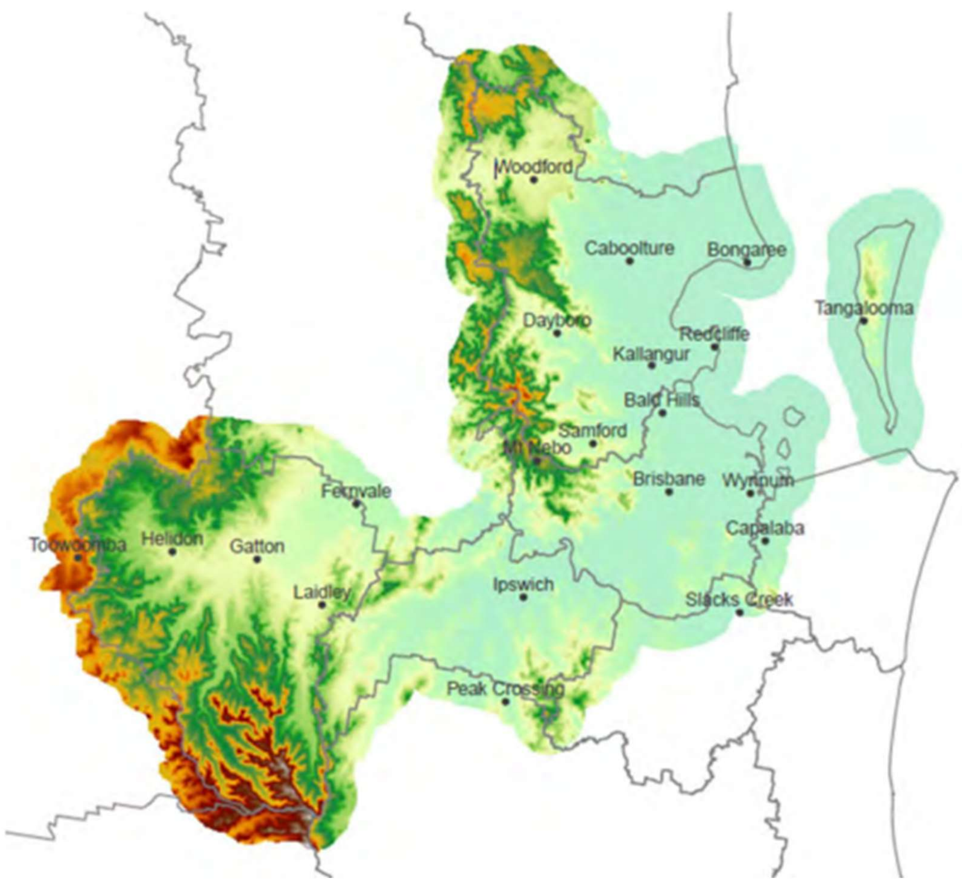
MORETON BAY CITY COUNCIL

LIMB DESIGN RAINFALL CLIMATE CHANGE CONSIDERATIONS ADDENDUM TO LIMB REPORT

ADDENDUM



MAY 2025

SECURITY LABEL: OFFICIAL

Level 1, 119 Macquarie Street
Hobart, TAS, 7000

Tel: (03) 6111 1726
Fax: (02) 9262 6208
Email: wma@wmawater.com.au
Web: www.wmawater.com.au

LIMB DESIGN RAINFALL CLIMATE CHANGE CONSIDERATIONS ADDENDUM TO LIMB REPORT

ADDENDUM

MAY 2025

Project LIMB Design Rainfall Climate Change Considerations Addendum to LIMB report	**Project Number** **125002**
Client Moreton Bay City Council	**Client's Representative** Alana Mosely
Project Manager Mark Babister	

