COMPLETE STORM MODELLING APPROACHES: PREBURST AND POSTBURST RAINFALL

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Abstract

Event-based flood modelling in Australia commonly relies on design rainfall bursts derived from Intensity–Frequency–Duration (IFD) relationships. While Australian Rainfall and Runoff (ARR) provides guidance on preburst rainfall depths, there remains limited direction on the duration over which preburst rainfall should be applied, particularly for sub-hour burst durations.

This study analyses a national complete storm database developed to derive statistical relationships between burst duration, event rarity, and corresponding preburst and postburst durations. The primary objective is to provide practical guidance for selecting representative preburst durations to accompany design burst events in hydrologic modelling, while also quantifying postburst characteristics for completeness.

Results indicate that preburst duration varies systematically with burst duration and event rarity, and can be significantly longer than commonly assumed in simplified modelling approaches. A key outcome of this analyses is the development of a pragmatic duration-selection framework, enabling practitioners to adopt consistent and defensible preburst durations across a range of design events, including sub-hour bursts not explicitly covered in existing ARR products.

Postburst rainfall was also analysed to understand its influence on hydrologic response. While postburst rainfall may have limited affects to peak discharge, postburst rainfall may be relevant for other applications, including runoff volume estimation, hydrograph recession, water quality processes, and storage routing. Accordingly, indicative postburst durations are also presented to support broader modelling needs.

The findings support a simplified and robust approach to complete storm modelling, with emphasis on appropriate representation of antecedent rainfall conditions, while providing a consistent basis for incorporating post-event rainfall where required.

Introduction

Design flood estimation in Australia is typically undertaken using event-based modelling approaches, where design rainfall bursts derived from Intensity–Frequency–Duration (IFD) relationships are applied to hydrologic models. These bursts represent the critical portion of rainfall responsible for generating peak runoff. However, real rainfall events occur as complete storms, comprising antecedent (preburst), burst, and post-event (postburst) rainfall.

Australian Rainfall and Runoff (ARR) provides guidance on preburst rainfall depths derived from a national storm database, recognising the importance of antecedent rainfall in influencing catchment wetness and runoff response. While these depths are widely adopted in practice, there remains limited guidance on how preburst rainfall should be temporally applied, particularly in terms of the duration over which preburst rainfall should be distributed. This limitation is most pronounced for sub-hour burst durations, where no explicit guidance is provided.

In contrast, postburst rainfall has received comparatively little attention in design flood estimation. It is generally not considered in event-based modelling focused on peak discharge, and ARR provides limited guidance on its representation. However, postburst rainfall may influence other aspects of hydrologic response, including runoff volume, hydrograph recession, storage routing, and water quality processes.

In practice, the absence of clear guidance on preburst duration has led to a range of inconsistent approaches, including:

- adopting arbitrary or fixed preburst durations across all burst durations
- neglecting preburst rainfall for short-duration events
- implicitly representing antecedent conditions through initial loss assumptions alone

While these approaches can appropriately account for the complete storm under many conditions, these approaches introduce some level of simplification, particularly in urban and detention-sensitive catchments where antecedent conditions can materially influence peak discharge.

This study addresses this gap by analysing complete storm characteristics from the ARR storm database to develop evidence-based guidance on selecting suitable preburst durations for design bursts. The primary focus is on establishing practical relationships between burst duration, event rarity, and representative preburst duration, including extension to sub-hour burst durations.

Postburst rainfall characteristics were analysed to provide a more complete representation of storm structure supporting broader modelling contexts where runoff volume and hydrograph shape are important.

Other literature estimating preburst durations

There are several studies available that have undertaken quantifying durations of which preburst rainfall is applicable to. While a comprehensive review of all available literature has not been compiled as part of this study, a selection of relevant studies has been summarized below.

Average preburst durations were quantified by Loveridge M et al. (2015). However, the available results were limited to the 60-minute, 6-hour and 24-hour durations. This analysis indicated that Australian averages (medians) of preburst durations lie below 10hrs for all burst durations and frequencies.

Jordan et al. (2005) investigated the preburst rainfall for ten extreme convective storms. For three of the storms, no preburst rainfall was observed at all, and the maximum duration out of the ten storms observed was a 7-hour preburst window.

Carroll D (2025) undertook the quantification of observed durations of preburst for a long-record gauge (84 years of hourly data) in Brisbane City. Results from this independent analysis have been used for validation purposes for this study.

A complete preburst duration dataset was unable to be identified from this literature review, however the work by Carroll D. (2025) is believed to provide the closest literature available for comparative efforts.

Methodology

Available Data

3020 continuous rainfall gauges were available to this study to conduct analysis, largely, IFDs for each of these gauges were sourced from the 2016 BoM IFDs, however, longer record gauges (>30 Water Years) had bespoke at-site IFDs derived as it is preferable to use the latest available at-site observations. Daily read rainfall gauges were discounted from the dataset as temporal distribution within subdaily timesteps are critical to this study. The spatial distribution of these gauges is presented in Figure 1.

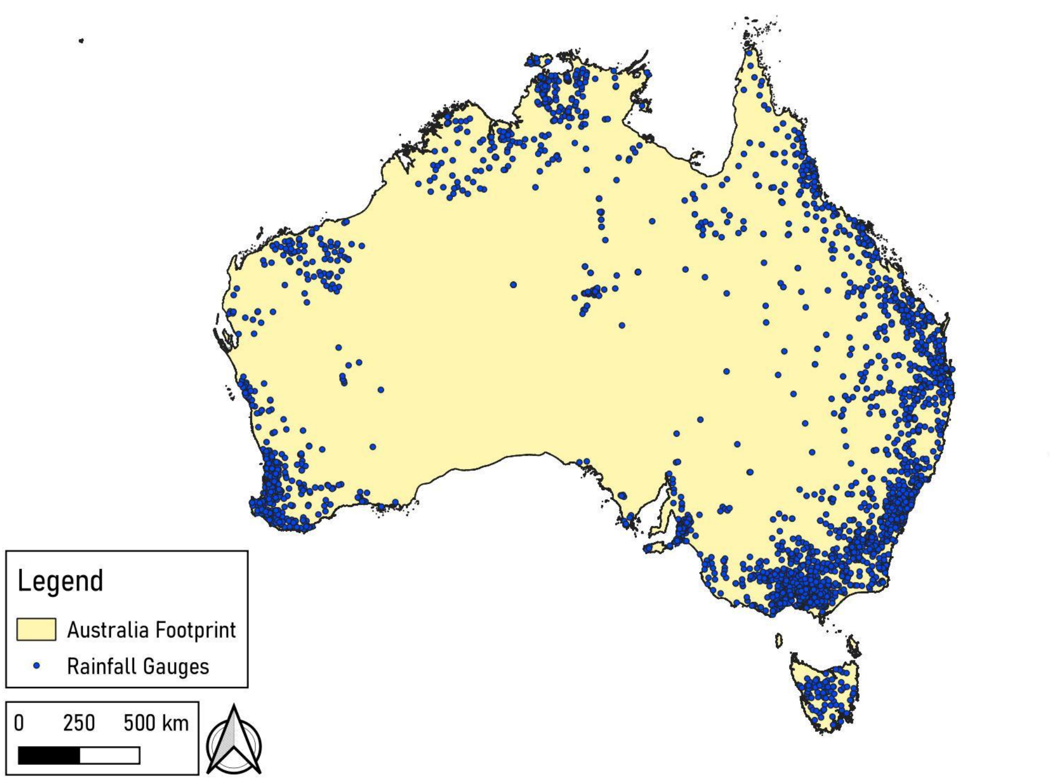

Figure 1: Location of gauges analysed

Storm event selection

The annual maximum series for each burst duration have been directly used for the collation of the complete storm database. By selecting storms for pre-burst analysis based on the annual maximums that are often used for intermediate and rare IFD generation, the preburst depths and durations later derived in this study have direct correlation and application to design event rainfall IFDs.

