mortdale and Peakhurst wards prepared in 2018. The mapping indicates the subject site is outside of the 1% AEP flood however is affected by the PMF, refer Figure 3 and Figure 4 respectively.

Figure 3: 1% AEP Flood Mapping (Georges River Council)

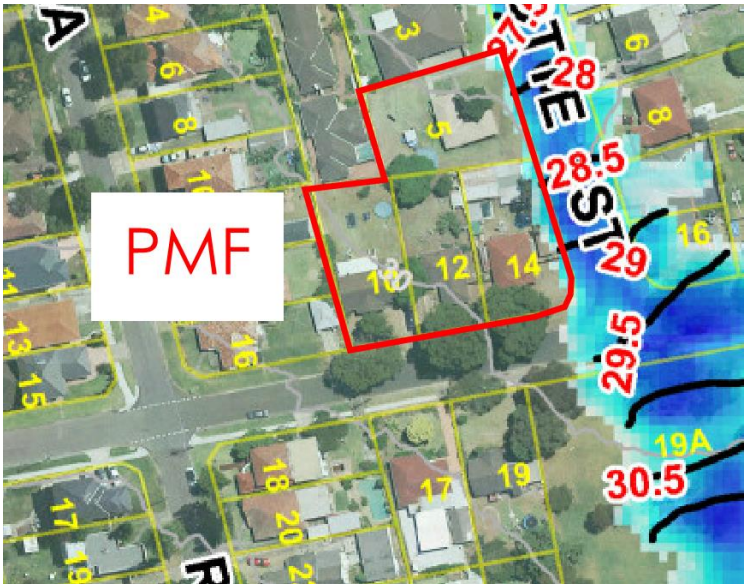


Figure 4: PMF Flood Mapping (Georges Rover Council)

Georges River Council provided a flood advice letter, as shown in Appendix D, for 14 Munmurra Road, Riverwood. They provided a PMF Level of 28.895 mAHD. They also provided an email for 5 Bernadotte Street stating the max PMF depth is about 170mm at the front of the property. Taking the highest boundary for 5 Berndotte Street, and using a flood depth of 170mm, the PMF flood level is 28.1 mAHD. See existing site survey provided by Norton Survey Partners in Appendix A.

Flood Hazard Category

The flood risk at a site is (in part) determined by the hydraulic hazard of the floodwaters in the immediate vicinity of the site. The NSW Floodplain Development Manual (2005) provides a set of guidelines for determining the hydraulic flood hazard at a particular site. A provisional hazard can be assigned to an area using Figure 5 and the combined impact of flood velocity and flood depth. In general, an area will be (provisionally) assigned High Hazard if any of the following criteria are satisfied:

- The flood depth (D) is greater than 1.0 m;
- The flood velocity (V) is greater than 2.0 m/s;
- The combination of V and D lie in the dark blue region (mathematically this is approximately where V + 3.33D is greater than 3.33).

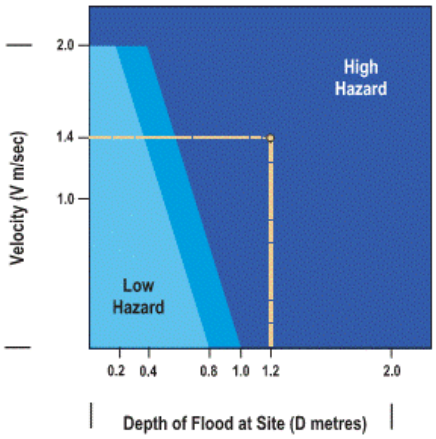


Figure 5: Provisional Hydraulic Hazard Categories (NSW Floodplain Development Manual, 2005)

Based on the flood mapping provided by Georges River Council (refer Figure 3 and Figure 4) showing a depth range of 0.3-0.5m. Due to not having a flood velocity available for site, JN assume that the velocity is less than 1m/s due to only just entering small parts of site. Therefore, using Figure 5, the flood affect within site is a low hazard.

Hydraulic Category

Georges River Council specifies hydraulic categories as below:

> ***Flood Risk Precinct 1 – High Flood Risk:*** *Flood Risk Precinct 1 is the area of land below the 1% annual exceedance probability (AEP) flood that is either subject to a high hydraulic hazard or where there are significant evacuation difficulties. Most development should be restricted in this precinct as development in high flood risk precinct is associated with higher risk to life and evacuation difficulties during the event of*

flood. In this precinct, there would be a significant risk of flood damages without compliance with flood related building and planning controls.

Flood Risk Precinct 2 – Low Flood Risk: *Flood Risk Precinct 2 is land below the 1% AEP flood that is not subject to a high hydraulic hazard and where there are no significant evacuation difficulties. There would still be a significant risk of flood damage in this precinct. However, these damages can be minimised by the application of appropriate development controls.*

Flood Risk Precinct 3 – Outside the 1% AEP flood extents but within the PMF: *Flood Risk Precinct 3 is defined as all other land within the floodplain (within the extent of the probable maximum flood) but not identified within either the High Flood Risk or the Low Flood Risk Precinct. The risk of damages due to flood event in low flood risk precinct is low for most of the land uses.*

Referring to Figure 3 and Figure 4, the subject site is within Flood Risk Precinct 3 – Outside the 1% AEP flood extents but within the PMF area.

Catchment Analysis

A catchment analysis of overland flow was completed using the catchment as seen in Figure 6 of 1,121 sqm. The area has been assumed to be 50% impervious and will be captured by a swale along the site boundary. Flows from this catchment have been calculated at in DRAINS software as 50L/s for the 1% AEP Storm.

