



FNQROC DEVELOPMENT MANUAL

DESIGN MANUAL

D4

STORMWATER DRAINAGE

Version No. – 05/23

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GENERAL

D4.01 SCOPE

1. This section sets out the minimum standards for the design of stormwater drainage systems for urban and rural areas.
2. The designer needs to make reference to the associated design manuals related to D1 Road Geometry and D5 Stormwater Quality Management.
3. The Queensland Urban Drainage Manual (QUDM) shall be the basis for the design of stormwater drainage, except as amended by these manuals.

D4.02 OBJECTIVES

1. The objectives of stormwater drainage design are as follows:
 - (a) To collect and convey stormwater from a catchment to its receiving waters with minimal nuisance, danger or damage and at a development and environmental cost which is acceptable to the community as a whole.
 - (b) Limit flooding of public and private property, both within the catchment and downstream, to acceptable levels to prevent or minimise adverse impacts.
 - (c) To provide convenience and safety for pedestrians and traffic in frequent stormwater flows by controlling those flows within prescribed velocity/depth limits.
2. For new developments a stormwater drainage system in accordance with the "major/minor" system concept in accordance with Queensland Urban Design Manual (QUDM); that is, the "major" system shall provide safe, well-defined overland flow paths for rare and extreme storm runoff events while the "minor" system shall be capable of carrying and controlling flows from frequent runoff events.
3. For redevelopment areas where the proposed development replaces an existing development, the on-site drainage system is to be designed in such a way that the estimated peak flow rate from the site for the design average recurrence interval (ARI) of the receiving minor system is no greater than that which would be expected from the existing development and is not concentrated in such a way as to cause nuisance to downstream properties.

D4.03 REFERENCE DOCUMENTS

Note: Where Acts or reference documents are updated, reference should be made to the current version.

Institute of Public Works Engineering Australasia

- Queensland Urban Drainage Manual

Institute of Engineers Australia

- Australian Rainfall and Runoff - A guide to flood estimation.

Queensland Government – Department of Environment and Science

- Environmental Protection Act
- The Environmental Protection (Water) Policy
- Queensland Water Quality Guidelines

Australian Standards

- AS 5065 Polyethylene and polypropylene pipes and fittings for drainage and sewerage applications"
- AS 2566 Buried flexible pipelines Installation

DESIGN CRITERIA

D4.04 GENERAL

1. The Queensland Urban Drainage Manual (QUDM) shall be the basis for design of stormwater drainage except where amended by these manuals.
2. Minor system flows (as defined by QUDM) are to be conveyed underground to a legal point of discharge unless otherwise approved by council.
3. Councils have or are in the process of producing drainage management plans for particular catchments within their boundaries.
4. The design of the stormwater drainage system, for the development shall be such that the upstream drainage is not adversely affected and that the downstream drainage system is capable of adequately catering for the discharge of the modified flow produced as a result of the development.
5. If the downstream system is not capable of carrying the modified discharge, the designer shall indicate the measures proposed to ensure the downstream system is capable of carrying the modified discharge. This will involve negotiation with adjoining landowners for minor creek systems to produce easements over downstream drainage paths. Written approval from the respective property owners is required for the easement and any engineering works on their property from the development site to the legal point of discharge.
6. Alternatively where a development will result in increased peak flows the stormwater drainage system may include on-site measures to such as detention basins, to ensure that the peak discharge from the development area is restricted to a level no greater than that discharging prior to the development.
7. All works proposed within creeks and natural watercourse, or lands under the control of other Authorities must have the approval of all relevant authority prior to commencing the work and evidence of such approvals shall be provided with the design submission.
8. The design of the stormwater drainage system shall accommodate the future developed peak flows from upstream catchments on the basis of development in accordance with the Planning Scheme.
9. The designer shall be responsible for assessing the existing and future developed flow regime entering the development site from upstream catchments and shall provide detailed calculations with the design submission.

10. Unless approved otherwise by the Council, piped drainage systems shall extend to legal point of discharge.
11. All Material and components of the Stormwater Drainage system shall be durable and fit for purpose, with a minimum lifespan 60 years.

D4.05 DESIGN AVERAGE RECURRENCE INTERVAL ^{CRC}

1. Design Average Recurrence Interval (ARI) shall be in accordance with table 4.3 "Recommended Design Average Recurrence Intervals" (modified from QUDM) unless noted otherwise in the Local Authority Specific Requirements.
2. For the purpose of drainage, a major road shall be defined as a major collector or higher order road.

Table 4.3 – Recommended Design Average Recurrence Intervals (ARI) and annual exceedance probabilities (AEP)

		ARI (years)	AEP
(i) MAJOR SYSTEM DESIGN		100 ¹	1%
(ii) MINOR SYSTEM DESIGN			
Development Category			
Central Business and Commercial		10	10%
Industrial		5	20%
Urban Residential High Density - greater than 20 dwelling units/ha		10	10%
Urban Residential low Density - greater than 6 & up to 20 dwelling units/ha		5	20%
Rural Residential – 2 to 5 dwelling unit/ha		5	20%
Open Space – parks, etc.		1	63%
Major Road	Kerb & Channel Flow	10 ²	10%
	Cross Drainage (Culverts)	50 ³	2%
Minor Road	Kerb & Channel Flow	Refer to relevant development category in QUDM	
	Cross Drainage (Culverts)	10 ³	10%
1. <i>State Planning Policy</i> recommends adoption of the 1% AEP (Annual Exceedance Probability) flood frequency for waterway flood management planning. 2. The design ARI for the minor drainage system in a major road shall be that indicated for the major road, not that for the Development Category of the adjacent area. 3. Culverts under roads should be designed to accept the full flow for the minor system ARI shown. In addition the designer must ensure adequate public safety controls (e.g. d*V product) exist and that the nominated Major Storm flow does not cause unacceptable damage to adjacent properties, or adversely affect the use of the land. If upstream properties are at a relatively low elevation, it may be necessary to			4.

install culverts of capacity greater than that for the minor system ARI design storm to ensure unacceptable flooding of upstream properties does not occur. In addition, the downstream face of causeway embankments may need protection where overtopping is likely to occur.	
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D4.06 DESIGN RAINFALL DATA

1. Design Intensity Frequency Duration (IFD) Rainfall Charts have been developed for the Far North Queensland Area. If the location of the proposed development falls between two IFD Charts or is not covered by the charts, Council should be contacted to confirm the appropriate table to be used. Alternatively IFD Charts can be generated using the Bureau of Meteorology online Rainfall IFD Data System (<http://www.bom.gov.au/water/designRainfalls/ifd/index.shtml>) Table D4.1 shows the location of the appropriate Rainfall Chart to be used for stormwater drainage design (Refer Appendix A in this manual).

Table D4.1 IFD Rainfall Charts

Location	IFD Chart
Aloomba, Deeral, Bellenden Ker, Babinda	1
Atherton	2
Cairns, Edmonton, Gordonvale, and Northern Beaches	3
Cape Tribulation	4
Cardwell	5
Chillagoe	6
Cooktown	7
Daintree	8
Dimbulah	9
Herberton	10
Innisfail	11
Julatten	12
Kuranda	13
Malanda	14
Mareeba	15
Millaa Millaa, Tarzali	16
Mt Garnet	17
Port Douglas, Mosman	18
Ravenshoe	19
Tully, Mission Beach	20
Yungaburra, Pearamon	21

2. If the location of a proposed development falls between two IFD Charts or is not covered by the above charts, Council should be contacted to confirm appropriate table to be used.

D4.07 CATCHMENT AREA

1. The catchment area of any point is defined by the limits from where surface runoff will make its way, either by natural or man-made paths, to this point. Consideration shall be given to likely changes to individual catchment areas due to the full development of the catchment.
2. The catchment boundary shall be determined by using the most accurate information available and details of catchments shall be provided to Council with the design submission.

D4.08 KERB INLETS AND MANHOLES TRC, MSC

1. Kerb Inlet pits shall be in accordance with Standard Drawings S1050, S1055 and S1060. All pits are to be recessed sufficiently to maintain a continuous lip line in accordance with these drawings. Alternate proprietary kerb inlets systems may be used only where approved by Council.
2. Kerb Inlet capacity design charts have been prepared for the standard kerb inlets (Refer Appendix B in this manual). Where an alternate proprietary kerb inlets systems have been approved for use by a Council, a copy of certified inlet capacity design charts for the alternate inlets shall be provided to Council with the design submission.
3. Blockage Factors shall be used for the design of the drainage system as shown in Table D4.2.

Table D4.2 Kerb Inlet Blockage Factors

Inlet Type	Blockage Factor
On Grade - Side Entry, (no Grate)	20%
On Grade - Side Entry, (with Grate)	10%
On Grade – Grate only	50%
Sag - Side Entry, (no Grate)	20%
Sag - Side Entry, (with Grate)	Nil
Sag – Grate only	50%

4. The kerb inlet capacity design charts shall be used in accordance with the following:
 - a. Curves indicated on the charts that are shown in full are considered "Reliable" curves.
 - b. Curves indicated on the charts that are shown dashed up to an Approach Flow of 250 l/sec are considered "Satisfactory" for use.
 - c. Curves indicated on the charts that are shown dashed with an Approach Flow in the range 250 l/sec to 500 l/sec are "Estimates Only" and are to be used with caution in critical locations.
 - d. No extrapolation beyond the limits of these charts shall be permitted.
5. Side entry pits with grates are preferred. Grated inlet pits with no side entry shall only be used in areas with a low risk of consequential damage from blockage and shall be subject to Council approval.

