

Annexure C – Afflux Flood Maps



Legend

	Site		-0.03 - -0.02
	Buildings		-0.02 - -0.01
	Proposed Buildings		-0.01 - 0.01
Peak Flood Level Afflux (m)			
	<= -0.3		0.01 - 0.02
	-0.3 - -0.2		0.02 - 0.03
	-0.2 - -0.1		0.03 - 0.04
	-0.1 - -0.05		0.04 - 0.05
	-0.05 - -0.04		0.05 - 0.1
	-0.04 - -0.03		0.1 - 0.2
			>= 0.2

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0 25 50 m



Client
Landcom

Project Title
Flood Impact Assessment
6 Halifax Street, Macquarie Park

ABN 50 665 559 651
Phone: +61 (2) 8834 3487
Website: <https://livingwatereng.com.au/>
Email: admin@livingwatereng.com.au

Figure Number
C1

Figure Title
Peak Flood Level Afflux
Post-Development Conditions
10% AEP Design Flood Event

LWE Ref
P23-002

Issue Date
24-May-24

Version
Final



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Legend

	Site		-0.3 - -0.2
	Buildings		-0.2 - -0.1
	Proposed Buildings		-0.1 - 0.1
Peak Flood Velocity Afflux (m/s)			0.1 - 0.2
	<= -3		0.2 - 0.3
	-3 - -2		0.3 - 0.4
	-2 - -1		0.4 - 0.5
	-1 - -0.5		0.5 - 1
	-0.5 - -0.4		1 - 2
	-0.4 - -0.3		>= 2

0 25 50 m



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Figure Number
C2

Figure Title
Peak Flood Velocity Afflux
Post-Development Conditions
10% AEP Design Flood Event

LWE Ref
P23-002

Issue Date
24-May-24

Version
Final



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Legend

Site

Buildings

Proposed Buildings

Peak Velocity-Depth Afflux (m^2/s)

<= -0.25
 -0.25 - -0.2
 -0.2 - -0.15
 -0.15 - -0.1
 -0.1 - -0.08
 -0.08 - -0.06

-0.06 - -0.04
 -0.04 - -0.02
 -0.02 - 0.02
 0.02 - 0.04
 0.04 - 0.06
 0.06 - 0.08
 0.08 - 0.1
 0.1 - 0.15
 0.15 - 0.2
 >= 0.2

0 25 50 m



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Figure Number
C3

Figure Title
Peak V-D Product Afflux
Post-Development Conditions
10% AEP Design Flood Event

LWE Ref
P23-002

Issue Date
24-May-24

Version
Final



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Legend

	Site		-0.03 - -0.02
	Buildings		-0.02 - -0.01
	Proposed Buildings		-0.01 - 0.01
Peak Flood Level Afflux (m)			0.01 - 0.02
	<= -0.3		0.02 - 0.03
	-0.3 - -0.2		0.03 - 0.04
	-0.2 - -0.1		0.04 - 0.05
	-0.1 - -0.05		0.05 - 0.1
	-0.05 - -0.04		0.1 - 0.2
	-0.04 - -0.03		>= 0.2

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0 25 50 m



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Figure Number
C4

Figure Title
Peak Flood Level Afflux
Post-Development Conditions
5% AEP Design Flood Event

LWE Ref
P23-002

Issue Date
24-May-24

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Legend

	Site		-0.3 - -0.2
	Buildings		-0.2 - -0.1
	Proposed Buildings		-0.1 - 0.1
Peak Flood Velocity Afflux (m/s)			0.1 - 0.2
	<= -3		0.2 - 0.3
	-3 - -2		0.3 - 0.4
	-2 - -1		0.4 - 0.5
	-1 - -0.5		0.5 - 1
	-0.5 - -0.4		1 - 2
	-0.4 - -0.3		>= 2

0 25 50 m



Client
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Website: <https://livingwatereng.com.au/>
Email: admin@livingwatereng.com.au

Figure Number
C5

Figure Title
Peak Flood Velocity Afflux
Post-Development Conditions
5% AEP Design Flood Event

LWE Ref
P23-002

Issue Date
24-May-24

Version
Final



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Legend

Site

Buildings

Proposed Buildings

Peak Velocity-Depth Afflux (m^2/s)

	≤ -0.25
	$-0.25 - -0.2$
	$-0.2 - -0.15$
	$-0.15 - -0.1$
	$-0.1 - -0.08$
	$-0.08 - -0.06$

	$-0.06 - -0.04$
	$-0.04 - -0.02$
	$-0.02 - 0.02$
	$0.02 - 0.04$
	$0.04 - 0.06$
	$0.06 - 0.08$
	$0.08 - 0.1$
	$0.1 - 0.15$
	$0.15 - 0.2$
	≥ 0.2

0 25 50 m



Client
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Project Title
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Figure Number
C6

Figure Title
Peak V-D Product Afflux
Post-Development Conditions
5% AEP Design Flood Event

LWE Ref
P23-002

Issue Date
24-May-24

Version
Final



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Legend

	Site		-0.03 - -0.02
	Buildings		-0.02 - -0.01
	Proposed Buildings		-0.01 - 0.01
Peak Flood Level Afflux (m)			0.01 - 0.02
	<= -0.3		0.02 - 0.03
	-0.3 - -0.2		0.03 - 0.04
	-0.2 - -0.1		0.04 - 0.05
	-0.1 - -0.05		0.05 - 0.1
	-0.05 - -0.04		0.1 - 0.2
	-0.04 - -0.03		>= 0.2

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Figure Number
C7

Figure Title
Peak Flood Level Afflux
Post-Development Conditions
1% AEP Design Flood Event

LWE Ref
P23-002

Issue Date
24-May-24

Version
Final



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Legend

	Site		-0.3 - -0.2
	Buildings		-0.2 - -0.1
	Proposed Buildings		-0.1 - 0.1
Peak Flood Velocity Afflux (m/s)			0.1 - 0.2
	<= -3		0.2 - 0.3
	-3 - -2		0.3 - 0.4
	-2 - -1		0.4 - 0.5
	-1 - -0.5		0.5 - 1
	-0.5 - -0.4		1 - 2
	-0.4 - -0.3		>= 2

0 25 50 m



Client
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Project Title
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Email: admin@livingwatereng.com.au

Figure Number
C8

Figure Title
Peak Flood Velocity Afflux
Post-Development Conditions
1% AEP Design Flood Event

LWE Ref
P23-002

Issue Date
24-May-24

Version
Final



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Legend

Site

Buildings

Proposed Buildings

Peak Velocity-Depth Afflux (m²/s)

≤ -0.25
 -0.25 - -0.2
 -0.2 - -0.15
 -0.15 - -0.1
 -0.1 - -0.08
 -0.08 - -0.06

-0.06 - -0.04
 -0.04 - -0.02
 -0.02 - 0.02
 0.02 - 0.04
 0.04 - 0.06
 0.06 - 0.08
 0.08 - 0.1
 0.1 - 0.15
 0.15 - 0.2
 ≥ 0.2

0 25 50 m



Client
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Project Title
Flood Impact Assessment
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Email: admin@livingwatereng.com.au

Figure Number
C9

Figure Title
Peak V-D Product Afflux
Post-Development Conditions
1% AEP Design Flood Event

