- **2100 Conditions:**
  - Areas affected by riverine flooding along the Hawkesbury River may increase by 1.30 m.
  - Flood levels on Flannery Avenue and Pansy Crescent may increase by up to 0.05 m.
  - Overland flooding originating from the western side of North Richmond impacting Pecks Road, Stephen Street, Michael Street and Tyne Crescent may increase by up to 0.20 m.
  - Flood levels between Elizabeth Street and Bells Line of Road may increase by up to 0.50 m.
  - Overland flooding between Elizabeth Street and Monti Place may increase by up to 0.15 m.
  - Flood levels at the northern end of Elizabeth and William Streets may increase by up to 0.50 and 0.45 m, respectively.
  - Flood levels at the Susella Crescent, at the western end of O'Dea Place and the intersection of Bradley Road and Morton Street may increase by up to 0.05 m.

Management of the above impacts due to climate change would be considered in a future flood risk management study for the catchment.

14 Conclusion

The Redbank Creek Flood Study was completed to provide a detailed flooding assessment of North Richmond and the surrounding local catchment. A thorough literature review of previous flood studies was conducted, revealing a gap in information on flooding due to local overland flooding mechanisms for the Redbank Creek catchment.

The objective of this study was therefore to improve the understanding of flood behaviour and impacts, and better inform management of flood risk in the study area due to local overland flooding mechanisms. Direct flooding from the Hawkesbury River is not part of the scope of the current study as it is extensively covered by the Hawkesbury-Nepean River Flood Study. It is essential to recognise that areas affected by riverine flooding must be considered accordingly, as this flooding may occur independently of local flooding in the Redbank Creek catchment. However, tailwater effects were considered. The study also provides a sound technical basis for any further flood risk management investigations in the area including flood risk management studies and plans.

The key components of the flooding assessment included:

- Review of previous studies and available data
- Community consultation
- Hydrological analysis and modelling
- Hydraulic analysis and modelling
- Sensitivity analysis
- Flood mapping
- Description of consequences of flooding on the community
- Impact of climate change on local flooding
- Development of a draft flood study review report followed by a final report.

The flood maps appended to this report present the flood levels, depths and velocities for the critical duration and rainfall pattern of a full set of events including the 20%, 10%, 5%, 2%, 1%, 1 in 200, 1 in 500, 1 in 1,000, 1 in 2,000, 1 in 5,000 AEP events and PMF. The mapped results represent an envelope of the adopted critical durations and temporal patterns for the Redbank Creek catchment.

This report acknowledges that although the lack of gauging stations in the study area limits data availability for calibration, model validation and sensitivity analysis were undertaken in accordance with best practices. Sensitivity analysis highlighted the following points:

- Tailwater level impact: tailwater levels in the Hawkesbury River minimally affect upstream flood levels but have substantial impact on the extend of flooding and water level along the low-lying areas of Redbank Creek.
- Losses sensitivity: removing all losses can raise flood levels by up to 0.8 m along the creek and 0.2 m in the township, while ARR 2019 losses can reduce levels by up to 0.2 m upstream and increase them by 0.1 m in the downstream areas.

- Roughness sensitivity: increasing roughness by 20% reduces water levels by up to 0.25 m along watercourses with minor effects in the township, while decreasing roughness by the same amount has a similar but reversed effect.
- Blockage sensitivity: a double blockage scenario can raise flood levels by up to 0.2 m in the township, while a no blockage scenario causes local changes of up to 0.1 m, affecting areas upstream and downstream of major culverts.

The above results allowed the definition of the flood hazard (i.e., H1 - H6 flood hazard categories), hydraulic categories and emergency response classifications in the Redbank Creek catchment. These have been created and mapped to inform development control planning.

Results of the model allow the identification of main flooding areas, key infrastructure assets impacted by flooding, and road closures around the catchments. Key infrastructure typically may have access issues during severe flood events rather than flooding issues, except during the PMF event.