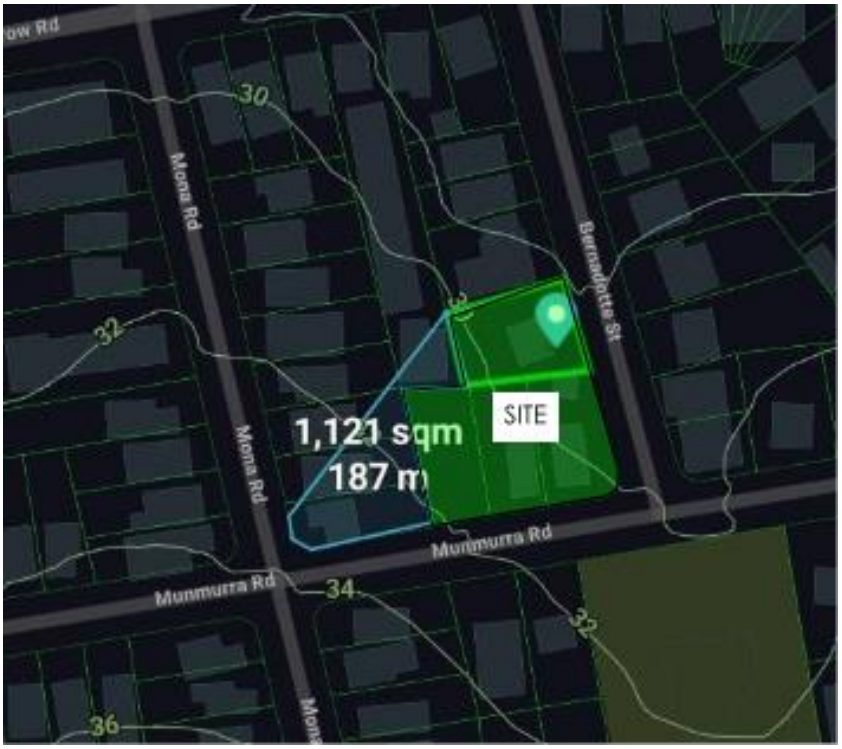


Figure 6: Overland Flow Catchment (Mecone Mosaic, 2023)

The swale has been sized as per Figure 7, catering for the 50 L/s from the external catchment. The swale is to be minimum 1.2m wide and 0.12m deep.

VEE-SHAPED OPEN CHANNEL BY MANNING EQUATION

Flow Depth	=	0.120	m
Left Side Slope	=	20.000	%
Right Side Slope	=	20.000	%
Channel Slope	=	3.200	%
Manning Roughness n	=	0.030	
Width of Left Side	=	0.600	m
Width of Right Side	=	0.600	m
Flow Width	=	1.200	m
Flow Area	=	0.072	m2
Wetted Perimeter	=	1.224	m
Hydraulic Radius	=	0.059	m
Velocity	=	0.902	m/s
Depth x Velocity	=	0.108	m2/s (< 0.4 limit) OK
Flow	=	0.065	m3/s = **64.9 L/s**

Figure 7: External Catchment Swale Sizing

The extent of the swale is shown in the current site stormwater drainage design in Appendix C.

Assessment Against DCP 2013 Flood Controls

Georges River Council Development Control Plan 2021 (DCP) Chapter 3 and Stormwater Management Policy outlines development controls specific to individual sites based on the flood risk associated with specific development types. The proposed Seniors Development has been classified as having a land use of Sensitive uses and facilities. Refer to Table 1 for an assessment against each of the relevant items.

Table 1: Assessment against GRC Stormwater Management Policy 2021

Criteria	Comment
Floor Level [3] All floor levels to be equal to or greater than the PMF level plus freeboard.	[3] PMF Levels + 500mm freeboard for flood affected Lots 59 and 60 is 29.395 mAHD and 28.60 mAHD respectively. The proposed ground levels for site are 29.45mAHD and 28.985mAHD respectively meeting Council's floor level requirements.
Building Components [2] All structures to have flood compatible building components below the PMF.	[2] This can be certified at CC stage as required. Any materials to be used within the PMF extent is to be approved flood compatible by Council as seen in Appendix B.
Structural Soundness [5] Engineer's report is required to certify that the structure can withstand the forces of floodwater, debris and buoyancy up to and including the PMF.	[5] Comment can be made on structural soundness at CC stage however the extent of the new buildings are outside of the PMF flood mapping.
Flood Effects [1] The applicant is to demonstrate to Council (by way of an Overland Flow Path Assessment or Local Flood Study as per Section 6.11of this Policy if requested) that the development will not increase flood affectation elsewhere having regard to: (i) Loss of flood storage; (ii) Changes in flood levels, flows and velocities caused by alterations to flood flows; and (iii) The cumulative impacts of multiple potential developments in the vicinity. [2] The impact of the development on flooding elsewhere is to be considered having regard to the three factors listed in No.1 above. [4] Council may require the creation of an easement, or that a Positive Covenant and Restriction on the use of the land be placed on the Title Certificate identifying the location of "overland flow paths", "flood storage" or locations of significant backwater flooding. This may include any sub-floor areas under buildings or other structures that are required to be of an "open structure" to allow for the passage of stormwater flow.	[1] The proposed development depicts landscaped areas where the probable maximum flood would affect the subject site much like the existing site, therefore there would be no change to flood storage, levels, velocities etc. [2] As per above [1]. [4] All PMF flooding are within open landscape areas or the start of small driveways that are open.

Parking and Driveway Access [1] The minimum surface level of open car parking spaces or carports shall be as high as practical, but no lower than 300mm below the 1% AEP flood level. In the case of garages, the minimum surface level shall be as high as practical, but no lower than the 1% AEP flood level. [3] Garages capable of accommodating more than 3 motor vehicles on land zones for urban purposes, or enclosed car parking, must be protected from inundation by floods to a level no lower than 150mm above the 1% AEP flood level. Garages that accommodate no more than 3 motor vehicles on land zones for urban purposes, or enclosed car parking, must be protected from inundation by floods to a level no lower than 1% AEP flood level. Any garage or car parking that includes the provision of a lift must be protected from inundation by floods to a level no lower than 300mm above the 1% AEP flood level. [5] The level of the driveway providing access between the road and the parking spaces should be as high as practical, and not lower than 0.3 metres below the 1% AEP flood level. However, Council may consider a lower level for the driveway in the following circumstances, where risk to human life is not compromised. (i) Where the road is lower than the parking space, no part of the driveway should be inundated to a greater depth than the roadway. (ii) Where the car parking space is lower than the road, the depth of inundation over the driveway must not be greater than the car park inundation depth, and the driveway must rise continuously in an egress direction. (iii) Where the car parking space and road are both below the 1% AEP flood level, the depth of inundation over the driveway must not be greater than the depth at either the car parking space or the road. Where feasible, the driveway should rise continuously in the egress direction.	[1] The 1% AEP Flood does not affect subject site. The lowest car parking space level is RL 29.20 which is more than 300mm above the PMF flood level. The proposed two laybacks off Bernadotte Street are very close to existing, having minimal impact on any flood storage. Furthermore, the proposed design does not contain any garages. [3] As per above [1]. [5] The 1% AEP flood level on the road before the proposed entrance to site is approximately 28.00 mAHD. The proposed vehicle crossing has a level of RL 27.82 meeting the level requirements. [6] The car parking on the proposed plans are not enclosed and are not affected by the 1% AEP flood.