Revision History

Revision	Description	Distribution	Authors	Reviewed by	Verified by	Date
0	Draft	Alana Mosely	Sarah Blundy, Harry Babister	Mark Babister	Mark Babister	Jan 25
1	Final	Alana Mosely	Sarah Blundy, Harry Babister	Mark Babister	Mark Babister	May 2025
2	Final – Appendix table updated	Alana Mosely	Sarah Blundy, Harry Babister	Mark Babister	Mark Babister	May 2025

1. Introduction

Australian Rainfall and Runoff (ARR) was updated in August 2024 to include updates to climate change considerations in Book 1 Chapter 6, ARR version 4.2 (Wasko et. Al. 2024). This includes an estimation of the baseline of the data used by the Bureau of Meteorology to calculate the Intensity-Frequency-Duration (IFD) design rainfalls in 2016. Midpoint or baseline date estimation for rainfall data is necessary for using the ARR 4.2 guidance. All references to ARR (e.g. to table numbers or sections) throughout this report refer to Book 1 Chapter 6 unless otherwise specified.

The LIMB IFD rainfalls were developed prior to this update so a midpoint/baseline date estimation was not created during the LIMB IFD project. This addendum outlines the midpoint of the data used to create the LIMB IFDs, as well as providing updated temperature changes based on this midpoint and worked examples to apply this.

2. LIMB data midpoint

Annual maximum series (AMS) data used for the LIMB project was reanalysed to establish a midpoint of the data used creating the IFDs. As the IFDs were created only using gauges with available data at each time resolution, a different midpoint was calculated for sub-daily and daily gauged data.

The midpoint for data weighted on a broad scale grid was calculated to ensure there were no significant bias in different parts of the study area (Figure 1). While there was some variation across the study area this didn't appear to be systematic, therefore a single midpoint was calculated for daily and sub-daily data using averages across all locations. A single midpoint can also be further justified as after this step the further spatial smoothing occurs.

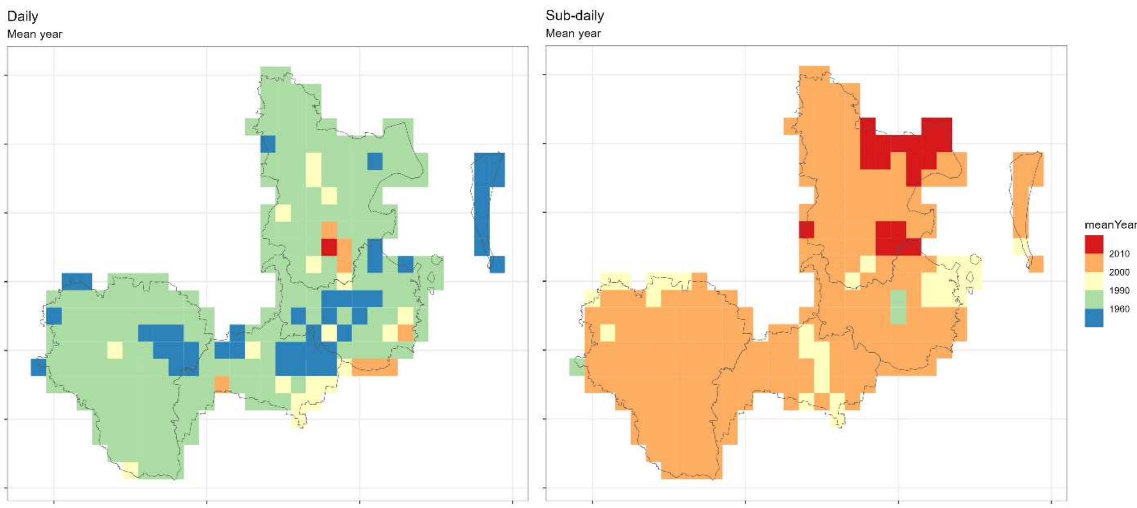


Figure 1 Weighted mean year of AMS used in gridding of L-moments for the LIMB IFDs for durations at least 1 day (on left) and for durations less than 1 day (on right).