It was observed that flow within the North Richmond township primarily follows Redbank Creek and the main drainage channel through the township during majority of events up to including 1 in 2000 AEP. Key flood-prone areas are highlighted below, noting that the described impacts are based on flooding that affects the floor level of buildings on properties:

- Properties located at the northern end of William Street, Elizabeth Street, Susella Crescent, Merrick Place and O'Dea Place are impacted from 1 in 500 AEP event; however, road access may be affected by events as frequent as 20% AEP;
- A few Properties along the northern side of Flannery Avenue are impacted from 1 in 200 AEP event; however, their access may be affected by event as frequent as a 5 AEP;
- A few properties at the north-west corner of Pansy Crescent are impacted by events as frequent as 10% AEP;
- Properties located along the main drainage channel between Pecks and Elizabeth Streets are affected due to 1 in 5000 AEP and PMF events.
- A few properties located between Stephen and Pecks Streets are impacted by events as frequent as 10% AEP.
- Properties situated between Tyne Crescent, Stephen Street and north end of Yvonne Place are impacted by events as frequent as 5% AEP.
- A secondary overland flow path was observed through the North Richmond township, from the sag point along Enfield Avenue through a few properties towards the south end of Monti Place, continuing towards the intersection of Charles and Elizabeth Streets. These areas are impacted by events as frequent as 10% AEP;
- Properties located at the southernmost corner of Tyne Crescent are impacted by events as frequent as the 5% AEP event;
- A few properties located at the north-east corner of the intersection of Charles and William Streets are impacted by events as frequent as 5% AEP;
- Properties near the intersection of Charles and Elizabeth Streets are impacted by flood as frequent as 5% AEP event such as North Richmond Community Centre.

It was observed that the North Richmond Community Centre lot, while used as an evacuation centre for the township of North Richmond, is impacted by an overland flow as frequent as a 20% AEP event to depths up to 0.25 m. The North Richmond Community Centre buildings are impacted above floor level by overland flows as frequent as a 20% AEP event to a depth of 0.03 m above the floor. Moreover, access to this venue by residents of various parts of the township may be restricted. It is therefore recommended that careful consideration be given to the design and management of the evacuation centre. Moreover, Turnbull Oval is also used as an evacuation centre for the township of North Richmond and, while it is outside of the extent of a PMF event, access to the oval by residents of northern parts of the township may be restricted from a 1 in 200 AEP event and from a 1 in 5000 AEP event, Terrace Road access will become limited for the majority of residents.

An economic impact assessment of flooding was undertaken by estimating the flood damages in the catchment. The preliminary flood damage assessment involved analysing 5,250 buildings within the study area. A total Annual Average Damage of approximate $1.5 million for residential properties and $373,510 for non-residential properties was estimated in the Redbank Creek catchment. To improve accuracy, a comprehensive floor level survey is recommended for future Floodplain Risk Management Studies to enhance damage assessments.

At last, a comparison of current design conditions, with the 2040, 2090 and 2100 climate change scenarios highlighted the following impacts on 1% AEP design flood conditions:

- 2040 Conditions: Rainfall intensity is expected to increase by 9.5%, resulting in riverine flooding along the Hawkesbury River rising by 0.40 m and localised overland flooding increasing by up to 0.20 m in North Richmond.
- 2090 Conditions: A 19.7% increase in rainfall intensity may lead to riverine flooding along the Hawkesbury River rising by 0.90 m, with overland flooding in areas like Pecks Road increasing by up to 0.30 m.
- 2100 Conditions: Rainfall intensity could rise by 30%, causing riverine flooding to increase by 1.30 m along the Hawkesbury River, while flood levels in localised areas, such as between Elizabeth Street and Bells Line of Road, may increase by up to 0.50 m.