LWE Ref
P23-002

Issue Date
24-May-24

Version
Final



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Legend

	Site		-0.03 - -0.02
	Buildings		-0.02 - -0.01
	Proposed Buildings		-0.01 - 0.01
Peak Flood Level Afflux (m)			0.01 - 0.02
	<= -0.3		0.02 - 0.03
	-0.3 - -0.2		0.03 - 0.04
	-0.2 - -0.1		0.04 - 0.05
	-0.1 - -0.05		0.05 - 0.1
	-0.05 - -0.04		0.1 - 0.2
	-0.04 - -0.03		>= 0.2

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0 25 50 m



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Email: admin@livingwatereng.com.au

Figure Number
C10

Figure Title
Peak Flood Level Afflux
Post-Development Conditions
1% AEP Design Flood Event (Climate Change)

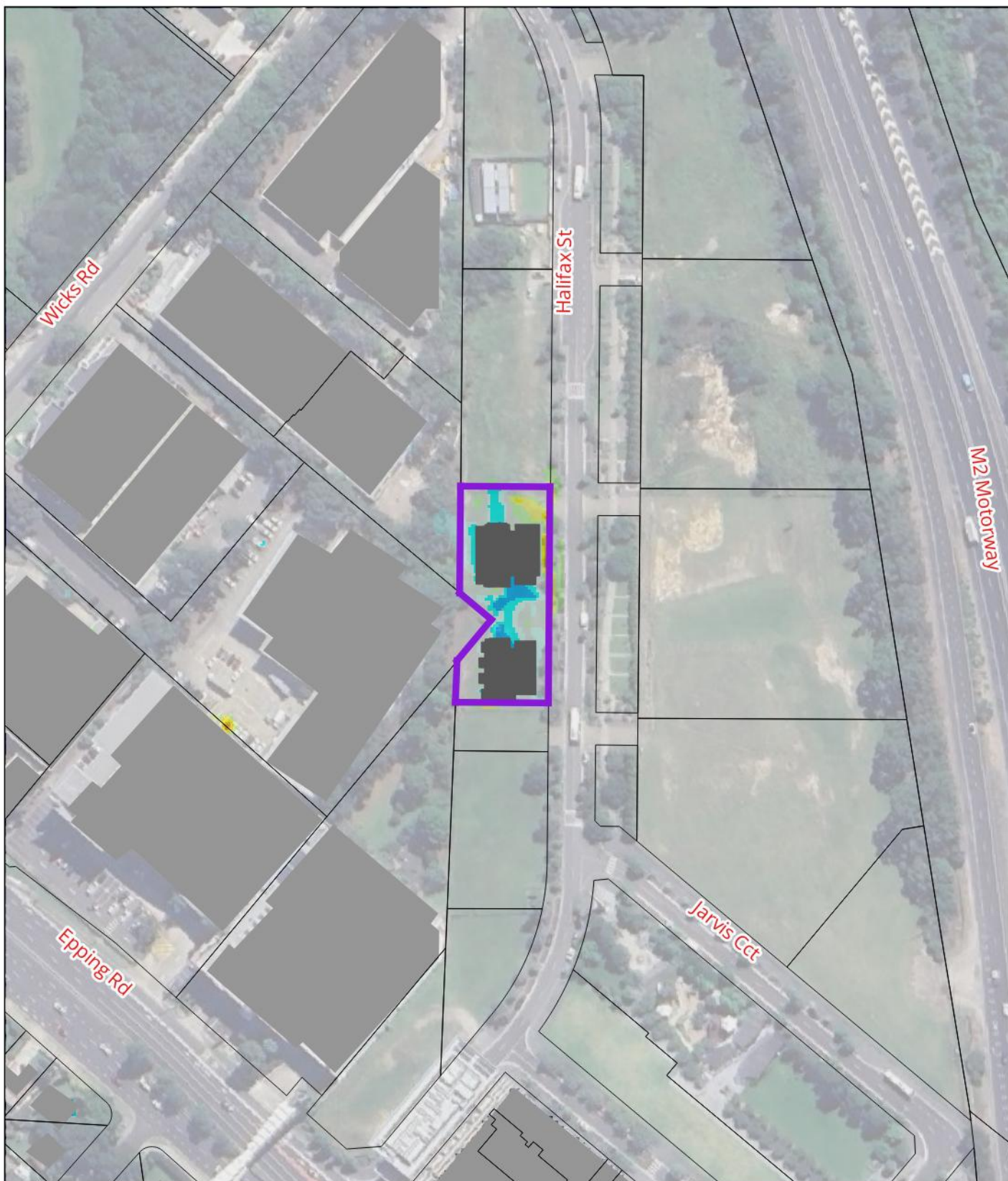
LWE Ref
P23-002

Issue Date
24-May-24

Version
Final



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Legend

	Site		-0.3 - -0.2
	Buildings		-0.2 - -0.1
	Proposed Buildings		-0.1 - 0.1
Peak Flood Velocity Afflux (m/s)			0.1 - 0.2
	<= -3		0.2 - 0.3
	-3 - -2		0.3 - 0.4
	-2 - -1		0.4 - 0.5
	-1 - -0.5		0.5 - 1
	-0.5 - -0.4		1 - 2
	-0.4 - -0.3		>= 2

0 25 50 m



Client

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Figure Number

C11

Figure Title

Peak Flood Velocity Afflux
Post-Development Conditions
1% AEP Design Flood Event (Climate Change)

LWE Ref
P23-002

Issue Date
24-May-24

Version
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Legend

Site

Buildings

Proposed Buildings

Peak Velocity-Depth Afflux (m^2/s)

	≤ -0.25
	$-0.25 - -0.2$
	$-0.2 - -0.15$
	$-0.15 - -0.1$
	$-0.1 - -0.08$
	$-0.08 - -0.06$

	$-0.06 - -0.04$
	$-0.04 - -0.02$
	$-0.02 - 0.02$
	$0.02 - 0.04$
	$0.04 - 0.06$
	$0.06 - 0.08$
	$0.08 - 0.1$
	$0.1 - 0.15$
	$0.15 - 0.2$
	≥ 0.2

0 25 50 m



Client
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Project Title
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Website: <https://livingwatereng.com.au/>
Email: admin@livingwatereng.com.au

Figure Number
C12

Figure Title
Peak V-D Product Afflux
Post-Development Conditions
1% AEP Design Flood Event (Climate Change)

LWE Ref
P23-002

Issue Date
24-May-24

Version
Final



LIVING WATER ENGINEERING
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Legend

	Site		-0.03 - -0.02
	Buildings		-0.02 - -0.01
	Proposed Buildings		-0.01 - 0.01
Peak Flood Level Afflux (m)			0.01 - 0.02
	<= -0.3		0.02 - 0.03
	-0.3 - -0.2		0.03 - 0.04
	-0.2 - -0.1		0.04 - 0.05
	-0.1 - -0.05		0.05 - 0.1
	-0.05 - -0.04		0.1 - 0.2
	-0.04 - -0.03		>= 0.2

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0 25 50 m



Client
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Project Title
Flood Impact Assessment
6 Halifax Street, Macquarie Park

ABN 50 665 559 651
Phone: +61 (2) 8834 3487
Website: <https://livingwatereng.com.au/>
Email: admin@livingwatereng.com.au