Largely IFDs were sourced from the 2016 BoM IFDs, however, for longer record rainfall gauges (> 30 Water Years), at-site IFDs were derived for durations ranging from 5 minutes to 168 hours for frequencies up to the 0.05%AEP. The GEV Distribution was employed to estimate IFDs with distribution parameters (shape scale and location) derived from the Method of Moments with tails of the distribution informed from surrounding durations. A total of 985 at-site derived IFDs were produced to inform the study as at-site derived IFDs have several advantages over using the 2016 BoM IFDs, being that the data used to derive the IFDs are directly related to the preburst and postburst estimates.

Complete Storm Definition

A complete storm definition was used in this study to separate preburst and postburst rainfall from extended dry periods. Various criterion has been developed as part of other existing literature with prominent examples below.

- Loveridge M et al. (2015) (ARR Revision)

  Identifies the first dry 24-hour period with less than 10mm of rainfall. The initial pre-burst duration is then defined from the end of the 24-hour dry period to the start of the burst event. Extend the preburst duration where the average 6-hour rainfall intensity exceeds 0.167mm/hr.

- Hill et al. (2014) (ARR Revision)

  12 hours of no significant rainfall.

- Rahman et al. (2001) (Monte Carlo, CRCCH)

  'Insignificant rainfall' periods defined as at least six dry hours, with dry defined as average intensity less than 0.25mm/hr with all hours experiencing less than a 1.2mm/hr intensity threshold.

For the purposes of this study focussing on preburst depths, this study aims to construct a bespoke definition for "a significant dry period" founded on the principles of the previously derived methods. "A significant dry period" for this study has been defined as when a considerable amount of initial loss has been recovered from a dry period.

Nominally, for typical Australian catchments, this has been estimated as when all the following conditions are met:
The preceding; -

- 5-minutes has less than 0.2mm of rainfall,
- 0.5-hours has less than 0.5mm of rainfall,

- 1-hour has less than 1mm of rainfall,
- 12-hours has less than 4mm of rainfall, and
- 24-hours has less than 10mm of rainfall.

A visualization and example of the undertaken storm categorization is shown in Figure 2 for a 6-hour storm.

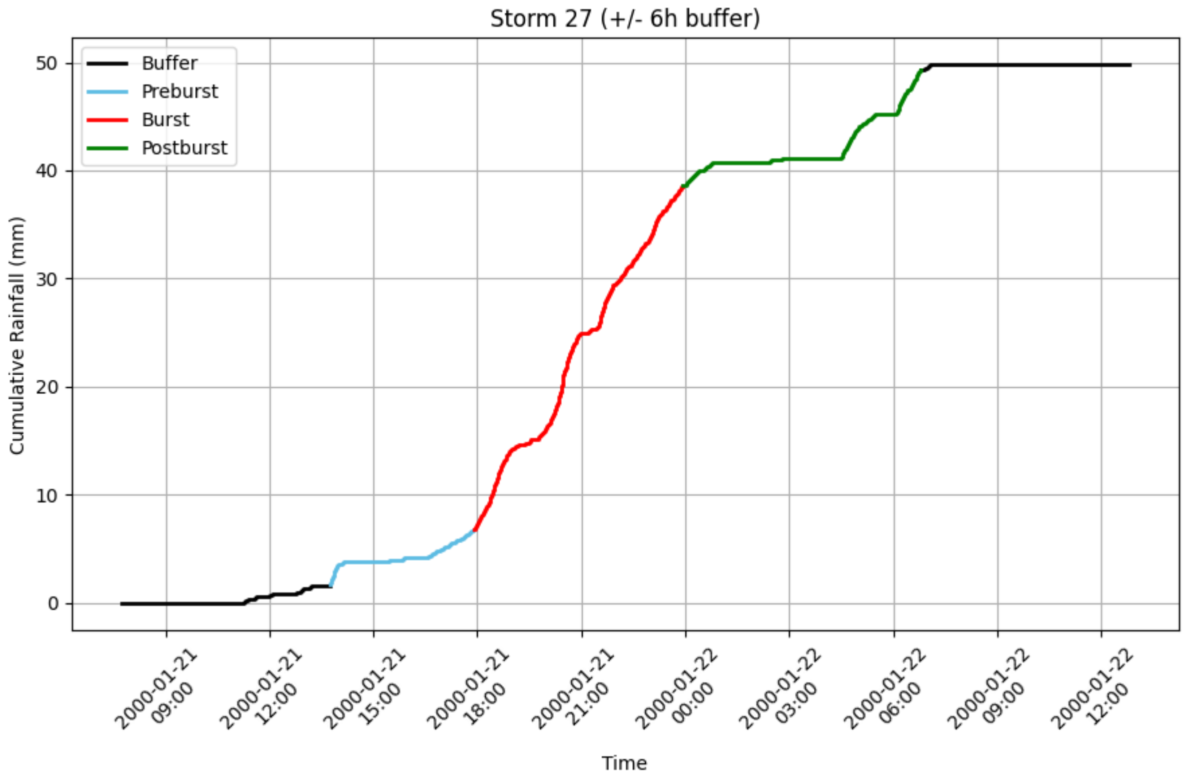

Figure 2: 6-Hour complete storm definition

Estimating quantiles from the complete storm dataset

From the conducted storm event selection and complete storm definition, preburst and postburst depths and durations were related to the burst event frequency and duration. Results indicate many storms did not observe any preburst and some storms observed very large preburst depths, as such the use of the statistical mean would skew to large outliers, alternatively, median preburst depths have been used to estimate typical values which has been estimated through a simplistic isotonic regression against event frequency. This approach also aligns with the preburst estimates of ARR datahub, where a range of preburst quantiles, such as the median, have been estimated.

Results

Australian averages

Australian averages are defined as the average of the entire complete storm dataset. No gauge weighting has been employed to account for gauge density in populous regions and as such the magnitude of Australian averages is not intended to be representative of any particular region in Australia. Preburst depths and durations are presented in Figure 1Figure 3 and Figure 4 respectively, similarly postburst depths and durations are presented in Figure 5 and Figure 6 respectively.

It is of note that, historically, practitioners have applied various methods for preburst depths for sub-hour events, as the minimum storm duration for preburst depths is an hour on ARR Datahub. The results of this analysis indicates that some level of tapered growth is applicable to sub-hour events.