[6] Enclosed car parking and car park areas accommodating more than 3 motor vehicles, with a floor level below the 1% AEP flood level, shall have adequate warning systems, signage, exits and evacuation routes.	
Evacuation [2] Reliable access for pedestrians or vehicles is required from the building, commencing at a minimum level equal to the lowest habitable floor level to an area of refuge above the PMF. Such a refuge may comprise a minimum of 20% of the gross floor area of the dwelling being above the PMF level. An engineer's report may be required. [4] The evacuation requirements of the development are to be considered. An engineer's report will be required if circumstances are possible that the evacuation of persons may not be achieved within the effective warning time. The development is to be consistent with any flood evacuation strategy, flood plan or similar strategy that has been adopted by Council. [6] An evacuation strategy to be considered and proposals made for improving the evacuation arrangements to the site in relation to the present situation where possible. Adequate flood warning should be available to allow safe and orderly evacuation without undue reliance on the SES or other authorised emergency personnel. Options could include the provision of access for pedestrians or vehicles to a publicly accessible location, or an area of refuge equal to at least 20% of the gross floor area, or such other area capable of accommodating the number of people likely to require evacuation that is above the PMF level.	[2] All of the lowest inhabitable floors on the site are above the PMF levels therefore meeting the 20% gross floor area requirement for refuge in the event of flooding. Furthermore, the proposed developments have a second floor if further area for refuge is required. [4] If evacuation is required away from site, there is adequate paths and ramps leading to exit out onto Munmurra Street (South-West portion of site) which is not affected by probable maximum floods according to the flood mapping provided by Georges River Council as seen in Figure 3. [6] As per above [4].
Management and Design [2] A Site Emergency Response Flood Plan is required where the site is affected by the 1% AEP flood level. [3] Applicant to demonstrate that there is an available area above the 1% AEP flood level plus freeboard to store goods; [4] No storage of materials below the prescribed floor level which may cause pollution or be potentially hazardous during floods.	[2] The site is not affected by the 1% AEP flood level. [3] The site is not affected by the 1% AEP flood level. [4] No known hazardous materials are planned to be stored below the prescribed floor level.

Please contact the undersigned for any further questions and clarification.

For and on behalf of JN,

Anthony Rourke

Junior Civil Engineer

Reviewed by;