Figure Number
C13

Figure Title
Peak Flood Level Afflux
Post-Development Conditions
PMF Design Flood Event

LWE Ref
P23-002

Issue Date
24-May-24

Version
Final



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Legend

	Site		-0.3 - -0.2
	Buildings		-0.2 - -0.1
	Proposed Buildings		-0.1 - 0.1
Peak Flood Velocity Afflux (m/s)			0.1 - 0.2
	<= -3		0.2 - 0.3
	-3 - -2		0.3 - 0.4
	-2 - -1		0.4 - 0.5
	-1 - -0.5		0.5 - 1
	-0.5 - -0.4		1 - 2
	-0.4 - -0.3		>= 2

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0 25 50 m



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ABN 50 665 559 651
Phone: +61 (2) 8834 3487
Website: <https://livingwatereng.com.au/>
Email: admin@livingwatereng.com.au

Figure Number
C14

Figure Title
Peak Flood Velocity Afflux
Post-Development Conditions
PMF Design Flood Event

LWE Ref
P23-002

Issue Date
24-May-24

Version
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LIVING WATER ENGINEERING
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Legend

	Site		-0.06 - -0.04
	Buildings		-0.04 - -0.02
	Proposed Buildings		-0.02 - 0.02
Peak Velocity-Depth Afflux (m ² /s)			
	<= -0.25		0.02 - 0.04
	-0.25 - -0.2		0.04 - 0.06
	-0.2 - -0.15		0.06 - 0.08
	-0.15 - -0.1		0.08 - 0.1
	-0.1 - -0.08		0.1 - 0.15
	-0.08 - -0.06		0.15 - 0.2
			>= 0.2

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0 25 50 m



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Website: <https://livingwatereng.com.au/>
Email: admin@livingwatereng.com.au

Figure Number
C15

Figure Title
Peak V-D Product Afflux
Post-Development Conditions
PMF Design Flood Event

LWE Ref
P23-002

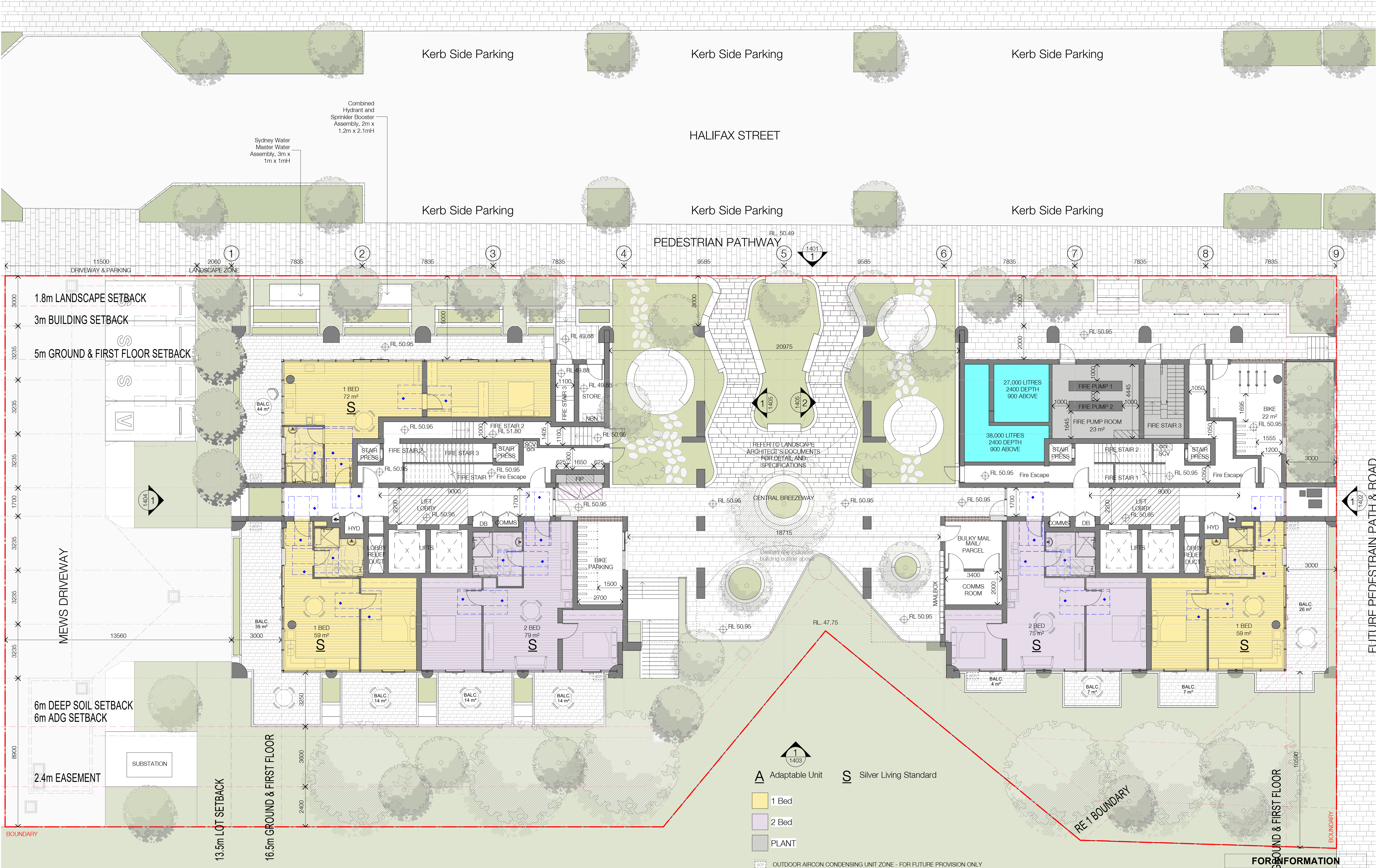
Issue Date
24-May-24

Version
Final



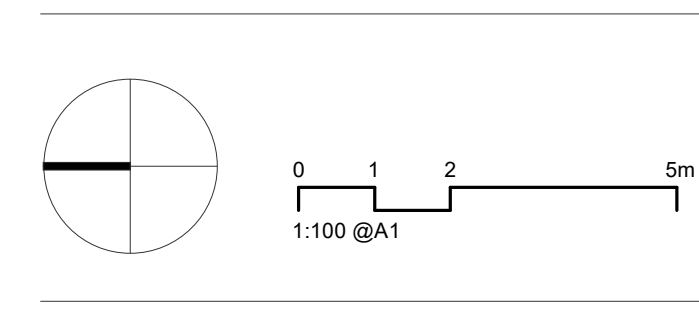
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Annexure D – Proposed Development Plans



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Nominated Architects: Adam Haddow-7188 | John Pradel-7004



Rev	Date	Revision	By	Chk.
1	2023/07/05	FOR INFORMATION	LL	SC

Client
LANDCOM

Project
LACHLAN LINE AFFORDABLE HOUSING LOT 117 LACHLAN'S LINE
Drawing Name
FLOOR PLAN GROUND

Date	Scale	Sheet Size
2023/07/05	1 : 100	@ A1
Drawn	Chk.	Job No.
LL	SC	6540
Drawing No.	Revision	
DA-1003	/ 1	

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CLIENT						ARCHITECT		LANDSCAPE		DO NOT SCALE		Drawn	RI	Designer	CR/RI	Client	LANDCOM		
												Drafting	CR	Design	CR	Project	6 HALIFAX ST, MACQUARIE PARK		
												Approved	(Project Director)			Title	GROUND FLOOR & PUBLIC DOMAIN PLAN		
												Date							
												Scale	1:100		This Drawing must not be used for Construction unless signed as Approved		Original Size	A1	
																Drawing No:	LD-DA101		Rev: 1

Annexure E – Council’s Advice and Flood Information

URBAN DESIGN REVIEW & PRELODGEEMENT PANEL ADVICE

PROPERTY: Lot 117 Lachlan's Line (6 Halifax Street, Macquarie Park)

MEETING DATE: 30/03/2023 **TIME:** 3:30pm to 5:00pm

PRELODGEEMENT No: PRL NO: PRL2023/0006

DEVELOPMENT: **Proposed Affordable housing development. 9,887sqm of GFA including 13 storeys 38 car parking spaces and total 135 units**

Note: The site benefits from a Concept Approval under SSD-5093.