6. Manholes shall be provided on stormwater drainage lines in accordance with the requirements of QUDM. Manholes for pipes up to 1200mm dia shall be constructed in accordance with the Standard Drawing S1065. Council may examine proposals for the use of proprietary manufactured directional changes for stormwater systems and the acceptance of these will be subject to the satisfaction of the Council.
7. Other factors to be considered in the design are as follows:
 - a. Pits to be free draining.
 - b. Kerb inlet pits at intersections generally are to be located at the tangent point taking into account the position of pedestrian paths and kerb ramps. Inlets shall not be placed on kerb return unless specifically approved by Council.
 - c. Reductions in pipe sizes shall not be permitted.
 - d. Pipework openings are to be located within a single wall. i.e. pipes shall not be permitted to enter through the corner of the pit structure.
8. The desirable maximum inlet pit depth should be limited to 1.5m to enable maintenance,
9. The desirable minimum and maximum stormwater manhole depth is to be limited to 1.2m and 3.0m respectively
10. Inlet pits should be located at the mid point of allotment frontages to reduce the likelihood of conflict with service conduits and future driveways

D4.09 PIPES / BOX CULVERTS

1. Stormwater drainage pipes and boxes shall be manufactured from steel reinforced concrete and constructed in accordance with the following:
 - a. Minimum pipe size 375mm dia, minimum box culvert size 450mm x 300mm.
 - b. Minimum clear cover shall be 600mm in general or in accordance with manufacturers specification, otherwise approved by the Council.
 - c. The minimum vertical and horizontal clearances between a stormwater pipe and any other pipe or service conduit shall be 150mm.
 - d. In areas of high water table, the designer must consider buoyancy uplift in relation to pipe/culvert joints.
 - e. In aggressive environments or where any part of the pipe / box culvert is below the Highest Astronomical Tide (RL 1.80m AHD), pipes / box culverts will have cover to reinforcement in accordance with the exposure classification requirements of AS 3600.
 - f. Where specifically approved for use by Council, polypropylene stormwater pipes may be used. On approval, Pipes must be manufactured in accordance with AS5065, and installed in accordance with AS2566.
 - g. The use of polypropylene(or other flammable material) stormwater pipes under public roads or utilities is not supported in rural areas.

D4.10 OVERLAND FLOW

1. Overland flow paths or emergency relief paths shall be formed and located in accordance with the requirements of QUDM. The following additional requirements shall also be required.
 - a. Where a pathway link is used for overland flow the pathway shall be concrete for its full width, shall have a maximum crossfall of 2.5 per cent and be constructed with a layback kerb and channel or

approved equivalent along one edge. The ARI 100 year flow shall be contained completely within the pathway.

- b. The footpath profile at the overland flow tip out point shall be designed to provide a fall from the kerb at the road edge towards the pathway / park.
- c. Flows through parks shall have non-erosive velocity or adequate protection against scouring to the satisfaction of Council.
- d. Where a stormwater pit is required to be aligned with a pathway for overland flow, the pedestrian path is to be offset and appropriate measures provided to guide pedestrians away from the pit and remove any potential hazards.
- e. Where flows discharge into receiving waters or drainage reserves, adequate protection against scouring of the batter slope shall be provided to the satisfaction of Council.

D4.11 DRAINAGE CALCULATIONS

1. If a legal point of discharge and tailwater conditions have not been provided by Council as development conditions they shall be confirmed with Council prior to proceeding with detailed design.
2. Hydraulic calculations shall generally be carried out in accordance with QUDM. The calculations shall substantiate the hydraulic grade line adopted for design of the system.
3. Catchment plans and hydraulic calculations including any additional calculations in support of overland flow path capacities, weir flows over kerbs, culvert designs etc shall be provided to Council with the design submission. Where a hydraulic modelling programme is used, calculations to be provided with the design including listings of all programme input parameters.

D4.12 OPEN CHANNELS

1. Generally, open channels will only be permitted where they form part of the trunk drainage system and shall be designed to have smooth transitions with adequate access provisions for maintenance and cleaning. Where Council permits the use of an open channel to convey flows from a development site to the receiving water, such a channel shall be designed in accordance with QUDM.
2. Maximum side slopes on grass lined open channels shall be 1 in 4, with a preference given to 1 in 6 side slopes. Channel inverts shall generally have maximum cross slopes of 1 in 10.
3. Low flow provisions in open channels to prevent scouring from trickle flows shall be provided to all grass lined channels. Trickle flow protection shall be contained within a pipe or hard lined channel and shall be designed to cater for the 3 month ARI storm event (60 per cent of the 1 Year ARI storm event flow).
4. Subsurface drainage shall be provided in grass-lined channels to prevent waterlogging of the channel bed.
5. Profiles of all grass lined channels shall such that mowing may be undertaken by a tractor and slasher to the satisfaction of Council.
6. Where the flow velocity and / or depth within an open channel pose a safety hazard, barrier fencing and / or appropriate hazard warning signs shall be provided to discourage access to the channel. The extent of precautions should be determined following consultation with Council.
7. The depth velocity product and the gutter flow widths are to be included in the submitted drainage calculations

D4.13 ALLOTMENT DRAINAGE / CATCH DRAIN ^{MSC}

1. Underground roof and rear of allotment drainage systems as detailed in Section 7.13.3 & 7.13.4 of QUDM are not permitted. All inter allotment drainage works shall be conveyed above ground via open channel catch drains linking to Councils minor drainage system.
2. All lots to drain towards the road reserve, drainage reserve or adjacent creek, stream or defined waterway unless otherwise approved by council. All allotments that do not drain towards a road frontage shall be provided with stormwater services in accordance with the following:
 - a. Where the allotment drains to an adjacent creek or drainage reserve, each allotment shall be provided with a 450mm x 450mm concrete or HDPE pit with galvanised grate. Each pit shall have a 150mm class SH UPVC outlet pipe discharging to the adjacent creek or drainage reserve. The pit shall be located at the lowest corner of the allotment and provision to facilitate entry of the roof pipe system for the future dwelling construction. The Outlet pipe shall be protected with a 300mm minimum concrete surround and suitable scour protection works to the creek bank or drainage reserve.
 - b. In instances where the site's characteristics do not lend itself to draining towards the road reserve, drainage reserve or adjacent creek, stream or defined waterway (e.g. hillslope developments), a catch drain shall be provided in an easement in favour of upstream properties unless otherwise agreed by Council. The width of easement shall contain the ARI 100 year storm flow from the upstream catchment or be three (3) metre wide, whichever is greater. Property fences shall be designed to not adversely interfere with the conveyance of stormwater through these catch drains, and/or cause undue blockages. Maintenance of the easement within the property is the responsibility of the property owner.
3. Allotment drainage or catch drains which have a change in horizontal alignment greater than 45 degrees shall be provided with concrete or wire-reinforced rock mattresses at such change points which shall be designed to cater for flows in accordance with QUDM.

D4.14 TELEMETRY SYSTEMS

1. Where required by the Local Authority pump station control panel shall incorporate SCADA equipment for transmission of monitoring data and control to Council's existing master system. Council should be contacted to obtain a copy of their Technical Specification for Telemetry Systems.

D4.15 RETAINING WALLS

1. Where retaining walls are incorporated in the retention of earth batters, adequate drainage shall be incorporated behind the top of the wall to ensure surface stormwater flows do not flow over the top of the wall but are contained in a designed system to pass the wall.
2. Appropriate scour protection is to be provided to the base of the wall.

D4.16 DETENTION BASINS

1. Detention basins may be considered as drainage solutions but shall be subject to approval of Council. Where approved detention basins shall be designed in accordance with QUDM.

D4.17 HEADWALLS ^{MSC}

1. Pipe / Box culvert headwalls shall be in accordance with Standard Drawings S1075, S1080, S1085 and S1090. Proprietary precast headwall may also be used as an alternative to cast insitu structures. Precast headwalls to include a 600 depth x 200 thick cast insitu cut-off wall as detailed in Standard S1075

2. The designer shall ensure that in addition to standard aprons and cut-off walls adequate protection works commensurate with design velocities and flows shall be provided to prevent downstream scouring and erosion.
3. Where floodgates are to be used, headwalls and aprons shall be specifically designed to accommodate the floodgate and minimise the potential for debris and siltation to impede the operation of the floodgate. Most precast headwalls are not suitable for use with floodgates.

D4.18 TABLE DRAINS ^{TRC}

1. Table drains shall generally be constructed with a minimum depth of 600mm or to a depth of 300mm below the pavement subgrade, whichever is greater.
2. Table drain profiles may be either v-shaped or trapezoidal. Reference should be made to the Local Authority Specific Requirements for each Councils preferred profile.

D4.19 EASEMENTS

1. Where stormwater drainage pipes pass through property other than a road reserve an easement shall be provided over the line in favour of the Council. The width of this easement is determined by the depth at which the stormwater pipe is laid and based on twice the depth to the pipe obvert plus the pipe diameter (with a minimum width of three (3) metres) and located centrally over the pipe.
2. If a stormwater pipe passes adjacent to a property and based on the above formula the area of influence passes within the property, an easement over that portion shall be required.

D4.20 OUTLET / OUTLET PROTECTION

1. Outlets into natural watercourse, open channels and tidal areas shall be designed in accordance with the requirements of QUDM.
2. All outlets shall be located to facilitate inspection and maintenance access.
3. Protection works to outlet shall be designed to meet the following criteria:
 - a. Dissipate the outflow velocity to minimise scouring.
 - b. Provide protection from stream flows in receiving waters,
 - c. Provide protection from overland (Major Storm) flows into receiving waters.
 - d. Provide protection from local scouring or undermining of the outlet structure.
4. Where a headwall is located within the tidal splash zone, it will be designed to comply with the exposure classification requirements of AS 3600
5. An energy dissipating outfall shall be provided where the velocity of the outflow or nature of the discharge from the pipe system into the receiving water could cause scouring in the receiving channel.
6. All tidal outlets shall be fitted with floodgates to prevent the intrusion of salt water into the system.
7. Outlets with floodgates shall be designed to ensure that they can operate freely at all times, and are protected from siltation, excessive vegetation growth, debris and the impacts of stream flows in the receiving waters.