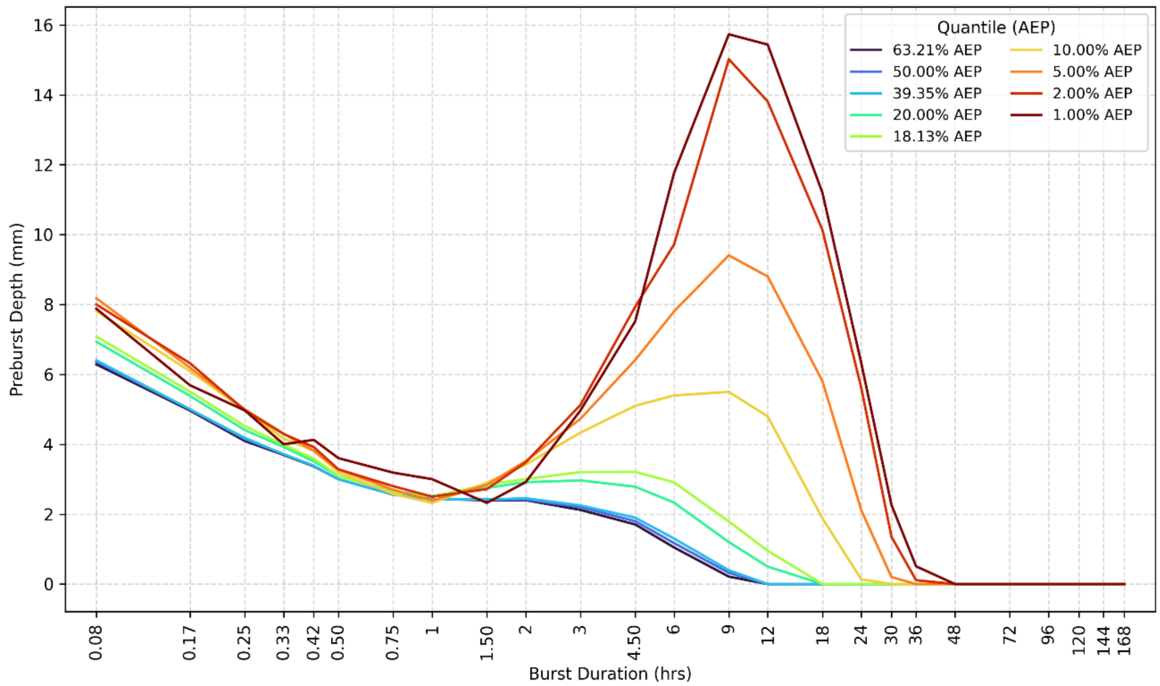

Figure 3: Australian average preburst depths

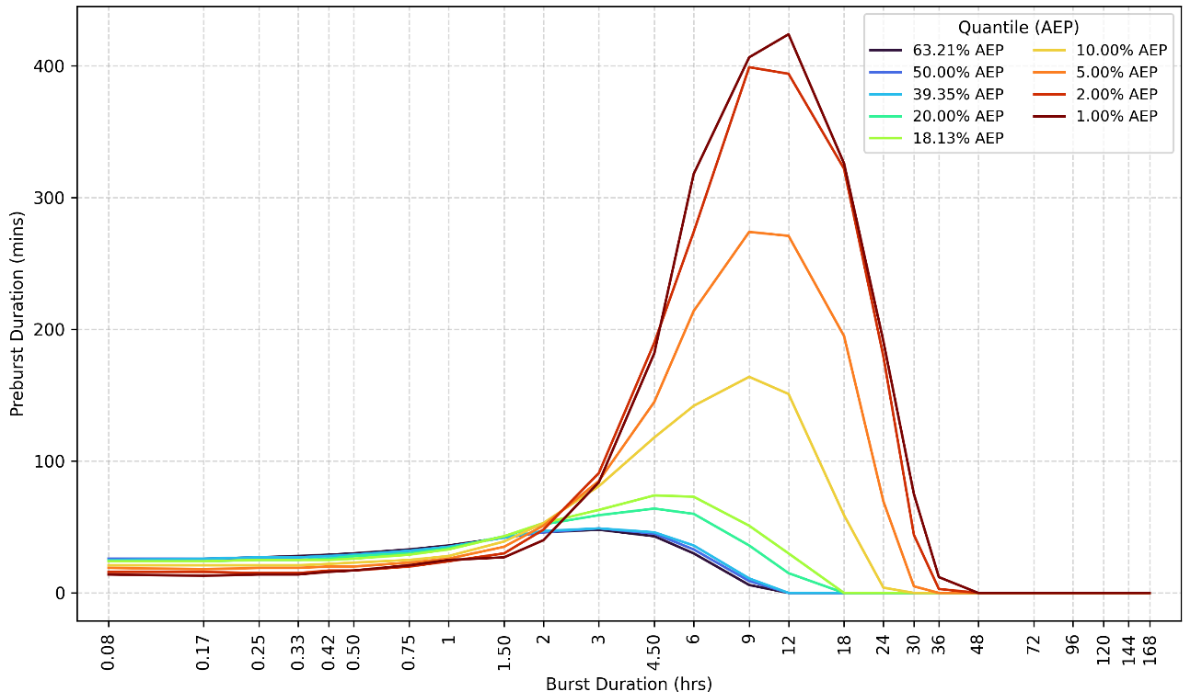

Figure 4: Australian average preburst durations

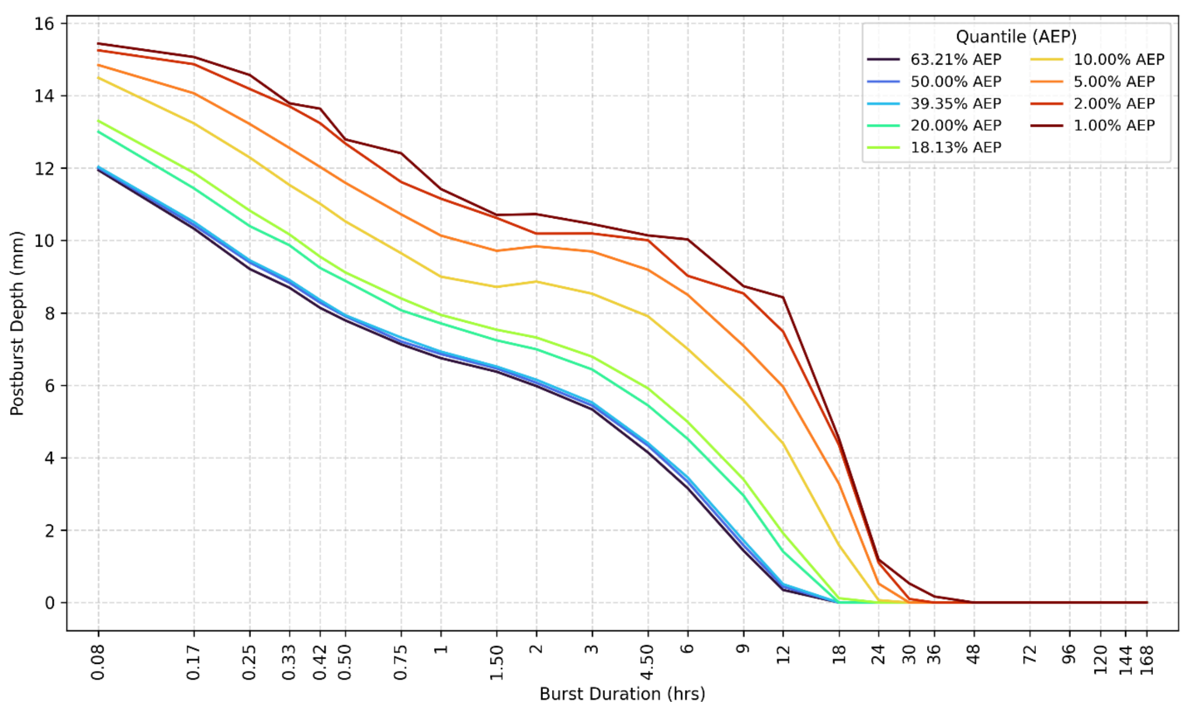

Figure 5: Australian average postburst depths

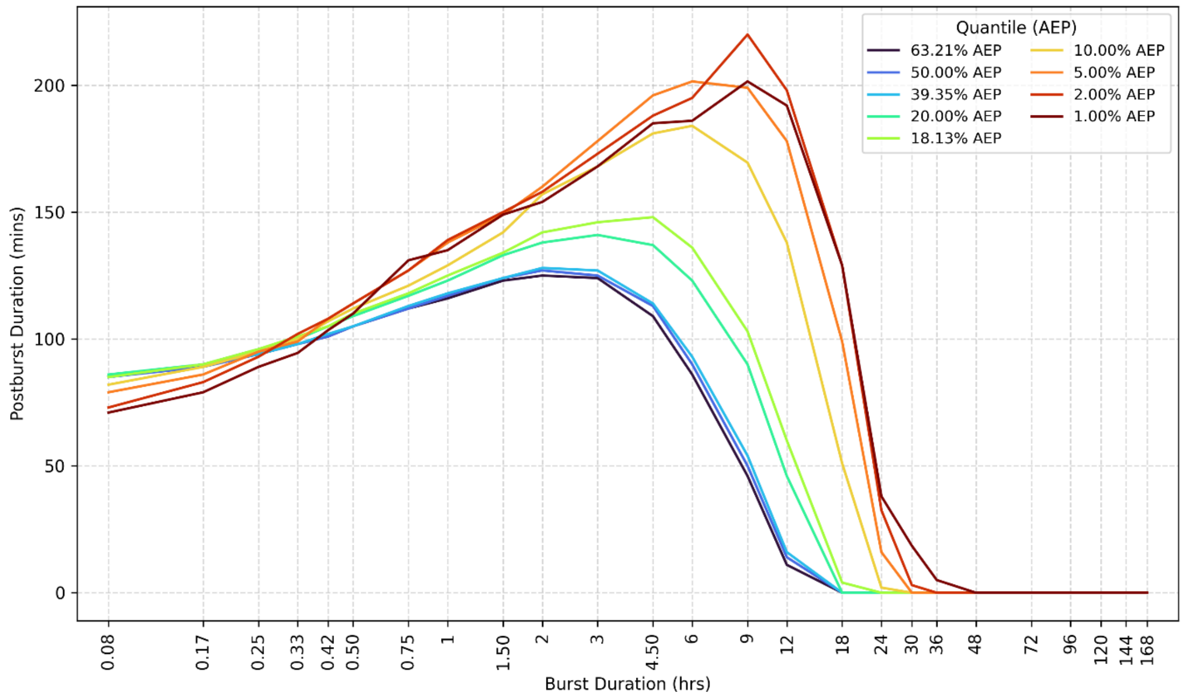

Figure 6: Australian average postburst durations

Regionalization

As estimates of Australian averages have many limitations for practical applications, a regionalization approach was undertaken in attempt to capture regions subject to unique storm mechanisms. This approach assumes that preburst depths and durations are dependent on typical storm mechanisms, such that areas subject to extreme rainfall of East Coast Lows (ECLs) have longer typical preburst durations than that of areas only subject to convective storm fronts.

While storm mechanisms have not been uniquely defined as part of this analyses, temporal pattern regions defined by ARR have been employed as a proxy of discrete typical storm mechanism regions. The previous analyses have been repeated for gauges in each temporal pattern region (Figure 7), with results of this analysis tabularized in Appendix A.

An overview of regional characteristics for depths, durations, and intensities for preburst and postburst rainfall is presented in Figure 8 to Figure 13 below. Notably, while the Wet Tropics (WT) temporal pattern region observes large preburst and postburst depths, the duration of which these depths are applicable to are much longer than other temporal pattern regions, resulting in less significant rainfall intensities. Comparatively East Coast South experiences large preburst and postburst rainfall depths, but over much shorter durations than that predicted of the wet tropics and as such the relative intensities are not too dissimilar.

Preburst and postburst intensities have been presented as to provide practitioners with some indicator to assess if either preburst or postburst exceeds that of a subject catchment's continuing loss. In reality, these average intensities cannot be used alone, as preburst and postburst is typically not distributed equally across the entire duration, and as such preburst may exceed continuing loss for portions of the duration and fall below continuing loss in other portions of the duration.