Scott McMillan

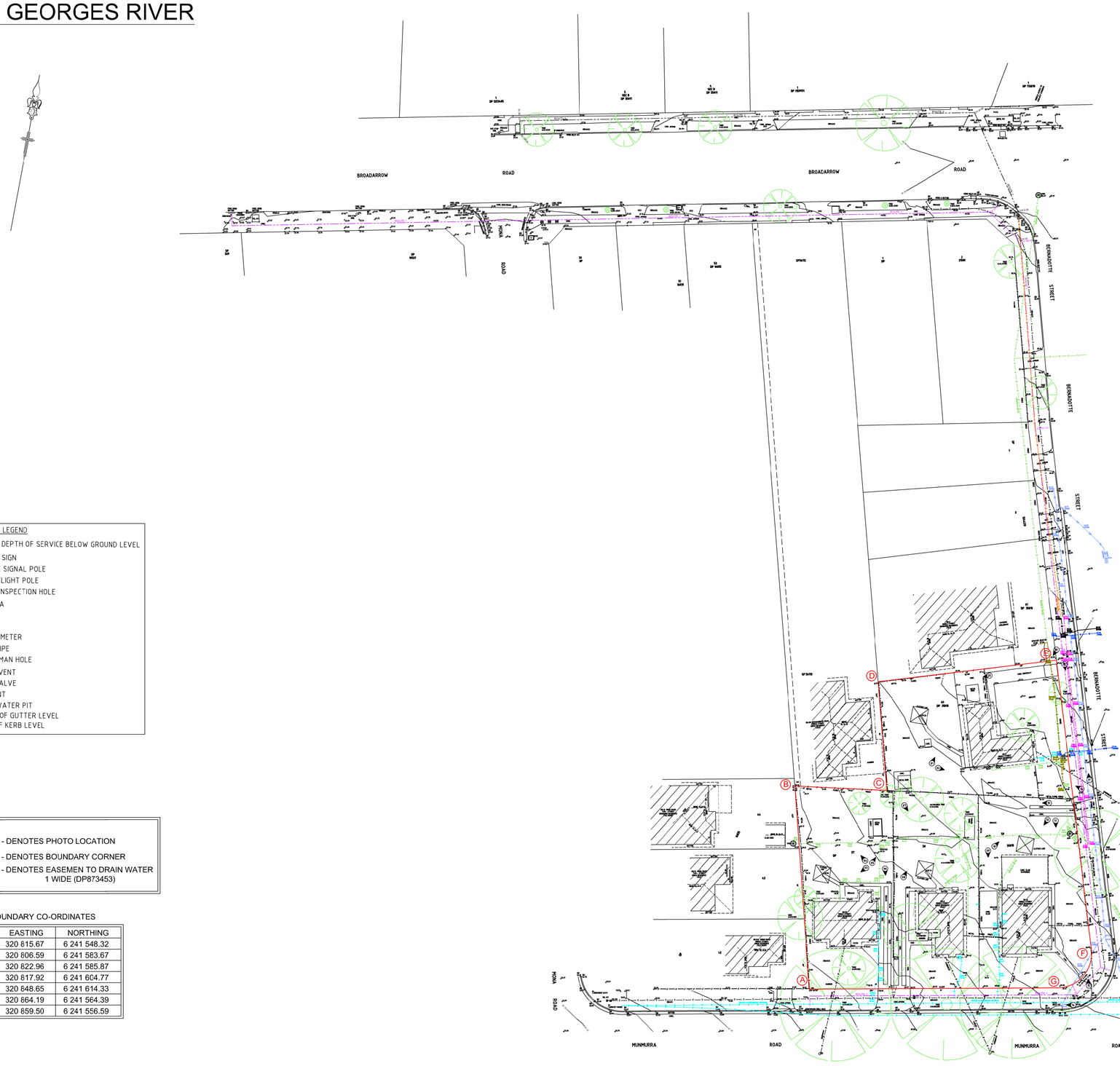
Civil Manager

BE (Hons) DipEngPrac MIEAust CPEng
NER 2465653

Appendix A

Site Survey

L.G.A. GEORGES RIVER



SYMBOL LEGEND

[400] DENOTE DEPTH OF SERVICE BELOW GROUND LEVEL
STREET SIGN
TRAFFIC SIGNAL POLE
POWER/LIGHT POLE
SEWER INSPECTION HOLE
TELSTRA
GAS
TAP
WATER METER
DOWN PIPE
SEWER MAN HOLE
SEWER VENT
STOP VALVE
HYDRANT
STORMWATER PIT
(G) INVERT OF GUTTER LEVEL
(B) BACK OF KERB LEVEL

S — S — DENOTES UNDERGROUND SEWER LINE (BY DURKIN & DBYD)
S — S — DENOTES UNDERGROUND SEWER LINE (BY DIGSAFE)
T — T — DENOTES UNDERGROUND COMMUNICATION CABLES (TELSTRA/NBN) DBYD
T — T — DENOTES UNDERGROUND COMMUNICATION CABLES (TELSTRA/NBN) (BY DIGSAFE)
SW — SW — DENOTES UNDERGROUND STORMWATER LINE (BY DIGSAFE)
G — G — DENOTES UNDERGROUND GAS LINE (DBYD)
G — G — DENOTES UNDERGROUND GAS LINE (BY DIGSAFE)
W — W — DENOTES UNDERGROUND WATER LINE (BY DURKIN & DBYD)
W — W — DENOTES UNDERGROUND WATER LINE (BY DIGSAFE)
[0.50]B DENOTES DEPTH OF SERVICE [0.50] CLASS B

LEGEND :

20 - DENOTES PHOTO LOCATION
A - DENOTES BOUNDARY CORNER
(A) - DENOTES EASEMEN TO DRAIN WATER 1 WIDE (DP873453)

BOUNDARY CO-ORDINATES

BDY CNR	EASTING	NORTHING
A	320 815.67	6 241 548.32
B	320 806.59	6 241 583.67
C	320 822.96	6 241 585.87
D	320 817.92	6 241 604.77
E	320 848.65	6 241 614.33
F	320 864.19	6 241 564.39
G	320 859.50	6 241 556.59

NOTES:

1) SITE BOUNDARIES DETERMINED BY SURVEY
2) THIS SURVEY HAS BEEN MADE PURSUANT TO SECTION 9 OF THE SURVEYING & SPATIAL INFORMATION REGULATION 2017.
2) ORIGIN OF LEVELS: SSM135859 RL28.947(A.H.D.) SCIMS
3) SITE COMPRISES LOTS 57, 58, 59, 60 D.P. 35818
4) SITE AREA 2493m² BY TITLE DIMENSIONS.
5) UNDERGROUND SERVICES HAVE NOT BEEN INVESTIGATED.
6) TREE SIZES ARE INDICATIVE
0.3Ø10S,8H DENOTES TREE SIZE 0.3 TRUNK DIAMETER, 10 SPREAD, 8 HIGH.
(G) - DENOTES INVERT OF GUTTER LEVEL.
(B) - DENOTES BACK OF KERB LEVEL.
(A) - DENOTES EASEMENT TO DRAIN WATER 1.0 WIDE (D.P. 873453) NOTED AS BEING APPURTENANT TO LOT 57 D.P. 35818 ON THE SUBJECT FOLIO
7) TREE NAMES SHOWN CONSTITUTE OUR OPINION ONLY IF TREE SPECIES IDENTIFICATION IS IMPORTANT THEY SHOULD BE DETERMINED BY A QUALIFIED ARBORIST.
8) SERVICE PIT LOCATIONS HAVE DETERMINED BY SURVEY. THE LOCATION OF WATER AND SEWER WITHIN THE SUBJECT LOTS AND THE COUNCIL STORMWATER LINE IN THE VERGE ADJACENT TO THE SUBJECT LOTS HAVE BEEN DETERMINED ONSITE BY DURKIN CONSTRUCTION PTY LTD, USING HAND WAND UNDERGROUND DETECTION AND GROUND PENETRATING RADAR (GPR). DUE TO SITE SOIL DENSITIES AND CONDITIONS SOME SERVICES WERE UNTRACEABLE AT POINTS. NON-SIGNAL PRODUCING SERVICES MAY EXIST AND ARE NOT SHOWN. PRIOR TO ANY CONSTRUCTION OR DEMOLITION, THOROUGH SEARCH OF ALL AUTHORITIES SHOULD BE MADE TO DETERMINE THE EXTENT AND NATURE OF SERVICES POT HOLING AND HAND AUGERS SHOULD BE USED WHEN EXAMINING SERVICES.
9) SERVICES OTHER THAN THE WATER, SEWER AND STORMWATER MENTIONED ABOVE IN NOTE 8 HAVE BEEN PLOTTED FROM DBYD SEARCH RESULTS OBTAINED FROM THE RELEVANT SERVICE PROVIDER. SEWER LINES WITHIN THE SUBJECT LOTS NOTED AS DBYD WERE NOT TRACEABLE AT THE TIME OF SURVEY AND HAVE BEEN PLOTTED USING DBYD SEARCH RESULTS.
10) WITH THE EXCEPTION OF THE SERVICES SHOWN IN BERNADOTTE STREET, DBYD SEARCH HAS NOT BEEN CARRIED OUT NORTH OF NO. 5 BERNADOTTE STREET OR IN BROADARROW ROAD

No.	DATE	NOTATION/AMENDMENT
A	12/12/22	EASEMENT (A) DESCRIPTION ADDED
B	5/07/23	UNDERGROUND SERVICES LOCATED ADJACENT TO No.5 BERNADOTTE STREET