15 References

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Appendix A Survey marks

Survey Mark	Easting	Northing	SCIMS Elevation (m AHD)	LiDAR 2019 Elevation (m AHD)	Difference (m)
SS 26765	287994.7	6282519	19.995	77.386	-0.44
SS 83983	288009.8	6282523	20.411	75.38	0.08
PM 81570	286993.8	6283248	63.798	48.776	-0.04
SS 12706	288296.2	6284181	86.41	27.33	-0.03
PM 81571	286838.8	6283802	81.274	19.976	-0.02
PM 81572	286613.8	6284429	84.182	20.249	-0.16
TS 1117	281485.2	6282886	247.673	70.495	0.06
SS 61312	282325.6	6282038	171.233	68.597	0.07
PM 81036	282157	6283336	186.915	63.967	0.17
PM 46087	285210.2	6282000	92.17	81.266	-0.01
PM 46088	285518.7	6281902	86.551	86.4	-0.01
PM 46089	285589.7	6281749	85.831	81.266	-0.01
SS 82069	285226.1	6282001	92.318	84.105	-0.08
SS 132542	284895.8	6282123	55.945	171.447	0.21
SS 132543	284980.2	6282232	57.001	187.333	0.42
SS 132545	285061.9	6282410	53.592	157.537	0.57
SS 132546	285142.3	6282510	51.952	138.185	0.32
SS 132547	285348.2	6282577	53.03	135.51	0.25
SS 58886	286858.8	6282057	36.828	136.774	0.58
PM 44005	287513.7	6282014	24.749	119.988	-0.02
PM 44006	287804.7	6282254	21.518	118.675	0.22
SS 81832	288183.5	6281925	24.946	86.87	0.32
SS 58295	288178.9	6282270	17.345	85.845	0.01
SS 89925	287806	6281623	36.427	75.757	0.5
SS 89927	287168.5	6282238	27	57.733	0.16
SS 89928	286820.3	6281708	32.783	56.098	0.15
SS 58890	286784.9	6281672	33.27	57.142	0.14
SS 90769	287724.3	6282054	21.67	55.837	0.14
SS 185090	287195.2	6281719	35.16	53.716	0.12
SS 185081	287360	6281455	37.71	52.364	0.41
SS 185082	287317.5	6281619	32.7	52.875	-0.16
SS 89933	283547.5	6284244	123.385	36.795	-0.03
SS 89934	283214	6284519	158.079	24.836	0.09
PM 45481	283647.2	6284915	164.906	21.683	0.16
PM 45482	283471.7	6284919	165.531	26.943	0.07
PM 45483	283335.9	6284864	162.538	24.999	0.05
PM 45484	283250.6	6284626	166.823	17.263	-0.08
PM 81034	283691.7	6284931	163.943	33.335	-0.01
PM 81035	282690.2	6284277	175.813	36.531	0.1
SS 89930	283304.6	6284805	161.078	35.672	0.15
SS 89932	283667.9	6284713	139.766	26.898	-0.1
SS 89933	283547.5	6284244	123.385	32.771	-0.01
SS 89934	283214	6284519	158.079	33.296	0.03
SS 89932	283667.9	6284713	139.766	21.636	-0.03
SS 49952	288482.8	6281751	26.71	23.749	0.13
PM 46073	287539.3	6281389	56.672	35.321	0.16
SS 52733	288303.9	6281658	35.08	37.649	-0.06
SS 52737	288540.3	6281661	24.266	32.615	-0.09

Survey Mark	Easting	Northing	SCIMS Elevation (m AHD)	LiDAR 2019 Elevation (m AHD)	Difference (m)
SS 52722	288389.6	6281707	29.795	123.495	0.11
SS 52731	288402.6	6281548	30.702	157.676	-0.4
SS 80087	287731.4	6281411	48.466	165.619	0.09
SS 62559	288583.4	6281827	23.688	166.731	-0.09
SS 83982	288681.6	6281681	13.223	140.343	-0.08
PM 44007	288141.4	6281892	26.876	175.853	0.04
PM 45708	288597.6	6281837	23.5	161.043	-0.03
SS 52733	288303.9	6281658	35.08	139.81	0.04
SS 52737	288540.3	6281661	24.266	123.495	0.11
SS 52722	288389.6	6281707	29.795	157.676	-0.4
SS 81832	288183.5	6281925	24.946	139.81	0.04
SS 67451	288621.7	6281786	21.95	26.695	-0.02
SS 62559	288583.4	6281827	23.688	56.631	-0.04
SS 58295	288178.9	6282270	17.345	35.057	-0.02