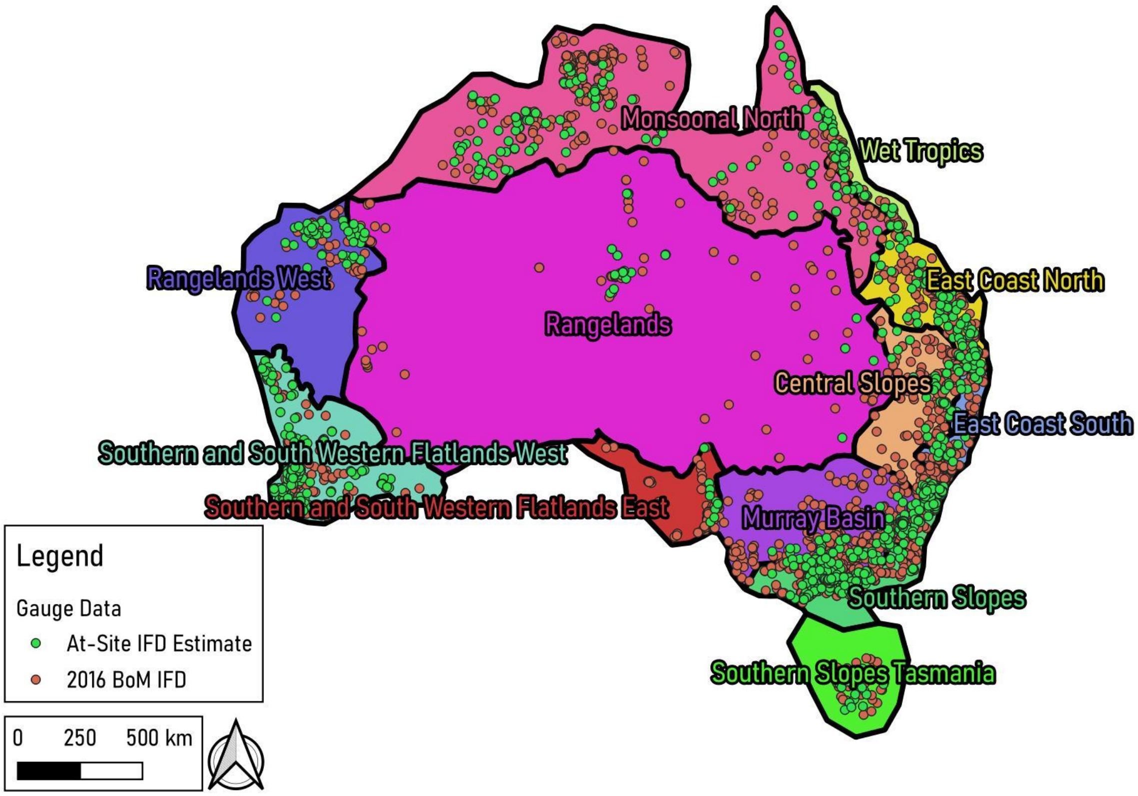

Figure 7: Temporal Pattern Regionalization

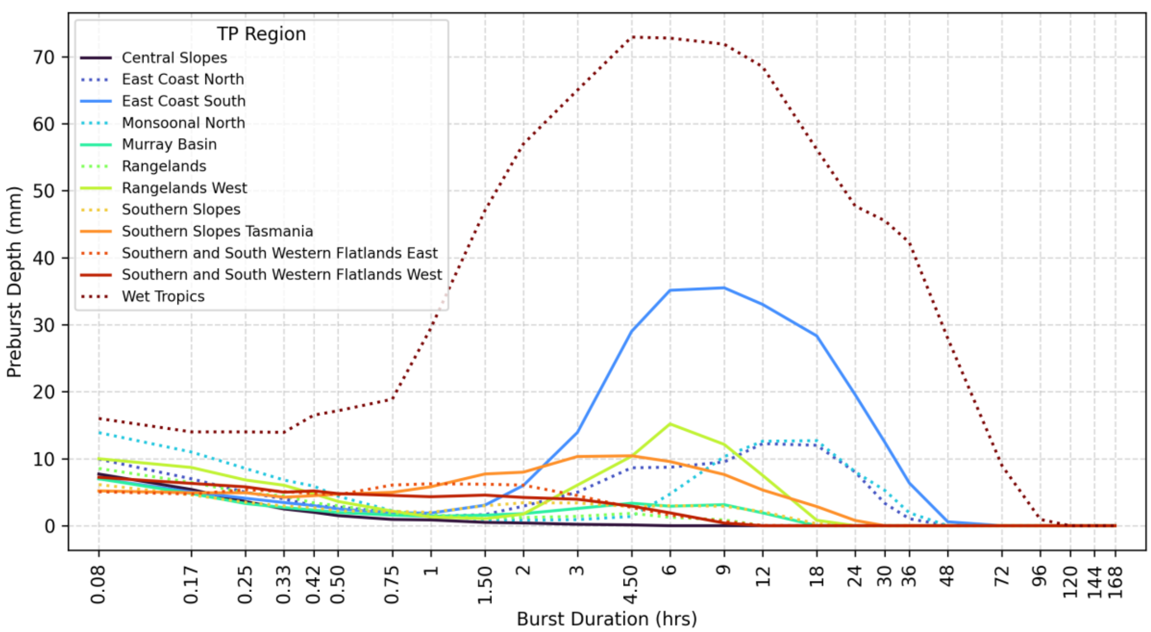

Figure 8: 10%AEP Regional preburst depths

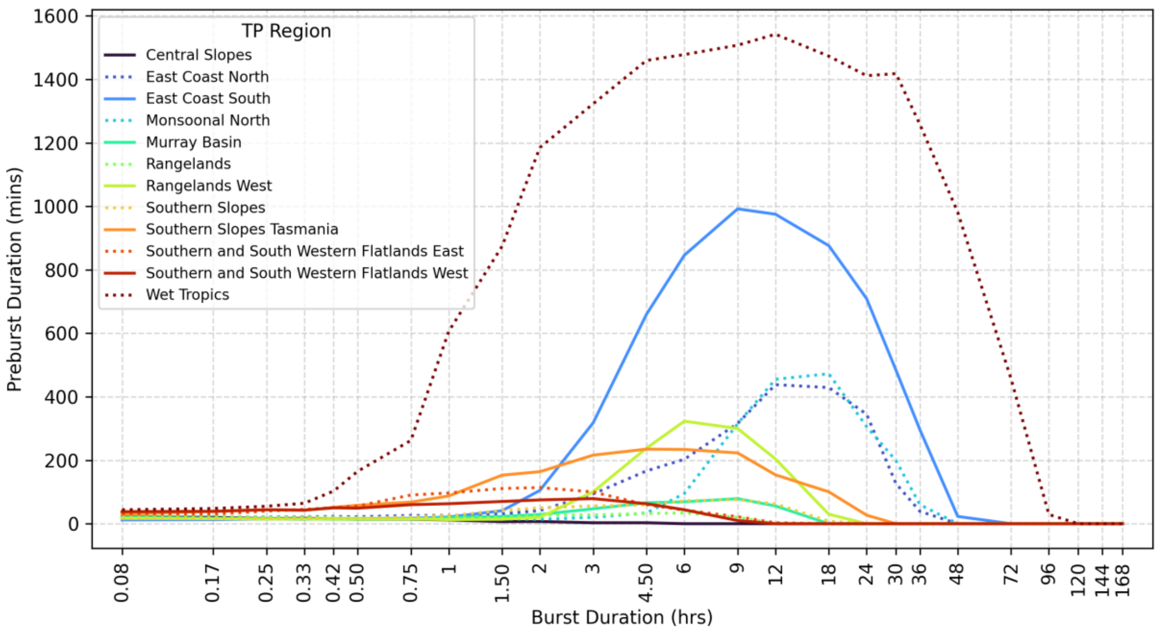

Figure 9: 10%AEP Regional preburst durations

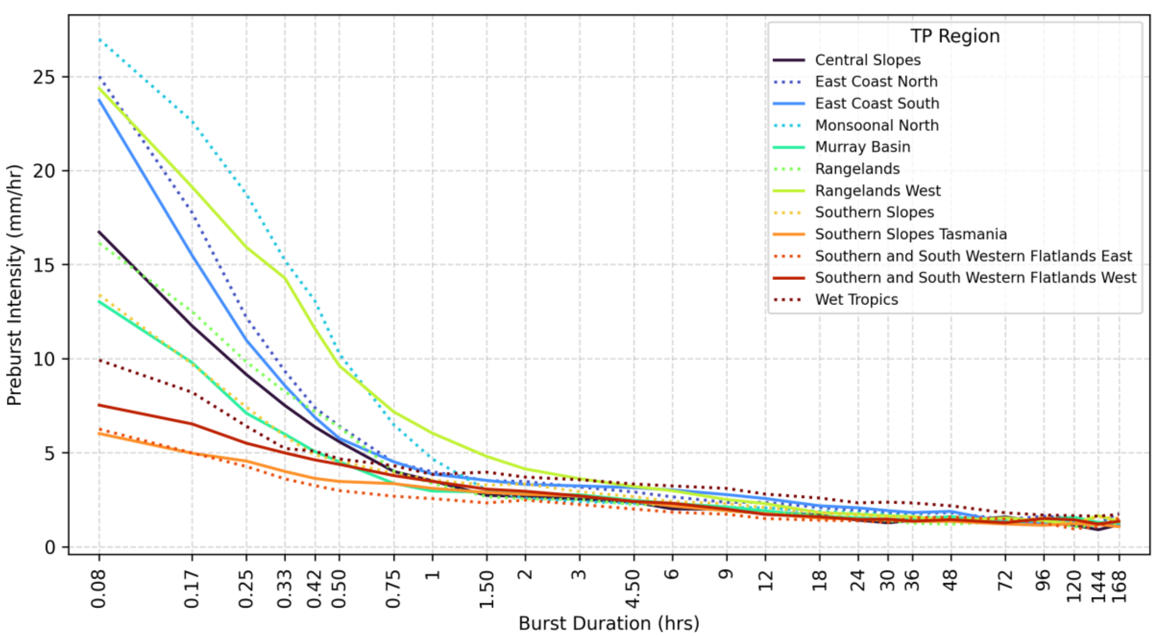

Figure 10: 10%AEP Regional preburst intensities

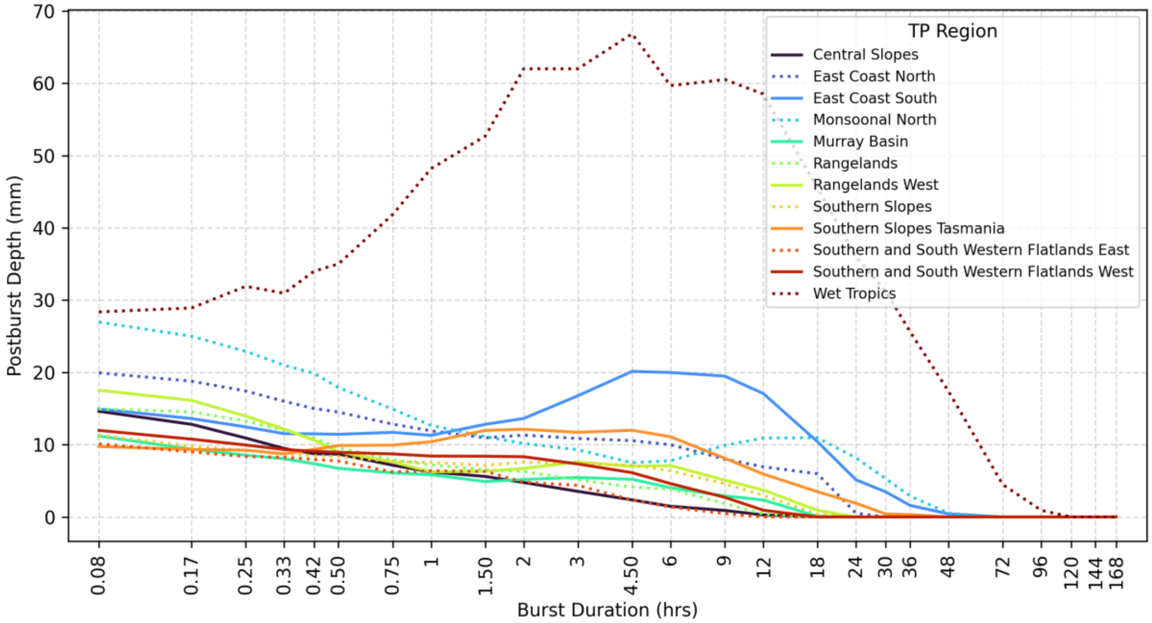

Figure 11: 10%AEP Regional postburst depth

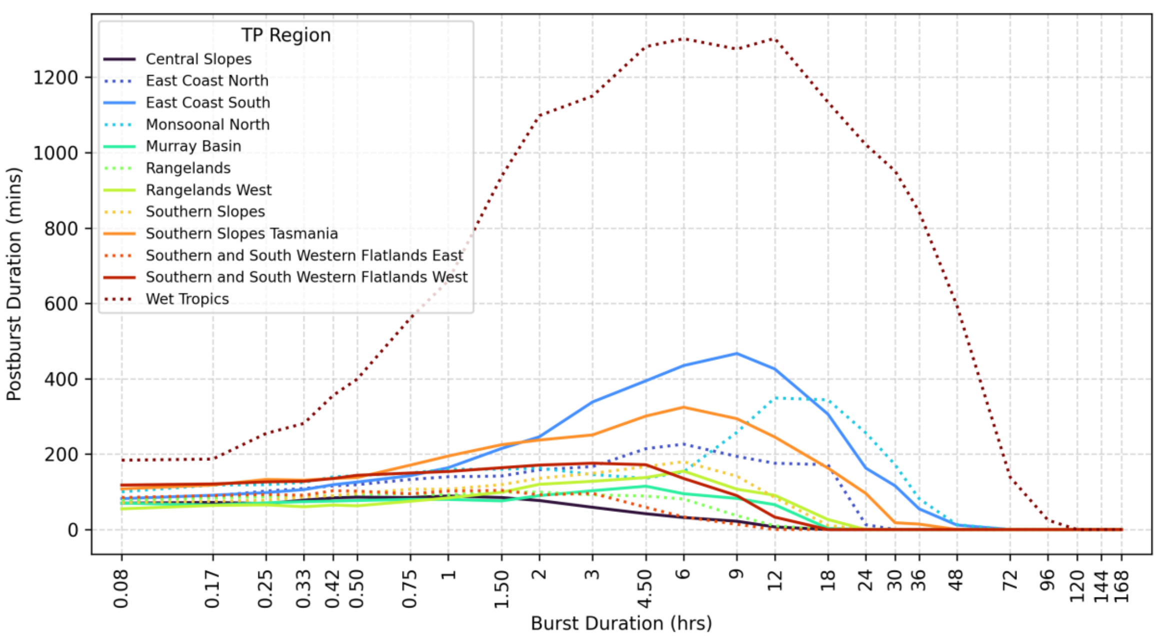

Figure 12: 10%AEP Regional postburst durations

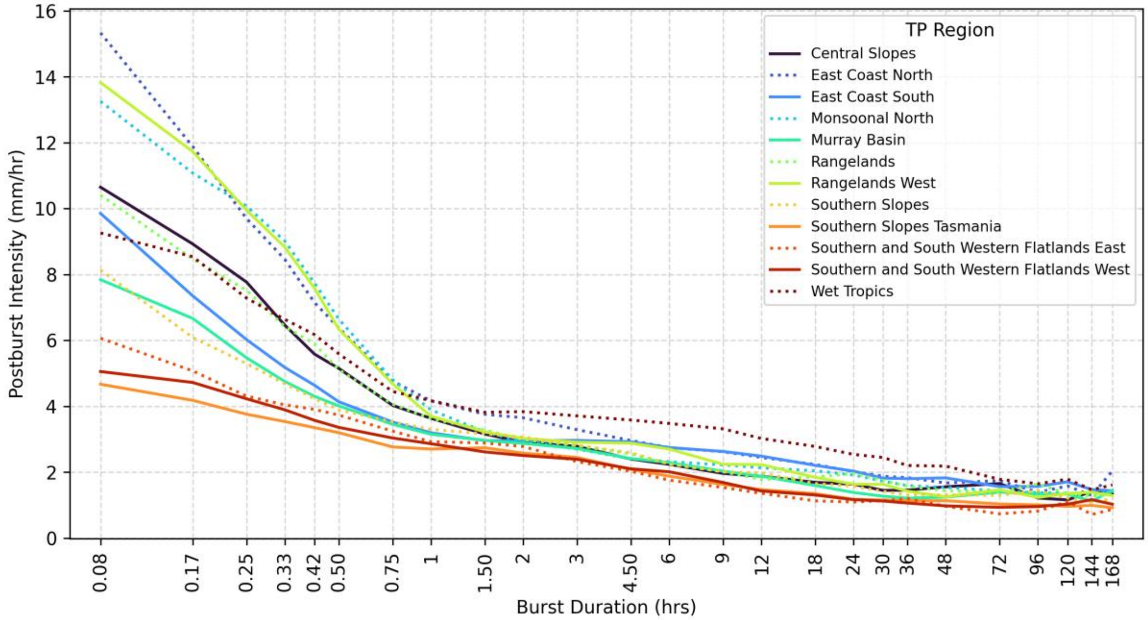

Figure 13: 10%AEP Regional postburst intensities

Practical Application

As preburst depths and ratios, as estimated through this study, may not align perfectly with other datasets such as those published on ARR Datahub, some estimates of this study may observe non-zero duration where ARR datahub predicts zero preburst depth and vice versa. As a result, this study has not prescribed an exact approach of implementation and has instead intended for this study to inform potential durations relevant to storms of interest.

A practical approach could be to derive study specific durations of preburst scaling with burst duration and event frequency, grouped into the “Frequent”, “Intermediate” and “Rare” bins. An indicative example of this approach is presented in Table 1, where instead of prescribing durations for every frequency, a simplification is used to promote interoperability and simplify necessary modifications.