8. The designer shall provide calculations to show that they have accounted for losses due to floodgates or other water control devices in the hydraulic design.

APPENDIX A

IFD RAINFALL CHARTS

Chart 1 Aloomba/Deeral**Annual Exceedance Probability (AEP)**

Duration	Duration (mins)	63.20%	50%	20%	10%	5%	2%	1%
1 min	1	187	205	258	291	322	360	387
2 min	2	171	189	242	277	309	351	383
3 min	3	160	176	225	256	285	323	351
4 min	4	150	165	210	238	265	299	324
5 min	5	142	156	198	224	248	279	301
10 min	10	115	126	158	178	196	219	235
15 min	15	99.2	109	136	153	169	188	201
20 min	20	88.4	96.8	121	137	151	168	180
25 min	25	80.5	88.2	111	125	138	154	165
30 min	30	74.3	81.5	103	116	128	143	154
45 min	45	61.7	67.9	86.1	97.7	108	122	131
1 hour	60	53.9	59.4	75.9	86.4	96.2	109	118
1.5 hour	90	44.3	49	63.2	72.4	81.1	92.2	100
2 hour	120	38.4	42.6	55.5	63.8	71.8	82	89.5
3 hour	180	31.4	35	46	53.3	60.3	69.3	76.1
4.5 hour	270	25.6	28.7	38.1	44.5	50.6	58.5	64.5
6 hour	360	22.2	24.9	33.3	39	44.5	51.7	57.2
9 hour	540	18.1	20.4	27.5	32.4	37.1	43.4	48.1
12 hour	720	15.6	17.6	24	28.3	32.5	38.2	42.5
18 hour	1080	12.6	14.3	19.7	23.3	26.8	31.7	35.5
24 hour	1440	10.8	12.3	17	20.2	23.3	27.7	31.2
30 hour	1800	9.6	10.9	15.2	18	20.8	24.9	28.1
36 hour	2160	8.68	9.91	13.8	16.4	19	22.8	25.8
48 hour	2880	7.36	8.42	11.8	14	16.3	19.7	22.4
72 hour	4320	5.77	6.62	9.3	11.1	12.9	15.8	18.2
96 hour	5760	4.8	5.52	7.79	9.35	10.9	13.4	15.5
120 hour	7200	4.14	4.76	6.73	8.1	9.47	11.7	13.5
144 hour	8640	3.66	4.2	5.94	7.17	8.4	10.4	12
168 hour	10080	3.28	3.76	5.33	6.44	7.56	9.34	10.8

Chart 2 Atherton

Annual Exceedance Probability (AEP)

Duration	Duration (mins)	63.20%	50%	20%	10%	5%	2%	1%
1 min	1	123	138	183	212	239	273	298
2 min	2	104	116	151	175	197	227	250
3 min	3	98.3	110	144	167	188	216	237
4 min	4	94.3	105	139	161	182	209	228
5 min	5	90.9	102	135	156	176	202	221
10 min	10	77.1	86.6	115	133	150	171	187
15 min	15	67.1	75.3	99.9	116	130	149	162
20 min	20	59.5	66.7	88.4	102	115	131	143
25 min	25	53.6	60.1	79.5	91.9	104	118	129
30 min	30	49	54.8	72.4	83.7	94.3	108	117
45 min	45	39.2	43.8	57.8	66.8	75.3	86.2	94.2
1 hour	60	33	36.9	48.7	56.3	63.6	72.9	79.8
1.5 hour	90	25.6	28.6	37.8	43.9	49.7	57.2	62.9
2 hour	120	21.2	23.8	31.6	36.7	41.6	48.1	53
3 hour	180	16.3	18.2	24.4	28.6	32.6	37.9	42
4.5 hour	270	12.4	14	19	22.4	25.8	30.2	33.6
6 hour	360	10.3	11.6	16	19	21.9	25.9	28.9
9 hour	540	7.92	9.02	12.6	15.1	17.7	21.1	23.8
12 hour	720	6.6	7.55	10.7	12.9	15.2	18.4	20.8
18 hour	1080	5.13	5.9	8.49	10.4	12.4	15.2	17.4
24 hour	1440	4.3	4.96	7.22	8.93	10.8	13.3	15.4
30 hour	1800	3.76	4.34	6.35	7.91	9.59	11.9	13.9
36 hour	2160	3.36	3.88	5.71	7.14	8.71	10.9	12.8
48 hour	2880	2.82	3.26	4.81	6.05	7.42	9.41	11.1
72 hour	4320	2.19	2.52	3.73	4.7	5.8	7.44	8.89
96 hour	5760	1.81	2.09	3.07	3.87	4.76	6.14	7.36
120 hour	7200	1.56	1.79	2.63	3.3	4.03	5.19	6.23
144 hour	8640	1.37	1.58	2.3	2.87	3.48	4.47	5.34
168 hour	10080	1.22	1.41	2.05	2.54	3.05	3.89	4.63

Chart 3 Babinda/Bellenden Ker**Annual Exceedance Probability (AEP)**

Duration	Duration (mins)	63.20%	50%	20%	10%	5%	2%	1%
1 min	1	192	210	263	297	329	369	397
2 min	2	177	195	249	284	317	360	393
3 min	3	165	182	231	263	293	332	361
4 min	4	155	170	215	245	272	307	333
5 min	5	146	160	202	229	254	286	309
10 min	10	118	129	161	181	200	224	240
15 min	15	101	110	138	155	171	191	205
20 min	20	90	98.3	123	139	153	171	184
25 min	25	81.9	89.6	112	127	140	156	168
30 min	30	75.7	82.8	104	118	130	146	157
45 min	45	63.2	69.3	87.7	99.4	110	124	134
1 hour	60	55.4	60.9	77.5	88.2	98.2	111	120
1.5 hour	90	45.9	50.7	65.1	74.4	83.3	94.6	103
2 hour	120	40.1	44.4	57.4	66	74.1	84.5	92.3
3 hour	180	33.1	36.8	48.1	55.6	62.8	72.1	79
4.5 hour	270	27.3	30.4	40.2	46.8	53.1	61.3	67.5
6 hour	360	23.7	26.6	35.4	41.3	47.1	54.6	60.3
9 hour	540	19.4	21.8	29.4	34.5	39.5	46.1	51.1
12 hour	720	16.8	18.9	25.7	30.2	34.7	40.8	45.4
18 hour	1080	13.6	15.4	21	24.9	28.8	34.1	38.1
24 hour	1440	11.6	13.2	18.2	21.6	25	29.8	33.6
30 hour	1800	10.3	11.7	16.2	19.3	22.4	26.8	30.3
36 hour	2160	9.25	10.5	14.6	17.5	20.3	24.5	27.8
48 hour	2880	7.81	8.92	12.5	15	17.4	21.2	24.2
72 hour	4320	6.1	6.98	9.84	11.8	13.9	17	19.6
96 hour	5760	5.09	5.84	8.26	9.97	11.7	14.4	16.7
120 hour	7200	4.42	5.07	7.18	8.68	10.2	12.6	14.7
144 hour	8640	3.93	4.51	6.4	7.74	9.1	11.3	13.1
168 hour	10080	3.57	4.09	5.79	7.01	8.25	10.2	11.9

Chart 4 Cairns

Annual Exceedance Probability (AEP)

Duration	Duration (mins)	63.20%	50%	20%	10%	5%	2%	1%
1 min	1	170	188	239	271	300	336	361
2 min	2	154	171	220	252	282	321	349
3 min	3	144	159	205	234	261	296	321
4 min	4	136	150	192	219	244	275	298
5 min	5	129	142	182	207	230	258	279
10 min	10	105	116	147	167	184	205	220
15 min	15	91.3	101	127	144	159	177	190
20 min	20	81.5	89.7	114	129	142	158	170
25 min	25	74.1	81.6	104	117	130	145	155
30 min	30	68.2	75.2	95.7	108	120	134	144
45 min	45	56.2	62.1	79.5	90.5	101	113	122
1 hour	60	48.5	53.7	69.2	79	88.2	99.6	108
1.5 hour	90	39	43.3	56.4	64.9	72.8	82.8	90.1
2 hour	120	33.2	37	48.6	56.1	63.2	72.3	79
3 hour	180	26.3	29.5	39.2	45.6	51.6	59.5	65.3
4.5 hour	270	20.7	23.3	31.4	36.8	42	48.7	53.8
6 hour	360	17.5	19.7	26.8	31.6	36.2	42.2	46.7
9 hour	540	13.7	15.6	21.5	25.4	29.2	34.3	38.2
12 hour	720	11.6	13.2	18.3	21.7	25.1	29.6	33.1
18 hour	1080	9.09	10.4	14.6	17.4	20.2	24	27
24 hour	1440	7.66	8.81	12.4	14.9	17.3	20.7	23.3
30 hour	1800	6.71	7.73	10.9	13.1	15.3	18.4	20.8
36 hour	2160	6.02	6.94	9.84	11.8	13.8	16.6	18.9
48 hour	2880	5.07	5.84	8.31	10	11.7	14.2	16.2
72 hour	4320	3.94	4.55	6.49	7.84	9.2	11.3	13
96 hour	5760	3.27	3.77	5.39	6.52	7.67	9.44	10.9
120 hour	7200	2.82	3.24	4.63	5.61	6.61	8.16	9.45
144 hour	8640	2.48	2.85	4.06	4.93	5.81	7.18	8.32
168 hour	10080	2.21	2.54	3.62	4.39	5.18	6.39	7.42