ATTENDANCE:

UDRP Panel:

Gabrielle Morrish
Matthew Pullinger
Designer

Architect/Urban Designer
Architect/Urban

Council:

Sohail Faridy Senior Coordinator Development
Assessment
Nic Najar Development Adviser – Town
Planner

Proponents:

- Paul Hunt
- Lishi Li
- Sevda Cetin
- Pip Hyde
- Anton Reisch
- Roh Iyer
- Nigel Macdonald
- Kemal Hughes
- Tasha Burrell
- Fay Edwards -
- Sonny Naamo
-

- Additional information is required to closely examine the cumulative overshadowing impact on Linear Park 4, particularly around 11:30 am to 1:30 pm on the winter solstice. It is important to ensure that the proposal is able to maintain a minimum of direct solar access to at least 50% of the open space in Linear Park 4.

Drainage and flooding:

- A detailed Flood Impact Assessment is required to be submitted with the Application
- Flood modelling files are required to be submitted with a DA
- A flood emergency response plan is required consistent with the LLUDG

Based on the information provided, the below major issues are to be addressed on a future DA submission:

- The site is affected by an overland flow path (Figure 8). Flood Impact Assessment Report must be prepared for pre and post developed scenario using 2D flood modelling software. The applicant shall prove that the proposed development is not adversely affecting the flood conditions to the neighbouring properties or downstream catchment. This includes 1% AEP and PMF Velocity Depth product (VxD), Flood Hazard Vulnerability, Flood Velocity and Flood Level values.

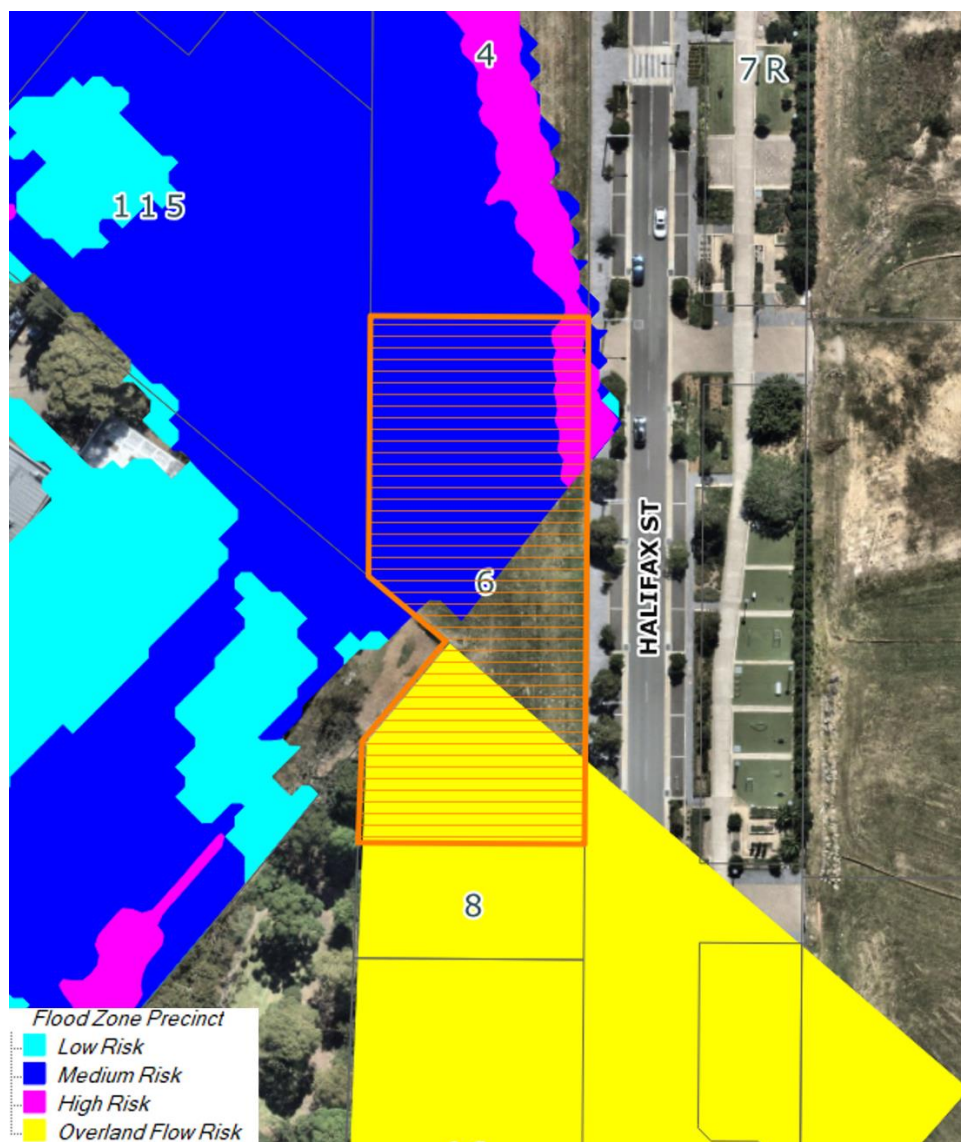


Figure 8: Flood Risk Precinct Extract (Source: Ryde Maps)

- Flood emergency response plan detailing the flood evacuation strategy during 1% AEP and PMF flood event must be submitted to Council.
- Full electronic copies of executable TUFLOW/HECRAS modelling file clearly identifying each scenario shall be submitted to Council. Electronic copy of modelling results for pre and post development scenario for velocity, depth, flood level, VxD VxD afflux and flood level afflux for 1% AEP and PMF flood event shall be submitted to Council.
- Existing scenario flood levels shall be calibrated with the flood levels provided by Council in the flood certificate. Please provide flood level calibration in the table or in the map for the locations shown in Council flood certificate.
- Any proposed basement and openings to basement such as stairwell entries, ventilation openings etc. shall be protected up to PMF level. Driveway crest level, openings to basement and PMF level must be shown in the report.
- The freeboard requirements of Ryde DCP to be implemented in the design of the habitable/non-habitable building areas. Please Figure 9 from Council's DCP for freeboard requirements.