Table 1: East Coast North preburst duration application example (mins)

Burst Dur / AEP	Frequent	Intermediate	Rare
5m	20	20	10
10m	20	20	10
15m	30	20	20
20m	30	20	20
25m	30	20	20
30m	30	20	20
45m	30	20	30
1hr	30	30	40
1.5hrs	20	40	40

2hrs	20	50	60
3hrs	20	140	300
4.5hrs	30	330	660
6hrs	20	440	860
9hrs	0	600	1260
12hrs	0	660	1500
18hrs	0	700	1270
24hrs	0	640	1260
30hrs	0	530	1200
36hrs	0	340	1000
48hrs	0	0	610
72hrs	0	0	50
96hrs	0	0	0
120hrs	0	0	0
144hrs	0	0	0
168hrs	0	0	0

Discussion

Several industry-standard software packages, including URBS, TUFLOW RoG ARR Module, and Storm Injector, provide direct capability to incorporate preburst rainfall prior to the application of the design burst. This functionality is increasingly being adopted in practice; however, guidance remains limited regarding the appropriate duration over which preburst rainfall should be applied. The primary intent of this study is to address this gap and provide practical guidance to Australian practitioners on selecting suitable preburst durations for these existing software packages.

It is recommended that preburst durations applicable to site locations are derived from that presented in Appendix A, where durations gauges have been sub divided into temporal pattern regions in attempt to capture gauge grouping by dominant storm mechanisms.

These durations are intended to provide a practical starting point for implementation within commonly used modelling frameworks. The provided durations have not been estimated with any method to enforce probability neutrality and are purely statistical estimates of typical storm characteristics.

References

1. Carroll, D. 2025, 'A preliminary note of pre-burst durations for application with the ARR 2019 design guidelines', unpublished manuscript.

2. Hill, P., Graszkiewicz, Z., Taylor, M. & Nathan, R. 2014, 'Australian rainfall and runoff revision project 6: Loss models for catchment simulation – rural catchments stage 3 report', Engineers Australia.

3. Jordan, P., Nathan, R., Mittiga, L. et al. 2005, 'Growth curves and temporal patterns of short duration design storms for extreme events', Australasian Journal of Water Resources.

4. Loveridge, M., Stensmyr, P. & Babister, M. 2015, ‘Temporal patterns of rainfall – part 2: Pre-burst rainfall, Australian Rainfall and Runoff Revision Project 3’, Engineers Australia.

5. Rahman, A., Weinmann, E., Hoang, T. et al. 2001, ‘Monte Carlo simulation of flood frequency curves from rainfall’, CRC for Catchment Hydrology.