Table 1 shows the mean number of years in the AMS for each gauge type and the weighted mean year of these data. As the IFDs for durations greater than or equal to one day include data recorded at sub-daily gauges, these are also included in this category. The weighted mean year is calculated on the mean year of data available for each gauge, weighted by each gauges' record length, i.e. longer records are given higher weights (as they are also weighted higher when calculating the IFDs). As the mean year for the daily data falls within the nominated "baseline" period of 1961-1990, this can be used with the climate change guidance using the same baseline.

Table 1 Climate change midpoint for sub-daily and daily gauges

Duration	Mean number of years in AMS	Weighted mean year	Climate change midpoint
< 1 day	20	2002	2002
>= 1 day	41	1967	1961-1990

3. Other design rainfall midpoints

The BoM 2016 IFDs used rainfall data up to 2012. The midpoint for this is likely to vary geographically however this level of detail is not publicly available. The ARR climate change considerations adopted 1961-1990 as the baseline relevant for use with the BoM 2016 IFDs at a national scale, for both sub-daily and daily durations.

The storms used for deriving the Generalised Tropical Storm Method Revision Project (GTSMR) Probable Maximum Precipitation (PMP) have a midpoint of 1958 (calculated from GTSMR storms data in Beesley et. Al., 2004). The global mean temperature anomaly centred on 1958 is effectively (when rounding to 1 decimal place) equal to the 1961-1990 baseline, and therefore it is appropriate to adopt the 1961-1990 baseline for this data. The storms used for deriving the Generalised Short-Duration Method (GSDM) PMP are not readily available to calculate a midpoint. However, as the GSDM project was carried out significantly earlier than the BoM 2016 IFDs (finalised in 2003) but still relied on sub-daily rainfall data availability it is very likely the midpoint would be within the 1961-1990 period, and therefore it is appropriate to use the same midpoint in relation to the GSDM data.

4. Global temperature projections

For durations of 1 day or longer, the LIMB midpoint falls within the ARR baseline period. Therefore, the climate change projections can be applied consistently with the method described in Book 1 Chapter 6, i.e. using the same temperature increases and factors. In addition to the three climate periods given in ARR (Current and near-term (2021-2040), Medium-term (2041-2060), Long-term (2081-2100)) a value for 2046, 2070 and 2099 are given at the request of the councils. 2099 is supplied as the last year of the climate scenarios as 2100 is not available. The 2046, 2070 and 2099 values relative to the 1961-1990 baseline for daily rainfalls are shown in Table 2, along with ARR values for the relevant time periods (from Table 1.6.2 in ARR)

Table 2 Global mean surface temperature projections (ΔT) for four socio-economic pathways relative to 1961-1990 baseline for 1946, 2070 and 2099. The 90% uncertainty interval is provided in parentheses. As with ARR Table 1.6.2 these are given as the year at the midpoint of each period window, with individual years added for 1946, 2070 and 2099

Climate Scenario	SSP1-2.6 (°C)	SSP2-4.5 (°C)	SSP3-7.0 (°C)	SSP5-8.5 (°C)
Current and near-term (2030)	1.2 (0.9-1.5)	1.2 (0.9-1.5)	1.2 (0.9-1.5)	1.3 (1.0-1.6)
2046	1.4 (1.1-1.8)	1.6 (1.3-2)	1.7 (1.4-2.1)	1.9 (1.5-2.4)
Medium-term (2050)	1.4 (1.0-1.9)	1.7 (1.3-2.1)	1.8 (1.4-2.3)	2.1 (1.6-2.7)
2070	1.4 (1.1-2)	1.7 (1.6-2.7)	1.8 (2-3.2)	2.1 (2.3-3.9)
Long-term (2090)	1.5 (1.0-2.1)	2.4 (1.8-3.2)	3.3 (2.5-4.3)	4.1 (3.0-5.4)
2099	1.4 (1.0-2.0)	2.5 (1.9-3.3)	3.6 (2.8-4.7)	4.5 (3.3-5.9)

The values for the Current and near-term, Medium-term and Long-term in Table 2 are taken directly from ARR Table 1.6.2. These numbers (in this report and in ARR) are equal to the midpoint year of each window, and are therefore labelled this way in Table 2. In most cases, the midpoint year of each window is equal to the mean of the years in the window, however this is not the case for the Long-term window where 2090 year is not equal to the mean of 2081-2100 (even allowing variation in extrapolation to 2100). For consistency to the ARR methodology, additional years requested by the councils (2046, 2070, 2099) were calculated directly from these years and not based on a window.