Appendix B Community consultation

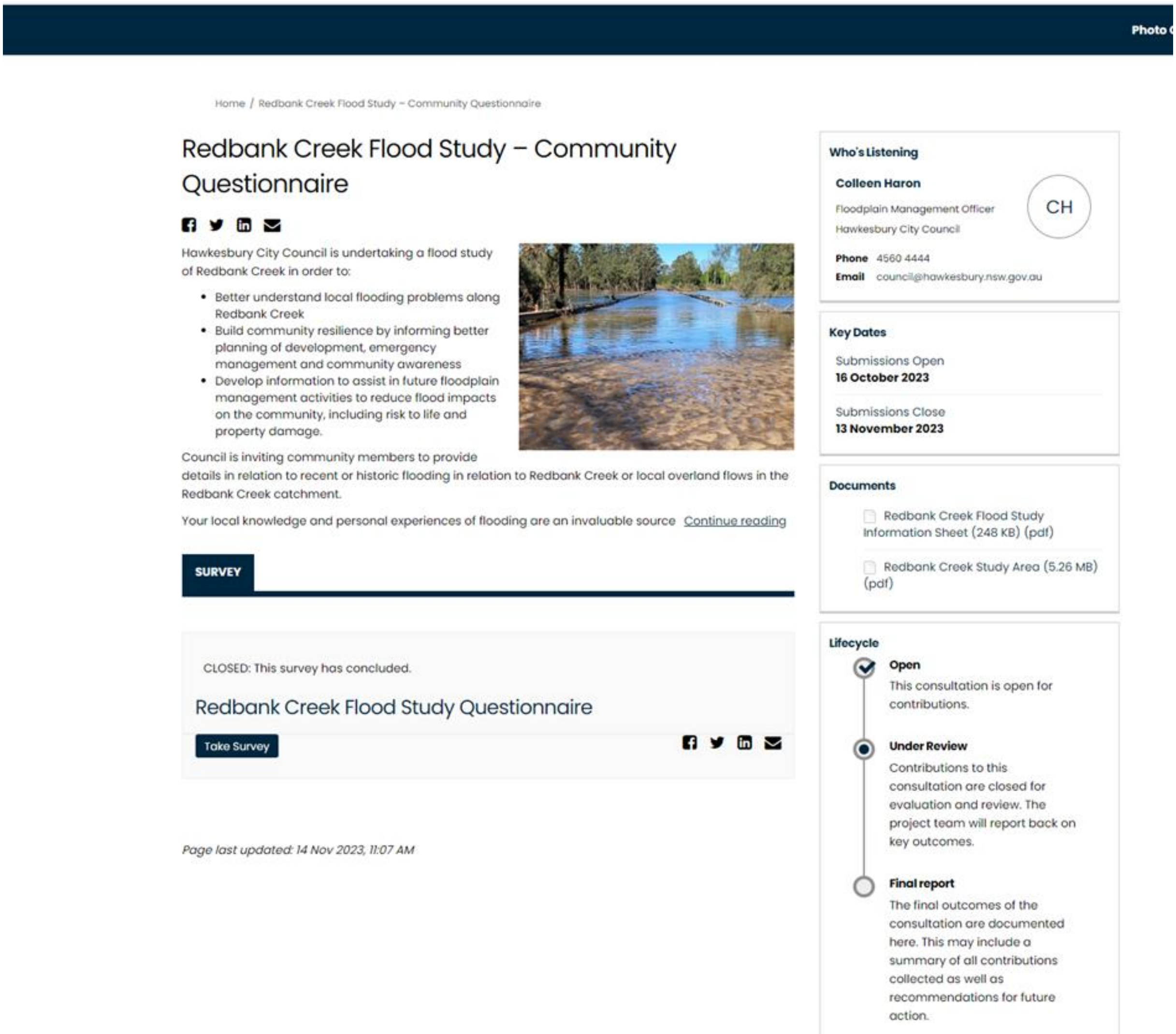


Photo c

Home / Redbank Creek Flood Study – Community Questionnaire

Redbank Creek Flood Study – Community Questionnaire

Hawkesbury City Council is undertaking a flood study of Redbank Creek in order to:

- Better understand local flooding problems along Redbank Creek
- Build community resilience by informing better planning of development, emergency management and community awareness
- Develop information to assist in future floodplain management activities to reduce flood impacts on the community, including risk to life and property damage.