No.	DATE	NOTATION/AMENDMENT

FILE	FILE SIZE (MB)	CHECKED BY

CONTOUR INTERVAL: 0.5m
DATUM: A.H.D.
ORIGIN OF DATUM: SSM135859 RL28.947 SCIMS
100 YEAR FLOOD RL: N/A
RECOMMENDED MINIMUM FLOOR RL: N/A
SOURCE OF FLOOD INFO: N/A

LEGEND OF COMMONLY USED SYMBOLS
WATER — W — W — W
SEWER — S — S — S
ELECTRICITY O/H — P — P — P
ELECTRICITY U/G — E — E — E
TELECOM O/H U/G — T — T — T
GAS — G — G — G
STORMWATER — SW — SW — SW
BENCH MARK
SURVEY CONTROL MARK PM SSM

REDUCTION RATIO 1 : 400 (A1)
0 5 10 15 20

LAND TITLE INFORMATION
LOTS: 57, 58, 59, 60
PLAN NOs : D.P 35818
OTHER:
AREA: 2493m²

DATE OF SURVEY: 21.08.22
SURVEY CONSULTANT:

Norton Survey Partners
SURVEYORS & LAND TITLE CONSULTANTS
PH +61 2 9555 2744
office@nspartners.com.au
SUITE 1 /505 BALMAIN ROAD
LILYFIELD N.S.W. 2040

REGISTERED SURVEYOR RYAN WILLS
REF: 55023-1.DWG

NSW GOVERNMENT Family & Community Services Land & Housing Corporation

DRAWING TITLE
DETAIL & LEVEL SURVEY

LOCATION
RIVERWOOD

STREET ADDRESS
MUNMURRA ROAD, BERNADOTTE STREET, BROADARROW ROAD

TYPE
S

JOB NUMBER
55023

SHT. 1 OF 10

Appendix B

Flood Compatible Materials

Building Component	Flood Compatible Material
Flooring and Sub-floor Structure	Concrete slab-on-ground monolith construction suspended reinforced concrete slab
Floor Covering	Clay tiles Concrete, precast or in situ Concrete tiles Epoxy, formed-in-place Mastic flooring, formed-in-place Rubber sheets or tiles with chemical-set adhesive Silicone floors formed-in-place Vinyl sheets or tiles with chemical-set adhesives Ceramic tiles, fixed with mortar or chemical-set adhesive Asphalt tiles, fixed with water resistant adhesive
Wall Structure	Solid brickwork Blockwork Reinforced, concrete or mass concrete
Roofing Structure **(for situations Where the Relevant Flood Level is Above the Ceiling)**	Reinforced concrete construction Galvanised metal construction
Doors	Solid panel with water proof adhesives Flush door with marine ply filled with closed cell foam Painted metal construction Aluminium or galvanized steel frame
Wall and Ceiling Linings	Fibro-cement board Brick, face or glazed Clay tile glazed in waterproof mortar Concrete Concrete block Steel with waterproof applications Stone, natural solid or veneer, wetproof grout Glass blocks'Glass Glastic sheeting or wall with waterproof adhesive
Insulation Windows	Foam (closed cell types)

	Aluminium frame with stainless steel rollers or similar Corrosion and water resistant material
Nails, Bolts, Hinges and Fittings	Brass, nylon or stainless steel Removable pin hinges Hot dipped galvanized steel wire nails or similar

Electrical and Mechanical Equipment

For dwellings constructed on land to which this chapter applies, the electrical and mechanical materials, equipment and installation should conform to the following requirements. ·

Main power supply

Subject to the approval of the relevant authority the incoming main commercial power service equipment, including all metering equipment, shall be located above the relevant flood level. Means shall be available to easily disconnect the dwelling from the main power supply. ·

Wiring

All wiring, power outlets, switches, etc., should, to the maximum extent possible, be located above the relevant flood level. All electrical wiring installed below the relevant flood level should be suitable for continuous submergence in water and should contain no fibrous components. Earth core leakage systems (or safety switches) are to be installed. Only submersible-type splices should be used below the relevant flood level. All conduits located below the relevant designated flood level should be so installed that they will be self-draining if subjected to flooding. ·

Equipment

All equipment installed below or partially below the relevant flood level should be capable of disconnection by a single plug and socket assembly. · Reconnection - Should any electrical device and/or part of the wiring be flooded it should be thoroughly cleaned or replaced and checked by an approved electrical contractor before reconnection.

Heating and Air Conditioning Systems

Heating and air conditioning systems should, to the maximum extent possible, be installed in areas and spaces of the house above the relevant flood level. When this is not feasible every precaution should be taken to minimise the damage caused by submersion according to the following guidelines.

Fuel

Heating systems using gas or oil as a fuel should have a manually operated valve located in the fuel supply line to enable fuel cut-off.

Installation

The heating equipment and fuel storage tanks should be mounted on and securely anchored to a foundation pad of sufficient mass to overcome buoyancy and prevent movement that could damage the fuel supply line. All storage tanks should be vented to an elevation of 600 millimetres above the relevant flood level. ·

Ducting

All ductwork located below the relevant flood level should be provided with openings for drainage and cleaning. Self-draining may be achieved by constructing the ductwork on a suitable grade. Where ductwork must pass through a water-tight wall or floor below the relevant flood level, the ductwork should be protected by a closure assembly operated from above relevant flood level.

Appendix C

Site Stormwater Design

NOTES:

TOTAL = 2494.1 m2
IMPERVIOUS = 1505.9 m2 (60.4%)
PERVIOUS = 988.2m2 (39.6%)

OSD SIZING BASED ON GEORGES RIVER COUNCIL STORMWATER MANAGEMENT POLICY 2021 TABLE 3:
SSR = 51.4 m3
PSD = 45.4 L/s
CAN HAVE UP TO 20% OFFSET FOR OSD STORAGE FOR RWT RE-USE USAGE

1% AEP FLOOD LEVEL (TAILWATER) - RL 27.38

OSD 1:
TOTAL AREA = 1803.8 m2 (72.3%)
SSR = 37.2 m3
PSD = 32.8 L/s
BYPASS = 141.3 m2 (0% IMPERVIOUS)
BYPASS PSD = 5.6 L/s
REMAINING OSD 1 PSD = 27.2 L/s