For sub-daily data the LIMB midpoint is in 2002. Table 3 shows the global mean surface temperature projections for future climate scenarios based on the 2002 baseline. This is an update of ARR v4.2 Table 1.6.2 with the changed baseline. As with the ARR methodology these points are taken from the midpoint of the climate period of interest.

The full table of rainfall scaling factors (similar to what can be obtained from the ARR datahub) is shown in Appendix A. These are relative to 2002 baseline for sub-daily durations, and relative to the ARR (1961-1990) baseline for daily and longer.

Table 3 Global mean surface temperature projections (ΔT) for four socio-economic pathways relative to 2002 baseline. The 90% uncertainty interval is provided in parentheses.

Climate Scenario	SSP1-2.6 (°C)	SSP2-4.5 (°C)	SSP3-7.0 (°C)	SSP5-8.5 (°C)
Current and near-term (2030)	0.64 (0.43-0.89)	0.66 (0.45-0.90)	0.67 (0.45-0.91)	0.76 (0.52-1.02)
2046	0.87 (0.55-1.26)	1.03 (0.73-1.44)	1.15 (0.82-1.57)	1.36 (0.95-1.82)
Medium-term (2050)	0.90 (0.57-1.34)	1.13 (0.79-1.58)	1.28 (0.92-1.74)	1.53 (1.08-2.05)
2070	0.98 (0.54-1.51)	1.53 (1.26-2.6)	1.98 (2-3.72)	2.46 (2.44-4.78)
Long-term (2090)	0.94 (0.54-1.51)	1.83 (1.27-2.60)	2.75 (2.00-3.72)	3.52 (2.44-4.78)
2099	0.90 (0.50-1.50)	1.93 (1.32-2.75)	3.09 (2.25-4.21)	3.91 (2.74-5.40)

Table 4 shows the estimated warming which has already occurred from the two baseline periods until present (2025), and also shows the warming from the HARC IFD baseline (2010). This uses the data behind ARR Figure 1.6.2 so partially relies on climate change projections and is therefore given for each climate change socioeconomic pathways, although most are very similar and a mean value could be applied. Actual observed anomalies are difficult to give precisely as they need to be smoothed to account for inter-annual variability. Data was extracted from the sources outlined in ARR Example 1C (CRU 2025, NASA GISS 2025, NOAA NCEI 2025), which estimated smoothed changes between 1 and 1.2 degrees above the 1961-1990 baseline. This is consistent with the values given in Table 4.

Table 4 Estimated warming which has already occurred between baseline periods and 2025 for daily and sub-daily LIMB data and the HARC baseline. This means there is an estimated 0.18 degrees of warming between 2002 and 2010.

Baseline	SSP1-2.6 (°C)	SSP2-4.5 (°C)	SSP3-7.0 (°C)	SSP5-8.5 (°C)
ARR and LIMB daily baseline (1961-1990)	1.07	1.07	1.07	1.13
LIMB sub-daily baseline (2002)	0.53	0.54	0.53	0.59
HARC baseline (2010)	0.35	0.36	0.35	0.41

The estimated warming which has occurred between the 1961-1990 baseline and 2002 is 0.54 degrees. Using ARR equation 1.6.1 this means a scaling of between 4 and 8% for sub-daily scaling (from 18 hours to 1 hour respectively). Therefore, if practitioners are using the current