Council is inviting community members to provide details in relation to recent or historic flooding in relation to Redbank Creek or local overland flows in the Redbank Creek catchment.

Your local knowledge and personal experiences of flooding are an invaluable source Continue reading

SURVEY

CLOSED: This survey has concluded.

Redbank Creek Flood Study Questionnaire

Take Survey

Page last updated: 14 Nov 2023, 11:07 AM

Who's Listening

Colleen Haron
Floodplain Management Officer
Hawkesbury City Council
CH

Phone 4560 4444
Email council@hawkesbury.nsw.gov.au

Key Dates

Submissions Open
16 October 2023

Submissions Close
13 November 2023

Documents

Redbank Creek Flood Study Information Sheet (248 KB) (pdf)

Redbank Creek Study Area (5.26 MB) (pdf)

Lifecycle

Open
This consultation is open for contributions.

Under Review
Contributions to this consultation are closed for evaluation and review. The project team will report back on key outcomes.

Final report
The final outcomes of the consultation are documented here. This may include a summary of all contributions collected as well as recommendations for future action.

Figure B.1 Snapshot of project website

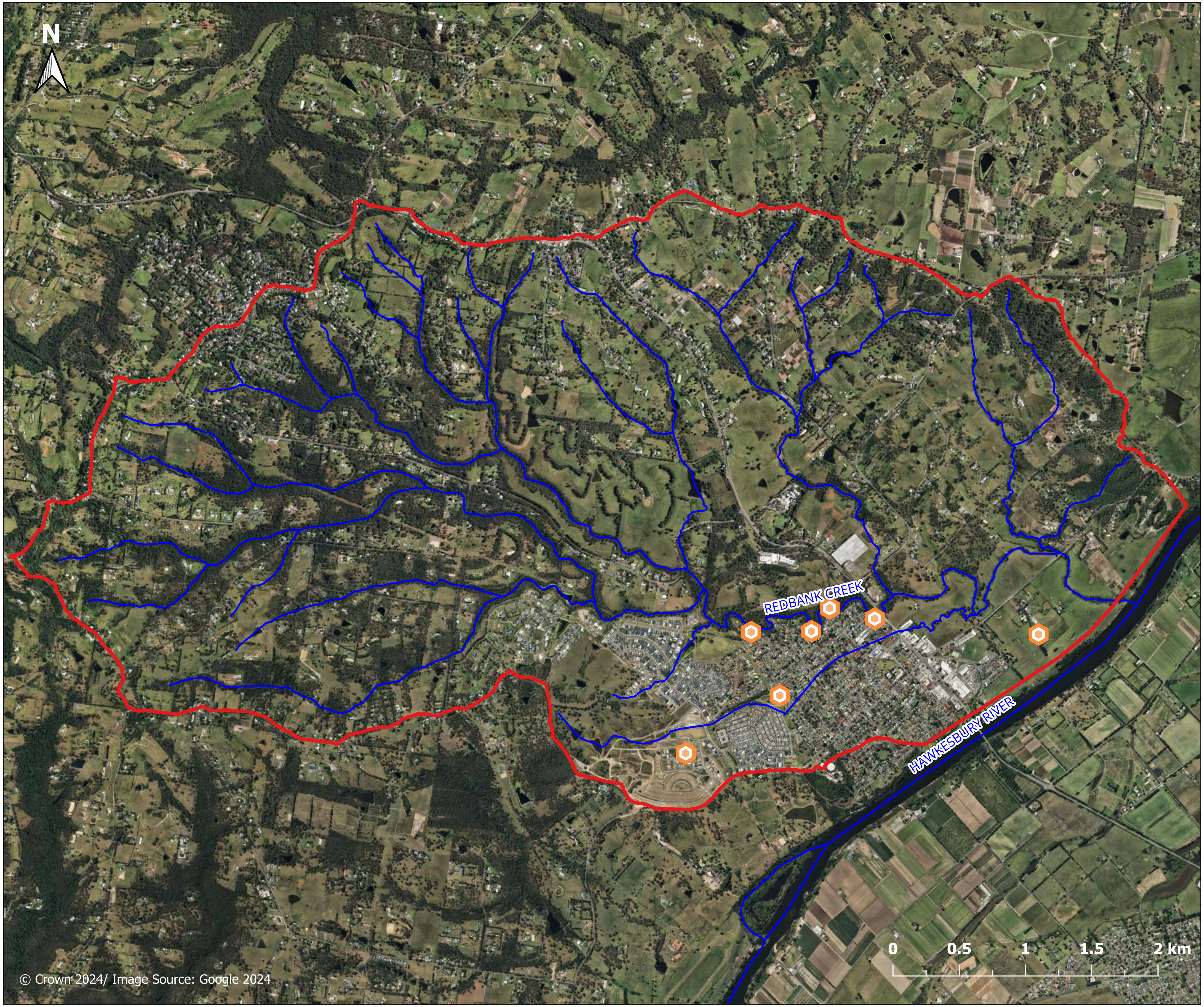


Figure B.2

Approximate location of questionnaire respondents

Legend

- Study area
- Watercourses
- Approximate location of respondents

Report MHL3008

Redbank Creek Flood Study

NSW GOVERNMENT

Manly Hydraulics Laboratory

Hawkesbury City Council

Redbank Creek Flood Study Questionnaire

Address of property in the study area **(This information will only be used to complete the Flood Study)**

What is the type of property?

- ☐ Residential
- ☐ Vacant land
- ☐ Commercial
- ☐ Other (please specify)

What is the status of the property?

- ☐ Owner occupied / Owner operated business
- ☐ Leased to rental tenants
- ☐ Other – please specify

How long have you lived or operated a business at this address?