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	-
Onsite Detention ^(d)	N/A	0.2m	0.1m	N/A	0.2m
Road Drainage Minor Systems (Gutter and pipe flow)		0.15m below top of grate			
Road Drainage		Refer to Figure 2-1.			
Detention Basins ⁽⁴⁾		The top water level shall be designed to be 0.5m below top of embankment (100yr ARI)			

Table 2.1 Freeboard requirements.

Figure 9: Council Free Board Requirements (Source: RDCP 2014)

Senan Naamo
14/60 Station St E
PARRAMATTA NSW 2150

24 May 2023

Our ref: D23/70779

Dear Mr. Naamo,

RE: Request for Flood Information – No. 6 Halifax Street, Macquarie Park

Reference is made to your application received on 19 May 2023 seeking flood level information pertaining to the above-mentioned address.

Please find attached flood level data sheet providing flood levels for the 100 year ARI (Average Recurrence Interval) flood event and the PMF (Probable Maximum Flood) event.

This information is derived from models established as part of the Macquarie Park Flood Study Report and Floodplain Risk Management Study and Plan.

Council's database indicates the presence of a Ø375mm drainage pipe within the site.

Please be advised that flood models are approximate. Care and expertise is required in the interpretation of these flood levels. In addition, this flood information does not take into account any local overland flow issues.

Any person or organisation who acts on the information provided does so at his / her / its own risk. To the extent permitted by law, the City of Ryde accepts no responsibility and excludes all liability whatsoever in respect of any use of or reliance upon this information.

Should you require any further information, please feel free to contact me on (02) 9952 8105.

Yours sincerely,



Anil Shrestha
Senior Stormwater Engineer

FLOOD INFORMATION REQUEST

Property Address: No. 6 Halifax Street, Macquarie Park
Issue Date: 24 May 2023
Flood Study Reference: Macquarie Park Flood Study Report (April 2010)
Flood Model Reference: TUFLOW Model (July 2010)

Flood Level Location Map



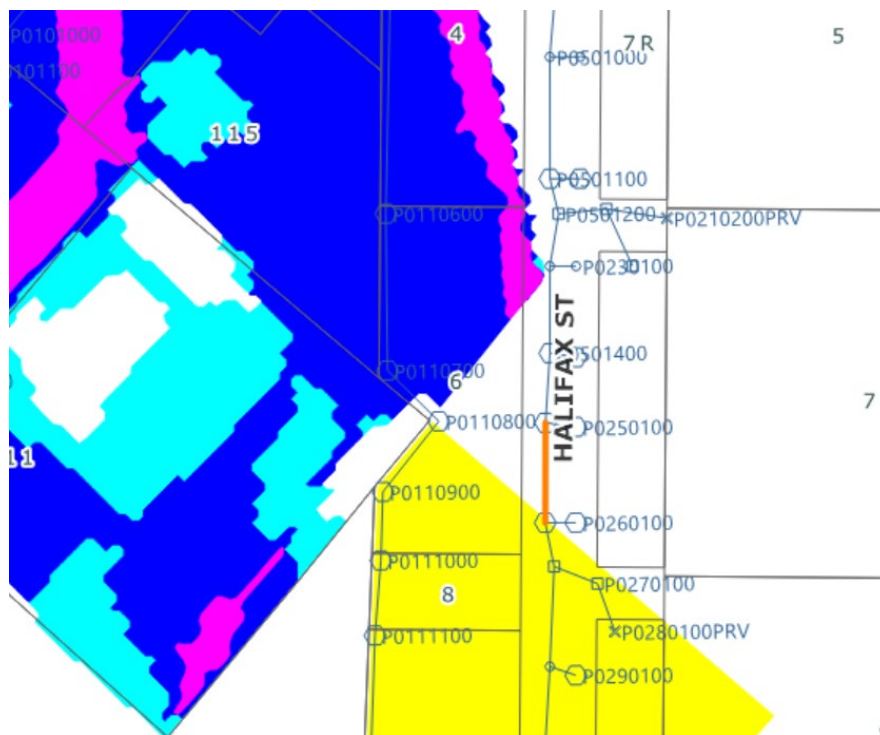
Flood Level Data Table

Location	100 Year ARI Flood Event (m AHD)	Probable Maximum Flood (m AHD)
A	46.91	46.97
B	43.90	43.93
C	48.56	48.63
D	45.17	45.20
E	51.51	51.57
F	47.65	47.67
G	52.88	52.90
H	Nil	Nil
I	54.20	54.21
J	Nil	49.32

Notes:

- All levels are based on Australian Height Datum (AHD).
- Flood levels are indicative only.
- The flood levels were derived using Aerial Laser Survey (ALS) data which is considered as approximate.
- This flood level information is for existing site conditions only.
- Concept plans are required for all new development proposals.
- The floor levels of the proposed habitable floor area should be set with a freeboard of 300 mm (Overland Flow and Low Risk) and 500 mm (Medium Risk and High Risk) to the 100 year ARI flood level. A freeboard of 150 mm (Overland Flow and Low Risk) and 300 mm (Medium Risk and High Risk) is applicable for non-habitable floor areas. Refer City of Ryde Development Control Plan 2014.
- A site specific flood study / risk assessment may be required for any future development. Engage a suitably qualified engineer to assist you in this matter. Any study or assessment shall be in accordance with the NSW Government's Floodplain Development Manual 2005 and the City of Ryde Development Control Plan 2014.
- Site specific ground and building survey levels should be used to relate flood levels and to assess the impact of flooding.

Flood Risk Map



Flood Risk Precincts

-  Low Risk
-  Overland Flow
-  Medium Risk
-  High Risk



Flood Extent (100 Year ARI Event)



Flood Extent (Probable Maximum Flood)



Annexure F – BoM and ARR Datahub Information

LOCATION **33.800 S 151.125 E** * NEAR.. Lachlan Line

LIST OF COEFFICIENTS TO EQUATIONS OF THE FORM

$$\ln(I) = A + B \times (\ln(T)) + C \times (\ln(T))^2 + D \times (\ln(T))^3 + E \times (\ln(T))^4 + F \times (\ln(T))^5 + G \times (\ln(T))^6$$

T = TIME IN HOURS AND I = INTENSITY IN MILLIMETRES PER HOUR

RETURN PERIOD	A	B	C	D	E	F	G
1	3.366183	-0.58590E+0	-0.35202E-1	0.78626E-2	0.93803E-3	-0.22910E-3	-0.23718E-4
2	3.617748	-0.57971E+0	-0.33718E-1	0.72888E-2	0.87575E-3	-0.16950E-3	-0.32431E-4
5	3.866802	-0.56569E+0	-0.29568E-1	0.74971E-2	0.40707E-3	-0.21631E-3	-0.11509E-4
10	3.986462	-0.55799E+0	-0.27428E-1	0.73704E-2	0.20124E-3	-0.21605E-3	-0.51993E-5
20	4.125691	-0.55206E+0	-0.25679E-1	0.74547E-2	0.16218E-4	-0.23099E-3	0.19022E-5
50	4.282383	-0.54531E+0	-0.23758E-1	0.76404E-2	-0.21351E-3	-0.26593E-3	0.14466E-4
100	4.386818	-0.54085E+0	-0.22442E-1	0.76345E-2	-0.34239E-3	-0.26773E-3	0.17987E-4

RAINFALL INTENSITY IN mm/h FOR VARIOUS DURATIONS AND RETURN PERIODS

RETURN PERIOD (YEARS)