LIMB and BOM enveloped IFDs grids there is a built in difference of between 4 and 8% within the grid the sub-daily grids depending on the data source. Ideally, the LIMB grids would be scaled to the same baseline and a new envelop calculated between this and the BOM IFDs using a consistent climate baseline. However, in the interim until this can be undertaken or if grids are already in use, it is recommended that the climate change factors based on the 2002 baseline are used across the grid, with the reasoning that:

- Given the LIMB IFDs are inherently 4-8% higher, they will already exceed the BOM locations in areas where the calculated baseline rainfall would be similar, and therefore the 2002 climate change factors should be used
- In areas where the LIMB IFDs are higher for the baseline period, the same logic holds (LIMB will be higher and therefore 2002 factors should be used)
- In areas where the LIMB IFDs are significantly lower for the baseline period, and therefore the BOM IFDs are shown in the envelope, the use of the envelope is already providing a conservatively high estimate of rainfall and therefore using the relatively smaller climate change factor is still reasonable.

If practitioners are concerned about this interpretation it is suggested that they review the LIMB IFDs and BOM IFD grids independently and using the relevant climate change factor based on the grid of their choice.

5. Other Climate Change considerations

This report focuses on climate change considerations relating to scaling of design rainfalls depths, in particular to the LIMB IFDs. Other considerations are outlined in ARR v4.2 Book 1 Section 6.4 and should be refereed to when undertaking event-based design flood modelling. In particular this section discusses potential changes in temporal and spatial pattern of rainfall, changes to sea levels and sea level interactions and provides detailed guidance how initial and continuing losses should be modified in consideration to climate change.

6. Worked example

6.1.1. Design rainfall adjustment for Moreton Bay Design Rainfall

Example A

This example presents a case where a practitioner wants to calculate the design rainfalls relevant to in the long term (2081-2100) for a critical event at -27.195, 153.025 in Deception Bay in Moreton Bay City Council.

In this example the critical duration has been assessed as 6 hours and the AEP of interest is 1%:

- The LIMB IFDs are extracted from the ARR datahub (Babister et Al 2016).
- The 6 hour 1% AEP design rainfall is 273.8mm.
- As the duration is less than 1 day the sub-daily baseline is used which is 2002.
- The practitioner wants to assess the difference between the SSP1 and SSP5 climate change scenarios. Table 3 shows temperature changes of 0.94 and 3.52 °C respectively.
- ARR gives a rate of change for rainfall depths of 10.2% per °C of warming for a 6 hour event (Table 1.6.5)
- Using ARR Equation (1.6.1) the factored design rainfall is:

$$273.8 \times \left(1+\frac{10.2}{100}\right)^{0.94} = 273.8 \times 1.096 = 300.0mm \text{ for SSP1}$$

$273.8 \times \left(1 + \frac{10.2}{100}\right)^{3.52} = 273.8 \times 1.408 = 385.4mm$ for SSP5

Alternatively, the factors from Appendix A could be used directly:

$273.8 \times 1.096 = 300.0mm$ for SSP1

$273.8 \times 1.408 = 385.4mm$ for SSP5

Example B

The practitioner from Example A wants to compare these rainfalls to the rainfalls corresponding to current day (2025).

- Using ARR Equation (1.6.1) and the temperature changes given in Table 4 the factored design rainfall is:

  $273.8 \times \left(1 + \frac{10.2}{100}\right)^{0.53} = 288.3mm$ for SSP1

  $273.8 \times \left(1 + \frac{10.2}{100}\right)^{0.59} = 289.9mm$ for SSP5

As you can see these give almost the same results, so it is appropriate to just use the mean of the temperature increases for the four socio-economic pathways for calculating current day rainfalls.

Example C

This example presents a case where the practitioner wants to review rainfalls relevant to a critical event on the Bremer River in Ipswich in the medium term (2041-2060) for SSP3 scenario. They are reviewing rainfalls within Ipswich town at -27.61, 152.76, for a critical event of 48 hours for the 5% AEP.