- ☐ 0-5 years
- ☐ 6-10 years
- ☐ 10-20 years
- ☐ More than 20 years

As far as you are aware, has the property (which includes land, back and front yards, etc) ever been adversely affected by flooding? Flooding impacts could include inundation, restricted access to/from the property, property isolated by floodwaters, risk to personal safety, damage to property, etc?

- ☐ Yes
- ☐ No

Please provide dates for up to 4 flood events that have affected the property.

Event 1		Event 3	
Event 2		Event 4	

What part(s) of the property were affected by flooding? **(select more than one if appropriate)**

	Yard	Garage/Shed	Building
Event 1	☐	☐	☐
Event 2	☐	☐	☐
Event 3	☐	☐	☐
Event 4	☐	☐	☐

Please provide any additional details here.

What was the depth of flooding? (cm)

Event 1		Event 3	
Event 2		Event 4	

Please provide any additional details here.

What was the duration of flooding? (hours/days)

Event 1		Event 3	
Event 2		Event 4	

Please provide any additional details here.

What was the velocity of the flood waters at the peak/worst?

	Stationary	Walking Pace	Running Pace
Event 1	☐	☐	☐
Event 2	☐	☐	☐
Event 3	☐	☐	☐
Event 4	☐	☐	☐

What was the source of the floodwaters? (select more than one if appropriate)

	Redbank Creek (flood waters rising in creeks)	Hawkesbury River inundation	Water flowing down the roads	Ponding of water within property	Ponding of water on roads	Overflow from neighbouring properties	Drainage channel (floodwaters rising in drainage channels)
Event 1	☐	☐	☐	☐	☐	☐	☐
Event 2	☐	☐	☐	☐	☐	☐	☐
Event 3	☐	☐	☐	☐	☐	☐	☐
Event 4	☐	☐	☐	☐	☐	☐	☐

Are there any flood marks on or near your property?

☐ Yes

☐ No

If Yes, do we have your permission for surveyors to access your property? (Please ensure you have completed the contact details at the bottom of this survey so we can contact you)

If you wish to stay informed about this study, please provide your preferred contact method below.