Chart 5 Cairns Northern Beaches**Annual Exceedance Probability (AEP)**

Duration	Duration (mins)	63.20%	50%	20%	10%	5%	2%	1%
1 min	1	171	189	242	275	306	344	371
2 min	2	157	173	224	256	286	325	353
3 min	3	145	161	208	237	265	300	325
4 min	4	137	151	195	222	248	280	303
5 min	5	129	143	184	210	233	263	284
10 min	10	106	117	149	170	188	211	227
15 min	15	91.7	101	129	147	163	182	196
20 min	20	81.9	90.5	116	131	146	163	176
25 min	25	74.6	82.4	105	120	133	149	161
30 min	30	68.8	76	97.4	111	123	138	149
45 min	45	56.7	62.8	80.7	92.1	103	116	125
1 hour	60	48.9	54.2	70.1	80.2	89.6	101	110
1.5 hour	90	39.2	43.6	56.8	65.3	73.3	83.4	90.7
2 hour	120	33.2	37	48.6	56.2	63.3	72.3	78.9
3 hour	180	26	29.2	38.8	45.1	51.1	58.7	64.4
4.5 hour	270	20.3	22.9	30.8	36	41	47.6	52.4
6 hour	360	16.9	19.2	26.1	30.7	35.1	40.9	45.2
9 hour	540	13.1	14.9	20.6	24.4	28.1	33	36.8
12 hour	720	11	12.5	17.4	20.8	24	28.4	31.8
18 hour	1080	8.54	9.81	13.8	16.6	19.3	23	25.9
24 hour	1440	7.17	8.26	11.7	14.1	16.5	19.8	22.4
30 hour	1800	6.27	7.24	10.3	12.5	14.6	17.6	20
36 hour	2160	5.63	6.5	9.29	11.2	13.2	16	18.3
48 hour	2880	4.74	5.48	7.86	9.54	11.2	13.7	15.7
72 hour	4320	3.71	4.29	6.16	7.5	8.85	10.9	12.6
96 hour	5760	3.09	3.57	5.13	6.24	7.37	9.12	10.6
120 hour	7200	2.67	3.07	4.4	5.35	6.33	7.84	9.11
144 hour	8640	2.34	2.7	3.85	4.68	5.53	6.85	7.96
168 hour	10080	2.09	2.4	3.42	4.14	4.89	6.05	7.03

Chart 6 Cape Tribulation

Annual Exceedance Probability (AEP)

Duration	Duration (mins)	63.20%	50%	20%	10%	5%	2%	1%
1 min	1	170	186	232	262	289	324	348
2 min	2	157	172	215	240	263	291	310
3 min	3	146	160	200	224	246	273	292
4 min	4	137	150	188	211	232	259	277
5 min	5	130	142	178	200	221	246	264
10 min	10	106	115	144	163	180	202	218
15 min	15	91.8	100	125	141	155	174	188
20 min	20	82.1	89.4	111	126	139	156	168
25 min	25	74.9	81.6	102	115	127	142	153
30 min	30	69.2	75.5	94.1	106	117	131	141
45 min	45	57.6	62.9	78.7	88.7	98	109	118
1 hour	60	50.2	55	69	77.9	86.1	96.2	104
1.5 hour	90	41	45	57.1	64.6	71.6	80.3	86.5
2 hour	120	35.3	38.9	49.7	56.6	62.9	70.8	76.4
3 hour	180	28.5	31.6	40.9	46.9	52.5	59.5	64.6
4.5 hour	270	22.8	25.5	33.6	38.8	43.9	50.3	55.1
6 hour	360	19.5	21.9	29.2	34	38.7	44.7	49.3
9 hour	540	15.6	17.6	23.9	28.2	32.3	38	42.4
12 hour	720	13.3	15.1	20.7	24.6	28.5	33.8	38
18 hour	1080	10.6	12.1	16.9	20.3	23.6	28.5	32.4
24 hour	1440	9.08	10.4	14.6	17.6	20.6	25.1	28.7
30 hour	1800	8.03	9.19	13	15.7	18.4	22.6	26
36 hour	2160	7.27	8.32	11.8	14.2	16.8	20.6	23.9
48 hour	2880	6.19	7.1	10	12.2	14.3	17.7	20.6
72 hour	4320	4.92	5.63	7.95	9.59	11.2	14	16.3
96 hour	5760	4.15	4.75	6.66	8	9.34	11.6	13.6
120 hour	7200	3.62	4.14	5.77	6.9	8.01	9.98	11.6
144 hour	8640	3.22	3.68	5.11	6.08	7.03	8.75	10.2
168 hour	10080	2.91	3.32	4.59	5.44	6.27	7.79	9.1

Chart 7 Cardwell**Annual Exceedance Probability (AEP)**

Duration	Duration (mins)	63.20%	50%	20%	10%	5%	2%	1%
1 min	1	175	194	250	286	320	363	394
2 min	2	161	178	230	263	295	334	364
3 min	3	149	165	214	245	274	311	338
4 min	4	140	155	200	230	257	292	317
5 min	5	132	147	189	217	243	275	299
10 min	10	107	119	153	175	195	221	240
15 min	15	92.4	102	131	150	168	190	206
20 min	20	82.2	90.9	117	134	149	169	183
25 min	25	74.7	82.6	106	121	136	154	167
30 min	30	68.7	76	98	112	125	142	154
45 min	45	56.5	62.6	81	92.9	104	118	129
1 hour	60	48.8	54.1	70.4	80.9	90.9	104	113
1.5 hour	90	39.2	43.7	57.3	66.2	74.7	85.6	93.7
2 hour	120	33.4	37.3	49.3	57.2	64.8	74.6	81.9
3 hour	180	26.5	29.7	39.8	46.5	52.9	61.3	67.7
4.5 hour	270	20.9	23.6	32	37.7	43.1	50.3	55.8
6 hour	360	17.7	20	27.4	32.4	37.2	43.6	48.5
9 hour	540	14	15.9	22	26.1	30.2	35.5	39.6
12 hour	720	11.9	13.5	18.8	22.4	25.9	30.6	34.1
18 hour	1080	9.41	10.8	15	17.9	20.8	24.6	27.4
24 hour	1440	8.01	9.16	12.8	15.3	17.7	20.9	23.3
30 hour	1800	7.06	8.08	11.3	13.5	15.6	18.4	20.5
36 hour	2160	6.37	7.29	10.2	12.1	14	16.5	18.3
48 hour	2880	5.41	6.18	8.59	10.2	11.8	13.8	15.3
72 hour	4320	4.25	4.85	6.7	7.94	9.14	10.7	11.8
96 hour	5760	3.53	4.03	5.57	6.58	7.56	8.81	9.71
120 hour	7200	3.03	3.46	4.78	5.66	6.49	7.56	8.35
144 hour	8640	2.64	3.03	4.2	4.98	5.71	6.67	7.37
168 hour	10080	2.34	2.69	3.75	4.45	5.12	5.99	6.64

Chart 8 Chillagoe

Annual Exceedance Probability (AEP)

Duration	Duration (mins)	63.20%	50%	20%	10%	5%	2%	1%
1 min	1	142	159	211	243	274	313	341
2 min	2	129	145	190	219	245	274	293
3 min	3	120	134	176	203	228	256	275
4 min	4	113	126	166	192	215	243	263
5 min	5	107	120	158	182	205	233	253
10 min	10	88.4	99	131	151	171	196	214
15 min	15	77	86.2	114	132	149	170	187
20 min	20	68.7	76.9	102	118	132	152	166
25 min	25	62.3	69.7	92.1	106	120	137	150
30 min	30	57.1	63.9	84.3	97.5	110	125	137
45 min	45	46.1	51.5	67.9	78.4	88.2	100	109
1 hour	60	38.8	43.4	57.1	65.9	74.1	84.2	91.4
1.5 hour	90	29.7	33.2	43.7	50.4	56.7	64.3	69.8
2 hour	120	24.1	27	35.5	41	46.2	52.5	57
3 hour	180	17.7	19.8	26.1	30.2	34.1	38.9	42.4
4.5 hour	270	12.8	14.3	18.9	21.9	24.8	28.5	31.3
6 hour	360	10.1	11.3	15	17.4	19.7	22.9	25.2
9 hour	540	7.22	8.08	10.8	12.6	14.3	16.8	18.7
12 hour	720	5.72	6.41	8.58	10	11.5	13.6	15.2
18 hour	1080	4.17	4.68	6.29	7.4	8.49	10.1	11.4
24 hour	1440	3.38	3.79	5.1	6.02	6.92	8.31	9.42
30 hour	1800	2.89	3.24	4.37	5.16	5.95	7.16	8.13
36 hour	2160	2.55	2.86	3.87	4.57	5.28	6.35	7.23
48 hour	2880	2.12	2.38	3.22	3.8	4.39	5.29	6.01
72 hour	4320	1.65	1.85	2.51	2.96	3.41	4.09	4.63
96 hour	5760	1.38	1.56	2.11	2.48	2.85	3.39	3.82
120 hour	7200	1.2	1.35	1.83	2.15	2.45	2.91	3.26
144 hour	8640	1.06	1.2	1.62	1.9	2.15	2.55	2.85
168 hour	10080	0.946	1.07	1.45	1.69	1.91	2.26	2.52