- The LIMB IFDs were extracted from the ARR datahub.
- The 48 hour 5% AEP design rainfall is 216.4 mm.
- As the duration is greater than 1 day the ARR baseline period can be used.

This could be calculated from the equation as was done in Example A and B:

$$216.4 \times \left(1 + \frac{8}{100}\right)^{1.8} = 216.4 \times 1.15 = 248.6mm$$

Using:

- 1.8° temperature change from ARR Table 1.6.2
- 8%/°C rate of change from ARR Table 1.6.1

However, as the same baseline is used as ARR the factors in the datahub could be used directly which give a factor of 1.15 for the year 2050 for durations >= 24 hours. I.e.

$$216.4 \times 1.15 = 248.9mm$$

This gives a very small difference due to the rounding differences in the equations.

7. REFERENCES

Babister, M., Trim, A., Testoni, I. & Retallick, M. 2016. The Australian Rainfall & Runoff Datahub, 37th Hydrology and Water Resources Symposium Queenstown NZ

Beesley, C.A., Meighen, J. and Xuereb, K.C. (2004). 'Catalogue of Significant Rainfall Occurences of Tropical Origin over Australia'. Hydrology Report Series No. 9, Hydrometeorological Advisory Service, Bureau of Meteorology.

Climatic Research Unit (CRU) (University of East Anglia) and Met Office, 2025. HadCRUT5 global temperature graphs. Accessed via https://crudata.uea.ac.uk/~timo/diag/tempdiag.htm on 14/01/2025

NASA Goddard Insitude for Space Studies (GISS), 2025. GISS Surface Temperature Analysis (GISTEMP v4). Accessed via Data.GISS: GISS Surface Temperature Analysis (GISTEMP v4) on 14/01/2025

NOAA, National Centers for Environmental Information (NCEI), 2025. Global Surface Temperature Anomalies. Accessed via Global Surface Temperature Anomalies | National Centers for Environmental Information (NCEI) on 14/01/2025

Wasko C., Westra S, Nathan R, Jacob D, Nielsen C, Evans J, Rodgers S, Ho M, Babister B, Dowdy A, Sharples W. Australian Rainfall and Runoff v4.2: Book 1 Chapter 6 Climate Change Considerations. © Commonwealth of Australia (Geoscience Australia), Version 4.2, 202

Appendix A

APPENDIX A. Climate change rainfall factors

A.1. Sub-daily (relative to 2002 baseline)

ARR climate periods

Duration	Current and near-term (2030 midpoint)				Medium-term (2050 midpoint)				Long-term (2090 midpoint)			
	SSP1-2.6	SSP2-4.5	SSP3-7.0	SSP5-8.5	SSP1-2.6	SSP2-4.5	SSP3-7.0	SSP5-8.5	SSP1-2.6	SSP2-4.5	SSP3-7.0	SSP5-8.5
1 min	1.094	1.097	1.098	1.112	1.134	1.171	1.196	1.238	1.140	1.291	1.469	1.636
2 min	1.094	1.097	1.098	1.112	1.134	1.171	1.196	1.238	1.140	1.291	1.469	1.636
3 min	1.094	1.097	1.098	1.112	1.134	1.171	1.196	1.238	1.140	1.291	1.469	1.636
4 min	1.094	1.097	1.098	1.112	1.134	1.171	1.196	1.238	1.140	1.291	1.469	1.636
5 min	1.094	1.097	1.098	1.112	1.134	1.171	1.196	1.238	1.140	1.291	1.469	1.636
10 min	1.094	1.097	1.098	1.112	1.134	1.171	1.196	1.238	1.140	1.291	1.469	1.636
15 min	1.094	1.097	1.098	1.112	1.134	1.171	1.196	1.238	1.140	1.291	1.469	1.636
20 min	1.094	1.097	1.098	1.112	1.134	1.171	1.196	1.238	1.140	1.291	1.469	1.636
25 min	1.094	1.097	1.098	1.112	1.134	1.171	1.196	1.238	1.140	1.291	1.469	1.636
30 min	1.094	1.097	1.098	1.112	1.134	1.171	1.196	1.238	1.140	1.291	1.469	1.636
45 min	1.094	1.097	1.098	1.112	1.134	1.171	1.196	1.238	1.140	1.291	1.469	1.636
1 hour	1.094	1.097	1.098	1.112	1.134	1.171	1.196	1.238	1.140	1.291	1.469	1.636
1.5 hour	1.086	1.088	1.090	1.102	1.122	1.156	1.179	1.217	1.128	1.265	1.423	1.571
2 hour	1.080	1.083	1.084	1.096	1.114	1.146	1.167	1.202	1.120	1.247	1.393	1.528
3 hour	1.074	1.076	1.078	1.088	1.106	1.134	1.153	1.186	1.111	1.226	1.359	1.481
4.5 hour	1.068	1.070	1.071	1.081	1.097	1.123	1.140	1.170	1.101	1.206	1.326	1.435
6 hour	1.064	1.066	1.067	1.077	1.091	1.116	1.132	1.160	1.096	1.195	1.306	1.408
9 hour	1.060	1.062	1.063	1.071	1.085	1.108	1.123	1.149	1.089	1.181	1.283	1.376
12 hour	1.057	1.059	1.059	1.068	1.081	1.102	1.117	1.141	1.084	1.171	1.267	1.354
18 hour	1.053	1.055	1.056	1.063	1.075	1.095	1.109	1.131	1.079	1.159	1.248	1.328