OSD 2:
TOTAL AREA = 690.3 m2 (27.7%)
SSR = 14.2 m3
PSD = 12.6 L/s
BYPASS = 125.4 m2 (28.7% IMPERVIOUS)
BYPASS PSD = 4.8 L/s
REMAINING OSD 1 PSD = 7.8 L/s

HAVE 27.7% OF OSD STORAGE BELOW 1% AEP FLOOD LINE (DROWNED ORIFICE). THIS IS BELOW THE 30% AS OUTLINED IN GEORGES RIVER COUNCIL STORMWATER MANAGEMENT POLICY 2021 SECTION 4.13

DRAWING REVIEWED BY:
Scott McMillan
Civil Manager
B.E. Civil (Hons)
MIEAust CPEng NER
2465653

JN Responsive Engineering

This document is issued by Jones Nicholson Pty Ltd (ABN 51 003 316 032)

DESIGN	DJA
DATE	20/09/2023
SIZE	A1
SCALE	1:200
PROJECT MGR	GC

CIVIL SKETCH

SITE STORMWATER PLAN

Proposed Senior Development
10-14 Munmurra Road and 5 Bernadotte St Riverwood NSW 2210
Custance Associates Australia Pty Ltd

N0221293 CSK01 E

25/09/2023 12:18:40 PM

Appendix D

Georges River Council Flood Advice Letter

GEORGES RIVER COUNCIL

Date: 25/08/2023

Our Ref: STM2023/0543

Contact: Rabi Pokharel

Ned Harper

ned.harper@facs.nsw.gov.au

Dear Sir/Madam.

Flood Advice Letter for Address **14 Munmurra Road, RIVERWOOD NSW 2210**

WHEN LODGING A DEVELOPMENT APPLICATION, YOU MUST ENCLOSE A COPY OF THIS LETTER.

FLOOD NOTATION

Council has notated this property as **NOT** being affected by the 1% Annual Exceedance Probability (AEP) Flood. The 1% AEP Flood means there is a 1% (i.e., a 1 in 100) chance of a flood of this height, or higher occurring in any one year.

Council has notated this property as being affected by a Probable Maximum Flood (PMF) flood. The PMF is the largest flood that could conceivably occur at a particular location.

FLOOD STUDY

The Council Flood Study applicable to the property is:

- Draft Overland Flow Risk Management Study and Plan for Hurstville, Mortdale and Peakhurst Wards (2023), Prepared by WMA water.

FLOOD LEVELS

All flood levels are shown in Australian Height Datum (m AHD)

Location/Event	PMF Level
PMF	28.895

FLOOD RISK EXPOSUE

The Flood Risk Exposure of the site in PMF Flood Event has been assessed as

Overland Flooding

Life Hazard: H1 during PMF event.

HAZARD CATEGORY DETAILS

H1 - Generally safe for vehicles, people, and buildings.
H2 - Unsafe for small vehicles.
H3 - Unsafe for vehicles, children, and the elderly.
H4 - Unsafe for vehicles and people
H5 - Unsafe for vehicles and people. All building types vulnerable to structural damage. Some less robust building types vulnerable to failure
H6 - Unsafe for vehicles and people. All building types considered vulnerable to failure.

Flood Planning Constraint Criteria (FPCC): 3

Table 14: Flood Planning Constraint Categories for the Study Area

	Constraints[1]	Implications	Considerations
FPCC 1	Floodway and flood storage areas in the 1% AEP event.	Any development is likely to affect flood behaviour in the 1% AEP event and cause impacts elsewhere.	Majority of developments and uses have adverse impacts on flood behaviour or are vulnerable. Consider limiting uses and developments to those that are compatible with flood function and hazard.
	H6 hazard in the 1% AEP event	Hazardous conditions considered unsafe for vehicles and people, all types of buildings considered vulnerable to structural failure.	
FPCC 2	Floodway in the 0.2% AEP event	People and buildings in these areas may be affected by dangerous floodwaters in rarer events.	Many uses and developments will be more vulnerable in these areas. Consider limiting new uses to those compatible with flood function and hazard (including rarer flood flows) or consider treatments to reduce the hazard (such as filling). Consider the need for additional development control conditions to reduce the effect of flooding on the development and its occupants.
	H5 flood hazard in the 1% AEP event	Hazardous conditions considered unsafe for vehicles and people, and all buildings vulnerable to structural damage.	
	H6 flood hazard in the 0.2% AEP event	Hazardous conditions develop in rare events which may have implications for the development and its occupants.	
	Areas of FPCC 3 surrounded by FPCC 2 or FPCC 1	Hazardous conditions arise due to isolation (see below)	

FPCC 3	Within the FPA (1% + 0.5m)	Hazardous conditions may exist creating issues for vehicles and people. Structural damage to buildings is unlikely.	Standard land use and development controls aimed at reducing damage and the exposure of the development to flooding are likely to be suitable. Consider additional conditions for critical utilities, vulnerable facilities and key community infrastructure.
	Note: Areas classified as FPCC 3 that are surrounded by FPCC2 and/or FPCC1 have been reclassified as FPCC2.	Even if elevated, hazard may arise from the area being isolated and cut off by deep or fast flowing water. Without a safe evacuation route, risk to life exists even if the building itself is not threatened. Such areas are reclassified as FPCC2 (see above)	See FPCC 2
FPCC 4	Within the PMF extent	Emergency response may rely on key community facilities such as emergency hospitals, emergency management headquarters and evacuation centres operating during an event. Recovery may rely on key utility services being able to be readily re-established after an event.	Consider the need for conditions for emergency response facilities, key community infrastructure and land uses with vulnerable users.
	Note: Areas classified as FPCC 4 that are surrounded by FPCC2 and/or FPCC1 have been reclassified as FPCC2.	Even if elevated, hazard may arise from the area being isolated and cut off by deep or fast flowing water. Without a safe evacuation route, risk to life exists even if the building itself is not threatened. Such areas are reclassified as FPCC2 (see above)	See FPCC 2

Flood Risk Precinct:

Low Flood Risk, outside 1% AEP extent but within PMF extent

FLOOD PLANNING LEVEL (FPL)

Refer to the Georges River Council Flood Control Matrices specified in the Stormwater Management Policy to determine the minimum floor level for the proposed development.