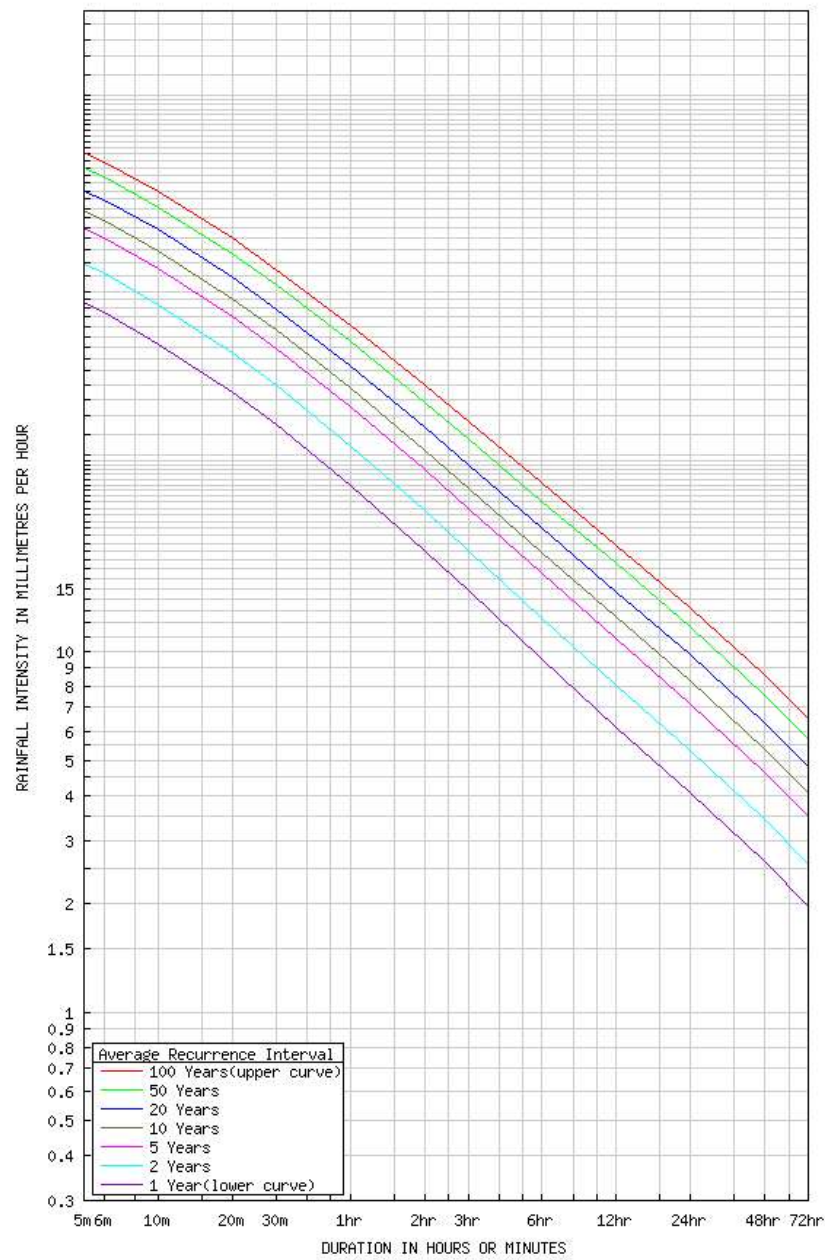
DURATION	1	2	5	10	20	50	100
5 mins	93.3	119.	150.	167.	190.	220.	243.
6 mins	87.4	112.	140.	157.	179.	207.	228.
10 mins	71.6	91.6	116.	129.	148.	171.	189.
20 mins	52.4	67.1	85.1	95.3	109.	127.	140.
30 mins	42.6	54.7	69.6	78.1	89.4	104.	115.
1 hour	29.0	37.3	47.8	53.9	61.9	72.4	80.4
2 hours	19.0	24.6	31.9	36.2	41.8	49.2	54.8
3 hours	14.8	19.1	25.0	28.5	33.0	39.0	43.6
6 hours	9.52	12.4	16.5	18.9	22.0	26.2	29.4
12 hours	6.18	8.09	10.9	12.5	14.7	17.6	19.8
24 hours	4.05	5.31	7.17	8.31	9.78	11.7	13.2
48 hours	2.61	3.43	4.63	5.38	6.33	7.60	8.59
72 hours	1.96	2.57	3.49	4.06	4.78	5.75	6.51

(Raw data: 37.37, 8.08, 2.57, 72.46, 17.63, 5.75, skew= 0.000)

HYDROMETEOROLOGICAL ADVISORY SERVICE

(C) AUSTRALIAN GOVERNMENT, BUREAU OF METEOROLOGY

* ENSURE THE COORDINATES ARE THOSE REQUIRED SINCE DATA IS BASED ON THESE AND NOT LOCATION NAME.



Help

[\[View Documentation: Opens new window\]](#)

Try another

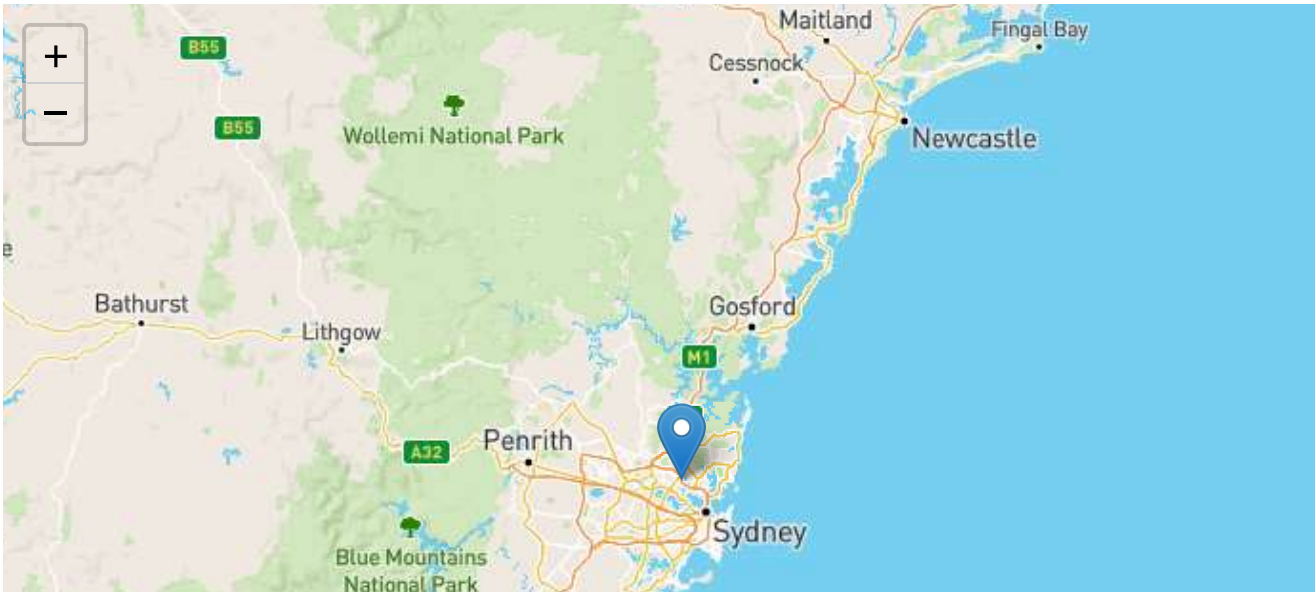
This page was created at **on**

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Australian Rainfall & Runoff Data Hub - Results