Chart 9 Cooktown**Annual Exceedance Probability (AEP)**

Duration	Duration (mins)	63.20%	50%	20%	10%	5%	2%	1%
1 min	1	172	188	236	267	297	336	364
2 min	2	167	182	226	252	275	304	325
3 min	3	153	167	208	233	256	285	305
4 min	4	141	155	193	218	240	269	290
5 min	5	133	145	182	205	227	256	277
10 min	10	107	117	147	167	186	211	229
15 min	15	93.2	101	127	145	161	183	199
20 min	20	83.9	91.3	114	130	145	164	178
25 min	25	76.8	83.7	105	119	132	149	162
30 min	30	71.2	77.6	97.2	110	122	138	149
45 min	45	59.2	64.7	81.1	91.7	102	114	123
1 hour	60	51.2	56	70.5	79.7	88.3	99.2	107
1.5 hour	90	40.7	44.8	56.9	64.5	71.6	80.6	87.1
2 hour	120	34.1	37.7	48.3	55	61.3	69.2	74.9
3 hour	180	26.1	29	37.8	43.4	48.8	55.5	60.5
4.5 hour	270	19.6	21.9	29.1	33.9	38.5	44.4	48.8
6 hour	360	15.8	17.8	24.1	28.3	32.4	37.8	41.8
9 hour	540	11.8	13.3	18.3	21.8	25.3	30	33.7
12 hour	720	9.53	10.9	15.1	18.2	21.2	25.5	28.8
18 hour	1080	7.17	8.2	11.6	14	16.5	20.1	23.1
24 hour	1440	5.92	6.78	9.63	11.7	13.8	17	19.6
30 hour	1800	5.14	5.89	8.37	10.2	12	14.9	17.3
36 hour	2160	4.59	5.27	7.48	9.08	10.7	13.3	15.5
48 hour	2880	3.88	4.44	6.29	7.6	8.93	11.1	13
72 hour	4320	3.08	3.52	4.92	5.9	6.86	8.58	10
96 hour	5760	2.6	2.96	4.11	4.89	5.65	7.07	8.27
120 hour	7200	2.25	2.57	3.54	4.2	4.83	6.04	7.07
144 hour	8640	1.98	2.25	3.11	3.68	4.23	5.29	6.19
168 hour	10080	1.75	2	2.75	3.26	3.76	4.7	5.51

Chart 10 Daintree**Annual Exceedance Probability (AEP)**

Duration	Duration (mins)	63.20%	50%	20%	10%	5%	2%	1%
1 min	1	165	181	227	256	284	319	344
2 min	2	150	164	206	232	256	284	304
3 min	3	140	153	193	217	240	267	286
4 min	4	132	144	181	205	226	253	272
5 min	5	125	137	172	195	215	241	259
10 min	10	103	112	141	160	177	199	215
15 min	15	89.2	97.5	122	138	153	172	186
20 min	20	79.8	87.1	109	124	137	154	166
25 min	25	72.7	79.4	99.6	113	125	140	151
30 min	30	67	73.3	92	104	115	129	140
45 min	45	55.4	60.7	76.4	86.4	95.7	107	116
1 hour	60	47.9	52.6	66.5	75.3	83.5	93.7	101
1.5 hour	90	38.7	42.6	54.2	61.7	68.6	77.1	83.3
2 hour	120	33	36.5	46.8	53.4	59.6	67.2	72.8
3 hour	180	26.2	29.2	37.9	43.6	48.9	55.6	60.5
4.5 hour	270	20.8	23.3	30.7	35.6	40.2	46.2	50.6
6 hour	360	17.6	19.8	26.5	30.9	35.1	40.7	44.9
9 hour	540	14	15.8	21.5	25.4	29.1	34.2	38.1
12 hour	720	11.9	13.5	18.6	22.1	25.5	30.3	34
18 hour	1080	9.56	10.9	15.2	18.2	21.2	25.6	29
24 hour	1440	8.19	9.37	13.2	15.9	18.6	22.6	25.8
30 hour	1800	7.28	8.34	11.8	14.2	16.7	20.4	23.5
36 hour	2160	6.61	7.58	10.7	13	15.3	18.8	21.7
48 hour	2880	5.67	6.51	9.24	11.2	13.2	16.3	18.9
72 hour	4320	4.55	5.22	7.39	8.92	10.5	13	15.2
96 hour	5760	3.86	4.41	6.21	7.47	8.73	10.9	12.7
120 hour	7200	3.36	3.84	5.37	6.43	7.47	9.28	10.8
144 hour	8640	2.98	3.4	4.73	5.62	6.5	8.06	9.38
168 hour	10080	2.67	3.05	4.21	4.98	5.72	7.09	8.24

Chart 11 Dimbulah**Annual Exceedance Probability (AEP)**

Duration	Duration (mins)	63.20%	50%	20%	10%	5%	2%	1%
1 min	1	135	153	204	237	267	305	333
2 min	2	120	135	178	205	230	257	276
3 min	3	112	126	166	192	216	243	261
4 min	4	106	119	158	183	206	233	252
5 min	5	101	114	151	175	198	225	244
10 min	10	84.4	95.2	127	148	167	192	211
15 min	15	73.6	82.9	111	129	146	168	184
20 min	20	65.6	73.9	98.8	115	130	149	163
25 min	25	59.4	66.8	89.3	104	117	134	147
30 min	30	54.3	61.1	81.5	94.6	107	122	133
45 min	45	43.6	49	65.1	75.4	85	96.9	106
1 hour	60	36.6	41.1	54.5	63	71	80.8	87.8
1.5 hour	90	28	31.3	41.4	47.9	53.9	61.2	66.5
2 hour	120	22.7	25.5	33.7	38.9	43.8	49.8	54.1
3 hour	180	16.7	18.7	24.8	28.7	32.3	36.9	40.2
4.5 hour	270	12.1	13.6	18	20.9	23.7	27.3	29.9
6 hour	360	9.61	10.8	14.4	16.7	19	22	24.3
9 hour	540	6.93	7.79	10.5	12.3	14	16.5	18.3
12 hour	720	5.51	6.21	8.4	9.9	11.4	13.5	15.1
18 hour	1080	4.03	4.56	6.23	7.4	8.57	10.3	11.7
24 hour	1440	3.26	3.69	5.08	6.08	7.08	8.57	9.78
30 hour	1800	2.78	3.15	4.37	5.24	6.14	7.46	8.55
36 hour	2160	2.45	2.78	3.87	4.66	5.48	6.68	7.67
48 hour	2880	2.02	2.3	3.21	3.89	4.59	5.61	6.45
72 hour	4320	1.55	1.76	2.48	3.02	3.58	4.36	5.01
96 hour	5760	1.28	1.46	2.06	2.51	2.97	3.61	4.13
120 hour	7200	1.1	1.26	1.77	2.15	2.55	3.08	3.5
144 hour	8640	0.967	1.1	1.56	1.89	2.22	2.67	3.03
168 hour	10080	0.859	0.983	1.38	1.67	1.96	2.35	2.65

Chart 12 Edmonton/Gordonvale

Annual Exceedance Probability (AEP)

Duration	Duration (mins)	63.20%	50%	20%	10%	5%	2%	1%
1 min	1	170	187	237	268	297	332	357
2 min	2	155	171	220	252	281	320	349
3 min	3	144	159	204	233	260	295	320
4 min	4	136	150	191	218	242	273	296
5 min	5	129	142	180	205	227	256	276
10 min	10	105	116	146	165	182	202	217
15 min	15	91.2	100	126	142	157	174	187
20 min	20	81.3	89.3	113	127	140	156	167
25 min	25	73.9	81.2	103	116	128	143	153
30 min	30	68.1	74.9	94.8	107	119	133	142
45 min	45	56.1	61.9	78.9	89.6	99.5	112	121
1 hour	60	48.5	53.6	68.7	78.4	87.4	98.6	107
1.5 hour	90	39	43.3	56.1	64.4	72.2	82.1	89.4
2 hour	120	33.2	37	48.4	55.8	62.8	71.8	78.4
3 hour	180	26.3	29.4	39	45.2	51.3	59	64.8
4.5 hour	270	20.7	23.3	31.2	36.5	41.6	48.2	53.2
6 hour	360	17.5	19.7	26.6	31.3	35.8	41.6	46.1
9 hour	540	13.7	15.5	21.2	25.1	28.8	33.8	37.5
12 hour	720	11.5	13.1	18.1	21.4	24.7	29	32.4
18 hour	1080	9.06	10.3	14.4	17.1	19.8	23.4	26.3
24 hour	1440	7.63	8.73	12.2	14.6	16.9	20.1	22.7
30 hour	1800	6.68	7.65	10.7	12.8	14.9	17.9	20.2
36 hour	2160	5.98	6.87	9.66	11.6	13.4	16.2	18.4
48 hour	2880	5.03	5.78	8.15	9.79	11.4	13.8	15.8
72 hour	4320	3.9	4.49	6.37	7.67	8.97	11	12.6
96 hour	5760	3.24	3.73	5.29	6.39	7.49	9.21	10.6
120 hour	7200	2.78	3.2	4.55	5.5	6.47	7.98	9.24
144 hour	8640	2.44	2.81	3.99	4.84	5.7	7.04	8.16
168 hour	10080	2.18	2.5	3.56	4.32	5.09	6.28	7.29