Current year (2025) and additional future years

Duration	2025				2046				2099			
	SSP1-2.6	SSP2-4.5	SSP3-7.0	SSP5-8.5	SSP1-2.6	SSP2-4.5	SSP3-7.0	SSP5-8.5	SSP1-2.6	SSP2-4.5	SSP3-7.0	SSP5-8.5
1 min	1.077	1.078	1.077	1.086	1.129	1.155	1.174	1.209	1.134	1.310	1.540	1.727
2 min	1.077	1.078	1.077	1.086	1.129	1.155	1.174	1.209	1.134	1.310	1.540	1.727
3 min	1.077	1.078	1.077	1.086	1.129	1.155	1.174	1.209	1.134	1.310	1.540	1.727
4 min	1.077	1.078	1.077	1.086	1.129	1.155	1.174	1.209	1.134	1.310	1.540	1.727
5 min	1.077	1.078	1.077	1.086	1.129	1.155	1.174	1.209	1.134	1.310	1.540	1.727
10 min	1.077	1.078	1.077	1.086	1.129	1.155	1.174	1.209	1.134	1.310	1.540	1.727
15 min	1.077	1.078	1.077	1.086	1.129	1.155	1.174	1.209	1.134	1.310	1.540	1.727
20 min	1.077	1.078	1.077	1.086	1.129	1.155	1.174	1.209	1.134	1.310	1.540	1.727
25 min	1.077	1.078	1.077	1.086	1.129	1.155	1.174	1.209	1.134	1.310	1.540	1.727
30 min	1.077	1.078	1.077	1.086	1.129	1.155	1.174	1.209	1.134	1.310	1.540	1.727
45 min	1.077	1.078	1.077	1.086	1.129	1.155	1.174	1.209	1.134	1.310	1.540	1.727
1 hour	1.077	1.078	1.077	1.086	1.129	1.155	1.174	1.209	1.134	1.310	1.540	1.727
1.5 hour	1.070	1.072	1.070	1.079	1.118	1.141	1.159	1.191	1.122	1.281	1.487	1.652
2 hour	1.066	1.067	1.066	1.074	1.110	1.132	1.149	1.178	1.114	1.262	1.451	1.602
3 hour	1.061	1.062	1.061	1.068	1.102	1.122	1.137	1.164	1.106	1.240	1.412	1.547
4.5 hour	1.056	1.057	1.056	1.062	1.093	1.111	1.125	1.150	1.097	1.219	1.373	1.493
6 hour	1.053	1.054	1.053	1.059	1.088	1.105	1.118	1.141	1.091	1.206	1.350	1.462
9 hour	1.049	1.050	1.049	1.055	1.082	1.098	1.110	1.131	1.085	1.191	1.324	1.426
12 hour	1.047	1.048	1.047	1.052	1.078	1.093	1.104	1.124	1.081	1.181	1.305	1.401
18 hour	1.044	1.045	1.044	1.049	1.073	1.087	1.097	1.116	1.075	1.168	1.283	1.371