Name	
Address	
Phone	
Email	

Privacy Notice

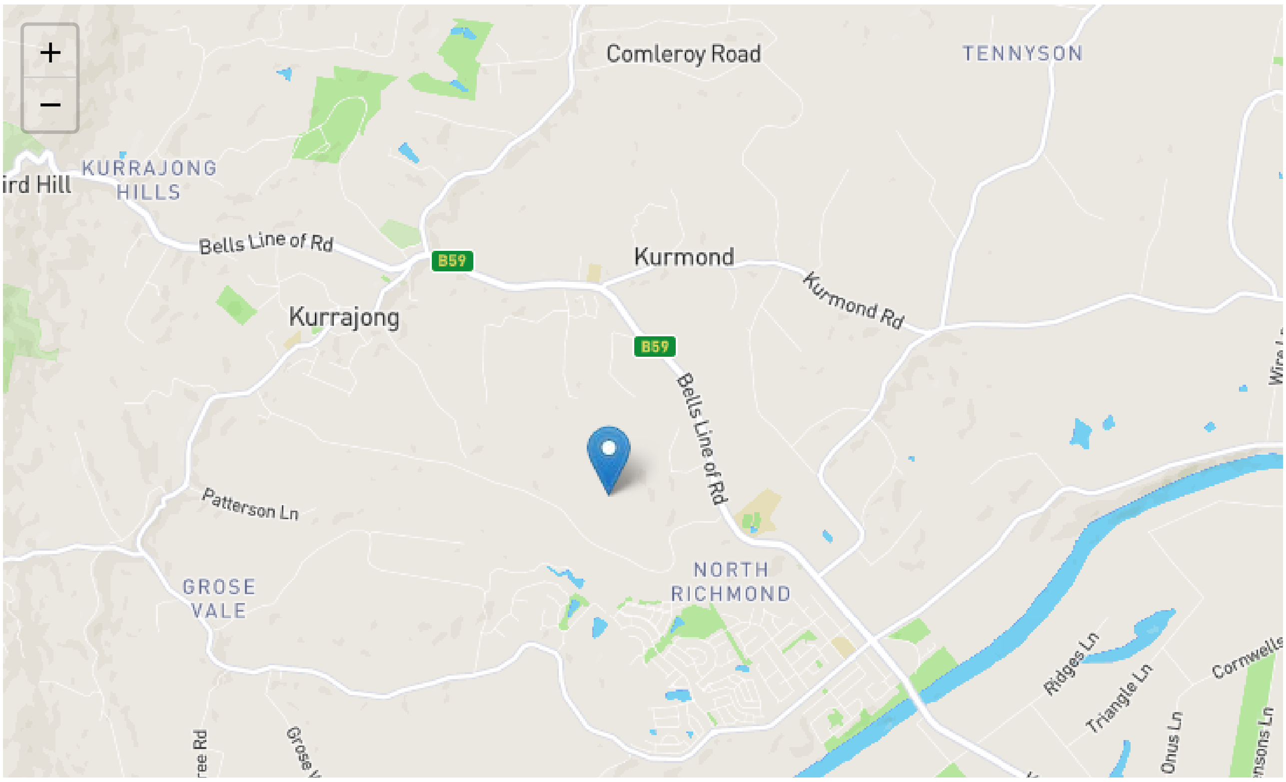
Council is bound by the provisions of the Privacy and Personal Information Protection Act 1998, in the collection, storage and utilisation of personal information provided in this form. Accordingly, the personal information will only be utilised for the purposes for which it has been obtained and may be available for public access and/or disclosure under various NSW Government legislation.

Appendix C ARR 2019 Data Hub

Australian Rainfall & Runoff Data Hub - Results

Input Data

Longitude	150.694
Latitude	-33.568
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
Baseflow Factors	show



Data

River Region

Division	South East Coast (NSW)
River Number	12
River Name	Hawkesbury River

Layer Info

Time Accessed	17 October 2023 01:16PM
Version	2016_v1

ARF Parameters

$$ARF = Min\left\{1, \left[1 - a\left(Area^{b} - c\log_{10}Duration\right)Duration^{-d} + eArea^{f}Duration^{g}\left(0.3 + \log_{10}AEP\right) + h10^{iArea\frac{Duration}{1440}}\left(0.3 + \log_{10}AEP\right)\right]\right\}$$

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

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

Layer Info

Time Accessed	17 October 2023 01:16PM
Version	2016_v1

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	2044.0
Storm Initial Losses (mm)	50.0
Storm Continuing Losses (mm/h)	3.8