Chart 13 Herberton**Annual Exceedance Probability (AEP)**

Duration	Duration (mins)	63.20%	50%	20%	10%	5%	2%	1%
1 min	1	118	132	174	201	226	257	280
2 min	2	98.9	110	143	164	183	208	226
3 min	3	93.6	104	136	156	175	199	216
4 min	4	90	100	132	152	170	194	210
5 min	5	86.8	97.2	128	148	166	188	205
10 min	10	74	83	110	127	143	163	177
15 min	15	64.3	72.2	95.6	110	124	141	154
20 min	20	57	63.9	84.4	97.5	110	125	136
25 min	25	51.3	57.5	75.8	87.4	98.2	112	121
30 min	30	46.8	52.3	68.8	79.3	89.1	101	110
45 min	45	37.2	41.5	54.5	62.7	70.4	80.1	87.1
1 hour	60	31.2	34.8	45.5	52.4	58.9	67	72.9
1.5 hour	90	24	26.7	35	40.3	45.3	51.7	56.3
2 hour	120	19.7	22	28.9	33.3	37.5	42.9	46.9
3 hour	180	14.9	16.6	22	25.5	28.9	33.2	36.4
4.5 hour	270	11.2	12.6	16.9	19.7	22.4	26	28.7
6 hour	360	9.21	10.4	14	16.5	18.9	22.1	24.5
9 hour	540	7	7.93	10.9	12.9	15	17.8	19.9
12 hour	720	5.79	6.58	9.15	11	12.8	15.4	17.4
18 hour	1080	4.46	5.09	7.19	8.74	10.3	12.6	14.5
24 hour	1440	3.72	4.26	6.08	7.45	8.9	11	12.7
30 hour	1800	3.24	3.71	5.33	6.57	7.91	9.87	11.5
36 hour	2160	2.9	3.31	4.78	5.92	7.17	9.01	10.6
48 hour	2880	2.43	2.78	4.02	5.01	6.1	7.75	9.19
72 hour	4320	1.88	2.15	3.12	3.9	4.76	6.12	7.32
96 hour	5760	1.57	1.79	2.58	3.22	3.92	5.05	6.05
120 hour	7200	1.35	1.54	2.22	2.75	3.33	4.28	5.11
144 hour	8640	1.2	1.37	1.95	2.4	2.89	3.68	4.38
168 hour	10080	1.07	1.23	1.75	2.14	2.54	3.22	3.8

Chart 14 Innisfail**Annual Exceedance Probability (AEP)**

Duration	Duration (mins)	63.20%	50%	20%	10%	5%	2%	1%
1 min	1	188	206	260	294	325	364	392
2 min	2	168	185	238	272	304	346	378
3 min	3	157	173	221	253	282	320	348
4 min	4	148	163	208	237	263	297	322
5 min	5	141	155	197	223	248	279	302
10 min	10	116	127	159	180	199	222	238
15 min	15	100	109	137	155	171	191	205
20 min	20	88.9	97.4	122	138	153	171	183
25 min	25	80.7	88.5	111	126	139	156	168
30 min	30	74.2	81.5	103	116	129	144	156
45 min	45	61.1	67.2	85.4	97	108	121	131
1 hour	60	52.9	58.2	74.4	84.8	94.6	107	116
1.5 hour	90	42.8	47.3	60.9	69.8	78.2	88.9	96.8
2 hour	120	36.8	40.7	52.7	60.6	68.1	77.7	84.9
3 hour	180	29.7	32.9	42.8	49.5	55.8	64	70.2
4.5 hour	270	23.9	26.5	34.8	40.3	45.6	52.6	57.9
6 hour	360	20.5	22.8	30	34.8	39.5	45.7	50.3
9 hour	540	16.5	18.4	24.3	28.3	32.2	37.3	41.3
12 hour	720	14.2	15.8	20.9	24.4	27.8	32.4	35.9
18 hour	1080	11.4	12.8	16.9	19.8	22.5	26.4	29.4
24 hour	1440	9.78	10.9	14.6	17	19.4	22.8	25.5
30 hour	1800	8.65	9.69	12.9	15.1	17.2	20.4	22.9
36 hour	2160	7.81	8.75	11.7	13.7	15.6	18.6	20.9
48 hour	2880	6.61	7.44	9.99	11.7	13.4	16	18.1
72 hour	4320	5.18	5.85	7.92	9.32	10.7	12.9	14.7
96 hour	5760	4.32	4.89	6.67	7.86	9.02	11	12.5
120 hour	7200	3.73	4.23	5.8	6.85	7.88	9.6	11
144 hour	8640	3.3	3.75	5.15	6.09	7.02	8.56	9.82
168 hour	10080	2.97	3.37	4.64	5.5	6.35	7.74	8.88

Chart 15 Julatten**Annual Exceedance Probability (AEP)**

Duration	Duration (mins)	63.20%	50%	20%	10%	5%	2%	1%
1 min	1	150	169	225	261	294	335	365
2 min	2	135	151	199	229	257	290	313
3 min	3	125	141	186	215	242	273	295
4 min	4	118	133	177	205	230	261	283
5 min	5	113	127	169	196	220	251	272
10 min	10	93.1	105	140	163	184	210	229
15 min	15	80.9	91.2	122	141	160	182	199
20 min	20	72.2	81.4	109	126	142	162	177
25 min	25	65.6	73.9	98.5	114	129	147	160
30 min	30	60.3	67.9	90.4	105	118	135	147
45 min	45	49.4	55.5	73.8	85.4	96.2	109	119
1 hour	60	42.3	47.5	63.2	73.1	82.3	93.7	102
1.5 hour	90	33.5	37.7	50.2	58.2	65.6	74.7	81.3
2 hour	120	28.2	31.7	42.4	49.2	55.6	63.5	69.2
3 hour	180	21.8	24.7	33.3	38.8	44	50.5	55.3
4.5 hour	270	16.8	19.1	26.1	30.6	34.9	40.5	44.6
6 hour	360	13.9	15.9	22	25.9	29.7	34.7	38.5
9 hour	540	10.7	12.3	17.3	20.6	23.9	28.3	31.6
12 hour	720	8.91	10.3	14.6	17.6	20.5	24.5	27.7
18 hour	1080	6.89	8.01	11.6	14.2	16.7	20.2	23
24 hour	1440	5.77	6.72	9.87	12.1	14.5	17.6	20.2
30 hour	1800	5.03	5.88	8.7	10.8	12.9	15.8	18.2
36 hour	2160	4.5	5.27	7.85	9.77	11.8	14.5	16.7
48 hour	2880	3.78	4.43	6.65	8.34	10.1	12.5	14.4
72 hour	4320	2.95	3.45	5.21	6.57	8.05	9.9	11.4
96 hour	5760	2.46	2.87	4.33	5.46	6.7	8.21	9.47
120 hour	7200	2.11	2.47	3.71	4.67	5.72	6.98	8.02
144 hour	8640	1.86	2.17	3.24	4.07	4.96	6.03	6.9
168 hour	10080	1.66	1.93	2.87	3.59	4.35	5.26	6

Chart 16 Kuranda**Annual Exceedance Probability (AEP)**

Duration	Duration (mins)	63.20%	50%	20%	10%	5%	2%	1%
1 min	1	144	162	217	251	282	321	349
2 min	2	125	141	186	215	242	276	300
3 min	3	118	133	176	203	229	260	283
4 min	4	112	127	168	195	219	249	271
5 min	5	108	121	162	187	211	240	261
10 min	10	89.6	101	136	157	177	201	219
15 min	15	77.7	87.9	118	136	153	174	189
20 min	20	69.2	78.1	104	121	136	155	168
25 min	25	62.7	70.7	94.5	109	123	140	152
30 min	30	57.5	64.9	86.6	100	113	128	139
45 min	45	46.9	52.8	70.4	81.4	91.6	104	113
1 hour	60	40.2	45.3	60.3	69.8	78.6	89.5	97.4
1.5 hour	90	32.2	36.2	48.3	55.9	63	71.9	78.4
2 hour	120	27.4	30.8	41.2	47.8	53.9	61.7	67.4
3 hour	180	21.7	24.6	33	38.5	43.6	50.1	54.9
4.5 hour	270	17.3	19.7	26.7	31.3	35.6	41.2	45.4
6 hour	360	14.8	16.8	23.1	27.2	31.1	36.2	40
9 hour	540	11.9	13.6	19	22.6	26.1	30.6	34.1
12 hour	720	10.3	11.8	16.6	19.9	23.1	27.4	30.7
18 hour	1080	8.32	9.63	13.8	16.8	19.7	23.6	26.7
24 hour	1440	7.18	8.34	12.1	14.8	17.6	21.3	24.3
30 hour	1800	6.39	7.45	10.9	13.4	16	19.6	22.5
36 hour	2160	5.81	6.78	10	12.4	14.8	18.3	21.1
48 hour	2880	4.96	5.8	8.65	10.8	13	16.2	18.8
72 hour	4320	3.91	4.58	6.88	8.63	10.5	13.2	15.5
96 hour	5760	3.24	3.79	5.7	7.17	8.75	11	13
120 hour	7200	2.77	3.23	4.85	6.09	7.43	9.36	11
144 hour	8640	2.41	2.81	4.19	5.25	6.39	8.04	9.47
168 hour	10080	2.12	2.47	3.66	4.57	5.55	6.95	8.17

Chart 17 Malanda**Annual Exceedance Probability (AEP)**

Duration	Duration (mins)	63.20%	50%	20%	10%	5%	2%	1%
1 min	1	129	144	191	220	248	284	309
2 min	2	110	123	160	185	209	241	265
3 min	3	104	116	152	176	198	228	251
4 min	4	99.8	111	146	169	191	219	240
5 min	5	95.9	107	141	163	184	211	231
10 min	10	80.7	90.4	120	138	156	178	193
15 min	15	69.9	78.3	104	120	135	153	167
20 min	20	62	69.4	91.6	106	119	136	148
25 min	25	56	62.6	82.4	95.2	107	122	133
30 min	30	51.1	57.1	75.2	86.8	97.7	112	122
45 min	45	41.2	46	60.4	69.8	78.6	89.9	98.3
1 hour	60	34.9	39	51.2	59.3	66.9	76.7	84
1.5 hour	90	27.4	30.6	40.4	46.8	53	61	67
2 hour	120	23	25.7	34	39.6	44.9	51.9	57.2
3 hour	180	17.8	20	26.8	31.4	35.8	41.6	46
4.5 hour	270	13.9	15.6	21.2	25	28.8	33.7	37.4
6 hour	360	11.6	13.2	18.1	21.4	24.8	29.2	32.6
9 hour	540	9.06	10.3	14.5	17.4	20.3	24.1	27.1
12 hour	720	7.62	8.74	12.4	15	17.6	21.2	24
18 hour	1080	5.98	6.9	9.95	12.2	14.5	17.7	20.3
24 hour	1440	5.04	5.83	8.51	10.5	12.6	15.6	18
30 hour	1800	4.41	5.11	7.51	9.33	11.3	14	16.3
36 hour	2160	3.95	4.58	6.77	8.44	10.2	12.9	15.1
48 hour	2880	3.32	3.85	5.71	7.16	8.74	11.1	13.1
72 hour	4320	2.58	2.99	4.44	5.59	6.85	8.8	10.5
96 hour	5760	2.15	2.48	3.68	4.62	5.65	7.3	8.77
120 hour	7200	1.86	2.15	3.16	3.95	4.81	6.21	7.46
144 hour	8640	1.65	1.9	2.79	3.46	4.19	5.38	6.44
168 hour	10080	1.48	1.72	2.5	3.09	3.71	4.72	5.62