Input Data

Longitude	151.134
Latitude	-33.791
Selected Regions (clear)	
River Region	show
ARF Parameters	show
Storm Losses	show
Temporal Patterns	show
Areal Temporal Patterns	show
BOM IFDs	show
Median Preburst Depths and Ratios	show
10% Preburst Depths	show
25% Preburst Depths	show
75% Preburst Depths	show
90% Preburst Depths	show
Interim Climate Change Factors	show
Probability Neutral Burst Initial Loss (./nsw_specific)	show





Data

River Region

Division	South East Coast (NSW)
River Number	13
River Name	Sydney Coast-Georges River

Layer Info

Time Accessed	04 May 2023 02:56PM
Version	2016_v1

ARF Parameters

$$ARF = Min \left\{ 1, \left[1 - a \left(Area^b - \log_{10} Duration \right) Duration^{-d} \right. \right. \\ \left. \left. + e Area^f Duration^g (0.3 + \log_{10} AEP) \right. \right. \\ \left. \left. + h 10^{i Area \frac{Duration}{1440}} (0.3 + \log_{10} AEP) \right] \right\}$$

Zone	a	b	c	d	e	f	g	h	i
SE Coast	0.06	0.361	0.0	0.317	8.11e-05	0.651	0.0	0.0	0.0

Short Duration ARF

$$ARF = Min \left[1, 1 - 0.287 \left(Area^{0.265} - 0.439 \log_{10} (Duration) \right) \cdot Duration^{-0.36} \right. \\ \left. + 2.26 \times 10^{-3} \times Area^{0.226} \cdot Duration^{0.125} (0.3 + \log_{10} (AEP)) \right. \\ \left. + 0.0141 \times Area^{0.213} \times 10^{-0.021 \frac{(Duration-180)^2}{1440}} (0.3 + \log_{10} (AEP)) \right]$$

Layer Info

Time Accessed	04 May 2023 02:56PM
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Version	2016_v1
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Storm Losses

Note: Burst Loss = Storm Loss - Preburst

Note: These losses are only for rural use and are **NOT FOR DIRECT USE** in urban areas

Note: As this point is in NSW the advice provided on losses and pre-burst on the NSW Specific Tab of the ARR Data Hub (./nsw_specific) is to be considered. In NSW losses are derived considering a hierarchy of approaches depending on the available loss information. The continuing storm loss information from the ARR Datahub provided below should only be used where relevant under the loss hierarchy (level 5) and where used is to be multiplied by the factor of 0.4.

ID	7239.0
----	--------

Storm Initial Losses (mm)	33.0
---------------------------	------

Storm Continuing Losses (mm/h)	1.8
--------------------------------	-----

Layer Info

Time Accessed	04 May 2023 02:56PM
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Version	2016_v1
---------	---------

Temporal Patterns | Download (.zip) (static/temporal_patterns/TP/ECsouth.zip)

code	ECsouth
------	---------

Label	East Coast South
-------	------------------

Layer Info

Time Accessed	04 May 2023 02:56PM
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Version	2016_v2
---------	---------

Areal Temporal Patterns | Download (.zip) (./static/temporal_patterns/Areal/Areal_ECsouth.zip)

code	ECsouth
------	---------

arealabel	East Coast South
-----------	------------------

Layer Info

Time Accessed	04 May 2023 02:56PM
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Version	2016_v2
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BOM IFDs

Click here (http://www.bom.gov.au/water/designRainfalls/revised-ifd/?year=2016&coordinate_type=dd&latitude=-33.791&longitude=151.134&sdmin=true&sdhr=true&sdday=true&user_label=) to obtain the IFD depths for catchment centroid from the BoM website

Layer Info

Time Accessed

04 May 2023 02:56PM

Median Preburst Depths and Ratios

Values are of the format depth (ratio) with depth in mm

min (h)\AEP(%)	50	20	10	5	2	1
60 (1.0)	9.3 (0.303)	6.4 (0.159)	4.5 (0.096)	2.7 (0.050)	2.6 (0.041)	2.5 (0.035)
90 (1.5)	14.5 (0.414)	9.6 (0.208)	6.3 (0.117)	3.1 (0.051)	2.3 (0.032)	1.7 (0.021)
120 (2.0)	10.3 (0.267)	7.4 (0.147)	5.5 (0.093)	3.7 (0.055)	3.1 (0.038)	2.6 (0.029)
180 (3.0)	9.2 (0.206)	7.4 (0.126)	6.2 (0.090)	5.0 (0.064)	4.1 (0.044)	3.4 (0.032)
360 (6.0)	7.3 (0.124)	11.1 (0.142)	13.6 (0.148)	16.0 (0.150)	12.1 (0.095)	9.1 (0.063)
720 (12.0)	5.2 (0.065)	11.2 (0.103)	15.2 (0.117)	18.9 (0.126)	23.5 (0.130)	27.0 (0.132)
1080 (18.0)	4.5 (0.046)	10.1 (0.076)	13.9 (0.087)	17.5 (0.094)	23.5 (0.105)	27.9 (0.110)
1440 (24.0)	1.1 (0.010)	6.5 (0.042)	10.0 (0.054)	13.3 (0.062)	21.1 (0.081)	26.9 (0.091)
2160 (36.0)	0.0 (0.000)	2.6 (0.014)	4.4 (0.020)	6.0 (0.023)	8.9 (0.028)	11.0 (0.031)
2880 (48.0)	0.0 (0.000)	0.1 (0.000)	0.1 (0.001)	0.2 (0.001)	2.2 (0.006)	3.8 (0.009)
4320 (72.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.9 (0.002)	1.5 (0.003)

Layer Info

Time Accessed 04 May 2023 02:56PM

Version 2018_v1

Note Preburst interpolation methods for catchment wide preburst has been slightly altered. Point values remain unchanged.

10% Preburst Depths

Values are of the format depth (ratio) with depth in mm

min (h)\AEP(%)	50	20	10	5	2	1
60 (1.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)
90 (1.5)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)
120 (2.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)
180 (3.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)
360 (6.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)
720 (12.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)
1080 (18.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)
1440 (24.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)
2160 (36.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)
2880 (48.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)
4320 (72.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)

Layer Info

Time Accessed 04 May 2023 02:56PM

Version 2018_v1

Note Preburst interpolation methods for catchment wide preburst has been slightly altered. Point values remain unchanged.

25% Preburst Depths

Values are of the format depth (ratio) with depth in mm

min (h)\AEP(%)	50	20	10	5	2	1
60 (1.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)
90 (1.5)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)
120 (2.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)
180 (3.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)
360 (6.0)	0.0 (0.000)	0.2 (0.002)	0.3 (0.003)	0.4 (0.003)	0.2 (0.001)	0.0 (0.000)
720 (12.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)
1080 (18.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	1.1 (0.005)	1.9 (0.007)
1440 (24.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.4 (0.002)	0.7 (0.003)
2160 (36.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)
2880 (48.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)
4320 (72.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)

Layer Info

Time Accessed 04 May 2023 02:56PM

Version 2018_v1

Note Preburst interpolation methods for catchment wide preburst has been slightly altered. Point values remain unchanged.