A.2. Daily relative to ARR (1961-1990) baseline period

ARR climate periods

Duration	Current and near-term (2030 midpoint)				Medium-term (2050 midpoint)				Long-term (2090 midpoint)			
	SSP1-2.6	SSP2-4.5	SSP3-7.0	SSP5-8.5	SSP1-2.6	SSP2-4.5	SSP3-7.0	SSP5-8.5	SSP1-2.6	SSP2-4.5	SSP3-7.0	SSP5-8.5
24 hour	1.095	1.097	1.097	1.105	1.117	1.136	1.150	1.172	1.120	1.200	1.288	1.367
30 hour	1.095	1.097	1.097	1.105	1.117	1.136	1.150	1.172	1.120	1.200	1.288	1.367
36 hour	1.095	1.097	1.097	1.105	1.117	1.136	1.150	1.172	1.120	1.200	1.288	1.367
48 hour	1.095	1.097	1.097	1.105	1.117	1.136	1.150	1.172	1.120	1.200	1.288	1.367
72 hour	1.095	1.097	1.097	1.105	1.117	1.136	1.150	1.172	1.120	1.200	1.288	1.367
96 hour	1.095	1.097	1.097	1.105	1.117	1.136	1.150	1.172	1.120	1.200	1.288	1.367
120 hour	1.095	1.097	1.097	1.105	1.117	1.136	1.150	1.172	1.120	1.200	1.288	1.367
144 hour	1.095	1.097	1.097	1.105	1.117	1.136	1.150	1.172	1.120	1.200	1.288	1.367
168 hour	1.095	1.097	1.097	1.105	1.117	1.136	1.150	1.172	1.120	1.200	1.288	1.367

Current year (2025) and additional future years

Duration	2025				2046				2099			
	SSP1-2.6	SSP2-4.5	SSP3-7.0	SSP5-8.5	SSP1-2.6	SSP2-4.5	SSP3-7.0	SSP5-8.5	SSP1-2.6	SSP2-4.5	SSP3-7.0	SSP5-8.5
24 hour	1.085	1.085	1.085	1.091	1.11	1.13	1.14	1.16	1.12	1.21	1.32	1.41
30 hour	1.085	1.085	1.085	1.091	1.11	1.13	1.14	1.16	1.12	1.21	1.32	1.41
36 hour	1.085	1.085	1.085	1.091	1.11	1.13	1.14	1.16	1.12	1.21	1.32	1.41
48 hour	1.085	1.085	1.085	1.091	1.11	1.13	1.14	1.16	1.12	1.21	1.32	1.41
72 hour	1.085	1.085	1.085	1.091	1.11	1.13	1.14	1.16	1.12	1.21	1.32	1.41
96 hour	1.085	1.085	1.085	1.091	1.11	1.13	1.14	1.16	1.12	1.21	1.32	1.41
120 hour	1.085	1.085	1.085	1.091	1.11	1.13	1.14	1.16	1.12	1.21	1.32	1.41
144 hour	1.085	1.085	1.085	1.091	1.11	1.13	1.14	1.16	1.12	1.21	1.32	1.41
168 hour	1.085	1.085	1.085	1.091	1.11	1.13	1.14	1.16	1.12	1.21	1.32	1.41

Note all durations greater than 1 day are scaled using 8%/°C and therefore factors are not dependent on duration above 1 day. Multiple durations are only included for consistency