FLOOD EFFECTS

The applicant is to demonstrate to Council (by way of an Overland Flow Path Assessment or Local Flood Study as per Section 6.11 of Stormwater management Policy) that the development will not increase flood affectation elsewhere having regard to:

(i) Loss of flood storage.

(ii) Changes in flood levels, flows and velocities caused by alterations to flood flows; and

(iii) The cumulative impacts of multiple potential developments in the vicinity.

Refer to the section 6 of the Georges River Council Stormwater Management Policy for additional information. See below link for SWMP.

Pol-073-01-01-Stormwater-Management-Policy-April-2021.pdf (nsw.gov.au)

FLOOD COMMENTARY

- Refer to Figures 1 to 4 for Flood Maps.
- No accurate information is recorded regarding the impact of tsunamis in the Georges River Local Government Area.

Council considers that this is the best information currently available on flooding in the area, but Council cannot comment on the accuracy of the result.

Should you require any further information, please contact Council's Strategic Stormwater Assets Engineer, Rabi Pokharel on 02 9330 9475.

Yours faithfully

Pulak Saha
Senior Stormwater Asset Engineer

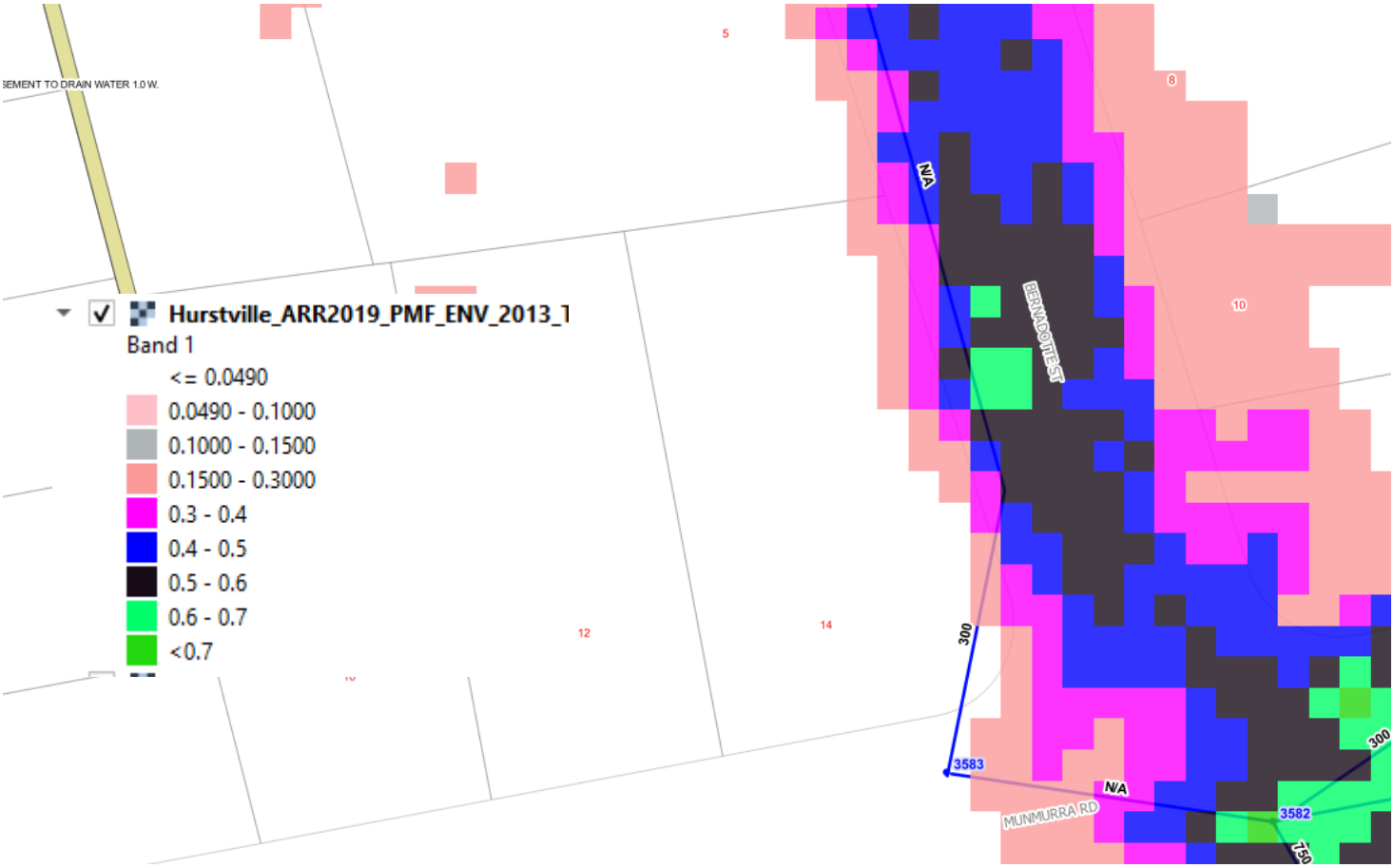


Figure 1: PMF flood depth

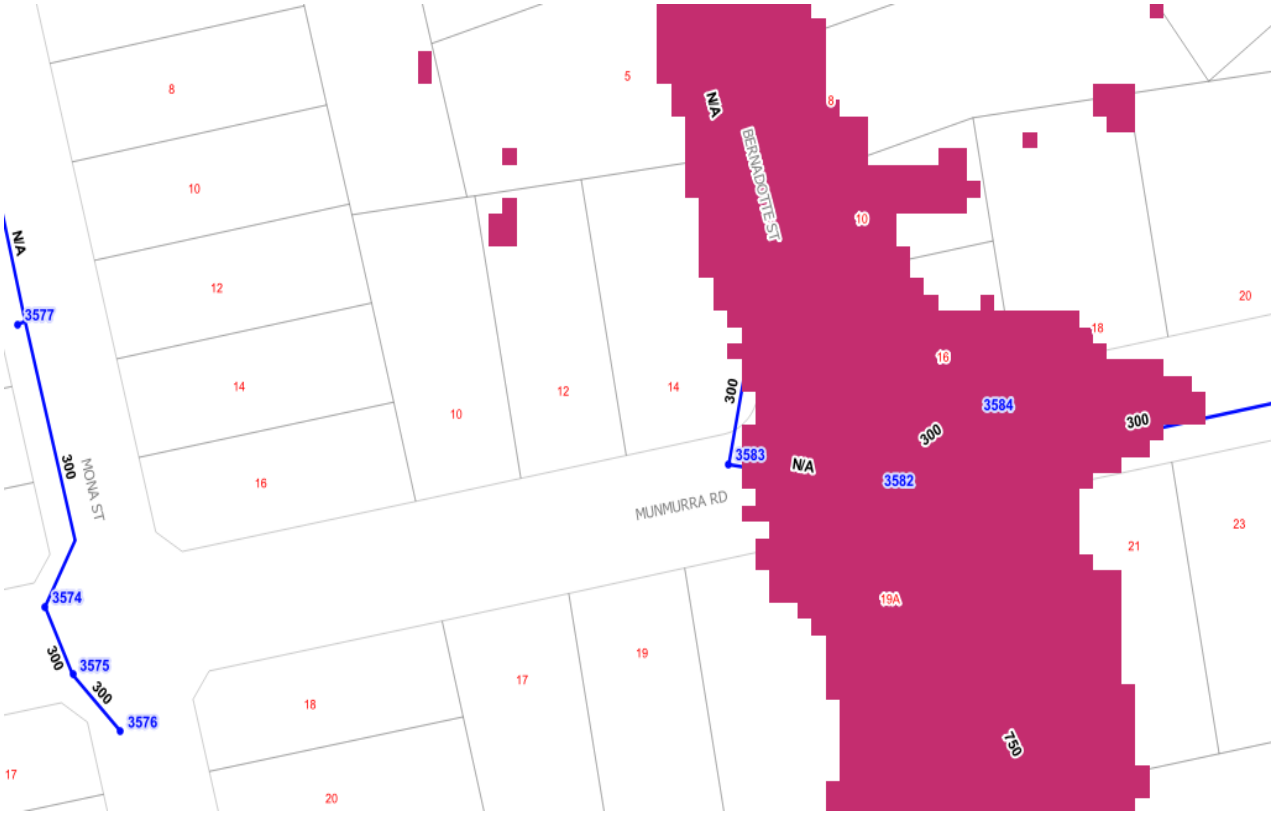


Figure 2: PMF Flood Extent Map

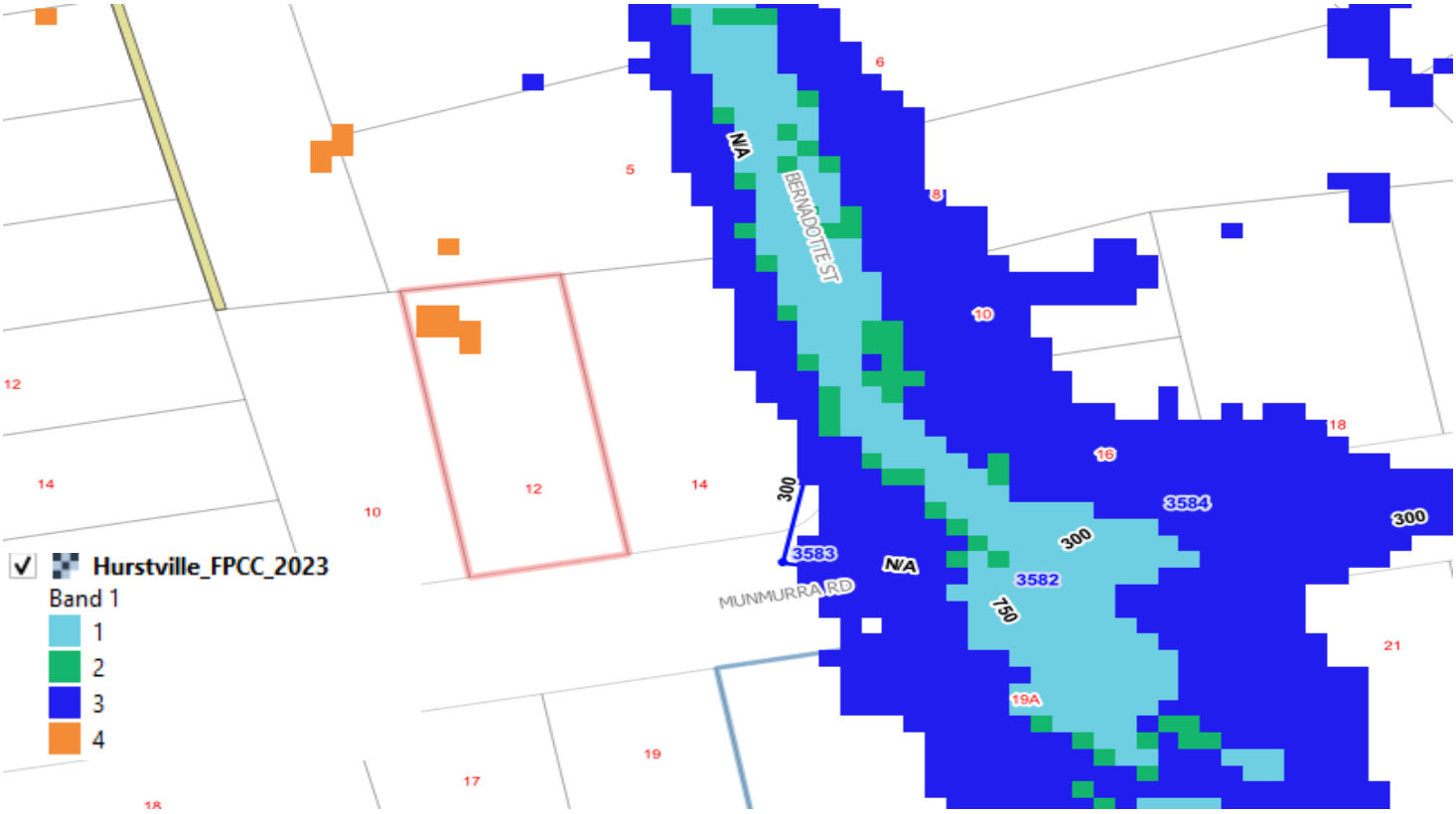


Fig 3: Flood Planning Constraints Category

Figure 4: Stormwater network map (indicative only)