Appendix A – Preburst Durations

Table 1: Central Slopes Preburst Durations (mins)

Burst Dur / AEP	63.2%	50%	20%	10%	5%	2%	1%
5m	21	21	21	21	20	20	15
10m	19	20	20	20	18	20	14
15m	20	21	21	16	15	14	19
20m	20	19	19	17	16	14	11
25m	18	18	18	15	14	15	15
30m	18	18	16	14	14	14	17
45m	16	16	14	14	13	13	21
1hr	13	13	12	12	11	14	17
1.5hrs	7	8	6	7	9	11	13
2hrs	5	5	5	7	7	7	11
3hrs	0	0	0	3	5	9	15
4.5hrs	0	0	1	3	4	7	10
6hrs	0	0	0	0	9	0	0
9hrs	0	0	0	0	5	11	1
12hrs	0	0	0	0	4	63	20
18hrs	0	0	0	0	0	24	32
24hrs	0	0	0	0	0	14	1
30hrs	0	0	0	0	0	0	0
36hrs	0	0	0	0	0	0	0
48hrs	0	0	0	0	0	0	0
72hrs	0	0	0	0	0	0	0
96hrs	0	0	0	0	0	0	0
120hrs	0	0	0	0	0	0	0
144hrs	0	0	0	0	0	0	0
168hrs	0	0	0	0	0	0	0

Table 2: East Coast North Preburst Durations (mins)

Burst Dur / AEP	63.2%	50%	20%	10%	5%	2%	1%
5m	24	24	24	21	16	10	7
10m	24	24	24	21	20	19	13
15m	26	26	25	22	20	16	16
20m	26	26	24	22	20	14	24
25m	26	25	25	23	19	20	22
30m	26	26	25	22	21	22	23
45m	25	25	26	26	24	27	33
1hr	25	25	26	26	29	31	37
1.5hrs	22	22	27	31	40	42	39
2hrs	22	23	30	42	54	77	55
3hrs	22	24	38	94	141	292	297
4.5hrs	23	26	43	167	330	549	658
6hrs	11	15	37	203	443	762	859
9hrs	0	3	41	316	595	1134	1260
12hrs	0	0	76	438	664	1119	1497
18hrs	0	0	7	429	701	1158	1267
24hrs	0	0	0	345	638	952	1264
30hrs	0	0	0	127	526	720	1199
36hrs	0	0	0	39	336	651	1000
48hrs	0	0	0	0	0	239	611
72hrs	0	0	0	0	0	0	52
96hrs	0	0	0	0	0	0	0
120hrs	0	0	0	0	0	0	0
144hrs	0	0	0	0	0	0	0
168hrs	0	0	0	0	0	0	0

Table 3: East Coast South Preburst Durations (mins)

Burst Dur / AEP	63.2%	50%	20%	10%	5%	2%	1%
5m	18	18	16	12	11	7	7
10m	17	17	15	13	12	9	7
15m	18	18	16	15	14	11	9
20m	18	18	17	14	14	10	15
25m	21	21	18	16	14	12	15
30m	24	23	20	16	15	14	16
45m	31	30	27	17	16	18	18
1hr	49	47	39	21	18	23	30
1.5hrs	84	81	71	41	37	28	32
2hrs	122	121	118	105	72	48	38
3hrs	196	198	258	318	357	240	148
4.5hrs	312	324	429	660	897	1156	911
6hrs	353	366	501	846	1165	1435	1600
9hrs	320	337	543	992	1270	1602	1673
12hrs	274	289	506	975	1255	1530	1684
18hrs	178	197	429	876	1119	1368	1487
24hrs	40	55	271	709	937	1149	1282
30hrs	0	0	136	484	708	923	854
36hrs	0	0	5	296	513	731	660
48hrs	0	0	0	23	176	324	326
72hrs	0	0	0	0	0	0	0
96hrs	0	0	0	0	0	0	0
120hrs	0	0	0	0	0	0	0
144hrs	0	0	0	0	0	0	0
168hrs	0	0	0	0	0	0	0

Table 4: Monsoonal North Preburst Durations (mins)

Burst Dur / AEP	63.2%	50%	20%	10%	5%	2%	1%
5m	22	22	23	22	21	18	18
10m	21	21	22	21	19	21	18
15m	21	21	20	19	18	18	22
20m	20	20	20	18	18	17	22
25m	20	19	20	19	18	17	21
30m	18	18	19	18	18	17	26
45m	15	15	16	15	16	16	25
1hr	13	13	15	15	15	14	24
1.5hrs	5	6	10	15	16	17	19
2hrs	1	2	6	14	16	26	30
3hrs	0	1	8	20	39	92	128
4.5hrs	0	0	3	34	84	235	348
6hrs	0	0	10	95	346	521	660
9hrs	0	0	7	315	522	796	826
12hrs	0	0	46	455	675	787	943
18hrs	0	0	71	473	677	679	888
24hrs	0	0	12	306	525	596	771
30hrs	0	0	0	199	425	598	735
36hrs	0	0	0	60	314	532	617
48hrs	0	0	0	0	60	437	469
72hrs	0	0	0	0	0	5	32
96hrs	0	0	0	0	0	0	0
120hrs	0	0	0	0	0	0	0
144hrs	0	0	0	0	0	0	0
168hrs	0	0	0	0	0	0	0

Table 5: Murray Basin Preburst Durations (mins)

Burst Dur / AEP	**63.2%**	**50%**	**20%**	**10%**	**5%**	**2%**	**1%**
5m	21	21	22	20	22	21	19
10m	21	21	19	17	15	15	14
15m	21	20	18	15	13	13	13
20m	21	20	18	15	13	12	10
25m	22	21	19	14	13	12	9
30m	24	24	20	14	12	11	9
45m	27	28	22	15	14	9	9
1hr	31	31	27	19	15	11	13
1.5hrs	39	39	30	23	15	13	11
2hrs	45	45	42	29	25	26	18
3hrs	49	48	49	47	55	62	63
4.5hrs	41	42	51	66	76	119	145
6hrs	27	27	43	69	106	166	218
9hrs	5	6	25	79	131	224	260
12hrs	0	0	1	56	119	174	214
18hrs	0	0	0	0	15	41	59
24hrs	0	0	0	0	0	0	0
30hrs	0	0	0	0	0	0	0
36hrs	0	0	0	0	0	0	0
48hrs	0	0	0	0	0	0	0
72hrs	0	0	0	0	0	0	0
96hrs	0	0	0	0	0	0	0
120hrs	0	0	0	0	0	0	0
144hrs	0	0	0	0	0	0	0
168hrs	0	0	0	0	0	0	0

Table 6: Rangelands Preburst Durations (mins)

Burst Dur / AEP	63.2%	50%	20%	10%	5%	2%	1%
5m	19	19	21	24	24	12	7
10m	19	19	21	22	20	12	5
15m	19	19	21	21	21	17	13
20m	17	17	19	21	21	27	27
25m	17	17	19	20	22	27	32
30m	15	15	17	19	20	28	34
45m	11	11	15	16	20	26	35
1hr	9	9	13	19	26	28	30
1.5hrs	7	8	11	19	21	33	25
2hrs	7	7	13	27	35	69	18
3hrs	0	0	12	28	53	107	160
4.5hrs	0	0	2	32	93	232	277
6hrs	0	0	0	34	148	307	452
9hrs	0	0	0	20	144	361	777
12hrs	0	0	0	1	150	513	556
18hrs	0	0	0	0	164	307	663
24hrs	0	0	0	0	92	303	404
30hrs	0	0	0	0	3	227	213
36hrs	0	0	0	0	0	71	87
48hrs	0	0	0	0	0	0	115
72hrs	0	0	0	0	0	0	0
96hrs	0	0	0	0	0	0	0
120hrs	0	0	0	0	0	0	0
144hrs	0	0	0	0	0	0	0
168hrs	0	0	0	0	0	0	0

Table 7: Rangelands West Preburst Durations (mins)