Chart 18 Mareeba**Annual Exceedance Probability (AEP)**

Duration	Duration (mins)	63.20%	50%	20%	10%	5%	2%	1%
1 min	1	135	152	204	237	267	305	333
2 min	2	117	132	175	202	227	258	281
3 min	3	110	124	164	190	214	244	265
4 min	4	105	118	157	182	205	234	255
5 min	5	100	113	151	175	198	225	246
10 min	10	84.3	95.3	128	149	168	192	209
15 min	15	73.5	83	111	130	146	167	182
20 min	20	65.4	73.9	99	115	130	149	162
25 min	25	59.1	66.7	89.4	104	117	134	146
30 min	30	54.1	61	81.6	94.7	107	122	133
45 min	45	43.4	48.9	65.2	75.6	85.3	97.4	106
1 hour	60	36.6	41.2	54.8	63.5	71.6	81.7	89.1
1.5 hour	90	28.2	31.7	42.1	48.8	55.1	62.9	68.6
2 hour	120	23.1	26	34.7	40.2	45.4	51.9	56.7
3 hour	180	17.3	19.5	26.1	30.4	34.4	39.5	43.2
4.5 hour	270	12.9	14.5	19.6	22.9	26.1	30.1	33.1
6 hour	360	10.4	11.8	16	18.8	21.5	25	27.6
9 hour	540	7.75	8.82	12.1	14.4	16.6	19.5	21.7
12 hour	720	6.31	7.2	10	12	13.9	16.5	18.5
18 hour	1080	4.75	5.45	7.73	9.34	11	13.2	14.9
24 hour	1440	3.91	4.5	6.47	7.88	9.34	11.4	13
30 hour	1800	3.37	3.89	5.64	6.92	8.26	10.1	11.6
36 hour	2160	2.99	3.46	5.05	6.23	7.48	9.22	10.7
48 hour	2880	2.48	2.88	4.24	5.27	6.37	7.94	9.26
72 hour	4320	1.9	2.21	3.28	4.11	5.01	6.31	7.42
96 hour	5760	1.56	1.81	2.7	3.39	4.14	5.23	6.17
120 hour	7200	1.32	1.54	2.29	2.87	3.5	4.42	5.22
144 hour	8640	1.15	1.33	1.98	2.47	3.01	3.79	4.46
168 hour	10080	1.01	1.17	1.73	2.15	2.61	3.27	3.84

Chart 19 Millaa Millaa / Tarzali**Annual Exceedance Probability (AEP)**

Duration	Duration (mins)	63.20%	50%	20%	10%	5%	2%	1%
1 min	1	131	146	192	221	248	283	308
2 min	2	111	123	161	185	209	240	264
3 min	3	105	117	153	176	198	228	250
4 min	4	101	112	147	170	191	219	240
5 min	5	97.2	108	142	164	184	211	230
10 min	10	81.8	91.4	120	138	156	177	192
15 min	15	70.9	79.1	104	120	134	153	166
20 min	20	62.8	70.1	91.8	106	119	135	147
25 min	25	56.6	63.1	82.6	95.1	107	122	132
30 min	30	51.7	57.6	75.4	86.8	97.5	111	121
45 min	45	41.7	46.4	60.6	69.9	78.6	89.8	98
1 hour	60	35.4	39.4	51.6	59.5	67.1	76.7	83.9
1.5 hour	90	27.9	31.1	40.9	47.3	53.5	61.5	67.4
2 hour	120	23.5	26.3	34.7	40.3	45.7	52.7	57.9
3 hour	180	18.5	20.8	27.7	32.4	36.9	42.8	47.2
4.5 hour	270	14.6	16.5	22.4	26.3	30.2	35.3	39.1
6 hour	360	12.5	14.1	19.4	22.9	26.5	31.1	34.7
9 hour	540	10	11.4	16	19.1	22.2	26.4	29.7
12 hour	720	8.61	9.88	14	16.9	19.8	23.7	26.8
18 hour	1080	7.01	8.09	11.6	14.2	16.8	20.5	23.5
24 hour	1440	6.07	7.03	10.2	12.6	15	18.5	21.4
30 hour	1800	5.43	6.3	9.22	11.4	13.7	17	19.8
36 hour	2160	4.95	5.74	8.45	10.5	12.6	15.9	18.6
48 hour	2880	4.26	4.95	7.31	9.11	11	14	16.6
72 hour	4320	3.41	3.95	5.84	7.3	8.88	11.4	13.7
96 hour	5760	2.88	3.33	4.9	6.1	7.41	9.57	11.5
120 hour	7200	2.5	2.88	4.22	5.24	6.33	8.16	9.79
144 hour	8640	2.21	2.55	3.71	4.57	5.49	7.03	8.4
168 hour	10080	1.98	2.29	3.3	4.05	4.82	6.12	7.26

Chart 20 Mission Beach

Annual Exceedance Probability (AEP)

Duration	Duration (mins)	63.20%	50%	20%	10%	5%	2%	1%
1 min	1	181	199	252	286	317	356	384
2 min	2	164	181	232	265	296	334	362
3 min	3	153	168	215	246	274	309	335
4 min	4	144	159	202	230	256	288	312
5 min	5	137	150	191	217	241	271	293
10 min	10	111	122	154	175	193	217	234
15 min	15	95.7	105	133	150	166	186	201
20 min	20	85.1	93.5	118	134	148	166	179
25 min	25	77.3	84.9	108	122	135	152	163
30 min	30	71.1	78.2	99.2	112	125	140	151
45 min	45	58.6	64.5	82.1	93.4	104	117	127
1 hour	60	50.7	55.9	71.4	81.4	90.8	103	111
1.5 hour	90	41	45.3	58.2	66.6	74.6	84.6	92
2 hour	120	35.2	38.9	50.2	57.6	64.6	73.5	80.1
3 hour	180	28.2	31.2	40.5	46.7	52.5	60.1	65.7
4.5 hour	270	22.6	25	32.6	37.7	42.6	48.9	53.7
6 hour	360	19.2	21.4	28	32.3	36.6	42.2	46.4
9 hour	540	15.3	17.1	22.4	26	29.5	34.2	37.7
12 hour	720	13.1	14.6	19.2	22.3	25.3	29.4	32.5
18 hour	1080	10.4	11.6	15.4	17.9	20.4	23.7	26.3
24 hour	1440	8.83	9.87	13.1	15.3	17.5	20.4	22.6
30 hour	1800	7.77	8.7	11.6	13.6	15.5	18.1	20.1
36 hour	2160	6.99	7.83	10.5	12.3	14	16.4	18.2
48 hour	2880	5.9	6.62	8.9	10.4	12	14	15.6
72 hour	4320	4.61	5.2	7.03	8.28	9.5	11.2	12.4
96 hour	5760	3.85	4.35	5.91	6.98	8.03	9.47	10.6
120 hour	7200	3.33	3.77	5.15	6.09	7.02	8.28	9.24
144 hour	8640	2.95	3.35	4.58	5.43	6.26	7.4	8.27
168 hour	10080	2.66	3.02	4.14	4.91	5.66	6.7	7.5

Chart 21 Mt Garnet**Annual Exceedance Probability (AEP)**

Duration	Duration (mins)	63.20%	50%	20%	10%	5%	2%	1%
1 min	1	120	136	182	212	240	276	302
2 min	2	104	116	154	178	200	229	250
3 min	3	97.1	109	145	168	190	217	237
4 min	4	92.6	104	139	162	183	209	229
5 min	5	88.9	100	134	156	177	202	221
10 min	10	75	84.7	114	133	151	173	190
15 min	15	65.3	73.7	99.1	116	131	151	165
20 min	20	58	65.4	87.8	102	116	133	146
25 min	25	52.3	59	79	91.9	104	120	131
30 min	30	47.7	53.8	71.9	83.6	94.7	109	119
45 min	45	38	42.8	57.1	66.3	75	86	94.1
1 hour	60	31.8	35.8	47.7	55.3	62.5	71.7	78.4
1.5 hour	90	24.3	27.3	36.3	42.2	47.7	54.7	59.8
2 hour	120	19.8	22.2	29.6	34.5	39	44.8	49.1
3 hour	180	14.6	16.5	22.1	25.8	29.3	33.7	37
4.5 hour	270	10.7	12.1	16.4	19.2	21.9	25.4	28
6 hour	360	8.62	9.75	13.2	15.6	17.9	20.9	23.1
9 hour	540	6.33	7.18	9.86	11.7	13.5	15.9	17.8
12 hour	720	5.11	5.81	8.03	9.58	11.1	13.3	14.9
18 hour	1080	3.81	4.34	6.05	7.28	8.52	10.3	11.8
24 hour	1440	3.11	3.55	4.98	6.02	7.08	8.68	9.99
30 hour	1800	2.67	3.05	4.29	5.2	6.15	7.6	8.81
36 hour	2160	2.36	2.69	3.81	4.62	5.48	6.82	7.95
48 hour	2880	1.95	2.23	3.15	3.84	4.57	5.74	6.75
72 hour	4320	1.5	1.71	2.42	2.95	3.52	4.47	5.29
96 hour	5760	1.23	1.41	2	2.44	2.9	3.69	4.38
120 hour	7200	1.06	1.21	1.72	2.1	2.49	3.15	3.73
144 hour	8640	0.926	1.06	1.51	1.84	2.18	2.75	3.24
168 hour	10080	0.824	0.948	1.36	1.65	1.95	2.43	2.85