75% Preburst Depths

Values are of the format depth (ratio) with depth in mm

min (h)\AEP(%)	50	20	10	5	2	1
60 (1.0)	46.2 (1.508)	34.2 (0.845)	26.2 (0.555)	18.6 (0.344)	19.6 (0.308)	20.3 (0.286)
90 (1.5)	43.4 (1.237)	42.0 (0.911)	41.0 (0.762)	40.1 (0.651)	32.9 (0.453)	27.5 (0.338)
120 (2.0)	43.2 (1.115)	40.1 (0.791)	38.1 (0.643)	36.2 (0.533)	35.7 (0.445)	35.3 (0.393)
180 (3.0)	46.4 (1.036)	43.2 (0.737)	41.1 (0.599)	39.2 (0.496)	43.5 (0.466)	46.7 (0.445)
360 (6.0)	43.5 (0.738)	54.3 (0.697)	61.5 (0.669)	68.4 (0.642)	71.6 (0.564)	73.9 (0.516)
720 (12.0)	29.1 (0.364)	41.2 (0.380)	49.2 (0.381)	56.8 (0.377)	67.1 (0.371)	74.8 (0.365)
1080 (18.0)	30.7 (0.318)	41.8 (0.315)	49.1 (0.309)	56.1 (0.301)	70.5 (0.315)	81.3 (0.320)
1440 (24.0)	13.6 (0.124)	32.4 (0.213)	44.8 (0.244)	56.7 (0.262)	64.6 (0.248)	70.5 (0.239)
2160 (36.0)	8.5 (0.065)	22.5 (0.123)	31.8 (0.143)	40.7 (0.155)	52.0 (0.165)	60.6 (0.170)
2880 (48.0)	4.9 (0.034)	9.2 (0.044)	12.0 (0.048)	14.7 (0.050)	25.8 (0.073)	34.1 (0.085)
4320 (72.0)	0.0 (0.000)	1.6 (0.007)	2.7 (0.009)	3.7 (0.011)	24.1 (0.059)	39.3 (0.086)

Layer Info

Time Accessed	04 May 2023 02:56PM
Version	2018_v1
Note	Preburst interpolation methods for catchment wide preburst has been slightly altered. Point values remain unchanged.

90% Preburst Depths

Values are of the format depth (ratio) with depth in mm

min (h)\AEP(%)	50	20	10	5	2	1
60 (1.0)	87.6 (2.861)	73.1 (1.808)	63.5 (1.342)	54.2 (1.002)	81.3 (1.279)	101.6 (1.431)
90 (1.5)	110.6 (3.150)	109.1 (2.369)	108.2 (2.010)	107.3 (1.740)	99.3 (1.369)	93.3 (1.149)
120 (2.0)	87.0 (2.248)	108.9 (2.148)	123.5 (2.083)	137.4 (2.021)	129.6 (1.617)	123.7 (1.377)
180 (3.0)	77.8 (1.739)	100.7 (1.717)	115.8 (1.686)	130.3 (1.651)	121.4 (1.301)	114.8 (1.093)
360 (6.0)	76.7 (1.303)	94.9 (1.217)	106.9 (1.162)	118.4 (1.112)	131.1 (1.034)	140.6 (0.981)
720 (12.0)	60.3 (0.753)	82.0 (0.758)	96.5 (0.747)	110.3 (0.731)	123.5 (0.683)	133.4 (0.651)
1080 (18.0)	68.5 (0.710)	89.2 (0.674)	102.9 (0.648)	116.1 (0.622)	136.6 (0.610)	152.1 (0.598)
1440 (24.0)	48.2 (0.439)	73.0 (0.479)	89.5 (0.487)	105.2 (0.487)	116.7 (0.449)	125.4 (0.425)
2160 (36.0)	30.9 (0.236)	60.7 (0.331)	80.5 (0.362)	99.5 (0.379)	107.5 (0.341)	113.6 (0.318)
2880 (48.0)	20.0 (0.137)	44.5 (0.215)	60.8 (0.243)	76.3 (0.258)	93.3 (0.263)	106.1 (0.264)
4320 (72.0)	6.7 (0.040)	16.3 (0.069)	22.7 (0.079)	28.8 (0.085)	60.7 (0.150)	84.7 (0.186)

Layer Info

Time Accessed	04 May 2023 02:56PM
Version	2018_v1
Note	Preburst interpolation methods for catchment wide preburst has been slightly altered. Point values remain unchanged.

Interim Climate Change Factors

	RCP 4.5	RCP6	RCP 8.5
2030	0.869 (4.3%)	0.783 (3.9%)	0.983 (4.9%)
2040	1.057 (5.3%)	1.014 (5.1%)	1.349 (6.8%)
2050	1.272 (6.4%)	1.236 (6.2%)	1.773 (9.0%)
2060	1.488 (7.5%)	1.458 (7.4%)	2.237 (11.5%)
2070	1.676 (8.5%)	1.691 (8.6%)	2.722 (14.2%)
2080	1.810 (9.2%)	1.944 (9.9%)	3.209 (16.9%)
2090	1.862 (9.5%)	2.227 (11.5%)	3.679 (19.7%)

Layer Info

Time Accessed	04 May 2023 02:56PM
Version	2019_v1
Note	ARR recommends the use of RCP4.5 and RCP 8.5 values. These have been updated to the values that can be found on the climate change in Australia website.

Probability Neutral Burst Initial Loss

min (h)\AEP(%)	50.0	20.0	10.0	5.0	2.0	1.0
60 (1.0)	15.8	9.3	9.9	11.1	10.5	8.3
90 (1.5)	14.2	8.8	9.5	9.7	9.5	7.7
120 (2.0)	15.7	9.7	10.2	10.1	9.9	7.0
180 (3.0)	16.1	10.4	11.2	11.0	11.0	7.3
360 (6.0)	17.0	10.9	11.8	10.7	10.9	6.6
720 (12.0)	20.5	14.4	13.7	12.3	12.2	4.1
1080 (18.0)	20.6	15.9	15.6	13.5	14.6	3.9
1440 (24.0)	25.4	18.5	18.0	15.0	16.8	6.4
2160 (36.0)	28.9	22.4	21.4	18.1	18.6	8.8
2880 (48.0)	31.3	25.8	24.4	27.8	21.8	9.7
4320 (72.0)	35.6	31.3	30.4	32.6	24.4	10.8

Layer Info

Time Accessed 04 May 2023 02:56PM

Version 2018_v1

Note As this point is in NSW the advice provided on losses and pre-burst on the NSW Specific Tab of the ARR Data Hub (./nsw_specific) is to be considered. In NSW losses are derived considering a hierarchy of approaches depending on the available loss information. Probability neutral burst initial loss values for NSW are to be used in place of the standard initial loss and pre-burst as per the losses hierarchy.

[Download TXT \(downloads/813ad21e-05d1-4fc0-9e24-7cc160a72676.txt\)](#)

[Download JSON \(downloads/44e82499-3f82-407e-ba41-5a30d49e9649.json\)](#)

[Generating PDF... \(downloads/7fbcd7a3-c392-4735-9838-8b16ed9aefc5.pdf\)](#)