Layer Info

Time Accessed	17 October 2023 01:16PM
Version	2016_v1

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

code	ECsouth
Label	East Coast South

Layer Info

Time Accessed	17 October 2023 01:16PM
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	17 October 2023 01:16PM
Version	2016_v2

BOM IFDs

Click here (http://www.bom.gov.au/water/designRainfalls/revised-ifd/?year=2016&coordinate_type=dd&latitude=-33.568037&longitude=150.693634&sdmin=true&sdhr=true&sdday=true&user_label=) to obtain the IFD depths for catchment centroid from the BoM website

Layer Info

Time Accessed	17 October 2023 01:16PM

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)	0.5 (0.021)	0.9 (0.026)	1.2 (0.028)	1.4 (0.029)	2.2 (0.038)	2.8 (0.043)
90 (1.5)	3.3 (0.114)	2.6 (0.064)	2.0 (0.043)	1.6 (0.028)	1.2 (0.019)	1.0 (0.014)
120 (2.0)	0.0 (0.000)	0.7 (0.016)	1.1 (0.022)	1.6 (0.027)	1.5 (0.021)	1.4 (0.018)
180 (3.0)	0.9 (0.025)	1.3 (0.026)	1.5 (0.026)	1.8 (0.026)	2.3 (0.028)	2.6 (0.029)
360 (6.0)	2.4 (0.052)	5.4 (0.087)	7.4 (0.099)	9.3 (0.107)	10.2 (0.097)	10.8 (0.090)
720 (12.0)	2.0 (0.032)	6.7 (0.079)	9.8 (0.096)	12.8 (0.106)	14.5 (0.099)	15.7 (0.095)
1080 (18.0)	0.1 (0.002)	4.3 (0.041)	7.0 (0.056)	9.7 (0.065)	13.3 (0.074)	16.1 (0.079)
1440 (24.0)	0.0 (0.000)	3.2 (0.027)	5.2 (0.036)	7.2 (0.042)	9.4 (0.045)	11.0 (0.047)
2160 (36.0)	0.0 (0.000)	2.0 (0.014)	3.4 (0.019)	4.6 (0.022)	5.4 (0.021)	5.9 (0.021)
2880 (48.0)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.0 (0.000)	0.7 (0.002)	1.2 (0.004)
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

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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

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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)	0.0 (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

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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)	13.3 (0.517)	14.8 (0.416)	15.8 (0.372)	16.7 (0.339)	26.1 (0.445)	33.2 (0.501)
90 (1.5)	29.6 (1.022)	23.2 (0.585)	18.9 (0.401)	14.9 (0.271)	18.5 (0.283)	21.2 (0.288)
120 (2.0)	10.1 (0.319)	18.0 (0.420)	23.3 (0.456)	28.4 (0.478)	28.3 (0.399)	28.2 (0.352)
180 (3.0)	17.1 (0.477)	31.6 (0.650)	41.2 (0.713)	50.4 (0.750)	43.7 (0.544)	38.6 (0.425)
360 (6.0)	19.5 (0.427)	33.0 (0.529)	42.0 (0.562)	50.5 (0.578)	60.9 (0.580)	68.7 (0.576)
720 (12.0)	21.8 (0.357)	34.9 (0.411)	43.6 (0.425)	51.9 (0.429)	52.1 (0.357)	52.3 (0.315)
1080 (18.0)	17.7 (0.242)	27.7 (0.269)	34.4 (0.274)	40.8 (0.274)	49.7 (0.276)	56.4 (0.276)
1440 (24.0)	5.4 (0.065)	19.8 (0.166)	29.3 (0.202)	38.5 (0.223)	44.4 (0.213)	48.9 (0.206)
2160 (36.0)	6.7 (0.068)	12.8 (0.089)	16.9 (0.096)	20.8 (0.099)	30.9 (0.122)	38.5 (0.134)
2880 (48.0)	1.2 (0.011)	3.2 (0.020)	4.6 (0.023)	5.8 (0.024)	11.1 (0.039)	15.1 (0.047)
4320 (72.0)	0.0 (0.000)	0.2 (0.001)	0.3 (0.002)	0.5 (0.002)	4.7 (0.014)	7.9 (0.021)

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