Chart 22 Mossman / Port Douglas

Annual Exceedance Probability (AEP)

Duration	Duration (mins)	63.20%	50%	20%	10%	5%	2%	1%
1 min	1	185	204	258	293	326	367	397
2 min	2	178	195	247	280	311	349	376
3 min	3	163	179	227	258	286	322	347
4 min	4	152	166	211	240	266	299	323
5 min	5	142	156	198	225	250	281	304
10 min	10	114	125	158	180	200	226	244
15 min	15	98.9	108	137	156	173	195	211
20 min	20	88.7	97.2	123	140	155	175	190
25 min	25	81.1	88.9	113	128	142	160	173
30 min	30	75.2	82.4	104	119	132	149	161
45 min	45	62.7	68.8	87.4	99.4	111	125	135
1 hour	60	54.5	60	76.4	87.1	97	110	119
1.5 hour	90	44	48.6	62.5	71.4	79.8	90.3	98
2 hour	120	37.4	41.4	53.6	61.5	68.9	78.3	85.2
3 hour	180	29.3	32.6	42.8	49.4	55.6	63.6	69.5
4.5 hour	270	22.6	25.3	33.7	39.2	44.5	51.3	56.4
6 hour	360	18.7	21	28.3	33.2	37.8	43.9	48.6
9 hour	540	14.2	16.1	22.1	26.1	30	35.3	39.3
12 hour	720	11.7	13.4	18.5	22	25.4	30.2	33.8
18 hour	1080	8.95	10.3	14.4	17.3	20.1	24.2	27.4
24 hour	1440	7.43	8.53	12.1	14.6	17.1	20.7	23.6
30 hour	1800	6.45	7.42	10.6	12.8	15	18.3	21
36 hour	2160	5.76	6.63	9.48	11.5	13.5	16.6	19.1
48 hour	2880	4.84	5.58	7.98	9.7	11.4	14.1	16.3
72 hour	4320	3.8	4.38	6.25	7.59	8.95	11.1	12.9
96 hour	5760	3.2	3.68	5.22	6.31	7.42	9.21	10.7
120 hour	7200	2.79	3.19	4.5	5.42	6.33	7.87	9.17
144 hour	8640	2.47	2.83	3.96	4.73	5.51	6.84	7.96
168 hour	10080	2.22	2.53	3.52	4.19	4.85	6.01	6.99

Chart 23 Ravenshoe**Annual Exceedance Probability (AEP)**

Duration	Duration (mins)	63.20%	50%	20%	10%	5%	2%	1%
1 min	1	121	135	178	205	231	263	286
2 min	2	102	113	148	170	191	220	241
3 min	3	96.3	107	140	162	182	209	229
4 min	4	92.5	103	136	157	176	201	220
5 min	5	89.2	99.7	131	151	170	195	212
10 min	10	75.6	84.6	112	129	145	165	179
15 min	15	65.6	73.4	96.6	111	125	142	155
20 min	20	58.1	64.9	85.3	98.4	111	126	137
25 min	25	52.3	58.4	76.6	88.3	99.3	113	123
30 min	30	47.6	53.2	69.8	80.4	90.4	103	112
45 min	45	38.1	42.5	55.7	64.3	72.3	82.5	89.9
1 hour	60	32.1	35.8	47.1	54.3	61.2	70	76.4
1.5 hour	90	25	27.9	36.8	42.7	48.2	55.3	60.6
2 hour	120	20.8	23.3	30.9	35.9	40.7	46.9	51.5
3 hour	180	16	18	24.2	28.4	32.3	37.5	41.4
4.5 hour	270	12.4	14.1	19.2	22.6	26	30.4	33.7
6 hour	360	10.4	11.8	16.3	19.4	22.4	26.4	29.5
9 hour	540	8.17	9.34	13.1	15.8	18.4	22	24.7
12 hour	720	6.92	7.95	11.3	13.7	16.2	19.4	22.1
18 hour	1080	5.51	6.36	9.21	11.3	13.5	16.5	18.9
24 hour	1440	4.7	5.44	7.95	9.83	11.8	14.6	16.9
30 hour	1800	4.16	4.82	7.08	8.81	10.7	13.3	15.5
36 hour	2160	3.77	4.36	6.43	8.03	9.75	12.3	14.4
48 hour	2880	3.21	3.71	5.49	6.88	8.41	10.7	12.6
72 hour	4320	2.53	2.92	4.31	5.42	6.65	8.53	10.2
96 hour	5760	2.12	2.44	3.58	4.49	5.5	7.07	8.47
120 hour	7200	1.82	2.1	3.07	3.84	4.67	5.99	7.16
144 hour	8640	1.61	1.85	2.69	3.34	4.04	5.15	6.13
168 hour	10080	1.43	1.65	2.4	2.95	3.54	4.48	5.3

Chart 24 Tully**Annual Exceedance Probability (AEP)**

Duration	Duration (mins)	63.20%	50%	20%	10%	5%	2%	1%
1 min	1	173	191	243	276	307	345	373
2 min	2	153	169	217	247	276	312	338
3 min	3	144	158	203	231	258	291	315
4 min	4	136	150	192	218	243	274	297
5 min	5	130	143	183	208	231	260	281
10 min	10	107	118	150	170	189	212	228
15 min	15	92.3	102	129	147	163	182	197
20 min	20	82	90.3	115	130	145	162	175
25 min	25	74.3	81.8	104	118	131	147	159
30 min	30	68.2	75.1	95.7	109	121	136	147
45 min	45	55.8	61.5	78.5	89.4	99.6	112	122
1 hour	60	48	53	67.9	77.4	86.4	97.7	106
1.5 hour	90	38.6	42.7	55	63	70.5	80	87.1
2 hour	120	33	36.6	47.3	54.3	61	69.5	75.8
3 hour	180	26.5	29.4	38.3	44.2	49.8	57.1	62.5
4.5 hour	270	21.4	23.8	31.2	36.2	41	47.2	51.9
6 hour	360	18.4	20.6	27.1	31.5	35.8	41.4	45.6
9 hour	540	15	16.8	22.4	26.2	29.8	34.6	38.3
12 hour	720	13.1	14.7	19.7	23	26.3	30.7	34
18 hour	1080	10.8	12.2	16.4	19.3	22.1	25.9	28.8
24 hour	1440	9.46	10.7	14.5	17	19.6	23	25.6
30 hour	1800	8.53	9.62	13.1	15.5	17.8	21	23.4
36 hour	2160	7.83	8.84	12.1	14.3	16.5	19.4	21.6
48 hour	2880	6.81	7.7	10.5	12.5	14.5	17.1	19.1
72 hour	4320	5.51	6.24	8.58	10.2	11.9	14	15.7
96 hour	5760	4.67	5.29	7.3	8.7	10.1	12	13.4
120 hour	7200	4.05	4.6	6.35	7.58	8.8	10.4	11.7
144 hour	8640	3.57	4.06	5.62	6.7	7.77	9.23	10.4
168 hour	10080	3.19	3.63	5.02	5.98	6.93	8.24	9.26

**Yungaburra /
Chart 25 Peeramon**

Annual Exceedance Probability (AEP)

Duration	Duration (mins)	63.20%	50%	20%	10%	5%	2%	1%
1 min	1	130	145	193	223	252	288	314
2 min	2	111	124	162	187	211	244	268
3 min	3	105	117	154	178	200	231	254
4 min	4	100	112	148	171	193	222	243
5 min	5	96.2	108	143	165	187	214	234
10 min	10	81	91	121	140	158	181	197
15 min	15	70.3	79	105	122	137	156	170
20 min	20	62.4	70.1	92.9	108	121	138	151
25 min	25	56.3	63.2	83.6	96.8	109	125	136
30 min	30	51.5	57.7	76.3	88.3	99.5	114	124
45 min	45	41.4	46.3	61.2	70.8	79.9	91.5	100
1 hour	60	35.1	39.2	51.8	60	67.7	77.8	85.2
1.5 hour	90	27.4	30.7	40.6	47.2	53.4	61.6	67.7
2 hour	120	22.9	25.7	34.1	39.7	45.1	52.2	57.5
3 hour	180	17.7	19.9	26.7	31.3	35.7	41.5	46
4.5 hour	270	13.7	15.4	21	24.8	28.5	33.4	37.2
6 hour	360	11.4	12.9	17.8	21.2	24.5	28.9	32.3
9 hour	540	8.87	10.1	14.2	17.1	20	23.8	26.9
12 hour	720	7.45	8.55	12.2	14.8	17.4	20.9	23.7
18 hour	1080	5.85	6.76	9.8	12	14.4	17.5	20.1
24 hour	1440	4.94	5.73	8.41	10.4	12.6	15.5	17.9
30 hour	1800	4.34	5.04	7.45	9.29	11.3	14	16.3
36 hour	2160	3.9	4.53	6.73	8.44	10.3	12.9	15.1
48 hour	2880	3.28	3.82	5.71	7.2	8.84	11.2	13.2
72 hour	4320	2.56	2.97	4.46	5.64	6.96	8.92	10.6
96 hour	5760	2.12	2.46	3.68	4.66	5.74	7.39	8.85
120 hour	7200	1.82	2.11	3.15	3.96	4.86	6.25	7.5
144 hour	8640	1.6	1.85	2.75	3.44	4.19	5.37	6.43
168 hour	10080	1.42	1.65	2.44	3.03	3.66	4.67	5.57

APPENDIX B

KERB INLET CAPACITY CHARTS