Burst Dur / AEP	63.2%	50%	20%	10%	5%	2%	1%
5m	17	18	17	17	16	18	18
10m	17	17	16	16	16	15	13
15m	15	15	15	15	15	15	14
20m	15	15	15	15	15	15	14
25m	15	15	15	15	15	15	22
30m	14	14	14	15	15	15	18
45m	8	9	12	15	15	21	21
1hr	3	3	7	13	15	15	37
1.5hrs	0	1	5	14	26	88	47
2hrs	0	0	5	20	45	136	238
3hrs	0	0	15	101	179	373	713
4.5hrs	0	0	18	238	409	567	596
6hrs	0	0	16	323	422	508	557
9hrs	0	0	13	300	375	479	449
12hrs	0	0	0	204	313	307	375
18hrs	0	0	0	30	102	183	262
24hrs	0	0	0	0	0	33	35
30hrs	0	0	0	0	0	0	33
36hrs	0	0	0	0	0	0	74
48hrs	0	0	0	0	0	0	0
72hrs	0	0	0	0	0	0	0
96hrs	0	0	0	0	0	0	0
120hrs	0	0	0	0	0	0	0
144hrs	0	0	0	0	0	0	0
168hrs	0	0	0	0	0	0	0

Table 8: Southern and South Western Flatlands East Preburst Durations (mins)

Burst Dur / AEP	63.2%	50%	20%	10%	5%	2%	1%
5m	53	50	49	31	24	15	12
10m	53	52	44	30	27	16	10
15m	62	62	58	40	27	24	10
20m	59	58	58	45	29	24	18
25m	67	65	62	51	31	27	20
30m	69	68	69	56	57	42	22
45m	67	66	73	91	105	112	54
1hr	73	72	89	97	101	158	73
1.5hrs	66	66	80	111	116	159	81
2hrs	85	85	99	114	125	157	290
3hrs	59	60	69	100	71	205	155
4.5hrs	30	30	43	60	63	234	234
6hrs	11	12	20	43	64	246	117
9hrs	0	0	0	22	39	221	86
12hrs	0	0	0	3	20	153	47
18hrs	0	0	0	0	0	51	0
24hrs	0	0	0	0	0	0	0
30hrs	0	0	0	0	0	0	0
36hrs	0	0	0	0	0	0	0
48hrs	0	0	0	0	0	0	0
72hrs	0	0	0	0	0	0	0
96hrs	0	0	0	0	0	0	0
120hrs	0	0	0	0	0	0	0
144hrs	0	0	0	0	0	0	0
168hrs	0	0	0	0	0	0	0

Table 9: Southern and South Western Flatlands West Preburst Durations (mins)

Burst Dur / AEP	63.2%	50%	20%	10%	5%	2%	1%
5m	52	51	48	38	31	24	23
10m	53	53	48	39	33	25	18
15m	55	55	50	44	35	23	18
20m	56	55	53	43	37	23	16
25m	58	58	55	50	42	26	20
30m	57	56	55	49	42	34	24
45m	63	63	64	60	54	38	30
1hr	64	64	65	63	63	52	54
1.5hrs	63	63	68	70	60	63	75
2hrs	63	63	68	75	79	84	84
3hrs	43	43	53	79	84	93	109
4.5hrs	23	24	35	63	82	113	125
6hrs	4	5	16	44	74	94	138
9hrs	0	0	0	10	45	208	287
12hrs	0	0	0	0	29	193	246
18hrs	0	0	0	0	0	47	114
24hrs	0	0	0	0	0	0	0
30hrs	0	0	0	0	0	0	0
36hrs	0	0	0	0	0	0	0
48hrs	0	0	0	0	0	0	0
72hrs	0	0	0	0	0	0	0
96hrs	0	0	0	0	0	0	0
120hrs	0	0	0	0	0	0	0
144hrs	0	0	0	0	0	0	0
168hrs	0	0	0	0	0	0	0

Table 10: Southern Slopes Tasmania Preburst Durations (mins)

Burst Dur / AEP	63.2%	50%	20%	10%	5%	2%	1%
5m	64	62	57	30	23	15	8
10m	80	78	60	39	23	15	10
15m	84	84	65	44	38	18	10
20m	90	89	70	42	32	18	10
25m	95	95	73	52	32	28	15
30m	106	103	85	58	40	28	25
45m	134	134	108	68	58	39	23
1hr	143	144	128	88	73	45	35
1.5hrs	173	173	169	153	103	72	38
2hrs	169	169	168	164	147	136	59
3hrs	192	190	200	216	190	217	135
4.5hrs	184	190	208	235	269	286	211
6hrs	171	176	197	234	291	276	241
9hrs	85	93	129	223	245	229	248
12hrs	46	50	68	154	229	238	239
18hrs	3	4	21	101	125	176	96
24hrs	0	0	0	27	71	165	203
30hrs	0	0	0	0	8	9	94
36hrs	0	0	0	0	0	0	0
48hrs	0	0	0	0	0	0	0
72hrs	0	0	0	0	0	0	0
96hrs	0	0	0	0	0	0	0
120hrs	0	0	0	0	0	0	0
144hrs	0	0	0	0	0	0	0
168hrs	0	0	0	0	0	0	0

Table 11: Southern Slopes Preburst Durations (mins)

Burst Dur / AEP	63.2%	50%	20%	10%	5%	2%	1%
5m	19	19	18	17	16	15	13
10m	19	19	18	16	16	14	11
15m	21	21	19	16	16	13	14
20m	22	22	20	16	15	13	14
25m	25	24	22	17	15	13	14
30m	27	27	23	17	14	12	12
45m	35	34	31	22	16	10	10
1hr	41	40	38	25	17	11	9
1.5hrs	46	46	51	42	27	10	4
2hrs	51	51	57	50	39	18	8
3hrs	54	54	56	56	37	21	10
4.5hrs	40	40	51	59	51	46	18
6hrs	27	28	45	72	89	60	65
9hrs	3	4	23	76	123	180	149
12hrs	0	0	3	63	127	241	256
18hrs	0	0	0	8	57	203	189
24hrs	0	0	0	0	4	65	86
30hrs	0	0	0	0	0	0	0
36hrs	0	0	0	0	0	0	0
48hrs	0	0	0	0	0	0	0
72hrs	0	0	0	0	0	0	0
96hrs	0	0	0	0	0	0	0
120hrs	0	0	0	0	0	0	0
144hrs	0	0	0	0	0	0	0
168hrs	0	0	0	0	0	0	0

Table 12: Wet Tropics Preburst Durations (mins)

Burst Dur / AEP	**63.2%**	**50%**	**20%**	**10%**	**5%**	**2%**	**1%**
5m	59	59	59	44	35	19	18
10m	75	74	61	48	42	44	36
15m	109	105	73	55	45	47	35
20m	142	132	108	65	48	47	43
25m	167	163	128	103	54	49	45
30m	212	202	185	165	96	63	67
45m	295	304	326	263	430	473	339
1hr	337	336	441	606	656	1011	1007
1.5hrs	442	467	580	874	1162	1297	1389
2hrs	546	563	754	1185	1254	1356	1535
3hrs	802	813	1063	1323	1448	1635	2305
4.5hrs	901	935	1112	1460	1479	1621	2315
6hrs	979	1018	1187	1478	1604	2049	2049
9hrs	1002	1030	1191	1508	1623	1926	1935
12hrs	899	944	1133	1542	1672	1669	1750
18hrs	784	814	1055	1473	1709	1732	1425
24hrs	626	648	1007	1412	1633	1559	1439
30hrs	478	534	855	1418	1483	1434	1371
36hrs	447	480	786	1258	1410	1255	1302
48hrs	164	203	469	981	1255	1333	1333
72hrs	0	0	23	457	652	917	1103
96hrs	0	0	0	29	296	861	930
120hrs	0	0	0	0	21	408	869
144hrs	0	0	0	0	9	235	787
168hrs	0	0	0	0	0	0	339